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## Epidemic preparedness in urban settings: new challenges and opportunities



In recent decades, many emerging infectious diseases have been occurring at an increasing scale and frequency—i.e. Ebola virus disease, severe acute respiratory syndrome (SARS), avian and pandemic influenza, Middle-East respiratory syndrome (MERS), and the recently emerged coronavirus disease 2019 (COVID-19). The outbreaks of these diseases resulted in wide ranging socioeconomic consequences, including loss of lives and disruption to trade and travel. Preparedness is a crucial investment because its cost is small compared with the unmitigated impact of a health emergency. The financing gap for preparedness, estimated at US\$4.5 billion per year, is

minuscule compared with estimated pandemic costs of \$570 billion per year.<sup>1,2</sup>

Within urban settings, preparedness activities have the added challenge of navigating a host of disruptive determinants that demand innovative solutions, especially the way in which diseases and their human hosts behave.<sup>3</sup> Ensuring that urban settings are prepared for emerging infectious diseases is crucially important. In 2018, 55% of the world’s population (4.2 billion people) resided in urban areas, and this proportion might increase to 68% by 2050.<sup>4</sup> Emerging infectious diseases also either originate in urban settings, such

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	Challenges	Opportunities
High population density and high volume of public transportation	A larger population to be managed; ease of disease spread between humans in congested areas; difficulties in contact tracing, especially causal contact in public areas; inequalities resulting in poor housing environments that might hinder outbreak prevention and control efforts; closer encounters with wildlife via food markets or because of expansion into previously untouched ecosystems	Urban planners can consider epidemic preparedness in their designs and implementation; transport networks can be used to rapidly move supplies to outbreak epicentres; harnessing advancement in technologies for more effective contact tracing
Interface between animals and humans	Areas of poor sanitation with rodents and other animal vectors; live domestic and wild animal markets; animals raised in backyard farms or industrial agricultural facilities in close proximity to humans	Improved sanitation and rodent control around humans and animal communities; vaccination of domestic animals for common zoonotic infections; precautions at slaughter to prevent contact with blood; regulating live animal markets to phase out sale of live animals or to ensure that those for sale are raised on commercial farms and have been verified to be disease free
Governance by local authorities	Competing interests within a finite local budget; insufficient authority to institute response measures promptly; insufficient epidemic preparedness capabilities or capacities at a subnational and local level; difficulties in accessing national capacities	Leaders in cities would be better placed to develop and implement effective and contextually appropriate solutions; consolidated local surveillance data can improve sense-making at the national level; local leaders can be engaged to advocate for greater investments in local systems
Heterogeneous subpopulations	A wide range of cultural factors, including modes of social interactions and acceptable control measures; some subpopulations might be difficult to reach	Community leaders can be mobilised for targeted approaches to preparedness and response; innovative solutions can be shared and adapted across cultures
High connectivity to other urban centres (domestic and international)	High likelihood of multiple importation events; risk of rapid export of disease to other parts of the country or to other countries; fear might lead to restrictions on travel and trade	Evidence-based points of entry measures and exit screening measures can be implemented; trust can be built through strong diplomatic relations to allow for better collaboration
Centres of commerce	Greater disruption to economic activity, stability, and growth	Businesses and corporations can be engaged in business continuity plans that also prevent further spread, as part of a whole-of-society approach
Unconventional communications and interactions	Multiple information sources leading to misinformation; false information might spread quickly	Unconventional but reliable information channels and social media can be used for risk communication

**Table:** Challenges, and opportunities for epidemic preparedness associated with characteristics of urban settings

as the emergence of COVID-19 in Wuhan, China, or rapidly propagate because of urbanisation once they are established, such as outbreaks of SARS in 2003 and Zika virus disease in the Americas.<sup>5-7</sup>

Many cities are important hubs of travel and trade; hence an uncontained outbreak would result in severe economic consequences beyond lives lost. More importantly, these urban centres risk becoming conduits of transmission to the world. As seen from the spread of COVID-19, diseases now follow major patterns of travel connections both domestically (with major cities in China connected by high speed rail) and internationally through flights.<sup>8</sup> For example, as of Feb 17, 2020, there were 172 exported cases of COVID-19 from China to 25 countries, with 156 secondary cases in 14 countries, and these were mostly in major cities with travel connections to China.<sup>9</sup>

Urban settings have some common characteristics, many of which are disruptive factors that need to be addressed for effective preparedness.<sup>3</sup> For example, the density of people in housing, during commutes using public transportation, and in work environments is high. Inequalities, exacerbated by the rapid influx of people from rural areas, often results in poor housing, insufficient supply of fresh water, poor sanitation facilities, and ineffective ventilation systems, all of which increase outbreak risks. Rapid urbanisation might lead to encroachment into natural habitats and closer encounters with wildlife and zoonoses, and increased proximity to animals in backyard farms and food markets also provides opportunities for zoonotic infections. Both SARS and COVID-19 might have originated from food markets, and of the 335 emerging infectious diseases recognised between 1940 and 2004, more than 60% were of zoonotic origin.<sup>10</sup>

