RADICAL CHANGE, OR JUST MORE OF THE SAME?
THE SHORT- AND LONG-TERM IMPLICATIONS OF COVID FOR URBAN CHANGE

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ABSTRACT

Many cities changed elements of their urban form remarkably rapidly with the onset of COVID-19 in early 2020, which should cause us to rethink some of the long-held views of the processes and speed of urban change. This paper takes a wide view of factors influencing urban change, and applies them to considerations of the speed, nature and extent of changes seen during the COVID pandemic, particularly in 2020-2021. It draws on both observation and media coverage from the UK during that period, and the rapidly-increasing body of academic research since mid-2020. Much change was relatively small-scale and, even when positive and well-received, has proven to be very temporary, and has largely vanished from late 2022 onwards. The ultimate lessons from the pandemic-induced urban change are most likely to be that cities, even historic ones, need to build in more resilience; and that change is necessary, appropriate and deliverable.

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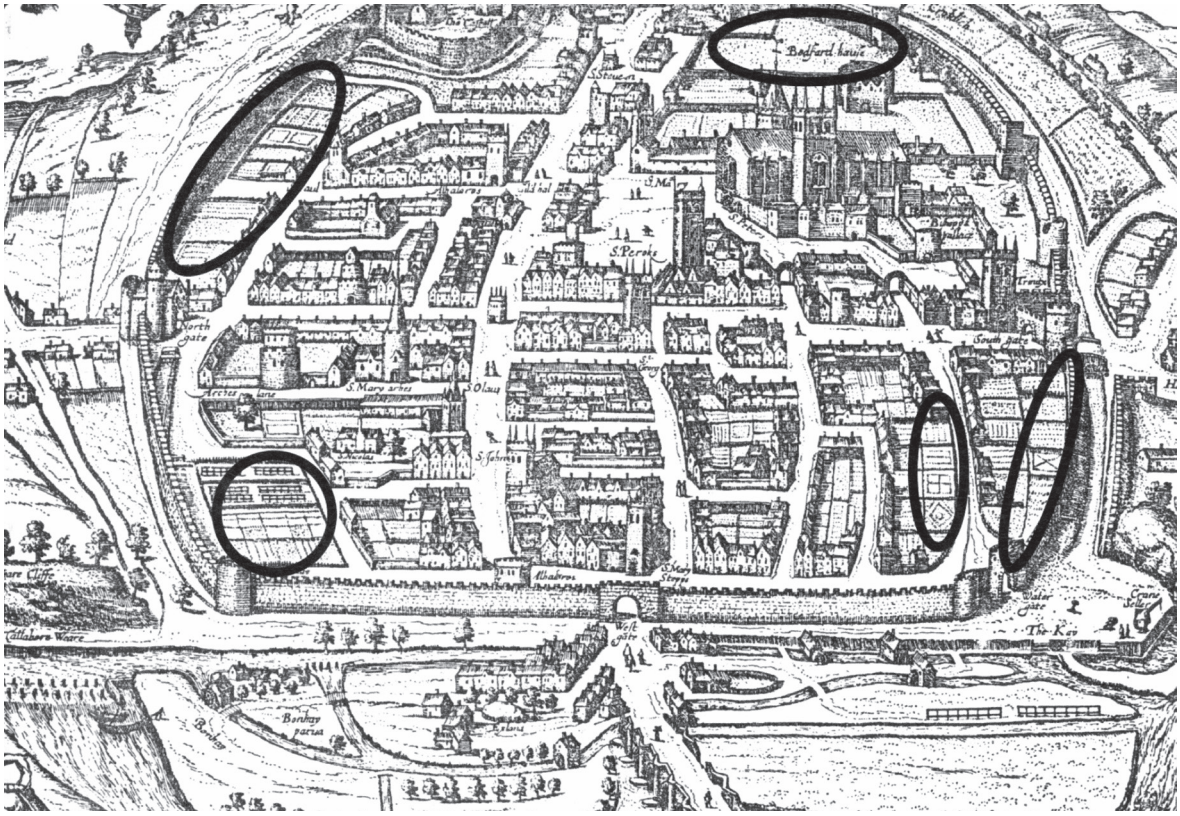

Figure 1. Stylised map of Exeter, 1597, with 'vacant areas' highlighted. Although by the time of this map some might be garden space, Black Death urban depopulation will have released significant areas for other uses. Based on Braun and Hogenberg, Civitates orbis terrarum.

