

Risk factors for SARS-CoV-2 infection in homeless shelters in Chicago, Illinois – March-May, 2020

Isaac Ghinai^{1,2}, Elizabeth S. Davis³, Stockton Mayer⁴, Karrie-Ann Toews^{1,2}, Thomas D. Huggett⁵, Nyssa Snow-Hill⁴, Omar Perez⁴, Mary K. Hayden³, Seena Tehrani³, A. Justine Landi³, Stephanie Crane³, Elizabeth Bell³, Joy-Marie Hermes³, Kush Desai³, Michelle Godbee³, Naman Jhaveri⁴, Brian Borah⁴, Tracy Cable⁴, Sofia Sami⁴, Laura Nozicka⁴, Yi-Shin Chang⁴, Aditi Jagadish^{1,4}, Mark Chee^{1,6}, Brynna Thigpen¹, Christopher Llerena^{1,4}, Minh Tran^{1,4}, Divya Meher Surabhi^{1,4}, Emilia D. Smith^{1,4}, Rosemary G. Remus¹, Roweine Staszczuk¹, Evelyn Figueroa⁴, Paul Leo⁴, Wayne M. Detmer⁵, Evan Lyon⁷, Sarah Carreon⁸, Stacey Hoferka⁹, Kathleen A. Ritger¹, Wilnise Jasmin¹, Prathima Nagireddy¹, Jennifer Y. Seo¹, Marielle J. Fricchione¹, Janna L. Kerins¹, Stephanie R. Black¹, Lisa Morrison Butler¹⁰, Kimberly Howard¹⁰, Maura McCauley¹⁰, Todd Fraley¹, M. Allison Arwady¹, Stephanie Gretschi¹, Megan Cunningham¹, Massimo Pacilli¹, Peter S. Ruestow¹, Emily Mosites², Elizabeth Avery³, Joshua Longcoy³, Elizabeth B. Lynch³, Jennifer E. Layden¹

¹ Chicago Department of Public Health, Chicago, IL, USA; ² Centers for Disease Control and Prevention, Atlanta, GA, USA; ³ Rush University Medical Center, Chicago, IL, USA; ⁴ University of Illinois at Chicago, Chicago, IL, USA; ⁵ Lawndale Christian Health Center, Chicago, IL, USA; ⁶ University of Chicago, Chicago, IL, USA; ⁷ Heartland Alliance Health, Chicago, IL, USA; ⁸ PCC Wellness, Chicago, IL, USA; ⁹ Illinois Department of Public Health, Springfield, IL, USA; ¹⁰ Chicago Department of Family & Support Services, Chicago, IL, USA

Corresponding author: Dr Isaac Ghinai, isaac.ghinai@cityofchicago.org; 847-778-4903

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Summary: Risk factors for SARS-CoV-2 infection in homeless shelters include being a resident compared to a staff member, sleeping in a room with a large number of other residents and residing in a shelter where many residents leave and return each day.

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Abstract

Background: People experiencing homelessness are at increased risk of COVID-19, but little is known about specific risk factors for infection within homeless shelters.

Methods: We performed widespread SARS-CoV-2 PCR testing and collected risk factor information at all homeless shelters in Chicago with at least one reported case of COVID-19 (n=21). Multivariable, mixed-effects log-binomial models were built to estimate adjusted prevalence ratios (aPRs) for SARS-CoV-2 infection for both individual and facility-level risk factors.

Results: During March 1 to May 1, 2020, 1717 shelter residents and staff were tested for SARS-CoV-2; 472 (27%) persons tested positive. Prevalence of infection was higher for residents (431/1435, 30%) than for staff (41/282, 15%) (prevalence ratio [PR] =2.52, 95% CI 1.78–3.58). The majority of residents with SARS-CoV-2 infection (293/406 with available information about symptoms, 72%) reported no symptoms at the time of specimen collection or within the following two weeks.

