

COVID-19 and Urban Density: Evaluating the Arguments

DISCUSSION REPORT

September 2020

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Abstract

Urban planning has increasingly focused on developing higher density residential environments and urban containment to address concerns related with low-density sprawl, such as congestion, CO₂ emissions, and loss of environmentally significant lands. As the COVID-19 pandemic began to unfold, a growing number of observers expressed concerns over seemingly higher case counts in higher density settings. In this report, we report on the results of an on-going media analysis of over 60 articles and academic studies to shed more light on this debate. We review various perspectives and supporting evidence on if and how COVID-19 might have an impact on urban intensification and containment policies. Evidence to date suggests that residential development densities alone are not necessarily in and of themselves associated with higher rates of COVID-19. Rather, it is overcrowding that affects vulnerable populations in particular that is actually the primary concern. The COVID-19 pandemic warrants review of open/green space allocations and building design in high density contexts, as well as emphasis on providing affordable and suitable housing to prevent overcrowding.

Introduction

In this report, we summarize the findings of a media analysis and scan of academic literature examining the relationship between population density and the spread of COVID-19. Media speculation about the relationship between population density and viral spread began to emerge shortly after the World Health Organization officially declared COVID-19 a pandemic on March 11th, 2020. Early observers suggested that cities were particularly affected. Some were quick to argue that the higher incidence in cities was because of higher densities. Others drew attention to the diversity of factors in the spread of the virus, such as overcrowded accommodations, global travel flows, and public facing jobs.

Media coverage grew on both sides of the debate, with journalists and experts in city building either arguing strongly in favour of continuing dense urban development, or expressing concern over the potential impact of density. Notably, most early observations were based largely on speculation and anecdotal evidence. Nonetheless, they contributed to an emerging discourse that appears to question the long-term sustainability of cities, specifically high-density core areas, in the context of a pandemic.

Prior to the COVID-19 pandemic, planning policies across Canada and the US were increasingly focused on promoting or requiring, higher density developments and urban containment in recent decades.¹ Higher density, coupled with active and public transport, as a means to address concerns related with low-density sprawl, has much support in the academic and policy literature. It is associated with positive outcomes in reducing congestion, CO₂ emissions, and preventing loss of environmentally significant lands. The current debate and public discourse thus warrant careful consideration of evidence on the relationship between density and COVID-19 case numbers.

We assembled a database covering 62 news articles through a combination of convenience sampling as well as a more systematic Google News search, using the following terms: “density AND COVID-19” and “COVID-19 AND urban density.” Our news database includes English-language publications from Canada, the United States, Australia, and Western Europe published between March 13th and June 18th, 2020. We also conducted a scan of relevant academic studies, including those referenced in the media.

Our report first reviews the types of questions that the public and academic discourse are trying to grapple with, and how density is being defined. We then turn our attention to evaluating the evidence to answer three questions that have been most prominent in public debate:

- Does population density increase viral spread?
- Are cities overall more vulnerable to viral spread?
- Will demand for residential and commercial activity in high density environments subside?

¹ Pierre Filion & Anna Kramer. “Transformative Metropolitan Development Models in Large Canadian Urban Areas: The Predominance of Nodes”, *Urban Studies* 49. (2012). 2237-2264.

The media discourse, particularly in the early stages, tried to build arguments to outline issues associated with higher density living environments. Historical precedents, cities as early pandemic hotspots, and the growing share of people working from home were framed as potential factors leading to dispersion away from large cities. Yet, as more systematic evidence is emerging, we find that although density is associated with higher case counts, this is occurring primarily in instances of overcrowding and the presence of already vulnerable populations, rather than due to density alone.

What question(s) are observers trying to answer?

The challenge of asking about the impacts of COVID-19 on density is that different observers are actually asking different types of questions. Our analysis reveals that the current discourse is trying to grapple with at least three separate, although clearly interrelated, questions. The inherent difficulty of collecting and providing supporting evidence to answer these questions 'in real time' needs to be kept in mind.

The questions are:

1. Does population density increase viral spread?
2. Are cities more vulnerable to viral spread?
3. Will demand for residential and commercial activity in high density environments subside?

Comparatively, the first two questions are more answerable in the sense that we can measure directly a potential link between, say, density and a particular response variable (e.g., viral spread). Complicating factors are the availability of data, the comparability of this data across different contexts (for instance, due to differences in reporting and testing or due to differences in the share of vulnerable populations), and the different ways in which COVID-19 is being measured and analysed (e.g., total number of cases, number of cases per capita, hospitalization rates, mortality rates).