Introduction

COVID-19 was a worldwide catastrophe, unique in living human memory: it appeared and spread quickly, killed many, and has declined quite quickly to become a 'nuisance illness' similar to influenza. In seeking to cope with a new and highly contagious illness, including the fear of illness and contagion, many towns and cities made changes to their physical structures. The catastrophe of COVID therefore provides an opportunity to rethink issues of urban change, and the types of factors that institute change or shape the nature and speed of change, more widely than simply as a response to one specific, or more local, catastrophe. We are used to thinking of catastrophe as an impetus for change in terms of war, natural and human-made disaster. In these situations, physical damage to settlements, and environments more widely, can be severe and widespread. Some might even consider a booming economy and a landscape of construction cranes to be an urban catastrophe, as it signifies rapid and potentially large-scale change, which may threaten familiar and traditional urban landscapes. Hence urban catastrophe responses, and perhaps even catastrophe preparedness, can have substantial effects on the built environment.

However, the extent to which medical catastrophe, a pandemic such as COVID, can lead directly to urban change is perhaps debateable. Certainly the last major worldwide

pandemic, the so-called 'Spanish influenza' (at least in the Anglophone world) after the First World War, did not lead directly to appreciable urban change, and only relatively temporary behavioural change. It might have informed post-war housing standards, through the behavioural change of increasing exposure to sunlight (Frost, 2020) and the design of healthcare facilities (Clarke, 2023). Yet, equally, other concerns in society may also have influenced these changes. Perhaps the last pandemic likely to have produced substantial physical change was the multiple plague known as the 'Black Death' in the mid-1300s, 'the greatest biomedical disaster in European and possibly in world history' (Cantor, 2001, p. 6), which caused an 'urban crisis' (Nicholas, 1999, p. 99). The scale of urban depopulation was so great – England, France, Italy and Spain lost as much as 50–60% of their population in just one or two years (Jedwab et al., 2019, p. 1) – that areas of open space in some town centres, almost certainly previously occupied by the rising population from the mid-1200s, remain evident in maps of the 1500s (Fig. 1). Jedwab et al. (2019), in a major statistical analysis, suggest that it took until the sixteenth century for cities and urban systems, on average, to 'relatively recover' to their pre-Plague population levels. So although the COVID pandemic does provide an opportunity for us to rethink the shape of future cities, we should be cautious in ascribing the cause of direct and immediate change to COVID alone: we should consider the longer term, and COVID as one – albeit very significant – factor in promoting societal and urban change.

Even so, there are many aspects of urban form that could be linked to health, or the lack of it through physical factors. Indeed, one of the key originating factors for the growth of town planning was concern for public health, particularly after the recognition of physical factors in the spread of urban cholera in the densely-packed industrial cities of the nineteenth century (Corburn, 2009, chapter 2; Freestone and Wheeler, 2015). Much has been written since the start of the COVID crisis (the range is demonstrated by Eltarabily and Elghezanwy, 2020; Sharifi and Khavarian-Garmsir, 2020; Cobbinah et al., 2021; Mouratidis, 2022; Salama, 2023; Urban Policy and Research, 2023). Jabareen and Eizenberg (2021) assert that 'the current situation of the COVID-19 pandemic and its related spatial practices construct a new socio-spatial urban order with far-reaching implications' and suggest that 'the prevailing urban form holds some major deficiencies that impede its functioning and its adaptation to new conditions'. Indeed, if new (ie post-pandemic) conditions are radically different, then pre-pandemic urban form is likely

to be deficient in some way. In fact COVID has clearly been a constructive impetus for critically rethinking aspects of urban form, urban design and planning: we are exhorted to review urban mobility; housing, working and public spaces; resettle underpopulated rural areas, and more. Architecture and urban design practices spent much lockdown time in producing new designs for COVID-resistant buildings and areas. As the immediate crisis has receded, but with the awareness of further possible virus outbreaks now much higher in the public and professional consciousness, it is appropriate to review such ideas. Interestingly, some of this review questions our preconceptions: Venerandi et al. (2023) examine the link between COVID and urban form in London, demonstrating that built-up density is a key factor, although this is an inverse relationship: perhaps surprisingly, "the typical London neighbourhood with high levels of COVID-19 infections and deaths resembles a suburb, featuring a low-density urban fabric dotted by larger free-standing buildings and framed by a poorly inter-connected street network". Wu et al. (2023, in Salt Lake County, Utah, confirm the role of density but "mobility factors such as street connectivity and walkability contribute to the local spread, while land use mixture is the catalyst in the outbreak stage".