Among residents, sharing a room with a large number of people was associated with increased likelihood of infection (aPR for sharing with >20 people compared to single rooms = 1.76, 95% CI 1.11–2.80), and current smoking was associated with reduced likelihood of infection (aPR=0.71, 95% CI 0.60–0.85). At the facility-level, a higher proportion of residents leaving and returning each day was associated with increased prevalence (aPR=1.08, 95% CI 1.01–1.16), while an increase in the number of private bathrooms was associated with reduced prevalence (aPR for one additional private bathroom per 100 people = 0.92, 95% CI 0.87–0.98).

Conclusions: We identified a high prevalence of SARS-CoV-2 infections in homeless shelters. Reducing the number of residents sharing dormitories might reduce the likelihood of SARS-CoV-2 infection. When community transmission is high, limiting movement of persons experiencing homelessness into and out of shelters might also be beneficial.

Keywords: COVID-19, SARS-CoV-2, transmission, homeless, congregate settings

Background

People staying in homeless shelters are at increased risk of acquiring respiratory pathogens, including SARS-CoV-2^{i,ii,iii}. Additionally, people experiencing homelessness have a high prevalence of chronic conditions that place them at higher risk for severe coronavirus disease 2019 (COVID-19)^{iv,v,vi}. Furthermore, non-Hispanic Black persons – who are over-represented among homeless shelter residents^{vii} – appear to have an increased risk of severe disease compared to non-Hispanic White persons^{viii,ix}.

In March 2020, the Chicago Department of Public Health (CDPH) detected the first of several cases of COVID-19 in residents of homeless shelters. Given the large outbreaks in homeless shelters in other US cities¹, and documentation of asymptomatic spread of SARS-CoV-2 in other congregate settings^x, CDPH collaborated with healthcare partners to offer testing to residents and staff of shelters from which cases were reported to rapidly identify and isolate people with SARS-CoV-2 infection. This article describes the findings of point prevalence surveys at 21 homeless shelters across Chicago. We gathered associated clinical and epidemiological information to describe the spectrum of illness and identify individual-level and facility-level risk factors for SARS-CoV-2 infection in homeless shelters.

Methods

Study population

In January 2019, an estimated 5,290 people were experiencing homelessness in Chicago, of which 4,030 were accommodated in homeless shelters^{xi}. Chicago shelters include dormitory-style accommodation with shared bathrooms; rooms accommodating family units but with shared bathrooms and dining facilities between families; and shelters with single rooms for each resident. Several shelters employ their residents – for this analysis, we defined anyone living in the shelter as a resident, including those who also worked at the shelter. Shelter staff comprised a range of full-

time and part-time staff, paid staff and volunteers, and people with lived experience of homelessness.

City-wide interventions

In March, 2020, the Chicago Department of Family and Support Services (DFSS) opened three auxiliary shelters with capacity to accommodate 344 residents to reduce crowding within existing shelters (decompression). Two additional shelters with capacity to accommodate 392 residents were opened in April and May. Following a statewide stay-at-home order on March 21, shelter residents were permitted to leave and return to a facility only for essential activities^{xii}. Beginning April 6, individuals living in dormitory-style accommodation and identified to be at risk of severe COVID-19 illness as a result of age (over 60 years) or comorbidities (aged over 55 with a condition defined as increasing the risk of severe disease¹) were offered protective housing in individual hotel rooms off-site – these individuals were tested on entry to the hotel and are included in these data with their shelter of origin and accommodation characteristics prior to entering the hotel (Figure 1).

Enhanced reporting of COVID-19 cases in shelters

All cases of COVID-19 in Chicago are reported through the Illinois' National Electronic Disease Surveillance System (I-NEDSS). Since March 19, all congregate living facilities have been required to report to CDPH if ≥ 2 cases have been identified among residents or staff at their facility^{xiii} – homeless shelters were additionally encouraged to report individual cases via a widely-publicized online reporting form² and targeted telephone outreach to shelter managers. Additionally, cases in

¹ As defined by CDC: <https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/people-at-increased-risk.html>

² <https://redcap.dph.illinois.gov/surveys/?s=FR7MAJAY84>

residents were detected through matching addresses reported into I-NEDSS to those of homeless shelters.

