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Local response in health emergencies: key considerations for COVID-19 in informal urban settlements

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Abstract

This paper highlights the major challenges and considerations for addressing COVID-19 in informal settlements. It discusses what is known about vulnerabilities and how to support local protective action. There is heightened concern about informal urban settlements because of the combination of population density and inadequate access to water and sanitation, which makes standard advice about social distancing and washing hands implausible. There are further challenges to do with the lack of reliable data and the social, political and economic contexts in each setting that will influence vulnerability and possibilities for action. The potential health impacts of COVID-19 are immense in informal settlements, but if control measures are poorly executed these could also have deep negative impacts. Public health interventions must be balanced with social and economic interventions, especially in relation to the informal economy upon which many poor urban residents depend. Local residents, leaders and community-based groups must be engaged and resourced to develop locally appropriate control strategies, in partnership with local governments and authorities.

Historically, informal settlements and their residents have been stigmatized, blamed, and subjected to rules and regulations that are unaffordable or unfeasible to adhere to. Responses to COVID-19 should not repeat these mistakes. Priorities for enabling effective control measures include: collaborating with local residents who have unsurpassed knowledge of relevant spatial and social infrastructures, strengthening coordination with local governments, and investing in improved data for monitoring the response in informal settlements.

Keywords

community-state relations; coronavirus; COVID-19; health data; infectious disease; informal settlements; rapid response; urban health

I Introduction

COVID-19 emerged in Wuhan, China, and its spread was initially concentrated in high-income countries such as the US, Spain, Germany, France and the Republic of Korea, as well as in middle-income Iran. In the early stages of the pandemic, most of the information about COVID-19 and who was at risk was based on data from these middle- and high-

³⁷Liem, A, Wang, C, Wariyanti, Y, Latkin, C A, Hall, B J (2020) “The neglected health of international migrant workers in the COVID-19 epidemic”, *The Lancet*, available at [https://doi.org/10.1016/S2215-0366\(20\)30076-6](https://doi.org/10.1016/S2215-0366(20)30076-6)

income contexts. Many of the recommendations (to wash hands, self-isolate and physically distance) assume basic living conditions and access to essential services (e.g. water, space). In wealthier countries, the public health response relies on a good baseline understanding of their populations and an ability to monitor changes. Much of the concern is centred on levels of critical care capacity in hospitals. As affected countries implement control measures that restrict social and economic life, their governments have begun to provide economic support packages to mitigate effects on livelihoods.

With COVID-19 now spreading across the world, it is clear that many of these strategies will not be possible to the same degree in low- and middle-income countries (LMICs), and especially not in urban informal settlements. There is heightened concern about these settings because of the combination of population density and limited infrastructure. With 1 billion people living in informal settlements – 30–70 per cent of inhabitants in some cities⁽²⁾ – there is an urgent need to consider the feasibility of existing advice and to support the development of locally appropriate approaches to protect these populations from the worst impacts of COVID-19.

This paper sets out what is known about vulnerabilities to COVID-19 and priorities to support local action. It was initially written as a rapid response briefing for the Social Science and Humanitarian Action Platform⁽³⁾ and involved contributions from a wide range of people listed in the acknowledgements. It illustrates the potential of collective and rapid social science analysis in humanitarian and health crises. Although it is written in the context of the ongoing COVID-19 pandemic, it provides advice that may be of relevance to future outbreaks of highly infectious disease.

II Background

A defining challenge of informal settlements and “slums” is the lack of data about them prior to, and during, emergencies. Due to their illegal or informal status there are often no reliable data about the number of people who live there or their health. The environment for policymaking is therefore doubly uncertain: both the new disease and the context are poorly understood. This makes it difficult to prepare for an outbreak, and could lead to inappropriate responses that are ineffective or could even worsen the situation (e.g. as did initial attempts to quarantine regions and cities in West Africa during the 2014–2016 Ebola outbreak).⁽⁴⁾ Currently many LMIC governments are applying restrictive control measures, but these may not be sustainable and could cause serious additional harms if the socioeconomic circumstances of the urban poor are not addressed.