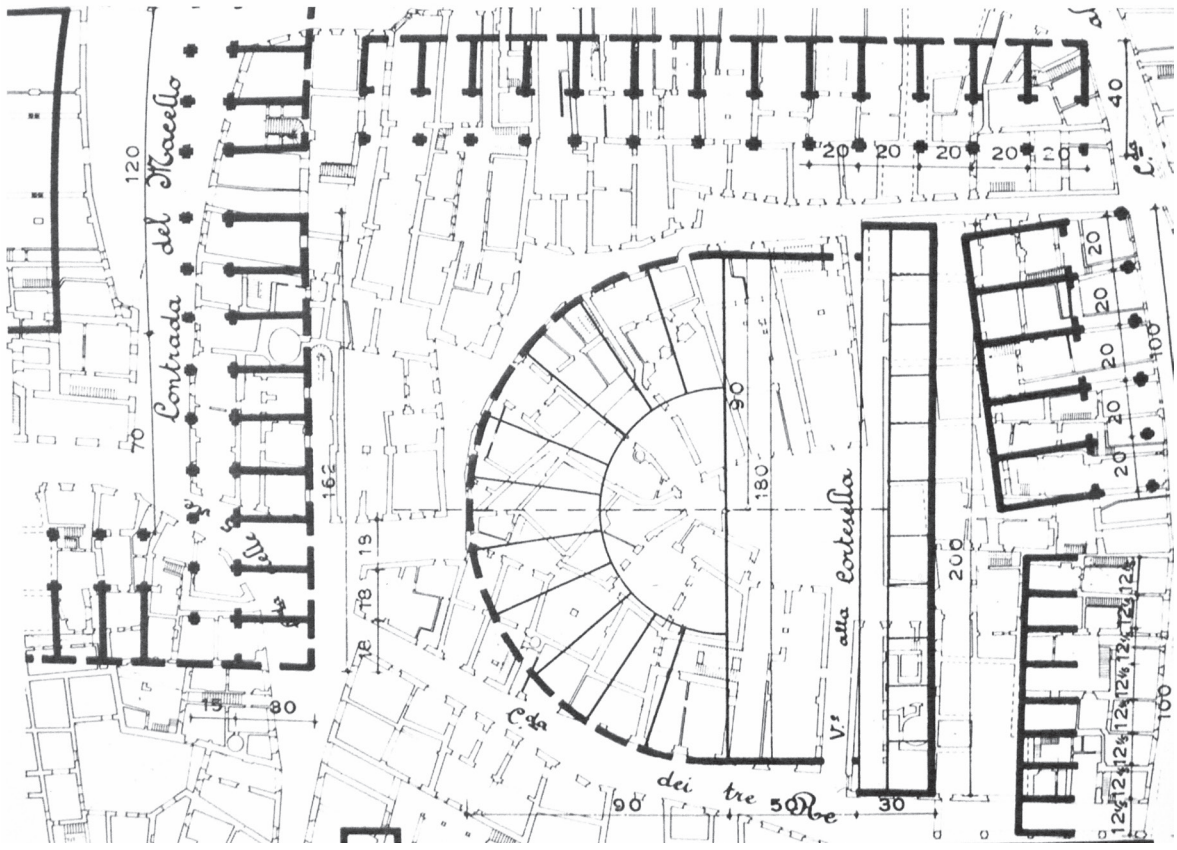

Figure 2. Urban persistence and inertia: Caniggia's analysis of Como, showing hypothesised and actual (derived from archaeology) Roman structures superimposed on a modern plan. Source: Caniggia, 1963.

Compact urban form contributes to "local resilience in the recovery stage".

Principles of urban change

Before doing so, however, there are some factors which could be termed 'principles of urban change' that should be considered. The first of these might be termed 'inertia'. A common definition of this is 'a tendency to do nothing or to remain unchanged' (www.encyclopedia.com).