Point prevalence surveys

During April 1–May 1, 2020, point prevalence surveys were conducted at all shelters with a reported case of COVID-19 in either a resident or staff member. Testing was scheduled, whenever possible, within 7-10 days of a reported index case and at a convenient time to maximize participation. Testing was offered to all residents and staff. Nasopharyngeal swab specimens were tested for SARS-CoV-2 by real-time reverse transcriptase PCR (rRT-PCR)^{xiv}. Shelters with a point prevalence of $\geq 5\%$ were offered further testing approximately 1–2 weeks later; at subsequent visits, testing was offered to any individual not previously tested and to those who previously tested negative.

Clinical and epidemiologic data

A standardized questionnaire collected information about demographics, role (resident or staff) accommodation details, whether they leave the shelter, symptoms, and past medical history.

To ascertain subsequent development of symptoms and other clinical outcomes, residents who tested positive for SARS-CoV-2 were re-interviewed by telephone 14 days following their test date. To identify hospitalizations and ICU admissions, names and dates of birth of residents testing positive were matched to data from locally-available surveillance from acute care hospital emergency departments. To identify deaths, these individuals were also matched to a list of COVID-19 related deaths that occurred under the jurisdiction of the Cook County Medical Examiner's Office and to state vital records data.

Shelter assessments

During April 2020, CDPH deployed medical staff to all shelters to provide one-time on-site training in infection prevention and control to shelter staff. While on-site, CDPH staff collected facility information, including the number of residents and staff, sleeping arrangements, and availability of hand hygiene materials. Follow-up telephone calls with shelter managers collected additional information according to a standard assessment form designed in collaboration with the US Centers for Disease Control and Prevention (CDC)³. Variables included the size of the facility in square feet, symptom screening practices, the level of decompression compared to pre-COVID-19 maximum occupancy, and the number of bathrooms per facility, including whether these were for the exclusive use of one person or family (private bathroom) or used by many individuals (shared bathrooms). Facility factors were reviewed by a team of clinicians and epidemiologists and factors deemed most relevant to transmission of SARS-CoV-2 were included in statistical analysis.

Statistical analysis

For individual, self-reported characteristics we report descriptive statistics according to infection status. Individuals who tested positive at any point were counted as infected with SARS-CoV-2. Prevalence was compared between residents and staff. To understand more about SARS-CoV-2 infections within homeless shelters, subsequent analyses were restricted to residents.

First, we described symptoms on the date of specimen collection and in the following two weeks, and compared their sensitivity and specificity to rRT-PCR. We also describe severe COVID-19 outcomes (hospitalization, admission to ICU and death). Next, we built individual and multi-level

³ The tool used was similar to that now published by CDC: <https://www.cdc.gov/coronavirus/2019-ncov/community/homeless-shelters/infection-control-inventory-planning-tool.pdf>

models (including facility factors) to identify risk factors for infection. Prevalence ratios (PRs)– with 95% confidence intervals (95% CIs) – were calculated using log binomial regression models^{xv}. In the individual, univariable model, factors were analyzed as categorical variables. Multivariable models included all variables with a p-value for association of ≤ 0.2 in the univariable analysis and a random effect to control for clustering at the shelter-level and calculated adjusted prevalence ratios (aPRs). Facility-level factors were assigned to all residents at each facility. Variables were selected for inclusion by a stepwise selection using the SAS procedure GLMSELECT; factors with a p-value > 0.2 were removed from the model. The multi-level model included both facility-level factors and individual-level factors. All analyses were conducted using SAS (version 9.4; SAS Institute). This study was reviewed by CDC and CDPH and deemed to be a public health response.

Results

During March 1–May 1, 2020, 21 homeless shelters with COVID-19 cases in residents or staff were reported to CDPH. Point prevalence surveys were conducted at all 21 shelters. Although the refusal rate was not formally collected, few residents or staff (estimated $< 5\%$) refused specimen collection. The point prevalence found on the first survey in different shelters ranged from 0% to 59%. Eight shelters were tested more than once, one site was tested three times. Overall, 1717 residents and staff were tested at least once (of which 586 residents and 77 staff were tested more than once) and 472 (27%) were positive for SARS-CoV-2 infection.

