COVID-19 Prevalence among People Experiencing Homelessness and Homelessness Service Staff during Early Community Transmission in Atlanta, Georgia, April–May 2020

Jane C. Yoon,[1] Martha P. Montgomery,[2] Ann M. Buff,[2] Andrew T. Boyd,[2] Calla Jamison,[2] Alfonso Hernandez,[1] Kristine Schmit,[2] Sarita Shah,[3] Sophia Ajoku,[4] David P. Holland,[1,4] Juliana Prieto[4], Sasha Smith[4], Mark A. Swancutt,[4] Kim Turner,[4] Tom Andrews,[5] Kevin Flowers,[5] Alyssa Wells,[5] Cathryn Marchman,[6] Emaline Laney,[7] Danae Bixler,[2] Sean Cavanaugh,[2] Nicole Flowers,[2] Nicholas Gaffga,[2] Jean Y. Ko,[2] Heather N. Paulin,[2] Mark K. Weng,[2] Emily Mosites,[2] Sapna Bamrah Morris[2]

1. Division of Infectious Diseases, Emory University School of Medicine, Atlanta, GA, USA
2. COVID-19 Emergency Response, Centers for Disease Control and Prevention, Atlanta, GA, USA
3. Rollins School of Public Health, Emory University, Atlanta, GA, USA
4. Fulton County Board of Health, Atlanta, GA, USA
5. Mercy Care, Atlanta, GA, USA
6. Partners for HOME, Atlanta, GA, USA
7. Emory University School of Medicine, Atlanta, GA, USA

Corresponding Author:

Sapna Bamrah Morris, MD, MBA, FIDSA

Centers for Disease Control & Prevention

1600 Clifton Rd NE, MS US 12-4

Atlanta, GA 30329

Work: (404) 639-8289 / Mobile: (404) 388-3073 / Fax: (404) 718-8308

Email: feu3@cdc.gov

Summary:

Facility-wide SARS-CoV-2 testing among people experiencing homelessness revealed higher infection rates among people living sheltered (2.1%) than those living unsheltered (0.5%). Facility-wide testing allowed for identification and isolation of infected individuals. Repeat testing in four facilities demonstrated decreasing COVID-19 prevalence.

Abstract

Background

In response to reported COVID-19 outbreaks among people experiencing homelessness (PEH) in other U.S. cities, we conducted multiple, proactive, facility-wide testing events for PEH living sheltered and unsheltered and homelessness service staff in Atlanta, Georgia. We describe SARS-CoV-2 prevalence and associated symptoms and review shelter infection prevention and control (IPC) policies.

Methods

PEH and staff were tested for SARS-CoV-2 by reverse transcription polymerase chain reaction (RT-PCR) during April 7–May 6, 2020. A subset of PEH and staff was screened for symptoms. Shelter assessments were conducted concurrently at a convenience sample of shelters using a standardized questionnaire.

Results

Overall, 2,875 individuals at 24 shelters and nine unsheltered outreach events underwent SARS-CoV-2 testing and 2,860 (99.5%) had conclusive test results. SARS-CoV-2 prevalence was 2.1% (36/1,684) among PEH living sheltered, 0.5% (3/628) among PEH living unsheltered, and 1.3% (7/548) among staff. Reporting fever, cough, or shortness of breath in the last week during symptom screening was 14% sensitive and 89% specific for identifying COVID-19 cases compared with RT-PCR. Prevalence by shelter ranged 0%–27.6%. Repeat testing 3–4 weeks later at four shelters documented decreased SARS-CoV-2 prevalence (0%–3.9%). Nine of 24 shelters completed shelter assessments and implemented IPC measures as part of the COVID-19 response.

Conclusions

PEH living in shelters experienced higher SARS-CoV-2 prevalence compared with PEH living unsheltered. Facility-wide testing in congregate settings allowed for identification and isolation of COVID-19 cases and is an important strategy to interrupt SARS-CoV-2 transmission.

Keywords:

COVID-19; SARS-CoV-2; prevalence; homeless persons; universal testing

Introduction

In 2019, approximately 570,000 people experienced homelessness on any given night in the United States (U.S.), and 63% used congregate shelters [1]. In Atlanta, Georgia, an estimated 3,200 people experienced homelessness on any given night in 2019, and approximately one-quarter were living unsheltered (i.e., living in a place not meant for human habitation) [2]. Risk of SARS-CoV-2 infection, the virus that causes COVID-19, may be higher among people experiencing homelessness (PEH) because of challenges in preventing respiratory disease transmission in congregate shelter settings. PEH might also be at increased risk of severe COVID-19 if infected due to a high prevalence of untreated, chronic medical conditions and obstacles to accessing healthcare [3–8].

Fulton County, the largest county in Georgia, which includes 90% of the city of Atlanta, reported the first COVID-19 case on March 2, 2020. A sharp increase in cases was recorded in mid-April 2020. A door-to-door household survey conducted in Fulton and neighboring DeKalb counties during April 28–May 3, 2020, found an estimated 2.5% seroprevalence of SARS-CoV-2 antibodies [9]. Reports of high SARS-CoV-2 infection rates and outbreaks within shelters in other metropolitan areas, in parallel with increasing local case-rates, led to concerns for widespread transmission in Atlanta shelters [10–12].