Many definitions extend this to a lack of interest, or unwillingness to take action (dictionary.cambridge.org). Unless there is an impetus for change, urban form will remain relatively static, for relatively lengthy periods (cf Larkham and Adams, 2019). M.R.G. Conzen (1962) recognised this when he identified the different rates of change of street, plot, building and land-use patterns. Streets tend to persist longest, but other features may persist as relics when their original landscapes have largely vanished. Caniggia (1963) showed how Roman building features could affect the position and size of buildings in Como even today (Fig. 2). The longevity of some features shapes current urban character and appearance. Land use, in contrast, can change extremely quickly.

The second factor is the scale of investment, both financial and cultural, in the existing built environment which, unlike the destruction in calamities of war, fire or natural disaster, is still with us despite the deaths during a pandemic. Our built environments during COVID may have been lacking in people, but the structures remained unchanged by the catastrophe, unlike catastrophes of war, fire and earthquake

Figure 3. Desertion of London's prime retail area: Regent Street – opportunity to rethink space use? Source: Kwh1050, CC BY-SA 4.0.

(Fig. 3). This could be seen as an inertia factor, but the impact of finance – funding and investment – on the built environment is often poorly recognised, although there has long been interest in finance and development cycles (Hoyt, 1960). The scale of past investment is likely, in most cases, to inhibit rapid replacement of still-functioning structures, although there are cases where features have a much shorter lifespan than was originally anticipated or designed (Larkham and Adams, 2019).

Third is the speed of change: this can be fast or slow, or – to use a geological metaphor – catastrophic or gradualistic. Some things, as Conzen recognised, are quick and easy, such as subdividing and selling a plot; others are more difficult, such as buying land and moving infrastructure in order to change a street alignment. Through urban history, most change appears to have been small-scale, incremental, gradualistic; but interspersed in some (but not all) places by short periods of catastrophe and response (Larkham, 1995). This leads to the model of 'punctuated equilibria', developed in evolutionary biology by Niles Eldredge and Stephen Jay Gould in the early 1970s and more recently adapted to fields ranging from organisational change management to changing public policymaking energy and environmental policy (Gould and Eldredge, 1972; Baumgartner et al., 2018; Speth, 2008). It has also been applied to conceptualising urban change (Larkham, 1992: Fig. 4). Here we might consider what happens during the period of crisis, and how the urban form in one period of relative equilibrium differs from its predecessor.

Fourthly, the scale of change is worth considering: is it small-scale and – to use Conzen's term, 'adaptive', or large-scale

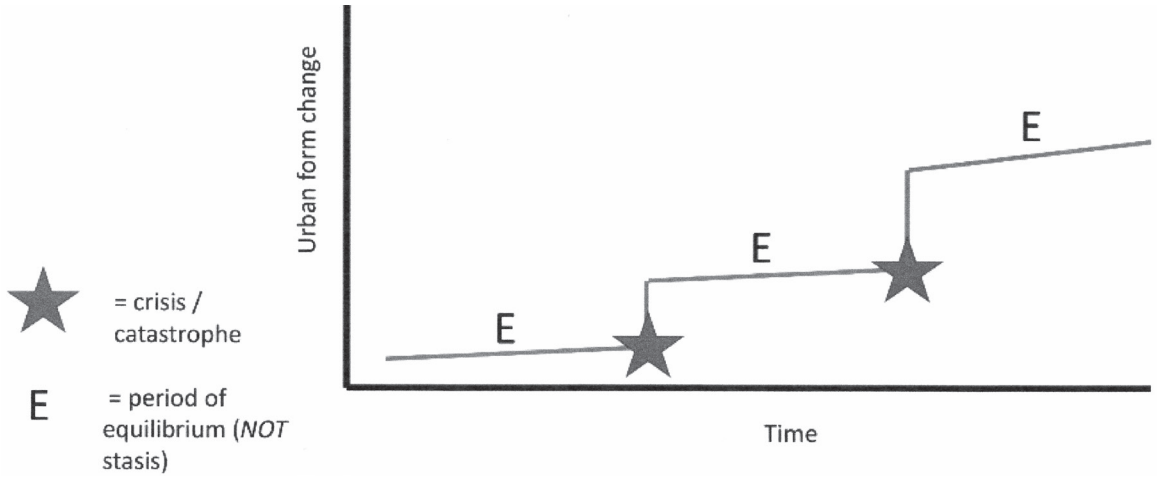

Figure 4. The punctuated equilibria model.