The majority of people tested (1435/1717, 84%) were residents. Prevalence of SARS-CoV-2 infection was higher for residents (431/1435, 30%) than for staff (41/282, 15%) (prevalence ratio [PR] =2.52, 95% CI 1.78–3.58). Subsequent results refer to the 1435 residents who were tested.

Information on age, gender and race and ethnicity were available for most residents (age=99%, gender=98%, race and ethnicity=94%). Most were male (1023/1412, 72%), and non-Hispanic Black (879/1353, 65%), with a median age of 52 (interquartile range: 39-60 years). More than 85% of resident respondents completed the questionnaire and provided self-reported information on symptoms, medical history, smoking status and accommodation details. Many (600/1265, 47%) slept in shared rooms of more than 20 people (Table 1).

On the date of specimen collection, 331 (77%) of 431 residents with SARS-CoV-2 infection provided information on their symptoms compared to 898 (89%) of 1004 without SARS-CoV-2 infection. Of the 331 with SARS-CoV-2 infection, 89 (27%) reported symptoms compared to 140 (16%) of 898 without SARS-CoV-2 infection. Among those with symptomatic SARS-CoV-2 infection, the most commonly reported symptoms were cough (n=56, 63%), congestion or runny nose (n=38, 43%), and subjective or measured fever (n=35, 39%). When compared to rRT-PCR, the specificity of reporting any symptoms on the date of specimen collection was 84%. When restricting symptoms to those in the Council of State and Territorial Epidemiologists (CSTE) surveillance case definition^{xvi}, specificity improved to 93%, though sensitivity declined to 14%⁴. In this population, the positive predictive value of reporting any new symptom on the date of specimen collection was 39%.

Most residents with SARS-CoV-2 infection (314/431, 73%) were reached for follow up, including 75 who did not provide information on symptoms initially. Twenty-four residents, who initially did not provide information on symptoms or were asymptomatic, reported developing symptoms within two weeks of testing positive, such that – overall – 113 (28%) of 406 residents with SARS-CoV-2

⁴ The CSTE case definition includes at least one of cough, shortness of breath or difficulty breathing, or at least two of fever (measured or subjective), chills, rigors, myalgia, headache, sore throat, or new loss of taste or smell. Although the CSTE case definition includes rigors as one of the minor symptoms, rigors were not captured in our questionnaires and were thus not included in our symptom analysis.

infection, who provided some information about symptoms, reported any symptom at any point while 293 (72%) reported no symptoms at the time of specimen collection or within the following two weeks.

Fifty-seven (13%) of 431 residents with SARS-CoV-2 were hospitalized due to COVID-19, with 19 requiring ICU admission. Two residents with SARS-CoV-2 infection died (2/431, 0.5%).

Risk factors for SARS-CoV-2 infection

Individual model:

In the unadjusted analysis, SARS-CoV-2 prevalence was higher for older individuals (PR for those aged >55 years compared to those aged <40 years = 1.74, 95% CI 1.40–2.16, $p<0.01$) and for non-Hispanic White persons compared to non-Hispanic Black persons (PR=1.27, 95% CI 1.04–1.54, $p=0.02$). Prevalence was higher for individuals sleeping in shared rooms (PR for sharing a room with >20 people compared to a single room = 3.33, 95% CI 2.29–4.85, $p<0.01$). Prevalence was lower for current smokers compared to people who had never smoked (PR 0.80, 95% CI 0.65–0.99, $p=0.04$). Prevalence did not differ by self-reported medical history or gender (Table 1).

After adjusting for individual-level factors (age, race or ethnicity, smoking status, accommodation details) and for clustering at the shelter level, prevalence ratios no longer differed by age or race and ethnicity. Sharing a room with >20 people remained associated with a higher prevalence (aPR = 1.70, 95% CI 1.07–2.69, $p=0.03$), and current smoking remained associated with a lower prevalence of infection compared to never smoking (aPR = 0.73, 95% CI 0.61–0.87, $p<0.01$) (Table 2).

