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Density and pandemic urbanism: Exposure and networked density in Manila and Taipei

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Abstract

Density has been a key focus in research on the urban dimensions of the COVID-19 pandemic. Much of this work has debated the role of density in infection rates. In contrast, we develop a comparison of the management of pandemic urbanism in two high density Asian cities with divergent pandemic experiences: Manila and Taipei. To pursue the comparison, we develop two conceptualisations of density: *exposure density* and *networked density*. Our approach allows us to examine the nature and consequences, especially for the urban poor, of different approaches to density in the pandemic, and to advance research on urban density.

Keywords

Density, exposure risk, Manila, network topology, pandemic urbanism, Taipei

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摘要

密度一直是城市层面新冠疫情研究所关注的重点。许多这方面的研究讨论密度对感染率的影响。相比之下，我们对两个具有不同疫情经历的高密度度亚洲城市的城市疫情管理进行了比较。这两个城市是马尼拉和台北。为了进行比较，我们提出了两种密度概念：接触密度和网络密度。我们的方法使我们能够研究在疫情中处理密度问题的不同方法的性质和后果（特别是对城市贫民而言），并推进对城市密度的研究。

关键词

密度、接触风险、马尼拉、网络拓扑、城市流行病学、台北

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Introduction

During the COVID-19 pandemic, state interventions were often aimed at either preventing or safely managing densities. This included measures ranging from physical distancing, quarantine arrangements and citywide lockdowns, to on-site rules for workplaces, schools or leisure, or mass gathering events. The pandemic governance of urban density reshaped everyday routines, challenged public health knowledge, enhanced the nature and scope of techno-social interventions, led to the remodelling of building interiors, and impacted public perceptions and experiences (Hamidi et al., 2020; McFarlane, 2021). Not surprisingly, urban density gathered significant popular and scholarly attention over the course of the pandemic (Acuto, 2020; Boterman, 2020; Connolly et al., 2020; Joiner et al., 2022). This work is part of a larger literature on COVID-19's impact on cities, covering four key areas (see Aalbers et al., 2020; Marvin et al., 2023; Sparke and Anguelov, 2020).

The first is urbanisation. As Connolly et al. (2020: 258) have argued, the intensifying process of 'extended urbanisation' on urban peripheries has increased vulnerabilities to the spread of infectious disease as cities, ruralities and agricultural practices mix (see Ali et al., 2023; Ali and Keil, 2008; Keil, 2020). The second is governance. Research on public policies has examined how temporary political controls have become longer-term state control (Kipfer and Mohamud, 2021), and how the pandemic catalysed shifts to greater digital experimentation, crowd control, and security regulation (Acuto, 2020; Chen et al., 2020; Jin and Zhao, 2022; Joiner et al., 2022; McGuirk et al., 2021). The third is *vulnerabilities*, and in particular how elderly, disabled, impoverished, or otherwise marginalised groups saw their struggles intensify in the pandemic and its aftermath, including lines along race, ethnicity, and class (Brickell, 2023; Pitter, 2020). Finally, the fourth is research on the *potential long-term impacts* of the pandemic, including on labour patterns, housing and real estate markets, and economic change (e.g. see Florida et al., 2023; Marvin et al., 2023).

Across this work, urban density has been a concern in relation to patterns of epidemic outbreak, state management of crowds, and the geographies of home, the city centre, and labour (Anacker, 2022; Boterman, 2020; Joiner et al., 2022). This has included a debate on the extent to which density might be a factor in higher rates of infection, hospitalisation, and death. The consensus that has emerged is that it was not density *per se* that drove infection, but the need for more fine-grained understandings of socio-spatial connections between working patterns,

poverty, domestic overcrowding, class, race and ethnicity (Boterman, 2020; Fang and Wahba, 2020; Hong et al., 2021; McFarlane, 2021; Tiberghien, 2021; Wolf, 2016). In the United States, for example, high densities were associated with the initial outbreaks, partly owing to their location as international and national transport hubs in addition to residential densities and high densities on the move, but there is little evidence of high densities themselves driving infection and death (Carozzi, 2020; Hamidi et al., 2020). At the same time, density was found to act as a social resource through which residents could draw in the support of neighbours and civil society groups, and mutual aid (Duque Franco et al., 2020; Mould et al., 2022).

Our approach is distinct. We focus on how density has been differently governed across two high density cities. This comparative approach has been rare in research on pandemic urbanism, which is surprising given the highly varied governance response to COVID-19 (McGuirk et al., 2021). Our contribution is to undertake a comparative analysis though the development of two closely related concepts: *exposure density* and *networked density*. These concepts, we argue, are useful for understanding the urban management of the pandemic, including the role of civil society and activist responses. They help us to see how differently density surfaced and was addressed, and how different approaches led to quite different outcomes for residents. They also widen the conceptual repertoire through which density is understood in urban research. Our contribution is, then, two-fold: first to understanding of pandemic urbanism and its governance; and second to the conceptualisations of density in cities.