Figure 5. Vancouver's first attempt at COVID-19 slow streets. Source: Paul Krueger, CC BY 2.0.

and more radical, that might fall into a Conzenian category of 'augmentative' (Conzen, 1969, see Glossary). Adapting an existing urban fabric can be relatively easy; augmenting it with new street and plot layouts can be expensive, problematic and time-consuming. Furthermore, are changes intended to be temporary or permanent? This affects cost, but also the concept of change and urban management: land-use planners have been giving more consideration to temporary, 'meanwhile', changes in recent years (Németh and Langhorst, 2014) including in response to COVID (Andres et al., 2021). Some of these changes have been superficial, scarcely affecting physical form at all (Fig. 5).

In summary, these factors contribute to consideration of how resilient our current urban landscapes might be. However, 'resilience' is used here in the definition of 'the ability of a substance or object to spring back into shape' (Oxford English Dictionary), rather than - as so much of the urban literature uses it - the capacity 'to maintain or rapidly return to desired functions in the face of a disturbance, to adapt to change, and to quickly transform systems that limit current or future adaptive capacity', although this is from a broad study of the term which acknowledges its complexity (Meerow et al., 2016).

Other factors affecting urban change

Caution over ascribing change directly to COVID also derives from other factors that were happening at – historically at least – much the same time. First would be the world economic crisis from 2008. This has been long-lasting with major consequences for economic growth, quality of life and numerous other factors; affecting countries in different ways and generating a range of responses (Grant and Wilson, 2012). It had specific effects on the real estate market and investment (Mach, 2019) and hence on the amount of money available for urban change on the part of national and local governments, and both institutional and individual property owners and investors.

A second factor would be the rapidly-increasing awareness of climate change and its likely impacts – rising temperature and rainfall, extreme weather events and so on: so great that it is now often called the climate emergency. This brings issues of the energy efficiency of buildings and other urban activities such as transport to the fore, and we have been seeking physical responses to this for three decades now, albeit slowly (Lowe, 2003; Maliphant, 2022).

Third would be the pace of technological development that can be applied to buildings, cities and the factors of urban life. We now tend to adopt technology changes very quickly (McGrath, 2019), as is demonstrated by the worldwide adoption and use of mobile phones. As a built environment example, a continuing move from petrol to electric vehicles, while driven principally by awareness of finite fossil fuels and the climate-change impacts of their combustion, will lead to small-scale changes in the provision of charging points and, perhaps, on a slightly larger scale the redundancy of the petrol filling stations that are still common and sometimes prominent features in our urban landscapes. A move, technology permitting, to more autonomous vehicles, and a new model of ownership and use that is more communal than individual, might free-up much space in terms of suburban and city-centre parking and, with more efficient use of street space, might make some of that space available for other uses such as cycle lanes, pedestrians or even other pavement uses. While a disruptive change (Yigitcanlar et al., 2019), eventual outcomes could have a wide range of positive effects.

Technology has also allowed more online retailing, with a resultant decline in the use or need for traditional high street space from the middle of the last decade – although this is reinforcing previous trends (Jones and Livingstone, 2018). Consumer behaviour has also changed in other ways from

before the COVID outbreak, including – in the UK at least – a reduction in new car purchasing (Statista, 2023) (although cars have become larger!), and a reduction in dwelling and garden sizes: in the UK this goes beyond what we see elsewhere in Europe at least (LABC, 2018).
Therefore a range of longer-term factors affect built-form use and change, and factors tending to result in urban inertia, or the 'bounce-back to previous state' definition of resilience. So what did COVID bring?

