

Cities & Health

ISSN: 2374-8834 (Print) 2374-8842 (Online) Journal homepage: www.tandfonline.com/journals/rcah20

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To cite this article: Deepti Adlakha & James F. Sallis (2021) Activity-friendly neighbourhoods can benefit non-communicable and infectious diseases, Cities & Health, 5:sup1, S191-S195, DOI: 10.1080/23748834.2020.1783479

To link to this article: https://doi.org/10.1080/23748834.2020.1783479

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Published online: 24 Jul 2020.

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CITIES & HEALTH
2021, VOL. 5, NO. S1, S191–S195
https://doi.org/10.1080/23748834.2020.1783479

COMMENTARY AND DEBATE

Activity-friendly neighbourhoods can benefit non-communicable and infectious diseases

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ABSTRACT

Walkable, activity-friendly neighbourhoods are recommended for their benefits for non-communicable diseases, environmental sustainability, and economic performance. But how do activity-friendly neighbourhoods function during infectious disease pandemics like COVID-19? The spread of COVID-19 in some of the world's dense cities has raised concerns about the risks of urban density and public transit. However, there are several pathways by which dense, mixed-use neighbourhoods with transit access and recreation facilities can reduce the risk of both infectious diseases and non-communicable diseases. Reducing health inequities is a core value for public health, and we comment on strategies for equitably creating activity-friendly communities.

ARTICLE HISTORY
Received 7 May 2020
Accepted 9 June 2020

KEYWORDS
COVID-19; physical activity; density

Introduction

Walkable, activity-friendly neighbourhoods are recommended for their benefits for non-communicable diseases, mental health, environmental sustainability, and economic performance. But how do activity-friendly neighbourhoods function during infectious disease pandemics like COVID-19? This commentary reflects on the pros and cons of activity-friendly neighbourhoods to reduce the spread and severity of COVID-19 and preserve the quality of life during the pandemic. We discuss changes cities can make to design spatially distanced transport and recreation opportunities and long-term implications for health in countries across the income spectrum. We propose ideas for mitigation of negative effects during infectious disease epidemics that would preserve the benefits of activity-supportive neighbourhoods for non-communicable diseases.

Physical activity benefits for non-communicable and infectious diseases

Physical activity protects people from many physical and mental health problems and is recommended internationally (World Health Organization 2019). However, the prevalence of meeting guidelines is low worldwide (Guthold *et al.* 2018). Residents of walkable, higher-density, mixed land-use, and pedestrian-oriented communities with recreation facilities are more physically active for transportation and recreation purposes than residents of lower-density suburban-style neighbourhoods, and these findings apply internationally (Sallis *et al.* 2020). Residents of activity-friendly communities have lower risk of obesity, diabetes, and heart disease. (Giles-Corti *et al.* 2016)

These findings related to non-communicable diseases are well known, but the relevance of physical activity for infectious diseases is less known. Moderate-intensity physical activity has beneficial effects on immune system and inflammation responses against viral respiratory infections such as COVID-19 (Nieman and Wentz 2019). The vast majority of deaths from COVID-19 have been among people with non-communicable diseases, and physical activity is an effective preventive and treatment strategy for these conditions. The most common physical activity is walking, which is free and accessible to most people. Thus, the physical activity benefits for both non-communicable diseases and infectious diseases are central to consideration of walkable communities during the COVID-19 pandemic.

Residential density and mixed use

High residential density would appear to be a huge disadvantage during an infectious disease epidemic because crowding on sidewalks, in buildings, and in public spaces is thought to make physical distancing difficult or impossible, thus promoting contagion. There are at least two fallacies with the idea that low-density sprawl can reduce the spread of COVID-19.