²Satterthwaite, D, D Archer, S Colenbrander, D Dodman, J Hardoy, D Mitlin and S Patel (2020), “Building resilience to climate change in informal settlements”, *One Earth* Vol 2, No 2, pages 143–156, available at <https://doi.org/10.1016/j.oneear.2020.02.002>.

³Anthrologica for SSHAP (2020a), *Key Considerations: Quarantine in the Context of COVID-19*, Social Science in Humanitarian Action Platform, <https://www.socialscienceinaction.org/resources/february-2020-social-science-humanitarian-action-platform/>; also Anthrologica for SSHAP (2020b), *Key Considerations: Online Information, Mis-information and Disinformation in the Context of COVID-19*, Social Science in Humanitarian Action Platform, available at <https://www.socialscienceinaction.org/resources/key-considerations-online-information-mis-disinformation-context-covid-19/>

⁴Campbell, L (2017), *Learning from the Ebola Response in Cities: Population Movement*, ALNAP working paper, ALNAP/Overseas Development Institute, available at <https://www.alnap.org/system/files/content/resource/files/main/alnap-urban-2017-ebola-population-movement.pdf>.

Experience to date with COVID-19 has highlighted that action must be swift before widespread transmission in LMIC cities takes hold. The organizational challenges of epidemic control are always intensive and dependent on meaningful local involvement. Good community engagement, involving two-way communication and dialogue, is usually done painstakingly and in person. A major challenge confronting COVID-19 responses is the need to move fast and at scale while also ensuring control measures are contextually appropriate.

Data show that urban growth in the last decades has been increasingly unplanned, with most urban poverty concentrated in informal settlements. Cities are often acutely segregated along wealth and social lines (including colonial and racial). Images of “slums” depict them as chaotic, dirty and disease ridden, and as a social, environmental and developmental threat to the rest of the city. Such views have informed attempts to deny residents tenure, and to threaten and carry out evictions. These histories may also be reflected in COVID-19 control measures and residents’ reactions to them (especially if enforced onto settlements from outside). In each context, there will be specific local circumstances at play (e.g. security anxieties, experiences of civil unrest and war, national and municipal styles of governance, ethnic and party political tension). Together, these will influence the extent to which people living in informal settlements perceive control measures to be for their benefit or for the benefit of others. Where residents of informal settlements are used to having their lives and livelihoods curtailed in the “public interest”, there may be serious mistrust in government messaging and acute tensions about the ethics and impacts of control measures.

III Vulnerability: What is Known and What is not Known

There are major concerns about the potential burden of COVID-19 in LMICs.⁽⁵⁾ These can be categorized as: 1) epidemiological vulnerability (e.g. fatality rates based on underlying conditions and age); 2) transmission vulnerability (e.g. social mixing, hygiene infrastructure); 3) health system vulnerability (e.g. availability of intensive care); and 4) vulnerability to control measures, including social protection failures. These are related and influence each other. Assessing acute and chronic vulnerability in LMICs is challenging due to the lack of data on informal settlements and the novelty of the disease. The following subsections outline various forms of vulnerability and groups that may be more severely affected. Many of these are based on a priori understandings of risk, but a key aspect of vulnerability is that it is often not clear who is vulnerable until problems occur or support systems fail. Thus, in an evolving situation like COVID-19 these suggestions must be complemented by local assessments and monitoring of vulnerability.⁽⁶⁾

a Epidemiological vulnerability to COVID-19

According to the emerging evidence from East Asia and Europe, the people most vulnerable to severe disease and death are those over 70 years of age and those with cardiovascular

⁵Dahab, M, K van Zandvoort, S Flasche, A Warsame, P B Spiegel, R J Waldman and F Checchi (2020), *COVID-19 Control in Low-Income Settings and Displaced Populations: What Can Realistically Be Done?*, Health in Humanitarian Crises Centre, available at <https://www.lshtm.ac.uk/research/centres/health-humanitarian-crises-centre/news/102976>.