COVID and change

First, it could be suggested that the pandemic brought nothing that had not been foreseen. A 2008 online simulation of a respiratory pandemic, carried out for the Institute for the Future at Palo Alto and involving ten thousand online participants, predicted virtually everything that happened in the COVID pandemic years 2020–2021 (McGonigal, 2022, p. xv). But responsible authorities seemed to learn little from it, and this is not unusual: the US Navy's 1932 fleet battle simulation identified the vulnerability of its Pacific bases to surprise attack, yet the attack on Pearl Harbor in December 1941 still surprised them (Reimers, 2018).
The first key change was behavioural: indeed described by some as 'profound changes to social behaviour' (Arora and Grey, 2020). Willingly or otherwise, most urban people began to wear masks, observe some form of social distancing, and reduce their socialising, shopping trips and work commuting (Fig. 6). So retail footfall declined quickly and catastrophically, while online retailing, for those fortunate enough to have the capability and equipment, rose equally swiftly (Enoch et al., 2022; Lashgari and Shahab, 2022). This, of course, led to road use falling and city centres lying under-used or empty. There was a substantial rise in cycling

Figure 6. Queuing for bread, Tring Market. Source: Snapshooter46, CC BY-NC-SA 2.0.

(Francke, 2022) but a rise in vehicle speed amongst those still using motor vehicles, particularly during the UK's lockdowns (DFT, 2021). In lockdown and since, many people have worked from home and home-schooled their children; while this has proven good for some, with reduced commuting and increased quality of life, for others the pressures of space and competing uses have been problematic. Not all dwellings have had appropriate physical space or even bandwidth, and competing activities in the home can disturb work patterns and concentration: workers' health can suffer (Al-Habaibeh et al., 2021; Birimoglu Okuyan and Begen, 2022; Fukumura et al., 2021).

When lockdowns were lifted, if only partially, physical changes were evident in many places. COVID did spur planners and city managers to produce some changes very quickly, but they seem to have been largely small-scale and temporary. Typically, to accommodate social distancing for pedestrians, pavements were temporarily widened and some streets were closed to traffic, or similar restrictions were imposed: this was easier when there was so little vehicular traffic (apart from the substantially increased number of delivery vans in suburban areas). A portfolio of changes quickly emerged, with evident new approaches to street management, and which could provide examples and experiences for re-conceptualising streets as public spaces (Gregg et al., 2022). Even in the UK's climate, on-street cafes and pubs became quite common. In several countries, restaurants colonised outdoor space with small greenhouses or other temporary structures to create dining spaces resistant to disease transmission. Similar approaches have been used to break up the previously-popular open-plan offices into much smaller spaces. There have been other land-use changes, with unused car parks converted to COVID testing sites, vaccine centres and so on. Similar approaches occurred within buildings, with one-way systems, barriers, signs and so on.

In the UK, official guidance for a built environment response to COVID was produced surprisingly quickly. Perhaps someone had indeed been planning ahead. The UK Government guidance was first published on 13 May 2020, and by September version 7.3 was available (HM Government, 2020: the guidance was withdrawn on 8 April 2022). It contains very detailed suggestions for managing all types of built environments and urban forms, although all were quick, temporary and relatively cheap. It prioritised providing additional space, such as widened and one-way pavements, for those people allowed out under the various lockdown regimes.

Therefore, following the guidance, all of these physical changes – urban adaptations – were small-scale, rapidly done

and have almost all proven temporary. They are more adaptive than augmentative, in Conzen's terms. Most signs, cones and bollards have long gone: as one example, those in Sunderland in the north of England were removed as early as July 2021. Some municipal authorities sought public feedback about the changes, especially where roads were closed to vehicular traffic. While some respondents identified benefits, others – principally businesses and vehicle users – have fought to have the previous situation reinstated (BBC, 2022). Few seem to have been made permanent. Personal observations in the English Midlands are that where streetworks were put in place there has been little attempt to capitalise on the experience of the COVID period, for example by providing additional cycle space, when those streetworks were removed. There was professional concern in England that building changes allowed during the emergency 'had no place in a pre-COVID-19 world and after our experiences of 'lockdown' cannot be allowed to remain in place' (Levitt Bernstein, 2020). More systematic research has found some more permanent changes with greater public acceptance and embeddedness in long-term planning agendas (Verhulst et al., 2023). There has been some campaigning for making some of this 'tactical urbanism' more permanent (dos Santos et al., 2020). However, despite public support for making some changes permanent, in places 'transportation agencies remain an impediment' (Noland et al., 2022).

Permanence of changes?