'Exposure density' is the topography of infection risk expressed in locales. Prior to the pandemic, the World Health Organization (WHO, 2012: 14) identified 'exposure assessment' as an estimate of the number of people known or likely to have been exposed plus the number who are likely to be susceptible. The phrase has been historically linked to radiology, but is more widely understood as transmission potential in a site, including both perceived and quantified risks, from cognitive measurements of crowdedness to real-time public health data dashboards (including statistics, charts and maps). Transmission potential links to living conditions, dose-response relationships to infectious agents, incubation periods, Case Fatality Rates, and existing immunity. Temporality also plays into how exposure is understood. For example, evidenced emerged through the pandemic that it was most likely to be 'prolonged exposure', that is, at least 15 minutes of proximate contact, that would lead to a higher degree of infection risk (Kurgat et al., 2019; Ryan et al., 2021).

In the city, this means that exposure is tied to the places in which residents spend time, including homes, neighbourhoods, workplaces, and entertainment venues (bars, cafes, clubs, cinema, theatres, sport complexes, etc). Exposure risk increases when density and poverty coincide, particularly in the confluence of domestic overcrowding, an inability to isolate at home or work or to access adequate water, sanitation and soap and inadequate health care (Cox, 2020; Neiderud, 2015). The 'attack rate', a term used to describe the percentage of people infected in a specific place and time, has been shown to be especially high 'in crowded events, homes and other spaces where lots of people are in close, prolonged contact' (Hernandez et al., 2020: n.p.). The World Bank developed a methodology for identifying areas that had the highest exposure risks. Two elements were key: the practical inability of physical distancing in poor 'overcrowded' homes, and conditions where people might have little option but to cluster

(e.g. to access public toilets and water pumps) (Bhardwaj et al., 2020). In Mumbai, for example, the Bank used the location of public toilets as a key service that people had to use; in Kinshasa, water kiosks.

If exposure density primarily focuses on issues related to hazard and risk calculation and assessment, our use of 'networked density' differs in two significant ways. First, its focus is more on *responses* to the pandemic. Our particular concern here is how dense networks of sociability and solidarity played out in the delivery of care and support, and how 'density' as a spatial feature conditions and enables the emergence of such networked density (Duque Franco et al., 2020; Mould et al., 2022). Here, civil society coalitions proved to be especially important. Second, networked density is expressed *across* urban space. While exposure density focusses on topographies – the activities going on *within* particular sites – networked density is a topological expression of density, emergent as the coming together of people and provisions across the city (e.g., through a thick network of activists and residents). Here, density emerges not just as numbers in place (exposure density) but as a distributed range of actors, knowledge and resources across sites. While networked density can be focussed *on* numbers (in the form of state-led contact tracing, for instance, or in response to exposure density numbers), it is less a problematic of numbers of people in a site than it is a form of gathering and accumulation, a thickening of relations between groups over space (Lury et al., 2012; Martin and Secor, 2014; McFarlane, 2016).

A 'networked density' then is a distinct socio-spatial phenomenon from closely related ideas like 'social capital', 'social infrastructure', 'community resilience' and even 'social network density' (e.g. Klinenberg, 2018; Leon, 2020; Putnam, 2001; Simone, 2004). While all of these, in different ways, refer to social connections beyond the family and close friends, they tend to focus on particular places and/or position the density of social relations across space as passive background rather than active in the making of urban provisions and everyday life. In our approach, we are concerned with forms of support, care and solidarity that could happen *because* of the dense network of people across urban space, that is, the network is constitutive rather than merely circumstantial. Finally, it is important to add that exposure density and networked density are not separate domains. Given that the latter serves to respond to or anticipate the former, they are intimately inter-related and co-constituting. Our contribution to debates on urban density then, is to stretch and pluralise who we think about in density's geographies, and in particular to call for more attention to how different spatialities of density – in place or networked across space – interact with one another in ways that can have important social, economic and political consequences and relationships.

Governing the pandemic: A comparative view

We develop the concepts of exposure and networked density by comparing two city regions in Asia: Metro Manila, The Philippines and the Taipei Metropolitan Area, Taiwan. These cities exhibit distinct physical, socio-political, regulatory conditions, and cultural dispositions. They serve as major capital cities within their respective countries. While they are both high-density large South-East Asian cities, they differ significantly in economic conditions and density levels.