⁶Napier, A D (2014), *The Rapid Assessment of Vulnerable Populations - A 'Barefoot' Manual*, University College London.

disease, diabetes, chronic respiratory disease, hypertension or cancer.⁽⁷⁾ There is no evidence of a gendered difference in infection rates, but men appear to be almost twice as likely to die as women.⁽⁸⁾

- **Age:** Although the population of LMICs is young when compared to that in high-income countries, in absolute terms LMICs account for 69 per cent of the global population over 60, which represents a significant overall vulnerability.⁽⁹⁾ Moreover, although there has been speculation that severe disease and death will be lower in LMICs due to the smaller proportion of their populations over 80 years old,⁽¹⁰⁾ it is not clear if this will be the case, especially if age-related underlying health status is different. There is a perception that cities have younger populations than rural areas (e.g. with working-age people migrating to cities in search of work, and older people returning to villages in later life); however, age distributions between urban and rural populations in LMICs are similar.⁽¹¹⁾ Each city will have different age distributions but it would be unwise to discount the age-related risks in LMIC cities.
- **Gender:** There is no clear explanation for the observed higher fatality rates among men from COVID-19. It has been tentatively linked to gendered lifestyle-related conditions, e.g. smoking, which may also be a factor in informal settlements. However, gender differences in mortality rates have been apparent even where rates of smoking are not as dissimilar.⁽¹²⁾
- **Comorbidities:** Levels of hypertension, cardiovascular disease, diabetes and cancer are poorly documented in informal settlements,⁽¹³⁾ though they are increasing in LMICs and sometimes higher than in HICs.⁽¹⁴⁾ Accurate evidence of disease burdens in informal settlements is limited by the residents' reliance on private, often informal, providers of drugs and services, which means their illnesses are not counted. Qualitative research in Sierra Leone has revealed significant levels of chronic conditions that are treated informally and often not diagnosed.⁽¹⁵⁾ Respiratory disease is a major concern due to indoor and

⁷Jain, V and J-M Yuan (2020), "Systematic review and meta-analysis of predictive symptoms and comorbidities for severe COVID-19 infection", *medRxiv* preprint, available at <https://doi.org/10.1101/2020.03.15.20035360>.

⁸Purdie, A, S Hawkes, K Buse, K Onarheim, W Aftab, N Low and S Tanaka (2020), "Sex, gender and COVID-19: disaggregated data and health disparities", *BMJ Global Health Blog*, 24 March, available at <https://blogs.bmj.com/bmjgh/2020/03/24/sex-gender-and-covid-19-disaggregated-data-and-health-disparities>.

⁹Lloyd-Sherlock, P, S Ebrahim, L Geffen and M McKee (2020), "Bearing the brunt of covid-19: older people in low and middle income countries", *BMJ* Vol 368, available at <https://doi.org/10.1136/bmj.m1052>.

¹⁰Beam Dowd, J, V Rotondi, L Andriano, D M Brazel, P Block, X Ding, Y Liu and M C Mills (2020), "Demographic science aids in understanding the spread and fatality rates of COVID-19", *medRxiv* preprint, available at <https://doi.org/10.1101/2020.03.15.20036293>.

¹¹DESA (2017), *Changing Population Age Structures and Sustainable Development: A Concise Report*, Population Division, UN Department of Economic and Social Affairs, available at <https://www.un.org/en/development/desa/population/publications/pdf/trends/ConciseReport2017/English.pdf>.

¹²Devlin, H (2020), "Men are much more likely to die from coronavirus - but why?", *The Guardian*, 26 March, available at <https://www.theguardian.com/world/2020/mar/26/men-are-much-more-likely-to-die-from-coronavirus-but-why>.

¹³Ezeh, A, O Oyebode, D Satterthwaite, Y F Chen, R Nduwga, J Sartori, B Mberu, G J Melendez-Torres, T Haregu, S I Watson, W Caiaffa, A Capon and R J Lilford (2017), "The history, geography and sociology of slums and the health problems of people who live in them", *The Lancet* Vol 389, pages 547-558.

¹⁴World Health Organization (2011), *Global Status Report on Non-Communicable Diseases 2010*, available at https://www.who.int/nmh/publications/ncd_report_full_en.pdf.