Multi-level model

Consensus review identified 12 facility-level factors suspected to influence transmission (Table 3). Some of these – regular environmental cleaning, use of face coverings, availability of hand hygiene materials, symptom screening, and isolation of symptomatic residents – were near-universally reported and thus excluded from the combined model.

In the multi-level model, after adjusting for facility-level factors with a p-value for association with SARS-CoV-2 infection of <0.2 (number of residents per 1000 square feet, number of bathrooms per resident and the proportion of residents leaving and returning each day) and those variables in the individual model, sharing a room with >20 people remained associated with increased prevalence of SARS-CoV-2 infection, and currently smoking remained associated with reduced prevalence of SARS-CoV-2 infection with similar effect sizes. The proportion of residents leaving and returning each day was associated with increased prevalence of infection in the combined model (aPR for an additional 1% of residents reporting leaving the facility and returning each day = 1.08, 95% CI 1.01–1.16, $p=0.03$), and an increase in the number of private bathrooms was associated with a reduced prevalence of infection (aPR for one additional private bathroom per 100 people = 0.92, 95% CI 0.87–0.98, $p=0.02$) (Table 4).

Discussion

Our findings demonstrate that SARS-CoV-2 can infect large numbers of people in homeless shelters. Residents were particularly vulnerable to infection, although 15% of staff who live off-site were also found to be infected. Outbreaks involving a similarly high proportion of shelter residents and staff have been reported from Boston^{xvii}, Seattle^{xviii}, and San Francisco¹. Our analyses also suggest the shelter residents most likely to acquire SARS-CoV-2 infection were those sleeping in a room with large numbers of other people and those residing in shelters where a higher proportion of residents

leave and return to the facility each day, possibly reflecting increased opportunities for exposure and then viral introduction.

Our analysis also found that current smokers appeared less likely to be infected with SARS-CoV-2 than non-smokers. Current smokers might spend additional time outside due to no smoking policies within shelter, and thus might avoid some exposures within the congregate setting. In cohorts in China and France, the prevalence of smoking in patients with COVID-19 has also been noted to be lower than that in the general population^{xix,xx,xxi}. However, it is well-documented that a smoking history is associated with both worse outcomes from COVID-19^{xxii,xxiii} and higher rates of other respiratory infections^{xxiv,xxv}. The significance of this finding in our cohort is therefore not well understood.

Our findings support efforts to reduce the total shelter population and number of individuals sharing rooms at shelters. Based on these findings, protectively housing individuals at increased risk of severe illness in single rooms, away from dormitory-style settings, appears beneficial. Additionally, measures to reduce movement into and out of shelters when community transmission is high, such as shelter-in-place orders, might reduce infection risk.

In this population, the majority of people with SARS-CoV-2 infection reported no symptoms. This finding is similar to reports from other cities where widespread testing of people experiencing homelessness has been performed^{17,18}. The true proportion of asymptomatic SARS-CoV-2 infections is not yet known, though most estimates are lower than that reported here^{xxvi}. The low proportion of symptomatic individuals identified in our study may reflect the difficulty in detecting new symptoms in this population with a high prevalence of underlying symptoms, including pain, fatigue,

gastrointestinal and respiratory complaints^{xxvii}, and the presence of background symptoms was not elicited in this study. Alternatively, residents may have underreported symptoms due to mistrust of the health care system, a belief (mentioned to the testing team) that they may lose their accommodation if openly symptomatic, or substance misuse or mental illness that may reduce ability to articulate symptoms. However, the rates of hospitalization and death were also lower than previously published estimates^{xxviii,xxix}, which was unexpected given the high prevalence of underlying conditions in people experiencing homelessness. Taken together, these findings might represent the true prevalence of asymptomatic and mild infection when widespread asymptomatic testing is conducted in this population, or may be due to the policy – implemented prior to the majority of these point prevalence surveys – of providing individual hotel rooms to protectively house people most likely to develop severe disease.

The strengths of this study lie in the size of the population and variety of the shelters studied, as well as the detailed information collected to facilitate adjustment for individual and facility-level confounders.