To understand SARS-CoV-2 prevalence and prevent transmission among PEH in Atlanta, homeless service agencies partnered with local and federal government agencies to: (1) determine SARS-CoV-2 prevalence among clients living sheltered and unsheltered and homelessness service staff through viral testing; (2) describe the clinical status of PEH and staff at the time of testing; (3) evaluate the sensitivity and specificity of symptom screening for COVID-19 detection; and (4) review shelter infection prevention and control (IPC) policies and provide recommendations to mitigate SARS-CoV-2 transmission.

Methods

Participants included clients living in shelters, clients living unsheltered, and staff in Atlanta, Georgia, during April 7–May 6, 2020. Testing at homeless shelters was offered facility-wide to all clients and staff. Testing was offered to clients living unsheltered during homeless outreach service events (e.g., meal services). Participation was voluntary but encouraged by service agencies. Written consent was obtained from each adult (≥16 years of age) or parent or guardian (for children <16 years) for administration of a brief, standardized screening questionnaire and testing for SARS-CoV-2 (see Supplemental Material #1). All screening interviews and specimen collections were conducted on-site at shelters or community events serving PEH. At shelters with more than five people with positive SARS-CoV-2 results upon initial testing, clients and staff were re-screened and re-tested 3–4 weeks later, and testing was also offered to any new clients or staff.

All participants (including parents or guardians of children <16 years) self-reported their sex, race, and ethnicity based on fixed-response categories. Race and ethnicity were combined into mutually exclusive categories and were considered missing when race was missing and ethnicity was either non-Hispanic or missing. Participants from a convenience sample of testing events were interviewed using the screening questionnaire to collect information on symptoms, underlying medical conditions, pregnancy status, and tobacco use. Persons interviewed were asked if they had any medical conditions in the following categories: diabetes, cardiovascular disease, chronic lung, kidney, and liver disease, immunocompromising conditions (e.g., HIV, chronic steroid use), and neurological conditions (e.g., seizure disorder).

Nasopharyngeal, oropharyngeal, or nasal mid-turbinate specimens were collected by clinical providers or supervised self-collection and tested by contracted commercial laboratories for SARS-CoV-2 by reverse transcription polymerase chain reaction (RT-PCR).

Positive SARS-CoV-2 test results were provided directly to the person (or parent or guardian for children <16 years) or to the shelter via the county public health department's standard notification procedure. Clients living in shelters who had positive SARS-CoV-2 were isolated immediately in a

separate housing unit at the shelter or isolated until transported to an isolation hotel. For clients living unsheltered, results were provided via a clinic hotline number or clinical outreach teams, which located the clients with positive SARS-CoV-2 and arranged transport to the isolation hotel. Staff with positive SARS-CoV-2 isolated at home. Clients were not allowed to return to shared spaces in shelters, and isolated staff did not return to work until they met symptom- or time-based criteria in accordance with the Centers for Disease Control and Prevention (CDC) guidelines at the time [13].

Shelter assessments were conducted in conjunction with screening and testing at a convenience sample of shelters. These shelters were selected based on availability of testing staff on the day of testing. Using a standardized assessment questionnaire (see Supplemental Materials #2), shelter management was interviewed to collect quantitative and qualitative data on shelter characteristics and services offered. Shelter characteristics included number of clients and staff, type (e.g., daytime only, 24 hours per day, transitional housing), services provided, and sleeping space configurations. Measures and policies implemented by the shelter to mitigate SARS-CoV-2 transmission, including standardized client and staff screening, isolation and quarantine protocols, and IPC, were also collected. Shelter staff were counseled on best practices to prevent transmission in the shelter.

Data Collection and Analysis

Descriptive statistics were used to characterize the population tested and the proportions with current and recent symptoms, underlying medical conditions, and positive SARS-CoV-2. Continuous variables were compared using Student's t-test, and categorical variables were compared using the chi-square test. Shelter characteristics were described in aggregate but were not analyzed in relation to SARS-CoV-2 prevalence due to small numbers. CDC determined this project to be non-research as part of the COVID-19 public health response. No personal identifiers were collected by the response team.

Results

Overall, 2,875 people (2,326 PEH and 549 staff), had specimens collected for SARS-CoV-2 testing during April 7–May 6, 2020. Among PEH, 1,690 (72.7%) were sheltered in 24 shelters, and 636 (27.3%) were unsheltered and tested during nine separate homeless outreach events. Of 2,875 people tested, 46 (1.6%) had positive SARS-CoV-2; 15 (0.5%) had indeterminate results. SARS-CoV-2 prevalence was 2.1% (36/1,684) among clients living in shelters, 0.5% (3/628) among clients living unsheltered, and 1.3% (7/548) among staff (P=0.01).