¹⁵Unpublished data from ongoing research in Sierra Leone, "Shock tactics: urban health futures in the wake of Ebola", A Wilkinson (principal investigator), funded by the Economic and Social Research Council.

outdoor air pollution (e.g. vehicular traffic, cookstoves), poor housing quality, occupational exposure and waste burning, all of which are linked to increased risk of respiratory disease in informal settlements.⁽¹⁶⁾ A reliance on precooked, often fried, street food in many settlements results in food consumption habits that are linked to non-communicable diseases such as diabetes and heart disease.⁽¹⁷⁾ It is plausible that there are many relevant chronic conditions, often undetected and poorly managed in communities, that would put large numbers of people at risk. In addition to the high-risk comorbidities identified so far, there may be other diseases that lead to worse outcomes, and that are disproportionately prevalent in LMICs and informal settlements. Major concerns have been raised around HIV,⁽¹⁸⁾ tuberculosis and malnutrition.

b Transmission vulnerability

This encompasses vulnerability related to social mixing, housing and infrastructure, where conditions could foster increased transmission. However, there is a paucity of evidence on social and environmental transmission dynamics.

- **Density:** Given the population and housing density of many informal settlements, there are more opportunities for social mixing and more limited options for physical/social distancing. A modelling study of influenza in Delhi estimated contact rates based on density in slums and found that ‘slum’ conditions were associated with higher and quicker epidemic peaks.⁽¹⁹⁾ However, not all informal settlements are densely populated. There are differences between peri-urban settlements, which tend to have lower density, and inner-city settlements (both formal and semi-formal), which tend to be denser.
- **Household and social structures:** Disease transmission often occurs within households, but “households” in informal settlements can be flexible, with people moving between homes, sharing food or sleeping space. Control strategies and responses based on assumptions about household units may fail. Children are often cared for by grandparents or older family members and this poses an elevated risk for transmission.
- **Mobility:** Mobility within and between cities is frequent and shared. Residents in cities often maintain strong ties with home regions, sending revenue home⁽²⁰⁾ and travelling between urban and rural settings frequently for work and social

¹⁶Checkley, W, S L Pollard, T Siddharthan, G R Babu, M Thakur, C H Miele and O C P Van Schayck (2016), “Managing threats to respiratory health in urban slums”, *The Lancet* Vol 4, No 11, pages 852-854, available at [https://doi.org/10.1016/S2213-2600\(16\)30245-4](https://doi.org/10.1016/S2213-2600(16)30245-4).

¹⁷Tacoli, C (2017), “Food (in) security in rapidly urbanising, low-income contexts”, *International Journal of Environmental Research and Public Health* Vol 14, No 12, Article 1554.

¹⁸ASSAf (2020), *ASSAf Statement on the Implications of Novel Coronavirus (SARS-CoV-2; COVID-19) in South Africa*, Academy of Science of South Africa, available at <https://www.assaf.org.za/files/2020/ASSAf%20Statement%20Corona%20Virus%202%20March%202020%20web.pdf>.

¹⁹Chen, J, S Chu, Y Chungbaek, M Khan, C Kuhlman, A Marathe, H Mortveit, A Vullikanti and D Xie (2016), “Effect of modelling slum populations on influenza spread in Delhi”, *BMJ Open*, available at <https://bmjopen.bmj.com/content/6/9/e011699>.

²⁰Tacoli, C and R Mabala (2010), “Exploring mobility and migration in the context of rural-urban linkages: why gender and generation matter”, *Environment and Urbanization* Vol 22, No 2, pages 389-395, available at <https://doi.org/10.1177/0956247810379935>.

reasons. It is also common to travel when sick and, in some countries, to return the deceased to their natal home.⁽²¹⁾ This might mean that residents of informal settlements risk spreading COVID-19 to rural areas and creating urban–rural “pulse dynamics” similar to those observed with Ebola.⁽²²⁾ The reasons for mobility and the implications of urban–rural linkages must be considered in control strategies.