Covering an urban region of almost 700 km^2, Manila is one of the most densely populated urban areas globally. Population density averages around 44,000 people per km^2, and has increased by an average of 32% since 2000. Over half the population

lives in dense low-income neighbourhoods (Edelman, 2016). In contrast, Taipei Metropolitan Area, including Taipei and New Taipei Cities, occupies an area of 2324.8 km^2 and has a much lower population density average (just under 3000 people per km^2). In both city regions, density climbs in lower income neighbourhoods (Li et al., 2016). Manila has a far larger number of people living in often highly dense and predominantly horizontal informal settlements, characterised by limited public space and overcrowded homes, which intensifies infection risk. In Taipei the urban poor are more often located in subdivided flats and multi-storied housing blocks, and with relatively greater capacity to isolate and distance. These conditions led to different exposure densities across the two cities and influenced networked density responses.

The two countries developed distinctive pathways in managing densities in the pandemic, and is it this that makes comparing their pandemic experiences instructive. In the Philippines, the authoritarian government led from 2016 to 2022 by populist President Duterte, and now by his ideological successor, Bongbong Marcus, mapped its discourse of intolerance onto the virus, pursuing a 'war' strategy that often stigmatised the poorest and which resembled its 'war on drugs' (Hapal, 2021; Saguin, 2022). The model of pandemic governance was both a continuation of Duterte's often violent anti-communist militarism, and an expression of his 'us versus them' authoritarian tendencies. This manifested as militaristic management characterised by punitive action.

On the one hand, the model of pandemic governance echoes that imposed by many other states. The government used community quarantines across the city's barangays – the smallest administrative forms in the Philippines – to contain the rapid transmission of the virus. From early in the pandemic, these took four forms (Jiang et al., 2022). The first was an enhanced community quarantine phase where public mobility was heavily restricted and fines were imposed on residents for leaving their homes. Only essential workers and services were allowed to operate. The second was a modified enhanced community quarantine, in which people were still required to stay home with reduced public transportation, but with some reopening of non-essential economic activities. The last two forms – general community quarantine and modified general community quarantine – relaxed restrictions further, allowing public transportation and more non-essential economic activities, although hospitality and tourism remained closed, and flexible working and working from home were encouraged.

On the other hand, the pandemic was governed through intolerant and often violent practices. When the pandemic began, Duterte warned people to 'obey the police and the military' or 'you will be arrested and brought to prison', and much of the pandemic governance was conducted by retired generals (Hapal, 2021: 229). Hapal (2021: 229) argues that lockdown measures were particularly 'intense in places where population density was high, namely urban poor places'. The poor were often violently policed through spatial markers of 'hot spots' and 'containment zones', and their livelihoods were hit severely by curfew restrictions (Golechha, 2020). As early as April 2020, the police had apprehended 156,000 people, but as lockdowns eased Duterte called on the police to be stricter, and larger fines and more arrests followed. At the same time, emergency subsidies via the Social Amelioration Programme (SAP) were slow and inadequate, placing greater pressure on civil society groups and poor communities to provide support and generate livelihood. Testing and contact tracing were criticised as weak and inadequate (David et al., 2020).

While the Philippines had one of the strictest and most prolonged set of

restrictions in the world, Taiwan had a nuanced and distinct response. By October 2021, it had the lowest number of cases and second lowest deaths per 100,000 amongst comparable OECD countries (Cheng, 2021). Taipei's long-held record of zero-cases in the first two waves of global infection in 2020 was attributed to its effective spatial-temporal coordination of global travel restrictions and highly targeted domestic measures (Hsieh et al., 2021). Established following the 2003 SARS outbreak, the strategy led by the Central Epidemic Command Centre was two-fold: preventing in-migration, and forwarding a heavily-resourced public information, testing and contact-tracing programme, including closely monitored 14-day quarantining.

Contact tracing and testing were facilitated by big data technologies. The National Health Insurance Administration (NHIA) augmented the function of its existing Smart Card to enable real-time access to patient records, diagnostics, and prescriptions, alongside travel history, occupation, and contact history across medical institutions. This was supplemented by the Intelligent Electronic Fences System, which used mobile phones and GPS to locate the country's quarantined residents. There was little substantial objection on the grounds of privacy, partly due to trust and support in the state shaped in part by the memory of the SARS crisis (Lee et al., 2020).

As with the Philippines, there was widespread mask wearing, but in Taiwan there was greater capacity for physical distancing and hand hygiene amongst urban residents, owing to the far smaller level of urban poverty in the country (1.3% of Taiwan's population is below the government poverty line, while in the Philippines it's closer to 24% (Asian Development Bank, 2021). Strict lockdown measures were largely avoided, although later in 2021 localised outbreaks did lead to closure of leisure facilities, schools, and indoor eating, all of which proved effective. The combination of early border control, heavily supported quarantining for incomers, intensive and effective contact tracing, mask wearing, and sustained mass sanitising of public spaces, have been widely regarded as key in the Taiwanese state's early and sustained success (Fitzpatrick, 2021).