Why did city planners and managers so rapidly undo their changes? Are we seeing urban inertia, or the resilient rebound to a pre-COVID state? One issue is that making temporary changes permanent costs money, and after both the global economic crisis and the uncertainties of the financial costs of COVID many UK local authorities are in very poor financial shape (Ahrens and Ferry, 2020), some only functioning with very large Government loans and several virtually bankrupt (Local Government Information Unit, 2023) and several, including Birmingham, are bankrupt. A second issue is behaviour change. As soon as possible (and sometimes before, given police penalties imposed, even on high-profile public figures, for a range of activities), much behaviour returned to near normal, if that is defined by pre-COVID patterns. This is shown in, for example, motor vehicle use: even if many are still working from home at least part of the time, many are returning to their places of work, at least some of the time, although there is much variation and some employers are accepting flexible work practices (Fiorentino et

al., 2022). Some report greater productivity and satisfaction with flexible arrangements, although others have sought to compel office workers back to the office, with the view that this constitutes more efficient use of space (a prominent UK example is Jacob Rees-Mogg while a Government minister in 2022: Smith, 2022).

Retail footfall rose quickly after lockdown, although still below pre-pandemic figures; online shopping and home deliveries have also remained popular (Robinson, 2023). Perhaps some of this footfall is a return to 'leisure shopping' – itself a behaviour change in Western economies from the 1970s and 1980s. Overall in the UK, by July 2021, after 17 months of crisis, urban economies were already recovering (Jahshan, 2021); though more quickly in smaller towns than in the major conurbations. But there are exceptions: observation suggests that Stratford on Avon lost about 45% of its shops, and they have been very slow to return: but many serviced the 4 million annual Shakespeare tourists, and they have been equally slow to return.

So, in my view, there is quite a substantial body of evidence showing a tendency to return a long way to the pre-pandemic urban situation, and quite quickly. Salama (2023) noted that "social distancing guidelines coupled with operating in a post pandemic virtual world will instigate new living and working patterns, which will result in different spatial requirements and place standards". Yet Salama was writing early in the crisis (this paper was first published online in 2020), and the social distancing guidelines, mask-wearing etc have been quickly forgotten by the majority.

Post-pandemic lessons

What can we learn for the post-pandemic future? Some have mentioned the need for more urban space, lower densities, fewer city-centre offices, and hence the demise of the skyscraper. Certainly in 2020 and 2021 tall building starts and planning applications fell in London and elsewhere. Yet Central Park Tower, the world's tallest residential building, has also opened in New York, and multiple tall towers have sought, and been granted, planning permission in Birmingham. As another critic noted, 'the history of the skyscraper is a history of people predicting its end'. Indeed, after the destruction of the World Trade Center in 2001, and the view that skyscrapers were vulnerable targets, we have built more than five times as many skyscrapers than existed before (Wainwright, 2021). Others argue that urban planning policies should continue to advocate higher-density development, both because of the imperatives of responding to environmental change through

sustainable development types, and the equivocal evidence about the relationship between high-density areas and COVID infection and death rates.

Perhaps there may be changes in the form of work spaces. Larger shared spaces with lower-density occupation, better ventilation including openable windows, better IT and a more flexible management approach to the use of space, including bookable hot-desking, have been advocated. But such ideas are hardly new. They may produce work environments that are more resistant to COVID infection spread, but also lead to greater workplace satisfaction and, perhaps, productivity. They will have little affect on urban form, being largely an issue for building interiors; but, surely, many existing buildings could be retrofitted in this way. There will surely be an impact for the commercial real estate market in terms of the values of unimproved office space.

Retailing patterns have changed, and seem likely to continue changing as online and delivery technologies improve. Again, though, this is not a specific COVID response. There may be major real estate implications here, if high street retail floorspace continues to be under-used and vacancy rates rise as more retailing goes online. It has been suggested that some forms of retailing may need only small 'sample' shops, where customers can 'feel the quality' but order online for home delivery. There may be more 'pop-up' shops. The value of un-needed retail property is likely to plummet. A problem for town planning is what should be done with this property, particularly in town centres, and more so in town centres that are also tourist destinations for their character, appearance and heritage value. How far can desirable characteristics be retained in re-use and conversion? But what would happen if heritage interests inhibit such alteration?