Demographic characteristics for tested participants are included in Table 1. Overall median age was 50.7 years; 7.0% (200/2,875) were aged 65 years and older. Nearly all children and adolescents experiencing homelessness were sheltered (130/133; 97.7%). Men accounted for 68.5% of all people tested. In total, 2,169 (76.4%) identified as Black, non-Hispanic; 466 (16.4%) as white, non-Hispanic; 101 (3.6%) as Hispanic; 103 (3.6%) as other race or ethnicity. Among PEH, 78.3% of clients living sheltered and 78.6% of clients living unsheltered identified as Black; among staff, 68.2% identified as Black. Mean age did not differ significantly for people with positive SARS-CoV-2 (47.7 years) compared with people with negative SARS-CoV-2 (46.6 years, P=0.63) (not shown). No children or adolescents age <18 years had positive SARS-CoV-2 results. For confidentiality reasons related to low numbers, SARS-CoV-2 results are not further reported by age, sex, or race and ethnicity.

A subset of 1,997 people from 15 testing events (69.5%) completed screening for medical conditions, including 1,037 of 1,690 (61.4%) clients from eight (33.3%) shelters, 636 of 636 (100%) clients living unsheltered, and 324 of 549 (59.0%) staff (Table 2). Approximately half in each group reported no underlying conditions. Cardiovascular disease, which included hypertension, was the most frequently reported comorbidity (32.0%), followed by chronic lung disease (14.7%) and diabetes (10%). Current smoking was reported by 48.8% of clients living sheltered, 63.0% of clients living unsheltered, and 19.1% of staff. Eight (3.6%) women reported being pregnant when screened.

The same subset of 1,997 people was screened for symptoms; 12 with inconclusive results were subsequently excluded (Table 3). Among the remaining 1,985, 22 (1.1%) were positive for SARS-CoV-2 and 1,963 (98.3%) were negative. Over three-quarters (16/21; 76.2%) of people with positive SARS-CoV-2 reported no symptoms during the previous week. For five (23.8%) of 21 people with positive SARS-CoV-2 who reported at least one symptom during the previous week, the predominant symptom reported was subjective fever (9.5% (2/21) the previous day; 18.2% (4/22) the previous week). Among people with negative SARS-CoV-2, 18.6% (363/1,952) reported at least one symptom in the previous week, and cough was most commonly reported (7.0% (137/1,957) in previous day, 10.0% (196/1,958) in previous week). Screening positive for measured or subjective fever, new or worsening cough, or shortness of breath was 14% sensitive and 89% specific for detecting SARS-CoV-2 compared with RT-PCR when reported in the previous day and 24% sensitive, 85% specific when reported in the previous week. Expanding the list to any symptom decreased specificity (87% in the last day; 81% in the last week), with no change in sensitivity.

SARS-CoV-2 testing results by shelter and testing round are shown in the Figure. During initial testing at shelters, 2,050 clients and staff were tested, and the overall prevalence was 2.0% (40/2,043); 0.3% (7) of tests were indeterminate. Overall median and mean SARS-CoV-2 prevalence was 0.2% and 2.7%, respectively, during initial testing. In one shelter, eight of 29 (27.6%) people had positive SARS-CoV-2. Twelve (50%) shelters had no individuals with positive SARS-CoV-2. Four shelters with more than five people with positive SARS-CoV-2 were revisited 3–4 weeks later for additional testing. Of 349 people tested during the second round (258 [74%] repeat and 91 [26%] new), three (0.9%) people had positive SARS-CoV-2; all positive tests were among shelter clients who had not been tested previously.

Nine (37.5%) shelters were offered and completed a shelter assessment; seven during initial testing and two at re-testing. All had >50 beds and four (44.4%) had >150 beds; eight (88.9%) were open 24 hours a day, and four (44.4%) had congregate sleeping rooms only. Many shelters reported experience with enhanced respiratory disease IPC measures and policies prior to COVID-19 as a result of widespread tuberculosis outbreaks in Atlanta shelters and training previously provided by the

Fulton County Board of Health [14]. Shelters made policy changes and implemented or strengthened IPC measures as part of their COVID-19 preparedness and mitigation efforts during March 2020: five (55.6%) increased spacing between beds, seven (77.8%) designated isolation areas for clients with suspected SARS-CoV-2, and five (55.6%) discontinued taking new clients. Eight (88.9%) implemented standardized symptom screening for clients, and three (33.3%) shelters implemented screening for both clients and staff. All shelters had made efforts to enhance physical distancing and infection prevention and control, although specific changes varied. Changes included increasing physical distancing in communal areas, introducing meal shifts or individual boxed meals for pickup, and modifying or suspending congregate programs. Shelters reported increasing the frequency and extent of cleaning and promoting hand hygiene via standardized IPC signage and strategic placement of hand sanitizer stations in entrances, kitchens, and communal areas.

In one shelter housing adult men, testing revealed a widespread, undetected outbreak. This shelter represented 1% (29/2,050) of people tested on the initial round but 20% (8/40) of those with positive SARS-CoV-2. Client census had been decreased by approximately half to facilitate physical distancing, but the shelter did not enforce city or state shelter-in-place orders nor restrict client movement. The shelter only had congregate sleeping spaces; sleeping mats and beds were placed at least six feet apart, but head-to-toe alignment was inconsistently used. Showers upon entry were encouraged, but face coverings and hand sanitizer were not provided due to insufficient supply. Household cleaning solutions and Environmental Protection Agency-registered disinfectants appropriate for cleaning high-touch surfaces or items were also not available [15, 16].