This coordination strategy allowed the majority of citizens in Taiwan to continue routine living with relatively minor disruptions throughout the pandemic. The economy continued to grow, and relative normalcy prevailed (Hsieh et al., 2021). Some commentators have called it a 'whole nation approach', based on close collaboration between government and residents. While the Philippines suffered one of the highest death tolls in Asia, Taiwan had the lowest by mid-2022 (Hsieh et al., 2021). The two countries, then, present starkly different approaches to addressing the challenges of high density in the pandemic. In the former, we see a strategy of punitive sovereign power and partial, haphazard state provisioning. We see too urban areas with far higher densities and much more extensive poverty and inequality, both of which lay the ground for a potentially larger pandemic impact in infection and death. In the latter, we see a high-tech elaboration of governmental power and fine-grained real-time monitoring, lower densities, and much reduced poverty and inequality.

The comparison provides insight into the highly differentiated nature of pandemic governance in large dense SE Asian urban contexts, and the possibilities and limits of different approaches. It doing so, it also builds on existing studies of the pandemic in other Asian cities, including on density. In Malaysia, China and Japan, for example, research has shown that networks of residents, civil society organisations, and the national and local states have played highly

differential support roles during and after lockdowns, from supportive and facilitatory, to punitive and obstructionist (Diao et al., 2021; Rauff et al., 2020; Teller, 2021; and see Kipfer and Mohamud, 2021, comparing policing responses in France and Canada).

Methodology: Researching comparatively in the pandemic

The research discussed here is part of a broader European Research Council supported research project, *DenCity*, that compares dimensions of high-density urban living (e.g. Chen et al., 2020; Chowdhury and McFarlane, 2022; Habermehl and McFarlane, 2023; Joiner et al., 2022; McFarlane, 2021; Tripathy and McFarlane, 2022). The research in Manila and Taipei took place from winter 2020 to late summer 2021, focussing on how cities managed and experienced the pandemic, and was supplemented by additional research trips and monitoring into late 2022. Our approach was to focus on how density was governed, perceived and managed by different groups.

With the exception of one post-pandemic trip, the research in Manila was online, given COVID-19 conditions and limitations on travel until spring 2022. It emerged through local academic and civil society contacts in the city, who in turn put us in touch with other civil society groups and activists. We conducted 14 interviewees with civil society groups, local government officers, and residents involved in pandemic relief work, and a survey of how residential perceptions and experiences of density were changing as a result of the pandemic.

While this sample proved helpful in developing a deeper understanding of some of the everyday lived experiences and perceptions of density during the pandemic, its size is also a product of the limits of online research. Had we been able to conduct in-person research in the city, we would have been able to more systematically identify respondents in different places in the city to capture a more fine-grained range of responses. Despite these limits, the interviews provided a valuable insight into new forms of density, that we conceptualise as exposure and networked densities. A research trip to Manila in late 2022 helped to place the research in the context of the city's neighbourhoods and to stress-test findings with 14 interviews with residents and civil society groups on high density living as the pandemic receded from view.

In Taipei, consistently low COVID-19 levels meant that it was possible to safely conduct on-site fieldwork, including survey and interviews with government officers, social workers, borough wardens, and community organisers. This led to 27 interviews with a range of residents from different socio-economic positions, as well as government officials, community organisers, NGOs, and social workers, as well as an online survey. Being able to conduct in-person research meant that in Taipei we were able to develop a more geographically sensitive understanding of how density was governed in different parts of the city than we did in Manila. Some of the interviews were walking interviews, which helped connect people's perceptions and experiences to everyday conditions and sites in neighbourhoods.

In both cities, data was supplemented through policy and media reports and government statistics. It is important to stress that we set out to compare particular conditions and organisations in both cities, rather than developing an 'across-the-board' account of the wider pandemic governance in both contexts. In both cities, while we selected established civil society and activist groups that were operating in high density poor urban areas, we did not set out to cover the range of organisations exhaustively. This means that there are civil society groups that may embody different

approaches to, and ways of working with, urban density through the pandemic, and which could lead to a different account. In the next section, we explain how the concepts of exposure density and networked density advance existing research on the pandemic urbanism.

Exposure density

Barangays, Manila's smallest municipal units, contain huge economic inequalities, and in poor areas are typically highly dense, with a shortage of medical and community quarantine facilities and inadequate sanitation and waste management. In these sites, we see the gaps between preventive policy measures and exposure densities shaped by historical disinvestment and deep inequalities in income and provisions.

The Commission on Population and Development (POPCOM) developed Demographic Vulnerability Tools (DVT) to document the connections between density, poverty, infection and death (Commission on Population and Development (POPCOM), 2021). They found that poor, high-density barangays had almost twice the infection rates of less-densely populated barangays – the key variable is poverty. Commission on Population and Development (POPCOM, 2021: n.p.) wrote: 'Even low-density barangays have higher-than-expected death rates not commensurate with the number of cases. This is because of the lack of residents' access to health-care facilities'. In an interview, one urban planner described how health care has become increasingly unequal: the poor struggle with threadbare overstretched systems, he argued, which quickly exceeded capacity during the initial pandemic waves, while wealthier groups have seen a deepening of what he described as a private insurance-based '*gentrification of healthcare*'.