The third question is most difficult to support with empirical evidence. This is because an answer to this question inherently needs to rely on anticipated preferences and speculations to forecast 'what people and/or firms *might* do'. All forecasts have to rely on what we expect people's preferences to be in the future, an inherently difficult exercise. But the difficulties of forecasting preferences are highly amplified in the context of rapidly changing conditions during a pandemic. That is to say, all forecasts during times of high uncertainty need to be taken with an additional grain of salt.

How is density measured?

Another complication in assessing the relationship between density and COVID-19 is that density is measured in a number of different ways. Although most consider people per area as a standard measure of population density, the scale at which this is measured varies. We encountered at least four different definitions of density in our analysis of media and academic studies:

1. Household level: People per dwelling unit (or, people per area of living space). Density at the household level refers to the number of occupants per area of internal living space. High internal density of a dwelling unit is commonly referred to as overcrowding.²
2. Local level: People per area of land on a development site or in a neighbourhood. Population density at the local level usually considers the aggregate numbers of individuals in relatively small geographic areas such as a development site, block, postal code, or neighbourhood.
3. Intra-urban level: People per area of land in core city as compared to surrounding suburbs. At the intra-urban level, measures of density compare larger areas within a metropolitan area such as city versus suburb, or counties in the US.
4. Inter-urban level: People per area of land compared across different metropolitan areas. At the inter-urban level, analyst compare average densities of entire metropolitan areas.

It is important to note that all types of population density are considered proxies for interpersonal contact, and thus it becomes a stand in for areas with potentially higher risk of viral transfer. At the household level, population density arguably works reasonably well as a proxy for social contact. For example, it is difficult to avoid being near other people in an overcrowded household. At the local level, higher density likely still correlates with higher social contact because the amount of shared space usually increases with density (e.g., elevators, hallways). However, it is highly likely that behavioural measures such as mask wearing, social distancing, timed elevator/stairway access, and proper ventilation systems could help mitigate the spread of infectious disease at the local level.

Outside of the context of strict quarantine orders, social contact is likely as much a function of lifestyle, activity and travel patterns (e.g., visiting a mall, going to a movie theatre, eating dinner at a busy restaurant, or gathering with friends) than density of the residential built environment alone. In other words, it is not clear that the residential environment itself is necessarily the primary point of contact where the virus is transferred.

At the inter- and intra-urban levels, a direct link between density and social contact is even more difficult to establish. In these types of analyses, density is measured as an average of internally diverse urban areas. Core cities and suburbs are not homogeneous when it comes to density due to differences in built form. In these cases, density becomes more of a stand in for city size. Larger cities usually have more higher density neighbourhoods than small ones, yet often also have just as many low-density neighbourhoods. Thus, from a planning (and urban geography) perspective, it becomes less clear whether average density can or should be used as a measure of social contact at these broader scales: yet, most medical studies we encountered did just that, unfortunately with little to no exploration of the limits or applicability of this measure.

² Brian Moloughney, *Housing and population health: the state of current research knowledge*. (Ottawa, Canadian Institute for Health Information = Institut canadien d'information sur la santé, 2004).

Does population density increase viral spread?

Due to early spread of COVID-19 in major global cities, observers started drawing connections between the local density of cities and viral spread. This led to simplistic observational claims that higher average density at the inter-urban scale was the culprit behind the spread of COVID-19.^{3,4} For example, one study found a correlation between COVID-19 cases and nearby subway usage in New York.⁵ Others reported on descriptive statistics at the intra-urban level, generally finding either no relationship between density and COVID-19 cases, that higher density urban cores had fewer case counts than lower density outlying areas, or that outcomes would depend more on government actions moving forward than existing densities.^{6,7,8,9} Furthermore, some observers argued that once a virus reaches less dense communities, it spread at rates comparable to those experienced in higher density urban areas.^{10,11}

Yet, on both sides of the debate, these initial claims had shortcomings. First, claims were often based on casual observations rather than systematic analysis. Second, causation was inferred from correlation without explicitly being able to test for cause and effect. Third, average densities were compared at the *inter-urban level*, ignoring the vast internal variation of the built environment *within* different urban areas. Fourth, other potential factors influencing viral spread were not directly accounted for in the empirical analysis.