Discussion

SARS-CoV-2 testing outreach efforts reached 24 shelters in Fulton County and approximately 70% of all PEH in Atlanta based on the 2019 point-in-time count in Atlanta [2]. Overall SARS-CoV-2 prevalence among PEH and staff tested in Atlanta from April to May 2020 was low compared with reports among PEH in other large, urban settings [10–12]. Although SARS-CoV-2 prevalence among clients living in shelters was only 2.1%, it was four times higher than the 0.5% prevalence among

PEH living unsheltered at the time. To our knowledge, this is the first report of SARS-CoV-2 prevalence in a population of PEH living unsheltered. Although the risk of SARS-CoV-2 was lower for PEH living unsheltered, unsheltered living situations pose an increased risk of morbidity and mortality compared with living sheltered, so linkages to permanent supportive housing should remain a priority [17].

Testing at shelters in other large, urban settings in the United States has primarily occurred in response to COVID-19 clusters or outbreaks [10–12]. In early April 2020, Baggett *et al.* investigated an outbreak in a large homeless shelter in Boston with a SARS-CoV-2 detection rate of 36% [10]. During an outbreak across three affiliated shelters in Seattle from March–April 2020, 18% of clients and 21% of staff had positive SARS-CoV-2 [11]. In Atlanta, universal screening and testing of PEH and staff was a proactive strategy, rather than in response to known COVID-19 cases. A recent study of long-term care facilities in Fulton County, Georgia, found 1.5% of residents had positive SARS-CoV-2 when testing was proactive, compared to 47.2% after a case was already diagnosed [18]. Only one shelter we tested was found to have a widespread, undetected outbreak. On March 23, 2020, 3 weeks after the first COVID-19 case was identified in Atlanta, the city implemented a 14-day shelter-in-place order, which was followed by a Georgia state-wide shelter-in-place order during April 3–30, 2020. Over half of shelters assessed stopped taking clients during these shelter-in-place orders, and all reported a lower-than-average number of clients, which helped facilitate physical distancing. The low SARS-CoV-2 prevalence among PEH and staff in Atlanta compared with other cities may reflect the impact of shelter-in-place orders coupled with low community prevalence at the time of testing and the proactive testing strategy.

Participants were screened for symptoms to evaluate correlation with SARS-CoV-2 infection; 76.2% of individuals with SARS-CoV-2 infection were asymptomatic at the time of testing. Similar proportions of people with positive and negative SARS-CoV-2 tests reported at least one symptom in the previous day and week. Many symptoms associated with COVID-19, such as cough and shortness of breath, are non-specific and can represent symptoms of chronic lung diseases, which were reported by 15% of the population screened. Similar to other studies, the sensitivity of symptom screening for

detecting SARS-CoV-2 infection was low (14%–24%) [19, 20]. Although the specificity was higher (81%–89%), screening would produce a high proportion of false positive results in low prevalence settings.

Most shelters assessed were conducting standardized symptom screening for clients, but only one-third were screening staff. Despite the limitations of symptom screening, CDC recommends that homeless service providers regularly assess *both* clients and staff for symptoms using a standardized protocol [21]. People with COVID-19 symptoms should immediately be provided with a face covering, isolated, and tested for SARS-CoV-2. Shelters, in coordination with local public health authorities and community coalitions, should have plans to isolate people with suspected or confirmed SARS-CoV-2 infection to prevent spread [21]. However, because an estimated 40–45% of people with SARS-CoV-2 are asymptomatic, shelters should reduce the number of people served or expand to alternative housing sites, increase physical distancing (i.e., >6 feet), and mandate use of face coverings by *all* staff and clients inside shelters except when in bed or individual rooms [21, 22].

Our finding of decreased prevalence in four shelters during repeat testing is consistent with reports from skilled nursing facilities and correctional facilities, supporting the use of universal (facility-wide) testing for early identification and isolation of those with positive SARS-CoV-2 as a strategy to interrupt transmission in congregate settings [23–25]. A potentially important factor in the observed decreased prevalence in these shelters was the ability to move all PEH identified with SARS-CoV-2 infections to separate housing units at the shelter or to offsite locations. In homeless shelters and encampments located in areas where SARS-CoV-2 community transmission is substantial, CDC recommends that initial (baseline) and regular testing be considered, regardless of whether an initial COVID-19 case has been identified [26]. In areas where community transmission is minimal to moderate, CDC provides examples of testing strategies that can be used to identify asymptomatic cases among both clients and staff, such as sentinel surveillance, positive symptom screening thresholds, or random testing (e.g., every third person) on a regular basis [26]. If a COVID-19 case is identified, CDC recommends repeat testing of all previously negative or untested individuals until testing identifies no new COVID-19 cases for at least 14 days [26].