Government assistance was haphazard and poorly delivered, and most of the organisation around emergency food was done by communities and civil society groups. People became '*absolutely desperate*' for basic support with food and income, the planner went on: '*Unfortunately, it [government financial assistance] is just too little to go around*'. One community activist has described how poor urban families were given a bag of rice and told it was 'help': 'They closed all markets last year, except supermarkets. And they encouraged people to stock up on food . . . How is one going to stock on food if one doesn't even have a fridge?' (Beltran et al., 2021: 38).

Exposure density in Manila was shaped not just by poverty but by state incompetence, neglect and authoritarianism. Respondents who live or work closely with low-income communities spoke about the impacts of COVID-19 control policies, such as the 'Balik Probinsya' (Balik Probinsya Program, 2023) programme (literally 'Back to the provinces') and the public transportation ban. Early in the pandemic, to reduce population density in poor dense neighbourhoods, people were encouraged to travel back to their provinces of origin. This led to large crowds awaiting transport and many became carriers of the virus to the provinces (Del Castillo and Maravilla, 2021). Despite the hazards of leaving, some opted to escape the city in-between lockdowns, particularly given the paltry and difficult to access state welfare support and the limited protection from landlord evictions (Johari, 2021).

For many residents, large scale de-densification programmes such as Balik Probinsya were not a relief but a contributing factor to exposure densities, hitting the poorest hardest. As a young female interviewee told us: '*Poor communication, lack of financial support, and generally the lack of a plan from the government increased fear among people . . . The government is historically pro-elite and the pandemic did not change that*'. Poorer residents were disproportionally

exposed not only to greater risk of infection, but also to disciplinary consequences of breaking restrictions. Another community activist described how the government focussed – albeit often ineffectively – on managing crowds in public places, but that dense poor residential areas were either abandoned or aggressively disciplined by, for instance, being fined or arrested for not wearing masks or physically distancing. Residents were often more apprehensive about government responses to the pandemic than the virus itself. One activist criticised the 'militaristic' response of the government:

> *They're even going after vendors on the street. So, there are a lot of street arrests where government confiscates goods . . . There was a total ban on public transport initially and you can only travel using a private car. And even where you get a certain permit in order to travel mostly from your home to buy a basic necessity like medicine [or to] go to the market only a certain group benefits from this . . . [the government] transferred . . . crowdedness and the risk to informal communities.*

While not all municipal staff were complicit in state neglect and authoritarianism – indeed, in poorer barangays, some suffered burnout from struggling to provide for those in need (Beltran et al., 2021) – there were voices who argued that the state ought to have gone further. Remarkably, given the militaristic nature of pandemic governance in the Philippines, one planner argued that the state should have been more aggressive, and pointed to elements of what he saw as the 'Chinese model', including sending teams into poorer areas to carry out forced testing.

Exposure density is as much about what the state did as what it did not do. Restrictions were implemented nationwide with no regard to the heterogeneous socio-spatial conditions of the households in barangays (Beltran et al., 2021). During a period of the tightest restrictions, one resident argued that it was simply impossible to comply with the rules of physical distancing because the housing infrastructures in poor, dense neighbourhoods require the extension of household lives outside:

> *You want to do physical distancing, but you can't go outside to breathe in fresh air as it would be against the quarantine laws . . . Wherever we go in city the houses are about a few metres only to about four by four or two by two, it is really small, then that's just all the area, the area where they eat, where they sleep in . . . all people of the household are in here.*

Another activist pointed to the difficulties of distancing at shared infrastructure, such as water taps, where residents found the police sometimes accosted them. One planner said that during the strictest restrictions people were *'packed so densely [that] . . . it just spread like wildfire'*, while a resident argued that it was unfeasible for children or elderly residents not to leave small, hot homes that lack ventilation. It is important to be clear here that it is not density per se that was the concern, but the interaction of density and poverty – especially the inadequate housing and infrastructure provisions for the numbers of people in place:

> *There is also the concern of energy usage. Because there is no window and they [residents] try to save on electricity, so they don't turn on the lights in the daytime, even if it's dark. A natural thing to do is to at least go out of the house. Even just outside your door. Unfortunately, the law enforcement agents of this government do not take that into consideration or do not even try to understand the consequences that these people were facing . . . They just arrest these people and put them in the police mobile and even in prisons, wherein they also do not practice physical distancing, which is ironic, because that's the reason why they were arrested.*

If the urban poor were not being disciplined by the state, they were left abandoned and told to isolate without the necessary assistance needed to do so. This amounts to the state effectively *increasing* exposure density in poor, dense topographies, in relation to both infection risk and the personal health and safety consequences of not being able to comply with strict restrictions.