Several academic studies, covering diverse geographic contexts, found a positive association between density and COVID-19 cases, even when other factors are taken into account using statistical analysis.^{12,13,14,15} However, these studies compare average densities across different cities. Since we do not know whether density is evenly distributed

³ Glenn Harlan Reynolds, "Coronavirus lessons on density, mass transit, bureaucracy and censorship: They kill," *USA Today*, May 6, 2020, <https://www.usatoday.com/story/opinion/2020/05/06/coronavirus-density-mass-transit-bureacracy-censorship-column/3075550001/>.

⁴ Joel Kotkin, "Angelenos like their single-family sprawl. The coronavirus proves them right," *Los Angeles Times*, April 26, 2020, <https://www.latimes.com/opinion/story/2020-04-26/coronavirus-cities-density-los-angeles-transit>.

⁵ Jeffrey E. Harris, "The Subways Seeded the Massive Coronavirus Epidemic in New York City," WEB.MIT.EDU, Updated April 24, 2020, http://web.mit.edu/jeffrey/harris/HarrisJE_WP2_COVID19_NYC_13-Apr-2020.pdf.

⁶ Aaron Gordon, "Coronavirus Is Not a Good Reason to Abandon Cities," *Vice*, April 22, 2020, https://www.vice.com/en_ca/article/xgqnrw/coronavirus-urban-density-bad-reason-to-abandon-cities.

⁷ Mary T. Bassett, "Just Because You Can Afford to Leave the City Doesn't Mean You Should," *New York Times*, May 15, 2020, <https://www.nytimes.com/2020/05/15/opinion/sunday/coronavirus-cities-density.html>.

⁸ Matt Elliot, "COVID-19 hot spots shouldn't make us rethink cities. They should make us rethink poverty" *The Toronto Star*, June 2, 2020, www.thestar.com/opinion/contributors/2020/06/02/covid-19-hot-spots-shouldnt-make-us-rethink-cities-they-should-make-us-rethink-poverty.html.

⁹ Cortright, "Is COVID-19". Cortright, Joe. "Is COVID-19 the End of Cities?" *Strong Towns*. April 21, 2020. <https://www.strongtowns.org/journal/2020/4/21/is-covid-19-the-end-of-cities>.

¹⁰ Richard Florida, "The Geography of Coronavirus," *CityLab*, April 3, 2020, <https://www.bloomberg.com/news/articles/2020-04-03/what-we-know-about-density-and-covid-19-s-spread>.

¹¹ McDonald & Spotswood, "Cities Are". McDonald, Rob & Erica Spotswood, "Cities Are Not to Blame for the Spread of COVID-19—nor Is the Demise of Cities an Appropriate Response." *The Nature of Cities*. April 14, 2020. <https://www.thenatureofcities.com/2020/04/14/cities-are-not-to-blame-for-the-spread-of-covid-19-nor-is-the-demise-of-cities-an-appropriate-response/>.

¹² Mark D. Verhagen, David M Brazel, Jennifer Beam Dowd, Ilya Kashnitsky, and Melinda C Mills. "Forecasting Spatial, Socioeconomic and Demographic Variation in COVID-19 Health Care Demand in England and Wales." *BMC medicine* 18, no. 1 (December 2020): 1–11, <https://doi.org/10.1186/s12916-020-01646-2>.

¹³ Alfonso Ilardi, Sergio Chieffi, Alessandro Iavarone, and Ciro Rosario Ilardi, "SARS-CoV-2 in Italy: Population Density Correlates with Morbidity and Mortality," *Japanese journal of infectious diseases* (2020): <https://doi.org/10.7883/yoken.JJID.2020.200>.

¹⁴ Amitesh Gupta, Sreejita Banerjee, and Sumit Das, "Significance of Geographical Factors to the COVID-19 Outbreak in India," *Modeling earth systems and environment* (June 17, 2020) <https://doi-org.proxy.lib.uwaterloo.ca/10.1007/s40808-020-00838-2>.

¹⁵ Pedro Pequeno, Bruna Mendel, Clarissa Rosa, Mariane Bosholn, Jorge Luiz Souza, Fabricio Baccaro, Reinaldo Barbosa, William Magnusson, "Air transportation, population density and temperature predict the spread of COVID-19 in Brazil" *PeerJ* 8:e9322, (June 2020), <https://doi.org/10.7717/peerj.9322>.

within a given city (in fact, it most likely is not), this type of study design is not well suited to measuring a link between density and COVID-19 spread at the local level. Using average densities at the inter-urban level is more likely to differentiate large cities from small ones. In the case of cities in the global south, this approach would capture the presence of informal settlements (where transmission rates would be expected to be higher due to poor infrastructure servicing and overcrowding).

