Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Assessing COVID-19 risk among people experiencing homelessness—Correspondence

Dear Editor,

We read with interest the recent article by Keller, et al., that used merged data from an emergency department electronic health record and the Homeless Management Information System (HMIS) to measure the relative burden of COVID-19 in a population of people experiencing homelessness (PEH) [1]. PEH may be particularly vulnerable to COVID-19 because of socioeconomic factors, mental illness, and chronic medical conditions. In this study, Keller et al. found that PEH have similar COVID-19 test positivity and a lower hospitalization rate than other emergency department (ED) patients, leading the authors to conclude that homelessness was not a COVID-19 risk factor. As the authors note, measuring disease in PEH can be difficult because housing status is often not captured in public health surveillance systems [2]. Merging clinical and housing data with public health data is an important strategy to understand disease burden, so we applaud Keller, et al. on their important area of focus.

Unfortunately, however, we are concerned about the interpretation of the study's findings. The authors studied a convenience sample of patients who visited an ED in Louisville, Kentucky and used ED SARS-CoV-2 testing to estimate the cumulative population incidence of COVID-19. The authors' analysis used test positivity as a surrogate for population-based disease incidence. This approach may contribute to bias because (1) most PEH do not access emergency care, (2) PEH may access ED-based care for different reasons than people who are housed (e.g., different access to alternative care sites, need for testing to access temporary housing) which could bias test positivity, and (3) the relationship between test positivity and population cumulative incidence may be different in PEH than those who are housed. Studies of ED care have shown that ED use is higher in PEH, largely because of reduced access to other care settings, but the impact of COVID-19 on care-seeking behaviors is not clear [3]. PEH in homeless shelters may have access to shelter-based testing, while those outside shelters may access the ED for testing [4]. Prior reports have shown lower COVID-19 positivity in PEH [5], but a population-based study showed that COVID-19 transmission for PEH may be higher [6]. An ED-based study of test positivity in patients with different housing status cannot be used to approximate a population-based measure of cumulative disease incidence.

The authors' conclusion that the probability of COVID-19 hospitalization was lower could suffer from the same bias since a lack of alternative locations for testing may divert PEH to the ED for testing. A prior report identified that PEH had higher frequency of hospitalization, but lower severity of illness than the general population [7]. Furthermore, in a community with multiple health systems, the frequency with which PEH seek care in any individual system may not represent the experience throughout the community, because of geographic and other contextual factors related to access to care.

In order "to identify whether COVID-19 affects homeless individuals disproportionately compared to the general public," the authors compare COVID-19 test positivity in PEH with those who are housed. This comparison is adjusted for age, gender, race, and insurance status, which would be important in an explanatory causal model, but may underestimate the effect of a risk factor in a comparison of disease burden. Comparing unadjusted estimates incorporates all the measured and unmeasured aspects of an individual's life—some of which may be mediators in the pathway to contracting COVID-19, but all of which may contribute to disparities in infection rates. The unadjusted comparison simply measures disease burden in the risk group and would be the preferred method for reporting.

Keller et al. attributes similarities in test positivity between PEH and control populations to sun exposure and unhygienic environments. This hypothesis seems to discount intensive efforts to reduce crowding in shelters and implement exposure reduction measures. PEH in a Chicago study, for instance, had fewer cases of COVID-19 among those who moved to individual rooms versus those who remained in congregate living in shelters [8]. Community policies, institutional programs, and other local contextual factors for PEH should be considered in the interpretation of any population-based comparison of cumulative COVID-19 incidence.

In conclusion, we appreciate the important work that Keller et al. did to merge disparate data systems to provide information about how housing is associated with risk of infection during the COVID-19 pandemic. This type of analysis can help policymakers and public health professionals to allocate resources to populations most likely to benefit. We caution readers, however, that despite the important role that emergency care plays in public health surveillance, ED visit frequency and ED SARS-CoV-2 test positivity cannot be used to estimate population-based cumulative incidence of infection. Continued use of public health informatics solutions to improve interpretation of public health data in PEH are critically needed, and we are eager to see more examples of these efforts in the future.

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Conflicts of interest

None of the authors have declared a financial conflict of interest.

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CRediT authorship contribution statement

Nicholas M. Mohr: Conceptualization, Writing – original draft. **Katherine D. Vickery:** Conceptualization, Writing – review & editing. **Kathryn League:** Conceptualization, Writing – review & editing. **Alaina P. Boyer:** Conceptualization, Writing – review & editing. **David A. Talan:** Conceptualization, Writing – review & editing.

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