In Taipei Metropolitan Area, in contrast, the story of exposure density was strikingly different. The identification and management of exposure densities were closely indexed to government-led epidemic preventive measures through the Central Epidemic Command Centre. The state attempted to pursue near-omnipresent and real-time technical intervention across the urban realm, including intensive practices of contact tracing, involving 2.6 hundred million, messages per month for case surveyors to track and follow up on across the pandemic, and online chatbot channels providing public information on the latest regulations and statistics (Wu, 2022). Whenever infection numbers appeared in dense spaces, there was a highly effective intervention at that site that ensured rapid quarantining of affected individuals. Here, exposure density merged with networked density. Through contact tracing, the state could not only identify emerging infection in particular dense locales, it could also act on networks of interactions that individuals might have had across space (see next section on networked densities). There was neither the capacity nor the political will to deploy such as system in Manila.

At the same time exposure densities were addressed through an intensive process of on-going risk reduction. The regularity of disinfection became symbolically important, a means through which residents could see continuous response to the invisible threats in the locale (Environmental Protection Administration, 2020). One young male interviewee who lived in a student dorm described the reassurance that accompanied the sheer frequency of sanitation across all public and semi-public facilities, and across the public realm: not just in the college but at the train station, at every escalator, in the metro stations, restaurants, gyms, libraries, and so on, a vast army of cleaning staff disinfecting the handrails, tables, and all sorts of interfaces frequently.

While Taipei saw none of the violent targeting of exposure densities witnessed in Manila, that does not mean that dense poorer areas were not left partially exposed. There were sporadic closures and bans of community spaces and events, with the state concerned that safety in numbers could not be assured. However, the policing of these rules was more consensual and peaceable. In some places, community activists responded by working to keep such spaces running. Activists described how despite what one called the '*de-densification*' logics in the city, it was important for the elderly, children, and socio-economically disadvantaged groups to '*have a regular place to go to*'. For all that the state acted as a powerful actor monitoring and mitigating exposure risk in dense spaces, activists developed a degree of autonomy through which they enabled densities to come together but in ways that placed a stringent focus on risk.

Part of the rationale activists gave was that the costs of not enabling densities would be other health costs that might be worse still than the virus. '*We did not stop any of the existing services*', said one activist. '*Everything goes as usual . . . If we do not provide a decent place for the local middle-school students, they will either be getting COVID-19 or taking drugs. Would that be any better?*'. Respondents described strategies including staff holding thermometers and alcohol spray at entrances, or the installation of UV-C light and disinfection gates.

Here we see conflicting claims about and prioritisations of exposure density. When

the state sought to close community spaces due to concerns about exposure density, some community workers saw a greater risk in exposing youth to hazards other than COVID-19. Activists prioritised exposure density in the form of the consequences of pandemic restrictions, rather than in the form of infection (although that mattered to them too). Unlike the aggressive policing and disciplining of Manila, these exceptions were largely tolerated as part of a gentler approach to pandemic governance that tacitly understood that local autonomy around balancing exposure risk and supporting precarious densities was to be respected.

In Manila, density was a source of potential contamination that had to be shut down and confined to the urban margins, then variously aggressively disciplined, partially supported, or abandoned altogether. The haphazard and often hostile state governance of exposure density contrasts, in Taipei, with a greater faith that local decision-making around care and support for exposed densities would best be served, when allied to government tracing technologies and information flows, by local decision-making. Given that this history of urban density debates has so often been one of vilifying high density as a potential threat to public health and order, Taipei's pandemic strategy offers a different approach, one in which practices of care, trust and reliable information cast exposure density not just as threat but resource (Chen et al., 2020; McFarlane, 2016; Pitter, 2020).

Networked density: Responding to the crisis

While existing debates on pandemics and urban density often focus on physical and topographical features, we argue that the concept of density, at times of emergency and crisis, is also revealed through the vitality of socio-economic networks. Densities are not just topographical. They do not only occur at particular sites, such as neighbourhoods, train stations, or markets. They are emergent in social and economic networks in the city that are closely interweaved with various topographical densities across urban spaces. The pandemic entailed different types of networked density. For example, media attention on so-called 'super spreaders' was partly based on a growing understanding of how specific individuals transmitted the virus through variegated intimate socio-spatial encounters as they moved between restaurants, factories, religious institutions, and neighbourhoods (Chang et al., 2021).