Ensuring better preparedness in urban settings will require a fresh emphasis on strengthening capacities to deal with outbreaks and other health emergencies. Many of these efforts are applicable across all settings, urban or otherwise, such as having a good understanding of the local socioeconomic and cultural milieu and an active involvement of communities and local leaders in both planning and implementation. However, urban settings also offer new opportunities (table), such as securing the commitment of local leaders and strengthening public health networks to prevent, detect, and respond to disease threats early. Businesses can be appropriately

engaged to manage employees in an emergency, and risk communication can be pushed through prevalent social media networks. Many lessons will also be learned from the city-wide community containment measures in Wuhan—the largest community quarantine exercise in history—and other containment measures rolled out in other Chinese cities and in Singapore.

Many urban settings now have substantial expertise and experience in preparing for and dealing with health emergencies. Having had large outbreaks of infectious diseases, authorities in some urban areas have developed purpose-built surveillance systems that make use of digital and web-based information.<sup>11</sup> Other local authorities have established surge capacity and contingency plans, including strong links with health-care facilities and national coordination bodies.<sup>12</sup> In some urban settings, complex simulation exercises have been run and disease spread has been modelled to determine the most effective public health actions to control the spread of infectious diseases.<sup>13</sup> There is room for sharing of best practices and measures in urban settings. Having an assessment and evaluation tool that is tailored for urban settings might also be useful for preparedness planning.

The ongoing pandemic of COVID-19 is a strong reminder that urbanisation has changed the way that people and communities live, work, and interact, and the need to strengthen systems and local capacities to prevent the spread of infectious diseases is urgent. As a global community, we must collectively invest in and build strong preparedness systems that are better adapted to increasingly urbanised settings.

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## Will financial innovation transform pandemic response?



The mounting death toll from COVID-19 recently prompted *The Guardian* to declare, “The World Bank’s \$500m pandemic scheme accused of ‘waiting for people to die’”.<sup>1</sup> Similarly, as the number of deaths from Ebola increased in the Democratic Republic of Congo (DRC), there was outrage in prominent journals. “The World Bank has the money to fight Ebola but won’t use it” wrote Garrett in *Foreign Policy*.<sup>2</sup> Others<sup>3–7</sup> too describe the malfeasance of the financial innovation called the pandemic bond. Hailed by former World Bank president Jim Kim as an instrument that “would rapidly respond to future outbreaks by delivering money to countries in crisis”,<sup>8</sup> critics judge the bond harshly, raising many points we agree with. For example, although the official death toll in the DRC increased to more than 2400 (to date), money from the bond was not released, because the epidemic did not meet predetermined benchmarks for payout. From non-bond sources, the World Bank will release up to US\$12 billion for COVID-19<sup>9</sup> and has released more than \$410 million for Ebola in the DRC.<sup>10</sup> What these critiques have not sufficiently considered is that the bond’s failure to launch is legal, and the World Bank is not alone in advocating such solutions. Rather, they are likely the future of humanitarian health aid and disaster relief.

The Pandemic Emergency Financing Facility (PEF) pandemic bond was facilitated by the World Bank to pre-pool money for rapid response ahead of a disease outbreak. It is a response to a dilemma: when health crises occur, many countries promise financial support but do not pay. The call for cash-on-demand intensified during the 2014–16 west African Ebola pandemic, and the World Bank issued the world’s first pandemic bond in July, 2017, raising \$425 million from private investors.

The financial terms of the pandemic bond are complex, but, in short, large private investors (rather than nation-states) put money in up-front for 3 years. If a qualifying pandemic occurs during that time, some of the money is disbursed for pandemic response. Otherwise, the investors get their money back plus interest of 10% or more.<sup>11</sup>

Everyone concerned with public health agrees that pre-committed pandemic funds are a good idea. However, growing uncertainty about how best to pay for health emergencies of international concern has brought previous health and humanitarian risk management strategies into question. In the past, governments and philanthropies mitigated all kinds of risks, from disease outbreaks to droughts. Since the 1970s, however, private sector involvement in civic problem-solving has increased. The pandemic bond is an iteration of the trend of turning to the private sector for global health and humanitarian funding solutions. The predominant ideologies of public health and the financial sectors, however, differ greatly.

Three crucial components of the bond need to be more widely understood. First, Garrett’s claim that “the World Bank has the money to fight Ebola but won’t use it”<sup>2</sup> is provocative but ignores the bond’s disbursement criteria. The PEF bond is a financial relationship governed by a legally binding agreement between the World Bank and its investors. Regardless of the severity of an epidemic, the release of pandemic bond funds is contractual and rules-based. If the predetermined disbursement criteria (which include confirmed deaths, cross-border spread, and disease growth rate) have not been met, the Bank has no authority to release investors’ money. These criteria result from the fact that the bond contract was not

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