Housing is equally likely to face changes, as indeed housing provision did in the UK following the crisis of both First and Second World Wars, with new government-imposed house design standards. Communal spaces in housing such as old persons' homes and student accommodation, and high-rise blocks, will pose particular problems. The future market might want smarter homes, perhaps larger if we spend more time at home and less at work; with flexible work and social spaces. More flexibility for adaptation to changing life stages might help. More space at entranceways for storing potentially contaminated clothing, and washing, has been mentioned. And, for sustainability rather than COVID reasons, we need better insulation and more use of renewable energy and concern for water management. We could re-think domestic access to nature, and even increase domestic-scale urban

agriculture. The balance between private and shared space might change with, for example, wider pedestrian footpaths. The space allocated for individual vehicles might change if we use fewer private cars. Garage space could be re-purposed. But we might need more storage space for cycles. However, we also need to remember the inertia factor: in the UK at least, the great majority of the houses we will have in 2050 have already been built: many of them some decades ago. While we can improve the houses themselves to some extent, it is much more difficult to change the urban landscapes in which they sit.

There is a cautionary note to this discussion: not all can afford houses of the type described here. Indeed much of the commentary and examples seem to relate to the relatively comfortable middle classes of the developed world, yet COVID has affected everyone and we need to consider all ways of living and working.

Streets and spaces will also change. In some residential areas, people have been walking on traffic-free street surfaces rather than on narrow and badly-maintained pavements. But town centres are likely to change, as many have enjoyed using traffic-free spaces for other uses. Cyclists certainly benefited (Fig. 7). Widened pavements made walking more comfortable. COVID may have given considerable impetus

Figure 7. Chichester, pop-up cycle lane, August 2020. Source: Djm-leighpark, CC BY-SA 4.0.

to town-centre pedestrianisation or, at the least, more sharing of space. More urban green spaces may be desirable, as this has been shown to improve mental health, as well as lead to a reduction in risk of obesity and diabetes – conditions which significantly increase vulnerability to COVID-19 and other diseases. Of course, it will be easier to design such space into new layouts, if that space can be afforded: who will pay? But even small spaces may be beneficial, especially if real foliage is used, rather than the common crisis-response of artificial turf and vegetation.

However, some of these visions could be just as visionary, and remain just as unbuilt, as the visions following the catastrophe of Second World War damage. More buildings and cities exist on paper (or, now, in digital form) than are ever built. The design ideal hits the inertia factors mentioned earlier.

Conclusions

The speed, scale and severity of COVID provided what Matthews (2020) calls a 'transgressive stressor': a rare event causing severe social, economic and environmental impacts felt at every level in society. Some of those impacts will be on the form and function of cities.

Crang (2000) suggested that 'city shape should be thought of as a morphology, a logic of changing and transmission, rather than a static shape'. COVID has pushed us to review that logic, to challenge the accepted standards and ways of operating that are often rooted in the experience and the urban forms of the immediate post-Second World War years. Cities certainly are not static, and they will change further after COVID, which demonstrated just how quickly they could change (and change back again). We need to consider how ideas for the post-COVID urban reality are developed and transmitted. But, despite all of the interesting ideas – not all of which are really new – we do not yet know the direction or speed of that change.

A 'new normal' will, of course, emerge. For built-up areas this might, for example, prioritise active and green travel, and reallocate road space. A more sustainable attitude to development, travel and other behaviour shows that we do need to do this, and the hiatus of COVID has shown that it can be done, and delivers immediate benefits – for some people at least. So perhaps Jabareen and Eizenberg (2021) were right: the pandemic has led to 'a new socio-spatial urban order', albeit often temporary, emphasising that the 'prevailing urban form holds some major deficiencies that impede its functioning and its adaptation to new conditions'.

To move to a new normal, a more sustainable normal, involves overcoming the substantial forces of inertia and 'bounceback resilience' identified discussed here. Inevitably this will be a lengthy and expensive process. While COVID gave every person in the world a wake-up call, rather like the neutron bomb of the late Cold War period, it killed and incapacitated people but caused no direct property damage. Therefore all of our inherited structures, the drag of inertia, still remain. The likelihood is that we will get 'more of the same', and the amount of 'radical new' urban forms will be limited, will be found particularly in new urban areas, and so this will not be a quick process. The direct urban impact of COVID will be relatively limited, and writing at the turn of 2023–2024 this is visually very evident. The indirect impacts, though, are likely to be profound and far-reaching, but possibly slow to take effect. We are now more aware that a wide range of urban changes are necessary, appropriate and deliverable. Typologies of change have been produced. There will be some urban reshaping to increase disaster resilience.

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