COVID-19

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COVID-19 and the density debate

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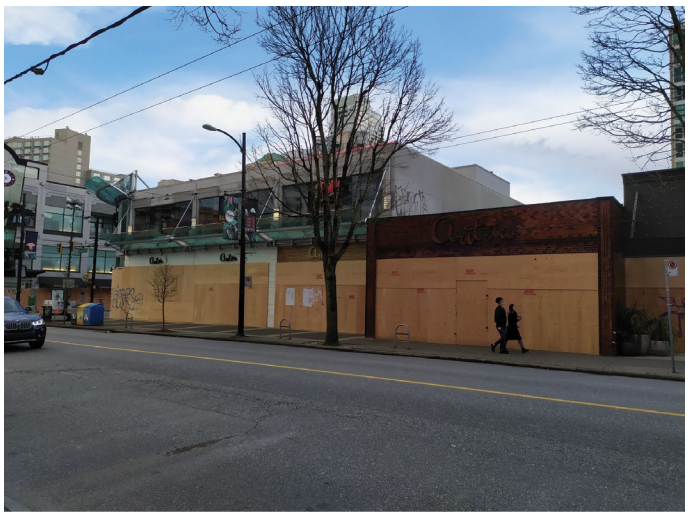
The relationship between cities and infectious disease spread has been heavily debated due to the perceived risk of high urban population densities. A new study examines this relationship in US cities, finding the influence of inequality looms larger than population density per se.

In 2020, cities were quickly vilified for their perceived role in facilitating infectious disease outbreaks due to the concentration of people and shared points of contact[1]. This led to people fleeing the cities for rural areas, which were thought to be safer. Subsequently, small cities, towns and rural areas started to experience higher infection rates than large cities[2]. This phenomenon triggered research into the relationship between density and infectious disease spread. A new study on this relationship by Kontokosta et al. supports earlier findings that there is no linear relationship between the two variables[3]. One explanation is that high-density neighbourhoods are more likely to adopt mitigating behaviours to reduce transmission. The authors determine this by using the concept of exposure density to map the number of contacts made by people in a community over a period of time.

While density is generally seen as a vital attribute of sustainable urban planning, the COVID-19 pandemic inspired renewed debate on the merits of dense urban living[4]. Pandemic restrictions resulted in a temporary de-densification of urban space, especially in city centres, as the middle and upper classes isolated at home or moved to peripheral or rural areas (see Fig. 1). However, as Kontokosta et al.[3] point out, self-isolation was nearly impossible in some poorer urban areas and migrant communities, largely due to their lack of ability to work from home. These more-vulnerable communities experienced greater incidence of illness and death, focusing attention on the underlying inequalities in our society that were revealed by the pandemic[5]. This study therefore supports the notion that variables other than density (including racial and ethnic disparities, political factors and social determinants, like occupation and income) influence the potential risk of COVID-19 spread.

Importantly, the authors also support the earlier finding that governance and cultural factors are at least as important as density in shaping the potential incidence of COVID-19[6]. Throughout the pandemic, not only did national and city governments adopt different approaches to managing densities and controlling populations, but citizens also responded differently to these measures. The timing of the restrictions differed from place to place as well, depending on the severity of the outbreak and political ideology. As such, while there is theoretically a positive correlation between neighbourhood density and COVID-19 infection rates, the authors point out that this is rarely the case in practice, owing to behavioural factors. For instance, as neighbourhood density increases, residents will be more likely to adopt social distancing practices to reduce their number of close contacts and their risk of infection.



A boarded-up street in Vancouver, Canada, in March 2020.

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Kontokosta and co-authors use two key concepts to arrive at their findings: population density and exposure density. Population density refers to the actual number of people in a particular area, in this case at the neighbourhood (or more precisely, census tract) scale. Exposure density, on the other hand, refers to changes in activity levels under lockdown orders as a measure of social distancing behaviour. This allows the authors to determine the extent to which communities adhered to mobility restrictions within and across US cities and to identify patterns that might influence health outcomes. The study builds on previous published work by the authors[7], expanding the exposure density metric to additional cities in the USA.

One limitation of the study's findings is that they are based on quantitative research methods. As the authors are trying to determine explanations for people's behaviour, it would be better to supplement the findings with qualitative research that can more reliably explain behavioural factors. Nonetheless, the paper does have important policy implications, suggesting that social distancing mandates, paradoxically, put more-vulnerable communities at risk, even though they are designed to protect these groups. This is because of the vast social infrastructure that is required to support people isolating at home, such as deliveries of food, medicine and essential services. The result is that more-vulnerable communities are disproportionately affected, "without a significant reduction in transmission risk"[3]. This supports previous literature criticizing the effectiveness of lockdowns[8], but stops short of developing alternative recommendations.

Kontokosta et al.'s study highlights several factors that contribute to differences in social distancing and COVID-19 infection rates, including political orientation, income, occupation, race and ethnicity, among others. Future research could investigate each of these factors in more depth to account for local contexts and to arrive at more specific recommendations for the formulation of public health

policies. Moreover, it would be interesting and clearly useful to know if there is an optimal level of population density relative to effective social distancing and infection risk. For example, do ultra-high-density cities, like Hong Kong, compare favourably with medium-density cities found in many European countries? How does the provision and use of green space and open space in cities compensate for density? Such questions will be important in preparing our increasingly urban society for inevitable future infectious disease outbreaks.

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Competing interests

The author declares no competing interests.