Or, to take a different example, what sustained Taiwan's 'zero-Covid' record was the backstage work of networked case identification, that is, mass contact tracing,[1] genomic sequencing, and surveillance (Carrington, 2020; Mohdin, 2020). Contact tracing worked topologically, folding people's movements and interactions across space into datasets to control risk. Case identifications were converted into disease representations and published through top-down public communication channels. This made visible epidemic network analyses that foregrounded inter-personal connectivity, with density emergent in the network of traced individuals across sites. Here, the network itself is a sort of density, one where the mass of people is not spatially concentrated but topologically distributed through all kinds of social and economic mobilities.

In Manila, the urban poor were often portrayed by authorities as a kind of node performing the work of networked densities, spreading infection from densities in the home to densities in transit to densities in public places or workplaces. The response took the form of scapegoating, fines and arrests of the urban poor. On the one hand, people lost jobs and food vendors quickly disappeared from the street, even as restrictions waxed

and waned; on the other, people had little alternative but to get back out and use whatever networks they had to find alternative livelihood (Simone, 2022).

Our interest in this section is primarily in networked densities as *responses* to the pandemic. Civil society, mutual support and activism played crucial roles in pandemic governance globally (Mould et al., 2022). Our argument is that the links between these groups and residents across urban space themselves formed a topological networked density. We have discussed the role of the state in responding to the crisis in both cities, but here we spotlight the role of civil society in addressing kinds of gaps and vulnerabilities through the pandemic. Activists and civil society groups may not have been the key actors managing the pandemic in both cities, but for many – especially the most vulnerable – they proved vital in the governance of COVID-19.

For one activist in Manila, civil society networks provided a central '*management mode*' supporting poor dense areas and groups across the city. Community-led food projects offer an important case in point. One NGO activist talked about the crucial role that community kitchens, pantries and gardens played. Pantries often took the form of tables on the street with ingredients or cooked food, which was typically donated. The first community pantry project was started by a young female vendor based at Maginhawa Street in the Quezon City area of Manila. She decided to serve food outside her house (De Leon, 2021). On a table she placed a sign: 'Magbigay ayon sa kakayahan, kumuha batay sa pangangailangan' (*Give what you can, take what you need*).

Her action inspired more community pantries to mushroom nationwide. The pantries brought together thick constellations of activists, established civil society organisations, and resident volunteers to enable flows of food, information and people into different sites of exposure densities in poor neighbourhoods (Canete et al., 2022). Hundreds of pantries regularly fed thousands of the urban poor across the city during the pandemic, but this vital initiative was not immune to the political context. One activist spoke about how the government was more concerned with policing than supporting pantries, with police very visible around the city. So-called 'red tagging', where activists were, in pre-pandemic times, identified by the Duterte regime as potential communists – often without evidence – was sometimes used in relation to pantry organisers.

This was seen by many activists as opportunistic targeting of government opposition voices. Some pantries were forced to close. Early in the pandemic, 21 residents in Sitio San Roque were arrested and released through a US$350 bail for gathering to wait for relief goods (Duterete had ordered police to 'shoot them dead'), and days later police raided a soup kitchen in the same area (Hapal, 2021). Nonetheless, one activist argued that the pantries became a model of support that other civil society groups, working on different issues, took inspiration from in their own organising and support work.

The story in Taipei was, once again, different, but with some connections in that civil society support became key for vulnerable and poorer groups. Similar to the barangay administrative system in the Philippines, *'lǐ'* is the native Taiwanese term for small administrative divisions such as a village, borough, or ward. Community civil society leaders at the level of *lǐ* played key roles in organising and sustaining networked densities of support throughout the pandemic, plugging gaps in pandemic governance that left some poorer, dense areas exposed, and operating in the form of networked density responses.

For example, we spoke to a community leader, Mr Fan He-Shan, based in Chun-

Chin *li*, Wanhua District, Taipei, who had initiated the National Food Banks Association. He described the networked density response. He began by recalling that his community was one that was badly impacted by the 2003 SARS outbreak, as the local hospital was the epicentre of the outbreak. Learning from how poorer residents had then been left exposed to infection and without adequate support, he worked with state civil society groups to coordinate health support with surrounding hospitals and establish a network of food provision to vulnerable groups. Prior to the pandemic, his community action had scaled-up nationwide and established a national network of food banks. It brought together over 200 communities with 60 food banks and 180 food-sharing fridges. The food banks served poorer residents, while the fridge was available to the general public.

This work was particularly important for those who were quarantining at home, especially elderly poor residents living in Taipei's dense and tiny apartment unit neighbourhoods. Pre-pandemic connections across civil society and mutual support groups realigned to deliver health care needs and food provision, including community restaurants that fed up to 300 people a day. While sustaining provisions with volunteers who are themselves often low-income, including for example casual workers in night markets or kitchens, was hugely challenging, respondents described how this network acted not only to provide basics, but also to support temporary employment.