However, these findings are subject to several limitations. First, PCR testing only detects current infections – the data presented here were collected several weeks into the epidemic in Chicago, and so may underestimate factors that increased risk of infection early in the epidemic. Second, most clinical and epidemiologic data were self-reported, and might be subject to reporting biases. Third, some facility-level factors were ascertained during follow-up telephone calls several weeks after testing and, in some instances, data were estimated (e.g., square footage of a facility without floor plans). Additionally, some important variables likely to impact an individual's risk of infection were not included in the analysis. For example, the time since detection of the first case in a shelter was

excluded given varied access to testing, the use of cloth face coverings was universally reported but regularly observed to be inaccurate by the testing team, and information on the orientation of beds (e.g. sleeping head to toe) was not collected. Finally, although the shelters included in our study represent a range of settings, results may not be generalizable to other cities or people living in different types of congregate settings.

The findings in this report support several recommendations issued by the CDC, including establishing overflow sites to reduce crowding (shelter decompression) and offering protective housing in individual rooms for people who are at highest risk of severe COVID-19^{xxx}. The nationwide outbreak of COVID-19 continues to put those living in congregate settings, including homeless shelters, at increased risk of infection. COVID-19 has the capacity to exacerbate poor health outcomes; given the potential for large outbreaks in homeless shelters, connecting people experiencing homelessness to primary care to manage modifiable risk factors is likely beneficial. In addition, action beyond the healthcare system – including providing pathways to stable housing – is important to mitigate the impact of COVID-19 in people experiencing homelessness.

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Declaration of interests: All authors declare no competing interests.

Patient consent statement: Verbal consent was obtained from all participants. This study was reviewed by the Centers for Disease Control and Prevention and the Chicago Department of Public Health institutional review boards or equivalent and received a non-research determination as part of public health response.

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Table 1: Self-reported characteristics of residents in homeless shelters, by SARS-CoV-2 PCR test result – Chicago, March–May 2020.

Characteristic	Positive		Negative		Total		Crude prevalence ratio (95%CI)	p-value
	n	(%)	n	(%)	n	(%)		
Total	431	(30.0)	1004	(70.0)	1435	(100)		
Age group (years)								
<40	80	(18.8)	307	(30.6)	387	(27.1)	1.0	
40-55	132	(31.0)	330	(32.9)	462	(32.3)	1.43 (1.13-1.80)	<0.01
>55	214	(50.2)	366	(36.5)	580	(40.6)	1.74 (1.40-2.16)	<0.01
Gender								
Female	128	(30.5)	261	(26.3)	389	(27.6)	1.0	
Male	292	(69.5)	731	(73.7)	1023	(72.5)	0.98 (0.83-1.16)	0.80
Race or ethnic group								
Non-Hispanic Black	257	(63.8)	622	(65.5)	879	(65.0)	1.0	
Non-Hispanic White	83	(20.6)	145	(15.3)	228	(16.9)	1.27 (1.04-1.54)	0.02
Hispanic	45	(11.2)	139	(14.6)	184	(13.6)	0.84 (0.64-1.10)	0.21
Non-Hispanic Other	18	(4.5)	44	(4.6)	62	(4.6)	0.96 (0.64-1.43)	0.85
Medical history[†]								
Respiratory condition [‡]	49	(14.4)	124	(13.4)	173	(13.7)	1.00 (0.78-1.29)	0.99
Cardiovascular condition [‡]	83	(24.3)	182	(19.7)	265	(21.0)	1.16 (0.94-1.42)	0.16
Diabetes mellitus [‡]	43	(12.6)	87	(9.4)	130	(10.3)	1.16 (0.90-1.51)	0.26
Smoking status[†]								
Never	135	(39.2)	341	(37.6)	476	(38.0)	1.0	
Current	113	(32.9)	412	(45.4)	525	(41.9)	0.80 (0.65-0.99)	0.04
Former	96	(27.9)	155	(17.1)	251	(20.1)	1.29 (1.04-1.59)	0.02
Sleeping arrangements[†]								
Single room	26	(6.7)	207	(23.6)	233	(18.4)	1.0	
Shared room (2–4 people)	40	(10.4)	114	(13.0)	154	(12.2)	2.33 (1.49-3.64)	<0.01
Shared room (5–8 people)	50	(13.0)	79	(9.0)	129	(10.2)	3.47 (2.28-5.29)	<0.01
Shared room (9–20 people)	47	(12.2)	102	(11.6)	149	(11.8)	2.83 (1.84-4.35)	<0.01
Shared room (>20 people)	223	(57.8)	377	(42.9)	600	(47.4)	3.33 (2.29-4.85)	<0.01
Shelter exposure[†]								
Leave and return to shelter during day [‡]	144	(49.5)	405	(48.8)	549	(49.0)	1.06 (0.87-1.29)	0.57