Other academic studies have compared densities and COVID-19 cases across large areas/sectors/districts within cities, with conclusions varying by geographic context.^{16,17} One study of Wuhan, China, found a positive association between density and viral cases, but it is not clear how density may relate to overcrowding in this context.¹⁸ Contrarily, a Dutch study determined that COVID-19 case counts and mortality rates were not clearly correlated with population density.¹⁹ They concluded that due to high levels of urbanization overall, it would likely be difficult to find a direct association between density and COVID-19 cases; and that overall global linkages and the interconnection of places, regardless of their densities, likely play a large role in viral spread. This sentiment, in a general sense, is also expressed by the work of Roger Keil and colleagues, who argue that viruses can commonly be traced to the edges and fringes of metropolitan areas, and then spread because of trade and travel networks and highly interconnected global infrastructures.²⁰

A study published in the Journal of the American Planning Association found that although large cities in the US were more affected by COVID-19, county density was not associated with infection rates:

*controlling for key confounding factors. We find metropolitan population to be one of the most significant predictors of infection rates; larger metropolitan areas have higher infection and higher mortality rates. We also find that after controlling for metropolitan population, county density is not significantly related to the infection rate, possibly due to more adherence to social distancing guidelines. However, counties with higher densities have significantly lower virus-related mortality rates than do counties with lower densities, possibly due to superior health care systems.*²¹

Finally, a study published by the Centre for Economic Performance at the London School of Economics and Political Science, incorporated several key research design components largely lacking in other studies. That is, constructing an instrumental variable for density to reduce the endogeneity effect, and incorporating a temporal dimension to account for the different amount of time the virus has been presented in a specific area (e.g., high density

¹⁶ Heyuan You, Xi Wu, and Xuxu Guo, "Distribution of COVID-19 Morbidity Rate in Association with Social and Economic Factors in Wuhan, China: Implications for Urban Development," *International journal of environmental research and public health* 17, no. 10 (May 14, 2020): <https://doi.org/10.3390/ijerph17103417>.

¹⁷ Willem R. Boterman, "Urban-Rural Polarisation in Times of the Corona Outbreak? The Early Demographic and Geographic Patterns of the SARS-CoV-2 Epidemic in the Netherlands." *Tijdschrift voor economische en sociale geografie* 111, no. 3 (July 2020): 513–529.

¹⁸ Heyuan You, Xi Wu, and Xuxu Guo, "Distribution of COVID-19 Morbidity Rate in Association with Social and Economic Factors in Wuhan, China: Implications for Urban Development," *International journal of environmental research and public health* 17, no. 10 (May 14, 2020): <https://doi.org/10.3390/ijerph17103417>.

¹⁹ Boterman, "Urban-Rural Polarisation".

²⁰ Keil, Roger, Creighton Connolly, S. Harris Ali. "Outbreaks Like Coronavirus Start in and Spread from the Edges of Cities," *The Conversation*, February 17, 2020. <https://theconversation.com/outbreaks-like-coronavirus-start-in-and-spread-from-the-edges-of-cities-130666>

²¹ Shima Hamidi, Sadegh Sabouri, and Reid Ewing. "Does Density Aggravate the COVID-19 Pandemic?" *Journal of the American Planning Association*. (18 June, 2020: 1–15) DOI: 10.1080/01944363.2020.1777891. Page 1.

areas might have higher rates, in an initial snapshot of time, not because of density per se but because they were among the first to be affected). These authors find:

*no evidence that population density is positively associated with time-adjusted COVID-19 cases and deaths...We show that population density can affect the timing of outbreaks through higher connectedness of denser locations. Furthermore, we find that population density is positively associated with proxies for social distancing measures, access to healthcare and income, highlighting the importance of these mediating factors in containing the outbreak.*²²

Overall, there is an association between density and COVID-19. However, it would appear that this association primarily comes about because of instances of overcrowding, particularly among already vulnerable populations, and because denser areas are more globally connected, and hence affected earlier in a pandemic.²³ It is also worth noting that age, number of comorbid conditions, inferred chronic obstructive pulmonary disease, hypertension or diabetes were deemed higher risk factors than density when considered comparatively.²⁴

Are cities overall vulnerable to viral spread?

Aside from the potential linkages between density and viral spread within cities, there is also a concern in public discourse about whether cities as a whole are more vulnerable to a pandemic when compared to towns or rural communities. Our media review revealed two opposing schools of thought regarding urban vulnerability to the spread of diseases.