- **Livelihood imperatives:** On an individual level, when a person falls sick, their response is dependent on competing priorities, especially the need to make a living. People describe not being able to afford to be sick, working through illness so as not to lose earnings, and using medicines as a “quick fix”.⁽²³⁾ The early symptoms of COVID-19 are difficult to distinguish from other common illnesses, and may be unlikely to be treated differently. Given the mild onset of COVID-19, infected people may follow established norms that prioritize work and daily survival, and may visit multiple informal providers to buy treatments (see Section IIc).
- **Ventilation:** Unventilated and confined spaces increase transmission risk due to the limited circulation of air. Home types and ventilation will vary by settlement, but should be taken into consideration when developing local plans to keep people safe.
- **Water:** Access to water is inadequate in most informal settlements, and residents usually do not have their own water supply. Instead water is often bought from private providers at high cost,⁽²⁴⁾ which can prohibit generous use and handwashing. Water points are also shared, which poses risks for spatial distancing (e.g. when queuing and collecting) and isolation (e.g. the need to leave the house for collection).
- **Toilets:** As with water, toilets are usually outside people’s homes and in shared facilities. Evidence is still emerging about how long the virus persists outside of the body and on which surfaces. To date there is no evidence of faecal transmission⁽²⁵⁾ but shared toilets conceivably pose transmission risks, particularly when excreta is not well managed. Lack of access to water and toilets in the household makes strict self-isolation all but impossible.

²¹See reference 4.

²²Scoones, I, K Jones, G Lo Iacono, D W Redding, A Wilkinson and J L N Wood (2017), “Integrative modelling for One Health: pattern, process and participation”, *Philosophical Transactions of the Royal Society B* Vol 372, No 1725, available at <http://dx.doi.org/10.1098/rstb.2016.0164>.

²³Van der Heijden, J, N Gray, B Stringer, A Rahman, S Akhter, S Kalon, M Dada, and A Biswas (2019), ““Working to stay healthy’: health-seeking behaviour in Bangladesh’s urban slums: a qualitative study”, *BMC Public Health* Vol 19, Article 600, available at <https://doi.org/10.1186/s12889-019-6750-0>; also Denyer Willis, L and C Chandler (2019), “Quick fix for care, productivity, hygiene and inequality: reframing the entrenched problem of antibiotic overuse”, *BMJ Global Health* Vol 4, No 4, available at <http://dx.doi.org/10.1136/bmjgh-2019-001590>.

²⁴Mitlin, D and A Walnycki (2019), “Informality as experimentation: water utilities’ strategies for cost recovery and their consequences for universal access”, *The Journal of Development Studies* Vol 56, No 2, pages 259–277.

²⁵World Health Organization & UNICEF 2020, “Water, sanitation, hygiene, and waste management for the COVID-19 virus”, available at <https://apps.who.int/iris/rest/bitstreams/1272446/retrieve>

- **Sanitation:** Waste disposal is often inadequate, and waste in the street poses a number of biohazard risks, including potentially COVID-19. Equally, waste collectors are at risk from contaminated waste.

c Health system vulnerability

While attention in the global North is on intensive care capacity, this can be severely limited in health systems with lower resources. Attention is needed to if and how people will access care, including when and by whom they are assessed as needing critical care. Availability of formal health providers (e.g. government or NGO clinics) is low in most informal settlements, and numerous studies of health-seeking behaviour identify cost and distance as major barriers to good-quality care.⁽²⁶⁾ There is a wide variety of informal, unregulated and private providers, including private pharmacists, petty drug sellers, community health workers, travelling healthcare workers, and those who live in the community and provide care. Although the use of non-Western medicine and providers can be frequent, it is often for particular kinds of diseases (e.g. those distinguished by severity, suddenness or other locally relevant indicators), and not for generic symptoms such as fever and cough. For such common symptoms, self-medication is popular and is mostly obtained from private providers, with care only sought at larger clinics or hospitals when severity increases (and if the direct and indirect costs of getting to hospital allow).⁽²⁷⁾ Barriers to access and aversion to hospital care in informal settlements must be considered. These barriers imply that sick people may remain in their community for some time, where they would need advice on self-isolation and home or community-based care, with all the challenges this implies. Private providers may be key to detecting spread, but also to facilitating spread, and should be engaged in any response. These patterns of health-seeking behaviour make it more likely that cases are, or will be, going undetected, and additional efforts should be made to identify cases in the community.