To take another example, Wawa Forest is a community youth group in Xizhi District, New Taipei City, on the urban edge of the Greater Taipei metropolitan area. It is part of a social welfare foundation supporting low-income children and teens.ã £Xizhi was one of the earliest established places for Taiwan's Amis indigenous residents, many of whom moved to the city and became construction workers supporting Taipei's urban growth. One activist in Xizhi explained that her pandemic work was with community youth groups networks across the city operating in poor dense areas like Xizhi to share food, distribute facemasks, explore empty spaces and remake them for children's play, ensure support for elderly residents, and help people access government support (Badger, 2020).

To take another instance, at the Taiwan Community Practice Association in Wanhua, one of the oldest and densest areas of Taipei, community activists described both how densities of poorer residents had been stigmatised, and how civil society acted as a networked density response. Wanhua is often understood as a place of high-density subsidised old apartments and tower blocks, of ageing population, poverty, crime, homelessness, and sex work. Homeless groups, one activist put it, were perceived as '*flaws of epidemic control*'. Residents themselves sometimes worried about exposure densities. Community workers talked about how in some buildings each elevator is shared by between 42 and 48 households. But it was density, in the form of networked densities of connections across the city, that activists identified as key to the response. One said:

> *I think Wanhua has been keeping very well until now . . . [with] homeless centres, NGOs, and legislators gathered to cope with the emergent situations and to challenge the biased information . . . I would understand urban density as the capacity of civil society to rapidly respond to such contingencies . . . In our everyday community work, we are also exploring . . . how to make good use of the potentials and powers of density . . . the ways in which resources and forces of mutual support are quickly roaming everywhere.*

She went on to contrast the larger perception of '*negative density*' in place – the topography of exposure density – with the '*positive density*' at work in Wanhua, which took to

the form of a thick and dynamic network of organisations from across the city operating in particular topographies.

Conclusion

The pandemic city was managed in radically different ways, with profound consequences for dense communities. In Manila, in keeping with the modus operandi of an authoritarian state, density was heavily policed, sometimes violently. The poor, largely abandoned by the state, were treated as vectors of disease to be met not with care but with brute sovereign power. Exposure in poor, dense barangay areas was both to the virus and to the state, either in its aggressive policing of pandemic rules (and opportunities of targeting opposition activists) or in its partial or barely existent provisioning. Networked densities of response constituted an important, if partial, part of support and pandemic governance. In Taipei, the politics of density was resolutely governmental and technocratic, framing risk through intense data monitoring and cross-sectional coordination. Exposure densities were forensically monitored and acted upon through a highly funded and dedicated real time infrastructure of pandemic governance. Yet, our account here has also shown that networked densities of care and support, often stretched across urban space, came to matter, providing food, support and community space.

The comparison shows how exposure and networked densities can act as conceptual tools for understanding how density is managed and addressed. In closing, we highlight three contributions for urban research.

First, while most accounts of urban density focus on numbers of people in site – density as topography – in this paper we have sought to work both with that tradition and a second, topological conception of density. Paying attention to both exposure and networked densities enables us to examine density beyond the usual research rubric of numbers in place, to think about densities across place. This is useful not just for research on pandemic outbreaks, but for understanding density more generally. For example, networked densities are often important for governance and survival in poor, dense areas outside of pandemic situations, and densities in place – including, of course, those of higher-income residents and organisations – often have thick constellations of actors, resources and knowledge beyond the site (Beilin and Wilkinson, 2015; Mitlin and Satterthwaite, 2013). Through developing concepts of exposure and network densities, and their inter-relations, we have sought to unsettle the geographies of urban densities. We suggest that attention to the different relations between density and space can open out how Urban Studies researchers understand and research density's socialities, economies, and politics.

Second, our account here injects density – often taken as an abstract and fixed number – with the dynamism of urban change. While in the pandemic density was often reduced to numbers – the numbers and ratio of cases in place, the numbers in hospital, the numbers at work or out of work, and so on – our approach here reveals how it operates not just as a metric and measure, but as changing political imaginary and practice tied to conceptions of residents, places, movement, actors, and forms of knowledge. Far from a neutral object of urban discussion, density becomes enrolled in different political projects, both in the pandemic and beyond it (compare, for instance, the networked density of food distribution with that of state management 'de-densification') (Pérez, 2020).

Third, and finally, there is methodological value in comparison as a route to nuancing and advancing our understanding of urban density. A comparative approach reveals not

just the distinct journeys of cities as they sought to manage density in the pandemic, but points too to range of ways in which density is made political, rooted in inequality, and mobilised as response. Comparison here allows us not just to widen the empirical scope of knowledge about urban density in the pandemic in Asia and beyond, but also to create a generative dialogue between sites through which to extend, problematise, and refine our conceptualisation and vocabulary of urban density.

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Note

1. These practices continued over the initial waves of Covid outbreaks, including major variants Alpha and Delta, and suspended after the emergence of the Omicron variant.

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