Our findings are subject to several limitations. SARS-CoV-2 transmission dynamics are complex, and these results represent a single point in time early in the COVID-19 pandemic. We did not screen or test all PEH or shelters in Atlanta; therefore, the results might not be representative of all PEH or shelters; they are not generalizable to other large metropolitan areas. We cannot compare this prevalence to the general population of Fulton County during this time period because representative testing had not been conducted among the general population. Additionally, misclassification of sheltered and unsheltered housing status might have resulted from movement between settings and the difficulty of verifying unsheltered status. Due to shortages of nasopharyngeal swabs, three specimen collection methods were used. Specimen collection methods have different SARS-CoV-2 detection sensitivities; however, nasal and nasal midturbinate specimens were shown to have >90% sensitivity compared with nasopharyngeal samples [27]. Symptom and medical condition screenings were only conducted at a subset of testing events, which oversampled the larger shelters and may not be generalizable. Shelter clients might not have disclosed symptoms due to fears that they would be removed from shelters. Thus, the proportion of people who reported symptoms might be underestimated. Only nine shelters of 24 underwent facility assessments, including two shelters at which assessments were conducted after initial testing. These findings may reflect improved or modified IPC policies as a result of knowledge of positive cases at these two shelters.

The findings provide an early view into the effects of the COVID-19 pandemic on PEH and homelessness service staff in Atlanta. As evidence grows and guidance evolves during the COVID-19 pandemic, shelters should prioritize mitigation strategies and best practices for congregate and high-risk settings to prevent SARS-CoV-2 transmission while continuing to provide essential services for PEH.

Acknowledgments: We would like to thank Anitra Walker (Mercy Care), Catherine Christie (Mercy Care), Partners for HOME, specifically Asher Morris, Atlanta Continuum of Care Service Providers, Mercy Care, Georgia Department of Public Health, Fulton County Board of Health, Emory University School of Medicine and Health System, specifically Troy Kleber, Alix Youngblood, Charlie Lane, Shane Mudrinich, Molly McCallum, Garrett Wallace, Mark Jedrzejczak, Michael Aaberg, and C.J. Hutchison, Fulton County Medical Reserve Corps, Northside Hospital Atlanta, and Grady Health Systems.

Disclaimer: The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

References

1. U.S. Department of Housing and Urban Development (HUD). The 2019 Annual Homeless Assessment Report (AHAR) to Congress. Part 1: Point-in-Time Estimates of Homelessness. Washington, D.C.: HUD, January 2020.
2. National Alliance to End Homelessness. State of Homelessness: Atlanta Continuum of Care. Available at: https://endhomelessness.org/homelessness-in-america/homelessness-statistics/state-of-homelessness-dashboards/?State=Georgia. Accessed 29 June 2020.
3. Badiaga S, Raoult D, Brouqui P. Preventing and controlling emerging and reemerging transmissible diseases in the homeless. Emerg Infect Dis. 2008;14(9):1353–59. doi:10.3201/eid1409.080204.
4. Aldridge RW, Story A, Hwang SW, Nordentoft M, Luchenski SA, Hartwell G, et al. Morbidity and mortality in homeless individuals, prisoners, sex workers, and individuals with substance use disorders in high-income countries: a systematic review and meta-analysis. Lancet. 2018;391(10117):241–50. doi:10.1016/S0140-6736(17)31869-X.
5. Pribish A, Khalil N, Mhaskar R, Woodard L, Mirza AS. Chronic Disease Burden of the Homeless: A Descriptive Study of Student-Run Free Clinics in Tampa, Florida. J Community Health. 2019;44(2):249–55. doi:10.1007/s10900-018-0580-3.
6. Baggett TP, Liauw SS, Hwang SW. Cardiovascular Disease and Homelessness. J Am Coll Cardiol. 2018;71(22):2585–97. doi:10.1016/j.jacc.2018.02.077.
7. Pearson DA, Bruggman AR, Haukoos JS. Out-of-hospital and emergency department utilization by adult homeless patients. Ann Emerg Med. 2007;50(6):646–52. doi:10.1016/j.annemergmed.2007.07.015.

8. Fryling LR, Mazanec P, Rodriguez RM. Barriers to homeless persons acquiring health insurance through the Affordable Care Act. J Emerg Med. 2015;49(5):755-62.e2. doi:10.1016/j.jemermed.2015.06.005.
9. Biggs HM, Harris JB, Breakwell L, et al. Estimated Community Seroprevalence of SARS-CoV-2 Antibodies – Two Georgia Counties, April 28–May 3, 2020. MMWR Morb Mortal Wkly Rep. ePub: 21 July 2020. doi: http://dx.doi.org/10.15585/mmwr.mm6929e2.
10. Baggett TP, Keyes H, Sporn N, Gaeta JM. Prevalence of SARS-CoV-2 Infection in Residents of a Large Homeless Shelter in Boston. JAMA. 2020;323(21):2191–92. doi:10.1001/jama.2020.6887.
11. Tobolowsky FA, Gonzales E, Self JL, et al. COVID-19 Outbreak Among Three Affiliated Homeless Service Sites - King County, Washington, 2020. MMWR Morb Mortal Wkly Rep. 2020;69(17):523–26. Published 2020 May 1. doi:10.15585/mmwr.mm6917e2.
12. Mosites E, Parker EM, Clarke KEN, et al. Assessment of SARS-CoV-2 infection prevalence in homeless shelters - Four U.S. cities, March 27-April 15, 2020. MMWR Morb Mortal Wkly Rep. 2020;69(17):521–22. Published 2020 May 1. doi:10.15585/mmwr.mm6917e1.
13. Centers for Disease Control and Prevention. Discontinuation of Isolation for Persons with COVID -19 Not in Healthcare Settings. Available at: https://www.cdc.gov/coronavirus/2019-ncov/hcp/disposition-in-home-patients.html Accessed 29 June 2020.
14. Powell KM, VanderEnde DS, Holland DP, et al. Outbreak of drug-resistant Mycobacterium tuberculosis among homeless people in Atlanta, Georgia, 2008-2015. Public Health Rep. 2017;132(2):231–40. doi:10.1177/0033354917694008.