First, there are those who argue cities are actually well-positioned to endure a pandemic due, in part, to greater access to healthcare resources, jobs, and amenities.^{25,26,27} For instance, University of Toronto planning professor, Matti Siemiatycki, noted that cities will continue to offer “job opportunities, family connections, access to health care, the best medical treatment, parks, culture.”²⁸ Others also argued that population density could prove to be advantageous during a pandemic. Health services tend to be clustered in denser communities, leading to improved health outcomes of local residents.^{29,30,31,32} Cities have

²² Felipe Carozzi, Sandro Provenzano, Sefi Roth, “Urban Density and Covid-19,” Centre of Economic Performance, *London School of Economics and Political Science*, <http://cep.lse.ac.uk/pubs/download/dp1711.pdf>, page 1.

²³ Jay Pitter, “Urban Density: Confronting the Distance Between Desire and Disparity,” *Azure Magazine* April 17, 2020, <https://www.azuremagazine.com/article/urban-density-confronting-the-distance-between-desire-and-disparity/>.

²⁴ Smith-Ray et. al., “Distribution of”.

²⁵ Bliss & Capps, “Are Suburbs Safer From Coronavirus? Probably Not,” *CityLab*, March 13, 2020, <https://www.bloomberg.com/news/articles/2020-03-13/are-suburbs-safer-from-coronavirus-probably-not>.

²⁶ Gelinias, “In New York”. Nicole Gelinias, “In New York City, Density Saves Lives, Too” *CityLab*, April 24, 2020, <https://www.bloomberg.com/news/articles/2020-04-24/in-new-york-city-density-saves-lives-too>.

²⁷ Jennifer Keesmat, “The Pandemic Does Not Spell the End of Cities,” *Foreign Affairs*, May 28, 2020, <https://www.foreignaffairs.com/articles/north-america/2020-05-28/pandemic-does-not-spell-end-cities>.

²⁸ Sean McNeely, “How will COVID-19 change Toronto? U of T’s Matti Siemiatycki on the city’s post-pandemic future,” *U of T News*, April 29, 2020, <https://www.utoronto.ca/news/how-will-covid-19-change-toronto-u-t-s-matti-siemiatycki-city-s-post-pandemic-future>.

²⁹ Hamidi, Sabouri, and Ewing, “Does Density”.

³⁰ Johns Hopkins University Bloomberg School of Public Health, “Urban density”. is not linked to higher coronavirus infection rates, is linked to lower COVID-19 death rates,” *Medical Xpress*, June 18, 2020, <https://medicalxpress.com/news/2020-06-urban-density-linked-higher-coronavirus.html>.

³¹ McNeely, “How will”.

³² Gelinias, “In New York”.

historically been drivers of economic activity, which could prove vital as the world begins to recover from the financial and job-related losses accrued so far.^{33,34}

In opposition are those who argue that large cities in particular are inherently more prone to experience impacts from pandemics due to their high levels of global connectivity. For instance, one Brazilian study found a link between COVID-19 cases in a city and the share of arriving flights.³⁵ But generally, arguments within popular news media about the impacts of COVID-19 on large cities draw on historical comparisons to make their case.

There is a long history of planning for disease prevention using density of the built form as a mitigating mechanism. In the past, cities were often portrayed as inherently “unhealthy” due to higher exposure to pollution disease spread in cities. It is therefore perhaps not altogether surprising, that during the current pandemic, several observers point to this history to uphold notions of the “unhealthy city”, and zero in on density as a primary factor in disease spread.^{36,37,38} This type of narrative draws heavily upon critiques of the city made during the industrial revolution while suggesting that disasters and public health crises have led to urban flight in the past, and necessarily will do so again.³⁹

Interestingly, some articles in the media also drew parallels between COVID-19 and the September 11th terrorist attacks.^{40,41,42,43} These articles provided limited and mostly anecdotal evidence of affluent New Yorkers temporarily seeking refuge in nearby, low-density counties.^{44,45} Notably though, even though after 9/11, there were speculations about residents leaving cities due to their vulnerability to terrorist attacks, these concerns did not materialize to the extent initially predicted. In this vein, history professor Steven Conn writes:

*a consistent trend across 200 years of American history has been the increasing urbanization of the population, and cities have proved resilient in the past - whether Philadelphia after the influenza pandemic of 1918 or Cincinnati after the cholera epidemic of 1849.*⁴⁶

³³ Robert Muggah & Thomas Ermacora, “Redesigning the COVID-19 City,” *NPR*, April 20, 2020, <https://www.npr.org/2020/04/20/839418905/opinion-redesigning-the-covid-19-city>.