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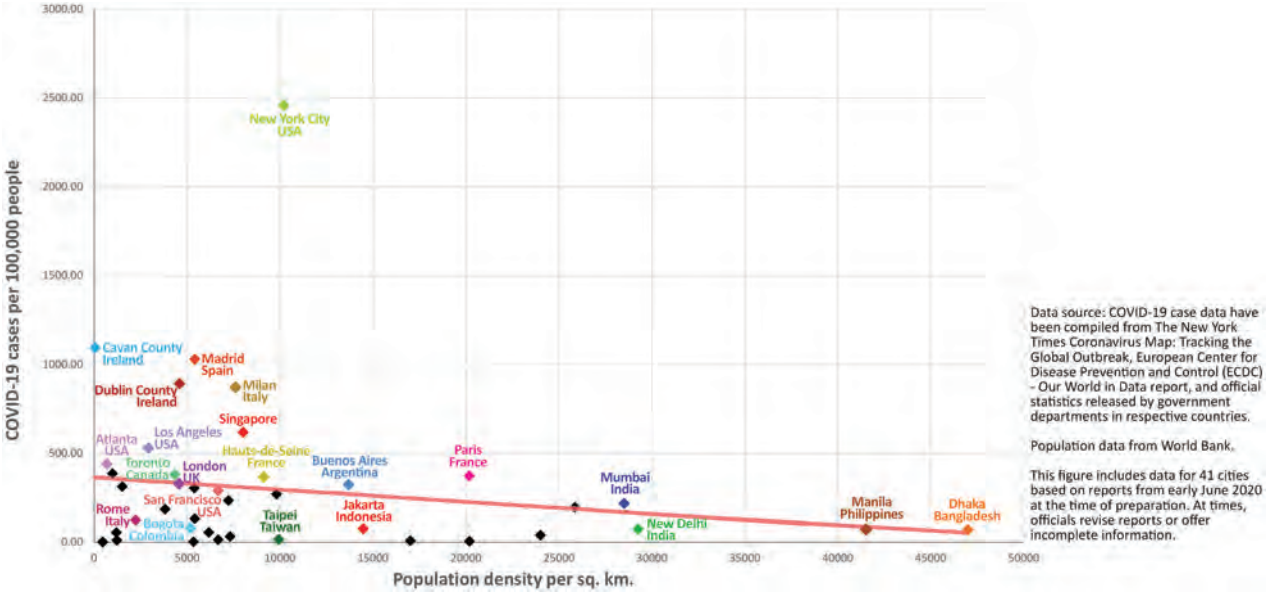


Figure 1. Scatter plot of population density and per capita COVID-19 cases.

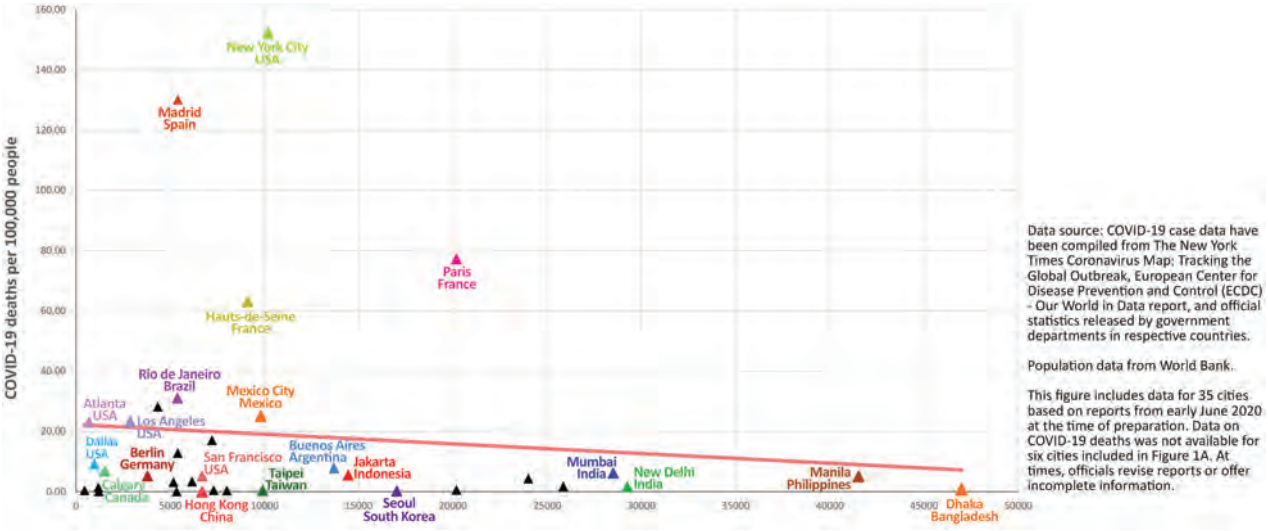


Figure 2. Scatter plot of population density and per capita COVID-19 deaths.

First, Figures 1 and 2 clearly show no association between high population density and per capita COVID-19 cases (Spearman's rho = −0.12, p = 0.45) and death rates (Spearman's rho = 0.02, p = 0.93). Numerous hyper-dense metropolitan areas – Singapore, Hong Kong, Tokyo, and Seoul – succeeded in containing the spread of COVID-19 compared to lower-density cities. Dense Asian cities in particular responded swiftly with public health interventions such as quarantines, wearing masks, testing, and contact tracing. It appears these traditional public health approaches can completely overcome contagion risk due to higher density.