[†] >10% missing data in selected variables.

[‡] Reference group for each is 'not', e.g. not reporting a respiratory condition, or not leaving the shelter during the day.

Table 2: Adjusted prevalence ratios of SARS-CoV-2 infection by self-reported characteristics of residents of homeless shelters – Chicago, March–May 2020.

Characteristic	Residents Only n=1148		
	Adjusted prevalence ratio [†]	(95%CI)	p- value
Age group (years)			
<40	1.0		
40-55	0.92	(0.73- 1.17)	0.51
>55	1.00	(0.80- 1.24)	0.98
Race or ethnic group			
Non-Hispanic Black	1.0		
Non-Hispanic White	1.03	(0.84- 1.25)	0.8
Hispanic	1.16	(0.91- 1.48)	0.22
Non-Hispanic Other	1.09	(0.75- 1.60)	0.65
Cardiovascular Condition[‡]			
Yes	1.13	(0.95- 1.34)	0.18
Current smoker[§]			
Yes	0.73	(0.61- 0.87)	<0.01
Sleeping arrangements			
Single room	1.0		
Shared room (2–4 people)	1.32	(0.86- 2.02)	0.2
Shared room (5–8 people)	1.50	(0.95- 2.36)	0.09
Shared room (9–20 people)	1.55	(0.95- 2.53)	0.08
Shared room (>20 people)	1.70	(1.07- 2.69)	0.03

[†] Adjusted for those variables in the unadjusted model with an association with SARS-CoV-2 infection with a p-value <0.2, and treating shelter as a random effect.

[‡] Compared to not reporting a cardiovascular condition

[§] Compared to never and former smokers combined

Table 3: Characteristics of 21 homeless shelters in Chicago with reported cases of COVID-19, March–May 2020.