³⁴ Foreign Policy, “How Life”. Foreign Policy, “How Life in Our Cities Will Look After the Coronavirus Pandemic,” *Foreign Policy*, May 1, 2020, <https://foreignpolicy.com/2020/05/01/future-of-cities-urban-life-after-coronavirus-pandemic/>.

³⁵ *Ibid.* Pequeno et al., “Air transportation”.

³⁶ Ron Elving, “What Coronavirus Exposes About America’s Political Divide.” *NPR*, April 12, 2020, <https://www.npr.org/2020/04/12/832455226/what-coronavirus-exposes-about-americas-political-divide>.

³⁷ Alex Bozikovic, “Will cities stay healthy, or will the coronavirus mean the end of density?” *The Globe And Mail*, March 20, 2020, <https://www.theglobeandmail.com/canada/toronto/article-will-cities-stay-healthy-or-will-the-coronavirus-mean-the-end-of/>.

³⁸ Stefan Labbé, “Will COVID-19 herald the end of urban density?” *Tri-City News*, May 18, 2020, <https://www.tricitynews.com/news/will-covid-19-herald-the-end-of-urban-density-1.24136773>.

³⁹ Richard Williams, “Will You Want to Go Straight Back Into the Crowd?” *The New York Times*, May 4, 2020, <https://www.nytimes.com/2020/05/05/opinion/cities-density-coronavirus.html>.

⁴⁰ CJ Hughes, “Coronavirus Escape: To the Suburbs,” *The New York Times*, May 8, 2020, <https://www.nytimes.com/2020/05/08/realestate/coronavirus-escape-city-to-suburbs.html>.

⁴¹ Nicole Gelinias, “In New York City, Density Saves Lives, Too” *CityLab*, April 24, 2020, <https://www.bloomberg.com/news/articles/2020-04-24/in-new-york-city-density-saves-lives-too>. Gelinias, “In New York”.

⁴² Jonathon Miller, “The Overstated COVID-19 Blame on Urban Density in Favour of Suburban Living” *Forbes Magazine*, May 14, 2020, <https://www.forbes.com/sites/jonathanmiller1/2020/05/14/the-overstated-covid-19-blame-on-urban-density-in-favor-of-suburban-living/#109c23b932c6>.

⁴³ Steven Conn, “A Make-Or-Break Moment for Cities,” *The Atlantic*, May 15, 2020, <https://www.theatlantic.com/ideas/archive/2020/05/make-or-break-moment-cities/611701/>.

⁴⁴ Hughes, “Coronavirus Escape”.

⁴⁵ Laura Bliss & Kriston Capps. “Are Suburbs Safer From Coronavirus? Probably Not,” *CityLab*, March 13, 2020, <https://www.bloomberg.com/news/articles/2020-03-13/are-suburbs-safer-from-coronavirus-probably-not>. Bliss & Capps, “Are Suburbs”.

⁴⁶ Steven Conn, “A Make-Or-Break”.

Several other authors also referenced historical examples of cities rebounding after adverse impacts. These examples were used as evidence that today's cities can survive the present pandemic too.^{47,48,49} History can provide useful context and precedents, but it should be noted that history does not, of course, provide a definitive forecast. The past cannot always predict the future.

Will demand for residential and commercial activity in higher density environments subside?

It is important to note that the argument that people will be reluctant to remain or move into higher density environments after the pandemic does not necessarily hinge on higher viral spread actually being 'caused' by density. In other words, public perception might be sufficient to shift attitudes and subsequently demand for higher density development, even if the evidence does not link density on its own to higher viral counts.

In light of assumptions about density being a factor in the spread of COVID-19, some news articles suggested that people would begin to leave cities permanently because of the pandemic.^{50,51,52} This speculation was supported purely by the large increases in the number of people working from home (which is assumed to lead to dispersal) and stated preference surveys.^{53,54,55} Yet other writers noted that it was too early to know whether people would leave cities⁵⁶, pointing to continued real-estate activity at the peak of the first wave of COVID-19 outbreak.⁵⁷ One study from 2007 found that workers who were assumed to have more flexibility in choosing a residential location were *both* more likely to disperse to the suburbs *and* more likely to reside centrally, depending on their occupations and demography.⁵⁸ In other words, there is not a precedence for a monolithic shift from high density to low density communities due to telecommuting. An array of factors, including location of quality of life amenities (which can include urban and/or natural features), location of clients, housing costs, kinship ties, and ethnic or cultural factors influence where people live.