Second, during infectious disease epidemics, dense walkable neighbourhoods allow residents to be active by walking or biking to essential goods and services or to parks for recreation. Remaining active reduces the risk of non-communicable diseases. The ability to walk or bike for daily needs allows residents to reduce the use of public transport where safe distancing can be difficult. Dense neighbourhoods can contribute to better healthcare access because hospitals are closer and emergency responses are faster. Rather than promoting contagion, there are several pathways by which dense, mixed-use neighbourhoods can reduce the risk of both non-communicable diseases and infectious diseases.

Transportation infrastructure

Automobiles would seem to be the safest mode of transport during the COVID-19 pandemic, because many automobile trips are solo, lowering the risk of infection.

This is likely to be the case, but the documented harms of high automobile use such as lung diseases from air pollution, higher non-communicable disease risk due to the inactivity during vehicle use, and injury and death from traffic crashes must be considered. (Stevenson *et al.* 2016) Suburban automobile-dependent development patterns are inequitable because many people cannot afford, or do not want, cars. For example, lower-income households, single-car families, disabled populations, and older adults who no longer drive face inequities in access to housing, education, employment and recreational activities relative to drivers. In low- and middle-income countries, air pollution, congestion, and road safety are common deterrents to walking and bicycling. The COVID-19 lockdown significantly reduced air pollution (European Environment Agency 2020). It will be a challenge to retain reduced car use and cleaner air as economic activity revives.

Public transport in dense walkable cities concentrates people and could increase contagion. This impact could be inequitable because of higher transport use among lower-income people (Lachapelle *et al.* 2015). During shutdowns when many people are not commuting to work and public transport is less crowded, further mitigation could be achieved by limiting riders, ensuring physical distancing, requiring masks, providing hand sanitizer, and cleaning vehicles often.

Walking and cycling for transportation are compatible with physical distancing. Walkable communities enable people at all income levels to travel to work, to school, and for daily needs using safe, healthy transport modes. Even people with long-distance work commutes could reduce non-work automobile travel that increases non-communicable disease risk and use of public transport that increases infectious disease risk. Societal shifts in work from home could further reduce crowding on public transport, especially if workers are able to walk or cycle. More telecommuting provides many workers with choices about avoiding the peak commute, thus staggering travel times and reducing crowding. Travelling off-peak on public transport can create more space for physical distancing during peak times for users who do not have options for remote work. Targeted interventions to enhance equity could prioritize denser, mixed-use redevelopment in lower-income communities and provide free bicycles for lower-income people.

A barrier to walking and bicycling for both transportation and recreation purposes is no or low-quality sidewalks and absence of safe bicycling facilities. Narrow sidewalks make physical distancing impossible unless some walkers step into the street. Built environment improvements to reduce the risk of both non-communicable diseases and infectious diseases are to widen sidewalks to 2 meters and build safe networks of protected bicycle facilities with equal access in lower- and higher-income neighbourhoods.

As lockdown restrictions are eased, we expect people will be reluctant to use public transport for some time. To avoid even greater levels of car use than pre-lockdown, cities can reconfigure streets for safe walking and cycling. Closing selected streets to vehicular traffic can promote physical distancing while walking and cycling, especially where sidewalks are deficient. Cities around the world are implementing temporary changes to make streets safe for walking and bicycling, including in crowded city centres in Paris, Rome, Milan, and Barcelona where sidewalks are generally narrow. (Local Actions to Support Walking and Cycling During Social Distancing Dataset 2020) Strategies include reallocating road space away from motor vehicles, lowering default speed limits, and parking bans.

Recreation environments

During the pandemic, parks, green spaces, and trails have been closed in many jurisdictions due to observed crowding. Closing parks may seem prudent to curb the spread of COVID-19. However, restricting access to popular outdoor places is likely to have negative implications for physical activity, mental health, and severity of COVID-19 infections. There is a compelling link between outdoor exercise and a strong immune system, suggested by the success of outdoor hospitals during the 1918 influenza pandemic (Hobday and Cason 2009). Rather than close these spaces, there could be education and monitoring to maintain physical distancing and limitations to the number of users at any one time.

In contrast to anecdotal reports from high-income countries of increases in use of trails and parks, people in lower-income areas likely do not have these opportunities. For urban residents in cramped housing without outdoor space, local parks could offer respite and decrease exposure to infectious diseases.

The quality of parks and recreation facilities are determinants of park use and physical activity (Van Cauwenberg *et al.* 2015). In low-income areas, neighbourhood parks are usually low spending priorities, but marquee parks (e.g., New York's High Line and Central Park, Chicago's Millennium Park) usually have wealthy donors who ensure high-quality landscapes and amenities. During infectious disease pandemics, residents must rely on smaller neighbourhood parks. Low-cost, equitable solutions could include opening school play fields, racing tracks, and selected streets, especially in low-income areas, to allow space for people to exercise safely.