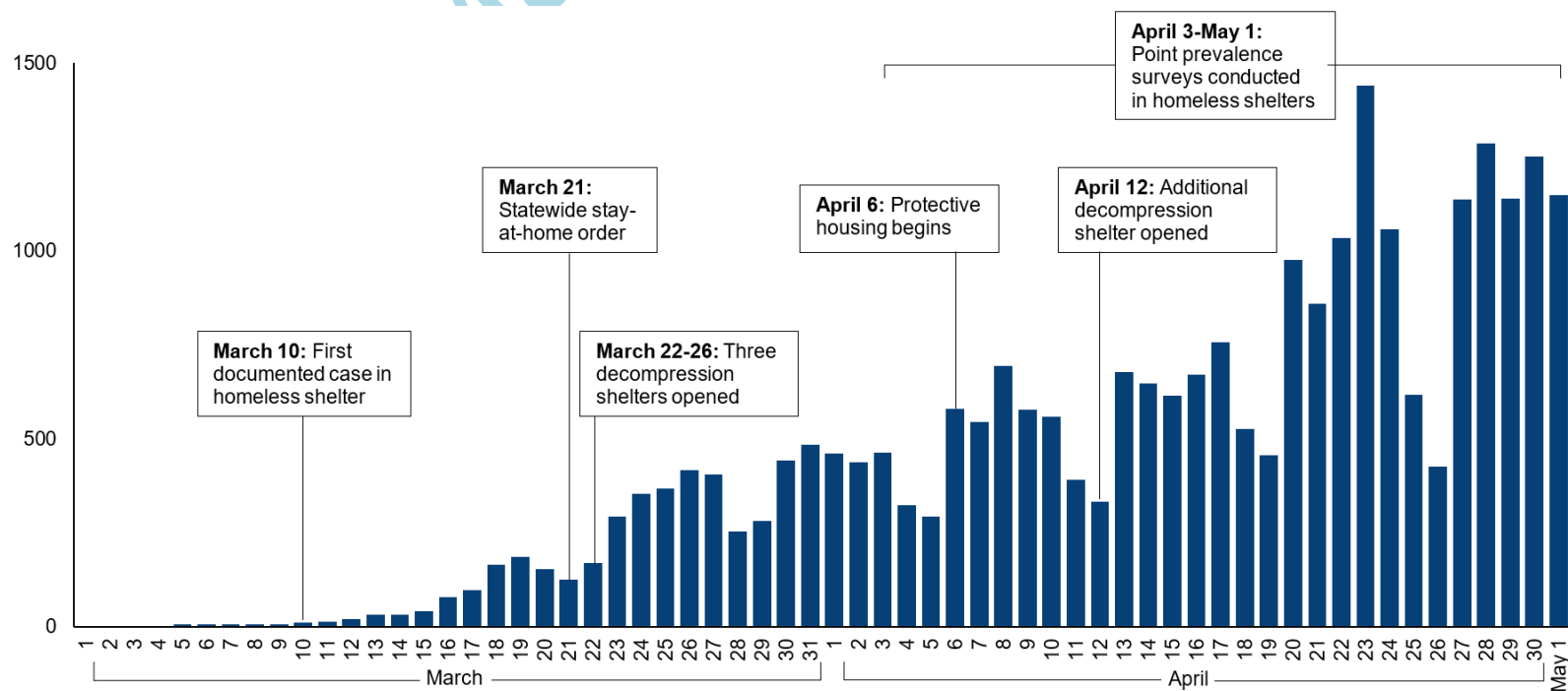
Characteristic	Values
Crowding	
Average occupancy (median, range)	65 (8-450)
Residents per 1,000 square feet (median, range)	4 (1-17)
Percent decompressed (current/maximum occupancy (%), range)	43 (13-87)
Communal bathrooms per 100 residents (median, range)	3 (0-25)
Private bathrooms per 100 residents (median, range)	0.5 (0-80)
Sleeping arrangements	
Number of dormitory style rooms (median, range)	2 (0-38)
Distance between beds $\geq$ 3ft (n, %)	19 (90.5)
Barriers between beds (n, %)	4 (21.1)
Staff	
Staff rotate to other sites (n, %)	11 (42.3)
Staff: resident ratio (ratio)	1:4 (1:1-1:20)
Temperature checks for staff before each shift (n, %)	11 (50.0)
Residents	
Proportion of residents leaving and returning each day (%), range)	44 (7-88)

Table 4: Prevalence ratios of SARS-CoV-2 infection in residents of homeless shelters, adjusted for individual- and facility-level factors in a multi-level log binomial model – Chicago, March–May 2020.

Characteristic	Adjusted prevalence ratio [†] n=1268	(95%CI)	p-value
Individual level factors			
Current smoker	0.71	(0.60-0.85)	<0.01
Sleeping arrangements			
Single room	1.0		
Shared room (2–4 people)	1.35	(0.87-2.11)	0.19
Shared room (5–8 people)	1.59	(1.00-2.53)	0.05
Shared room (9–20 people)	1.64	(1.00-2.70)	0.05
Shared room (>20 people)	1.76	(1.11-2.80)	0.02
Facility level factors			
Residents per 1,000 square feet	0.86	(0.68-1.08)	0.10
Communal bathrooms per 100 residents	0.89	(0.74, 1.07)	0.22
Private bathrooms per 100 residents	0.92	(0.87, 0.98)	0.02
Proportion of residents leaving and returning each day	1.08	(1.01-1.16)	0.03

[†]adjusting for all variables in Tables 2 and 3.

Figure 1: Number of daily cases of COVID-19 across Chicago, with a timeline of interventions relevant to homeless shelters – Chicago, Illinois, March-May 2020.



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