Qualitative research shows that health seeking in the case of severe disease can be quite haphazard, with people negotiating many different providers and taking recommendations from friends and family (as well as relying on their assistance to access different forms of care).⁽²⁸⁾ It is not clear to what extent people go to hospitals even when symptoms are severe, especially in contexts where hospitals are perceived to offer inadequate or inappropriate care or where money is a prohibitive factor. People frequently report being treated rudely or poorly at formal government clinics. Doctors in India, for example, have admitted that rationing and denial of care is already a formative part of the healthcare experience in LMICs.⁽²⁹⁾ Current messaging that there is no cure for COVID-19 may also deter people with severe cases from presenting at hospital. Response planners need to consider how to identify community members with severe cases and not to assume they will

²⁶Sverdlik, A (2011), "Ill-health and poverty: a literature review on health in informal settlements", *Environment and Urbanization* Vol 23, No 1, pages 123–155, available at <https://journals.sagepub.com/doi/10.1177/0956247811398604>.

²⁷Macarthy, J M, A Conteh, S A Sellu and L Heinrich (2018), *Health Impacts of the Living Conditions of People Residing in Informal Settlements in Freetown*, Sierra Leone Urban Research Centre

²⁸See reference 15.

²⁹Gopichandran, V, S Subramaniam and V H Krishnamoorthy (2020), "Social distancing....you must be kidding me", *Storytellers*, 15 March, available at <http://esichumanitiesclub.blogspot.com/2020/03/social-distancingyou-must-be-kidding-me.html>.

come to hospital. Planners also need to consider how to manage people's journeys to critical care facilities, if available.

d Direct vulnerability to control measures

Lessons from numerous disease outbreaks, including Ebola in West Africa, show that disease control measures can result in harm beyond the direct health threats. Failing to address these concerns can cause control measures to backfire. In many cases the most severe shocks will be from control measures, not the disease. Control measures considered here are those being widely implemented in the context of COVID-19, e.g. quarantine, lockdowns, self-isolation, advice on "working from home", travel bans, and the closure of schools, markets, churches, mass gatherings, food outlets and social spaces.

A clear and immediate impact is on livelihoods. In most informal settlements people live hand-to-mouth with very limited savings or capacity to save. Whatever the sector, or whether it is formal or informal, anything that interferes with travelling for work, demand for work, salaries or employment status will have disastrous impacts. Loss of income has further effects – for example, people may be less able to purchase vital water. Serious thought should be given to how to avoid curtailing people's livelihoods, or compensating them if this becomes necessary. This must include people working in the informal sector, which can be the majority of residents living in informal settlements. This is an area where evidence is lacking but where countries are developing emergency approaches. The Brazilian government has taken the step of paying a temporary monthly salary to informal workers,⁽³⁰⁾ and many others governments are using direct cash transfer (often digital) systems.⁽³¹⁾ The success of these measures may depend on the strength and coverage of existing government or NGO social protection systems, and especially on the extent to which they include the informal sector. There are additional concerns about the source (e.g. governments, donors) and sustainability of funding for such measures, given that the global financial outlook has been weakened by COVID-19. Assessments should also be made of how those who have lost livelihoods could be redeployed to response efforts (and paid).

There are potential impacts on and from mobility. Enforcing travel restrictions suddenly can lead to populations fleeing (as in northern Italy) or travelling under the radar (e.g. as during the 2018–2020 Ebola outbreak in the DRC) due to fear, loss of livelihoods and ongoing travel needs (e.g. to care for family members or to attend funerals). This can accelerate the spread of the virus and requires careful management. Restrictions on mobility may be important but are difficult to manage comprehensively and have historically proved ineffective unless mobility needs (e.g. livelihoods) are considered and addressed.⁽³²⁾ During the Ebola outbreak in West Africa, rural populations set up their own village or chiefdom taskforces that controlled movement into their locales. It will be important to advise and support rural populations to control in-movement to complement advice and restrictions on

³⁰Ribeiro, G (2020), "Brazil to pay emergency salary to informal workers", *The Brazilian Report*, 27 March, available at <https://brazilian.report/newsletters/brazil-daily/2020/03/27/brazil-to-pay-emergency-salary-to-informal-workers>.

³¹Rutkoski, M, A Garcia Mora, G Bull, B Guermazi and C Grown (2020), "Responding to crisis with digital payments for social protection: short-term measures with long-term benefits", *World Bank Blogs*, 31 March, available at <https://blogs.worldbank.org/voices/responding-crisis-digital-payments-social-protection-short-term-measures-long-term-benefits>.

³²See reference 4.

urban populations not to move. Urban transport hubs and travel modes for the urban poor require specific focus.