Planning for healthier cities after COVID-19

The specific components of activity-friendly neighbourhoods described in the current paper are expected to have mostly favourable influences on infectious

Table 1. Summary of expected net effects of built environment attributes on non-communicable diseases and infectious diseases.

Environmental attribute	Expected net effect on non-communicable diseases	Expected net effect on infectious diseases
Residential density	+	0
Mixed land use	+	+
Automobile-optimized transportation system	-	+
Public transportation	+	-
Pedestrian & bicycling facilities	+	+
Parks, trails, open space	+	+
Open streets initiatives*	+	+

Notes: + = favourable effect; 0 = no effect; – = unfavourable effect.
This table represents a simplification because expected unfavourable effects of density and public transport use on infectious diseases can be mitigated by public health interventions.
*Open streets are events that temporarily close certain streets to automobiles and open them to people to provide safe space for walking, cycling, and other forms of recreational and social activities.

diseases, as shown in Table 1, though some attributes may have unfavourable or no clear effects. Concerns about risk of infectious diseases in urban areas are leading to recommendations to reduce density and reliance on public transport. But these recommendations need to be made in the context of expected net health effects considering both infectious diseases and non-communicable diseases, taking into account that non-communicable diseases are responsible for about 65% of global deaths. Pandemics are catastrophic but rare events. The last major pandemic – the 1918 Spanish flu – cost 50 million lives, but it was 100 years ago. In a recent commentary, it was estimated that if all adults lived in activity-friendly neighbourhoods, about 2 million deaths per year could be avoided from non-communicable diseases (Goenka and Andersen 2016). Thus, if permanent urban design decisions are made solely on the basis of infectious disease risk, those decisions could have severe unintended, though predictable, negative consequences for non-communicable diseases.

City planners are accustomed to considering a multitude of trade-offs. Our recommendation is they explicitly include evidence related to both infectious disease and non-communicable disease risk in planning decisions. We encourage city planners to educate elected officials about the multiple health benefits of activity-friendly neighbourhood design and advocate for policies that will achieve the health-promoting urban environment features in Table 1. Walkable, activity-friendly urban design is already widely recommended (Giles-Corti *et al.* 2016), and the present analysis indicates those recommendations should be retained, but with modifications to mitigate potential risks of crowding from high density, public transit use, and recreation facility use during infectious disease pandemics.

Inequities in economic opportunity and health are global issues. Each country has its own pattern of socioeconomic, cultural, religious, and race/ethnic inequities. Reducing health inequities is a core value for public health, so throughout this paper, we commented on strategies for creating activity-friendly communities in an equitable way. Walkable communities with access to parks and public transport are desirable in many places, but as a result, gentrification and displacement of lower-income residents are common. However, solutions need to be tailored to local contexts. We conclude this commentary with a plea to incorporate policies that integrate affordable housing in development plans, so the benefits of activity-friendly communities are more equitably distributed across socioeconomic strata. This can be implemented through equity-based planning policies such as rent control, regional affordable housing commitments, increasing access to public transit, and other targeted programmes designed for low-income residents.

Data availability statement

The data that support the findings of this study are available from the corresponding author, [DA], upon reasonable request.

Disclosure statement

No potential conflict of interest was reported by the authors.

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Dr. Deepti Adlakha is an interdisciplinary academic with groundings in architecture, urban design, and public health. Her research focuses on environmental, social, and policy determinants for the prevention of chronic diseases. She is a licensed architect, urban designer, and a recipient of the Fulbright Fellowship. Dr. Adlakha is currently leading multiple research projects to promote physical activity and the design of healthy, active built environments in low- and middle-income countries. Dr. Adlakha is a steering committee member of the Low- and Middle-Income Country Council of the International Society for Physical Activity and Health and has served as technical advisor on physical activity and the built environment for public health agencies including the World Health Organization and Belfast Healthy Cities.

Dr. James F. Sallis's primary research interests are promoting physical activity and understanding policy and environmental influences on physical activity, nutrition, and obesity. He was Director of Active Living Research (2001–2015) that helped establish an interdisciplinary field of research to identify effective environmental and policy strategies to increase physical activity. He is an author of over 700 scientific publications and one of the world's most cited authors. He is currently focusing on getting research used to create healthier cities. Dr. Sallis is Past-President of Society of Behavioral Medicine and member of the National Academy of Medicine.

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