⁴⁷ Joe Cortright, "Is COVID-19 the End of Cities?" *Strong Towns*, April 21, 2020, <https://www.strongtowns.org/journal/2020/4/21/is-covid-19-the-end-of-cities>. Cortright, "Is COVID-19".

⁴⁸ Foreign Policy, "How Life in Our Cities Will Look After the Coronavirus Pandemic," *Foreign Policy*, May 1, 2020, <https://foreignpolicy.com/2020/05/01/future-of-cities-urban-life-after-coronavirus-pandemic/>. Foreign Policy, "How Life".

⁴⁹ Max Nathan, "The City and the Virus," *Medium*, May 14, 2020, <https://medium.com/@maxnathan/the-city-and-the-virus-db8f4a68e404>.

⁵⁰ Adam Jacobson, "Idiocy of our current urban systems': Inequality, not high-density cities, to blame for COVID-19's spread," CBC, April 24, 2020, <https://www.cbc.ca/radio/spark/idiocy-of-our-current-urban-systems-inequality-not-high-density-cities-to-blame-for-covid-19-s-spread-1.5544528>.

⁵¹ Hughes, "Coronavirus Escape".

⁵² Miller, "The Overstated".

⁵³ Kotkin, "Angelenos".

⁵⁴ Matthew Haag, "Manhattan Faces a Reckoning if Working From Home Becomes the Norm," *The New York Times*, May 12, 2020, <https://www.nytimes.com/2020/05/12/nyregion/coronavirus-work-from-home.html>.

⁵⁵ Johns Hopkins University Bloomberg School of Public Health, "Urban density is not linked to higher coronavirus infection rates, is linked to lower COVID-19 death rates," *Medical Xpress*, June 18, 2020, <https://medicalxpress.com/news/2020-06-urban-density-linked-higher-coronavirus.html>.

⁵⁶ Elizabeth Stinson, "Health and Disease Have Always Shaped Our Cities. What will be the Impact of COVID-19?" *Architectural Digest*, April 23, 2020, <https://www.architecturaldigest.com/story/how-will-coronavirus-impact-cities>.

⁵⁷ Marie Patino, "Urban Living Might Just Survive Coronavirus," *Bloomberg*, June 15, 2020, <https://www.bloomberg.com/news/articles/2020-06-15/urban-living-might-just-survive-coronavirus>.

⁵⁸ Markus Moos and Andrejs Skaburskis, "The characteristics and location of home workers in Montreal, Toronto and Vancouver," *Urban Studies* 44, no. 9 (2007): 1781-1808, <https://doi.org/10.1080/00420980701507639>.

In 2016, architecture scholar Thomas Fisher predicted that a pandemic would encourage telecommuting.⁵⁹ This would not mark the end of major metropolises, he argued, but would lead to a need for more mixed-use communities. He stated:

*With telecommuting comes the need for more mixed-use neighborhoods that can provide a range of services to people working close to home... The prospect of pandemic, then, should spur us to rethink one of the prevailing divides in urban design—that between those who envision a hightech metropolis of global connectedness and those who call for a return to traditional, small-scale, mixed-use settlements. We will actually need both ... The digital environment will connect us globally, while the mixed-use settlement will provide us with the diverse local goods and services we will need in a less mobile future.*⁶⁰

There are now a growing number of scholars, planners, and journalists calling on the need for more complete communities at the local level, which would include planning for enhanced walkability and cycling-friendly infrastructure.^{61,62,63} The call for more complete communities is substantiated by the argument that people's day-to-day lives are likely to remain more localized, and because the planning for complete communities can also help reduce CO₂ emissions by reducing reliance on cars.⁶⁴

Conclusions

The implications of our review are at least threefold. First, we suggest that further systematic study of the linkages between density and COVID-19 spread in specific communities is necessary to ensure evidence-based policy-making processes in different contexts. Second, governments likely will have a role to play in educating the public about the differences between current and historic factors that have an impact on urban living during and in the aftermath of a pandemic, while dispelling myths about links between density and COVID-19. Third, governments will have to evaluate the costs and benefits of dispersion in terms of accommodating individual preferences versus the broader social, economic and environmental costs of more dispersed urbanization. Specifically, the concerns over COVID-19 and density will need to be carefully weighed against the benefits to continue to promote higher density development, particularly as it relates to climate change prevention and mitigation.

Our analysis also reveals three themes related to the emerging narrative regarding density and COVID-19. First, there are arguments that draw on historical precedents to make a case for or against density. Second, cities – especially large global cities – are being represented

⁵⁹ Thomas Fisher, "Viral Cities," in *Designing Our Way to a Better World*, (Minneapolis: University of Minnesota Press, 2016), 117-126.