15. Centers for Disease Control and Prevention. Cleaning and Disinfecting Your Facility. Available at: https://www.cdc.gov/coronavirus/2019-ncov/community/disinfecting-building-facility.html. Accessed 30 June 2020.

16. U.S. Environmental Protection Agency. List N: Disinfectants for Use Against SARS-CoV-2 (COVID-19). Available at: https://www.epa.gov/pesticide-registration/list-n-disinfectants-use-against-sars-cov-2-covid-19. Accessed 30 June 2020.

17. Montgomery AE, Szymkowiak D, Marcus J, Howard P, Culhane DP. Homelessness, Unsheltered Status, and Risk Factors for Mortality. Public Health Rep. 2016;131(6):765–722. doi: 10.1177/0033354916667501.

18. Telford CT, Onwubiko U, Holland D, et al (2020). Mass Screening for SARS-CoV-2 Infection among Residents and Staff in Twenty-eight Long-term Care Facilities in Fulton County, Georgia. *medRxiv*. Published 2020 Jul 2. doi: https://doi.org/10.1101/2020.07.01.20144162.

19. Chow EJ, Schwartz NG, Tobolowsky FA, et al. Symptom screening at illness onset of health care personnel with SARS-CoV-2 infection in King County, Washington. JAMA. 2020;323(20):2087–9. doi:10.1001/jama.2020.6637.

20. Gostic K, Gomez AC, Mummah RO, Kucharski AJ, Lloyd-Smith JO. Estimated effectiveness of symptom and risk screening to prevent the spread of COVID-19. Elife. 2020;9:e55570. Published 2020 Feb 24. doi:10.7554/eLife.55570.

21. Centers for Disease Control and Prevention. Interim Guidance for Homeless Service Providers to Plan and Respond to Coronavirus Disease 2019 (COVID-19). Available at: https://www.cdc.gov/coronavirus/2019-ncov/community/homeless-shelters/plan-prepare-respond.html. Accessed 30 June 2020.

22. Oran DP, Topol EJ. Prevalence of asymptomatic SARS-CoV-2 infection: a narrative review [published online ahead of print, 2020 Jun 3]. Ann Intern Med. 2020;M20-3012. doi:10.7326/M20-3012.

23. Dora AV, Winnett A, Jatt LP, et al. Universal and serial laboratory testing for SARS-CoV-2 at a long-term care skilled nursing facility for veterans - Los Angeles, California, 2020. MMWR Morb Mortal Wkly Rep. 2020;69(21):651–5. Published 2020 May 29. doi:10.15585/mmwr.mm6921e1.

24. Sanchez GV, Biedron C, Fink LR, et al. Initial and repeated point prevalence surveys to inform SARS-CoV-2 infection prevention in 26 skilled nursing facilities — Detroit, Michigan, March–May 2020. MMWR Morb Mortal Wkly Rep 2020;69(27):882–886. DOI: http://dx.doi.org/10.15585/mmwr.mm6927e1.

25. Njuguna H, Wallace M, Simonson S, et al. Serial laboratory testing for SARS-CoV-2 infection among incarcerated and detained persons in a correctional and detention facility - Louisiana, April-May 2020. MMWR Morb Mortal Wkly Rep. 2020;69(26):836-840. Published 2020 Jul 3. doi:10.15585/mmwr.mm6926e2.

26. Centers for Disease Control and Prevention. Interim Considerations for Health Departments for SARS-CoV-2 Testing in Homeless Shelters and Encampments. Available at: https://www.cdc.gov/coronavirus/2019-ncov/community/homeless-shelters/testing.html. Accessed 5 July 2020.

27. Tu YP, Jennings R, Hart B, et al. Swabs Collected by Patients or Health Care Workers for SARS-CoV-2 Testing [published online ahead of print, 2020 Jun 3]. N Engl J Med. 2020;NEJMc2016321. doi:10.1056/NEJMc2016321.

Table 1. SARS-CoV-2 prevalence and demographic characteristics of 2,875 sheltered and unsheltered clients and homelessness service staff tested in Atlanta, Georgia, United States, April–May 2020

	Total	Sheltered Clients	Unsheltered Clients	Homelessness Service Staff
	N=2,875	n=1,690	n=636	n=549
	n (%)	n (%)	n (%)	n (%)
SARS-CoV-2 Prevalence (missing=15)	46 (1.6)	36 (2.1)[a]	3 (0.5)[a]	7 (1.3)[a]
Characteristic				
Age				
Mean age, years	46.6	44.1	51.2	49.1
Median age, years	50.7	48.5	54.3	51.5
<18 years	134 (4.7)	130 (7.7)	3 (0.5)	0 (0.0)
18–34	534 (18.6)	364 (21.5)	79 (12.4)	92 (16.8)
35–49	701 (24.4)	386 (22.8)	154 (24.2)	161 (29.3)
50–64	1,306 (45.4)	722 (42.7)	334 (52.5)	250 (45.5)
≥65	200 (7.0)	88 (5.2)	66 (10.4)	46 (8.4)
Sex (missing=2)				
Male	1,967 (68.5)	1,123 (66.5)	541 (85.1)	303 (55.2)
Female	834 (29.0)	503 (29.8)	89 (14.0)	242 (44.1)
Other	72 (2.5)	62 (3.7)	6 (0.9)	4 (0.7)
Race and Ethnicity (missing=36)				

Black, non-Hispanic	2,169 (76.4)	1,299 (78.3)	497 (78.6)	373 (68.2)
White, non-Hispanic	466 (16.4)	250 (15.1)	67 (10.6)	149 (27.2)
Hispanic	101 (3.6)	51 (3.1)	37 (5.9)	13 (2.4)
Other[b]	103 (3.6)	60 (3.6)	31 (4.9)	12 (2.2)

[a]chi-square test P=0.01

[b]Includes American Indian/Alaskan Native, Asian, Native Hawaiian/Pacific Islander, and other. Not reported individually due to small size.

Table 2. Medical conditions and smoking status of 1,997 sheltered and unsheltered clients and homelessness service staff screened for SARS-CoV-2 in Atlanta, Georgia, United States, April–May 2020

	Total	Sheltered Clients	Unsheltered Clients	Homelessness Service Staff
	n=1,997	n=1,037	n=636	n=324
	n (%)	n (%)	n (%)	n (%)
No underlying conditions[a] (missing=5)	1,018 (50.9)	533 (51.5)	304 (47.9)	181 (55.9)
Diabetes (missing=9)	198 (10.0)	114 (11.0)	57 (9.0)	27 (8.4)
Cardiovascular disease (missing=4)	638 (32.0)	336 (32.5)	216 (34.0)	86 (26.6)
Chronic lung disease (missing=4)	293 (14.7)	144 (13.9)	108 (17.0)	41 (12.7)
Chronic kidney disease (missing=7)	50 (2.5)	27 (2.6)	16 (2.5)	7 (2.2)
Chronic liver disease (missing=5)	87 (4.4)	44 (4.3)	36 (5.7)	7 (2.2)
Immunocompromising conditions[b] (missing=3)	94 (4.7)	33 (3.2)	51 (8.0)	10 (3.1)
Neurological conditions[c] (missing=5)	129 (6.5)	57 (5.5)	59 (9.3)	13 (4.0)
Smoking status (missing=2)				
Current smoker	968 (48.2)	506 (48.8)	400 (63.0)	62 (19.1)
Past smoker	269 (13.6)	149 (14.4)	68 (10.7)	52 (16.0)
Never smoker	758 (38.2)	381 (36.8)	167 (26.3)	210 (64.8)
Pregnant (% women aged 15–44 years, missing=5)	8 (3.6)	6 (5.6)	2 (6.1)	0 (0)

[a]Underlying conditions include diabetes (type I or type II), cardiovascular disease, chronic lung disease, chronic kidney disease, chronic liver disease, immunocompromising conditions, and neurological conditions.

[b]Documented conditions within immunocompromising conditions included: human immunodeficiency virus infection, cancer, rheumatoid arthritis, sarcoidosis, lupus, chronic steroid use, hyperthyroidism, hereditary spherocytosis, polymyalgia rheumatica, hepatitis C, and sickle cell disease or trait.

[c]Documented conditions within neurological conditions included: spinal stenosis, epilepsy, neuropathy, migraine, tardive dyskinesia, meningitis.

Table 3. Symptoms in the last day and last week reported by sheltered clients, unsheltered clients, and homelessness service staff screened by SARS-CoV-2 test result status in Atlanta, Georgia, United States, from April–May 2020