⁶⁰ Ibid, 122.

⁶¹ Keesmaat, Jennifer, Kwame McKenzie, Richard Florida. "Canada's new normal begins in our cities." *The Globe and Mail*. May 23, 2020. <https://www.theglobeandmail.com/opinion/article-canadas-new-normal-begins-in-our-cities/>.

⁶² Leanage, Neluka & Pierre Filion, "Can the 15-Minute Walking City Save Intensification Hubs in and Beyond the COVID-19 Pandemic," 2020, School of Planning, University of Waterloo, Working Paper.

⁶³ Florida, Richard, Andres Rodriguez-Pose, Michael Storper. "Cities in a Post-COVID World," *Papers in Evolutionary Economic Geography*, Utrecht University, Human Geography and Planning. <http://econ.geo.uu.nl/peeg/peeg2041.pdf>

⁶⁴ Leanage & Filion, "Can the 15-Minute".

as disease hot spots because of density, global connectivity, or both. And third, some arguments point to an increasing tendency for urban flight due to the rapid growth of working from home and (temporary) loss of access to urban amenities.

It is important to note that our understanding of the linkages between COVID-19, characteristics of the built form, and social dimensions of cities is still evolving. However, our analysis of the available evidence leads us to conclude that higher population density, except at the household level, does not appear to be linked directly with higher COVID-19 rates. The relationship between density and the presence of the virus is not linear or directly causal. There are increasing rates of COVID-19 in higher density environments where these coincide with overcrowding. However, not all density is associated with overcrowding. But, certainly the initial lockdown phases of the pandemic revealed shortcomings of some higher density living environments, in particular a shortage of access to open/green space.

In short, the pandemic has amplified two major problems that planners have been aware of for a long time. First, higher density urban environments function best if they are connected with appropriate open space, which includes things like courtyards, balconies, rooftop gardens, as well as surrounding public green spaces such as parks. Second, higher density-built form is prone to overcrowding when housing affordability is an issue. A lack of larger affordable housing units often results in more people living in the same house or apartment. This particularly affects lower income populations, Black, Indigenous and People of Color, refugees and recent immigrants. These populations are also disproportionately represented in the public-facing customer service-oriented sectors of the economy, such as retail and food services, which further increases their risk of viral exposure (as compared to working from home).

We suspect, based on the public discourse we have examined, that much will continue to be made of the link between density and COVID-19 spread, either to justify or argue against new high-rise apartments and other urban intensification efforts. Yet it would seem that it is not this type of density, actually often associated with middle- and higher-income earners, where highest case numbers were found. Rather, the COVID-19 pandemic has disproportionately affected vulnerable groups who may live in unaffordable, overcrowded housing or work in public-facing jobs.

In one of the articles we reviewed, prominent placemaker Jay Pitter made a case for the continued benefits of density before and after COVID-19, explicitly referring to how overcrowding has led to poor health outcomes for marginalized communities. She wrote:

Instead of being fearful of increased anti-density bias, we need to apply what we know toward a good urban density framework. This framework should be evidence-based and overlap with social determinants of health, such as food security, race, gender and poverty, while being anchored in a strong equity-based placemaking paradigm. It should be co-created through meaningful engagement with urbanists, public health professionals, community members and other stakeholders.⁶⁵

⁶⁵ Jay Pitter, "Urban Density: Confronting the Distance Between Desire and Disparity," *Azure Magazine*, April 17, 2020, <https://www.azuremagazine.com/article/urban-density-confronting-the-distance-between-desire-and-disparity/>.

Thus, although providing more open space and outdoor access in newly built higher density environments is important, it would seem that the most urgent issue, from a health and equity perspective, is actually to re-evaluate how we can reduce overcrowding and other sources of exposure among already highly vulnerable residents and communities.^{66,67,68}

⁶⁶ Elliot, "COVID-19".

⁶⁷ Imbrie-Moore, "Stop Blaming". Imbrie-Moore, Will. "Stop Blaming Urban Density for Coronavirus." *Harvard Political Review*. May 18, 2020. <https://harvardpolitics.com/columns-old/stop-blaming-urban-density-for-coronavirus/>.

⁶⁸ Rogers, A. "How does a virus spread in cities? It's a problem of scale." *Wired*, May 20, 2020. <https://www.wired.com/story/how-does-a-virus-spread-in-cities-its-a-problem-of-scale/>.

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