	Total N=1,985[a] n/N (%)	**SARS-CoV-2 (+) n=22** n/N (%)	**SARS-CoV-2 (-) n=1,963** n/N (%)
Symptoms in the last day			
Fever (measured >100.4°F or 38°C)	16/1970 (0.8)	0/21 (0.0)	16/1949 (0.8)
Fever (subjective)	55/1975 (2.8)	2/21 (9.5)	53/1954 (2.7)
New or worsening cough	137/1978 (6.9)	0/21 (0.0)	137/1957 (7.0)
Shortness of breath	64/1976 (3.2)	1/21 (4.8)	63/1955 (3.2)
Nausea	43/1975 (2.2)	1/21 (4.8)	42/1954 (2.1)
Vomiting	21/1977 (1.1)	1/21 (4.8)	20/1956 (1.0)
Diarrhea	48/1975 (2.4)	0/21 (0.0)	48/1954 (2.5)
Loss of smell	15/1976 (0.8)	1/21 (4.8)	14/1955 (0.7)
Loss of taste	21/1976 (1.1)	1/21 (4.8)	20/1955 (1.0)
Fever, cough, or shortness of breath	211/1973 (10.7)	3/21 (14.3)	208/1952 (10.7)
Any symptom	257/1973 (13.0)	3/21 (14.3)	254/1952 (13.0)
Symptoms in the last week			
Fever (measured >100.4°F or 38°C)	23/1966 (1.2)	1/21 (4.8)	22/1945 (1.1)
Fever (subjective)	93/1976 (4.7)	4/22 (18.2)	89/1954 (4.6)
New or worsening cough	197/1980 (9.9)	1/22 (4.5)	196/1958 (10.0)
Shortness of breath	85/1975 (4.3)	0/22 (0.0)	85/1953 (4.4)
Nausea	59/1976 (3.0)	1/22 (4.5)	58/1954 (3.0)
Vomiting	34/1976 (1.7)	1/22 (4.5)	33/1954 (1.7)

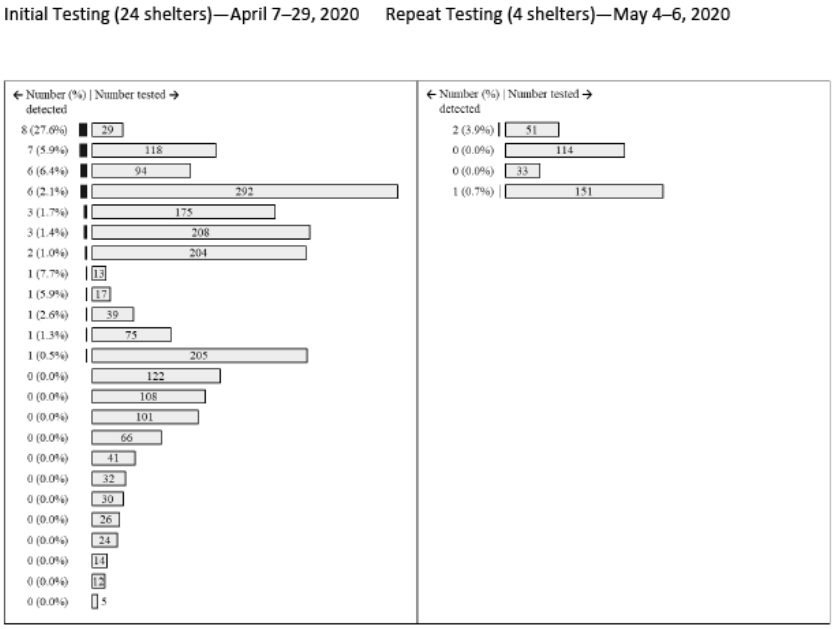
Diarrhea	91/1972 (4.6)	0/22 (0.0)	91/1950 (4.7)
Loss of smell	16/1976 (0.8)	1/22 (4.5)	15/1954 (0.8)
Loss of taste	28/1977 (1.4)	1/22 (4.5)	27/1955 (1.4)
Fever, cough, or shortness of breath	300/1975 (15.2)	5/21 (23.8)	295/1954 (15.1)
Any symptom	368/1973 (18.7)	5/21 (23.8)	363/1952 (18.6)

[a]12 results excluded due to inconclusive test results.

Figure. SARS-CoV-2 test results by homeless shelter (clients and staff) during initial and repeat testing events—Atlanta, Georgia, United States, April–May 2020

This figure depicts the number SARS-CoV-2 tests conducted (grey bars) among clients and staff from 24 homeless shelters and the number (%) of positive SARS-CoV-2 test results (black bars) during the initial round of testing (left figure) and repeat testing events at four shelters (right figure).

Figure 1


Initial Testing (24 shelters)—April 7–29, 2020
Repeat Testing (4 shelters)—May 4–6, 2020
← Number (%) | Number tested →
detected
8 (27.6%) 29
7 (5.9%) 118
6 (6.4%) 94
6 (2.1%) 292
3 (1.7%) 175
3 (1.4%) 208
2 (1.0%) 204
1 (7.7%) 13
1 (5.9%) 17
1 (2.6%) 39
1 (1.3%) 75
1 (0.5%) 205
0 (0.0%) 122
0 (0.0%) 108
0 (0.0%) 101
0 (0.0%) 66
0 (0.0%) 41
0 (0.0%) 32
0 (0.0%) 30
0 (0.0%) 26
0 (0.0%) 24
0 (0.0%) 14
0 (0.0%) 12
0 (0.0%) 5
← Number (%) | Number tested →
detected
2 (3.9%) 51
0 (0.0%) 114
0 (0.0%) 33
1 (0.7%) 151