Access to food is another immediate consideration. In poor settlements, households generally have no capacity to store food for several days, and source most of their food from informal markets and street food vendors. If movement is restricted, people's ability to access food will be severely reduced. Furthermore, if markets or food vendors are closed, this will mean people are not able to buy food they need.

d Systemic vulnerabilities

Risks in informal settlements are multidimensional, including overlapping issues of health (e.g. both chronic and acute including tuberculosis, dengue and cholera); social concerns (violence, persecution, criminalization, intimidation); natural factors (e.g. floods, rain, heat); and technological and infrastructural problems (e.g. accidents, fires, building collapse).⁽³³⁾ COVID-19 will be experienced alongside these risks, interact with them, and potentially diminish resilience to them. Impacts will intersect with people's identities and social roles in unpredictable ways. Below are some potential areas for concern, but many more are likely to emerge.

- **Care networks:** Older people may provide important care to extended family (e.g. grandchildren and orphans). If they are unable to fulfil this role, in the short and/or long term, it may contribute to vulnerability among those they care for, or restrict others' capacities (e.g. parents' ability to work).
- **Disabilities:** People with disabilities rely on care from others, as do some people with chronic health conditions. They are exposed to contracting the virus (as they are less able to self-isolate) and to the threat of losing key relationships that allow them to perform basic day-to-day functions. People with mobility impairments may be more exposed to the environment around them. For example, wheelchair users may find it challenging to not touch surfaces and are constantly having to touch chair wheels for mobility purposes.
- **Displaced people:** An increasing number of displaced people live in informal settlements rather than camps. These populations may be less well connected to local support structures, and evidence suggests that they face significant challenges accessing services and information.⁽³⁴⁾
- **Gendered impacts:** Gendered impacts are beginning to be identified and are relevant in informal settlements. These include: the potential for increased caring burdens for women and girls; uneven impacts on the earning potential of men and women (e.g. for migrant workers); the higher proportion of female health workers who in many contexts are at increased exposure risk; and diversion of resources from gender protection programmes. There have also been reports of

³³Adelekan, I O (2018), *Urban Dynamics and Everyday Hazards and Disaster Risks in Ibadan, Nigeria*, Urban ARK working paper, Urban Africa Risk Knowledge, available at <https://www.urbanark.org/sites/default/files/resources/URBAN%20ARK%20Working%20Paper.%20Adelekan%202018.pdf>.

³⁴Walnycki, A, Earle, L and Monteith, W (2019) "Towards more inclusive urban health systems for refugee wellbeing: Lessons from Kampala, Uganda." *IIED Working Paper*. IIED, London.

increased rates of gender-based violence under quarantine (e.g. in South Korea, China and the UK), following patterns from previous outbreaks including Ebola.⁽³⁵⁾

- **Safety and security:** In some cases informal settlements have high levels of violence, including the prevalence of criminal networks. Social tensions, linked to strained socioeconomic conditions, could be exacerbated at household and community levels. Both can have major impacts on potential responses.
- **Mental health:** People with mental health problems as well as frontline responders may have both short- and long-term trauma as a result of the pandemic and its control. People who have been under quarantine have been found to have long-term mental health challenges.⁽³⁶⁾
- **Evictions:** Tenancy in informal settlements is often insecure, with threats of eviction from landlords and from the state. Crises have been used as opportunities to evict vulnerable or unwanted tenants/populations, and this may continue with COVID-19 unless protective measures are agreed. Evictions appear to be ongoing, for instance, in South Africa.
- **Migrant workers:** The precarious position of migrant workers has been highlighted acutely. Millions of people providing low-paid and insecure labour in cities far from their original homes have found themselves out of work and without employer or state provided safety nets. These people, who often do not have access to reliable information in their own language, have been omitted from response plans, detained or forced to return home, treated inhumanely and stigmatised³⁷. The legal, social, health and economic implications of COVID-19 for these people, for the cities they work in and homes they return to, is still unfolding.

Impacts that impinge on supportive capacities and networks will produce vulnerabilities as they lead to breakdowns in social protection. For example, schools play a role in social protection. If they are closed, then children who rely on them for meals may experience hunger and suffer detrimental nutritional effects. Further, school closures may increase household expenditure and pressures on strained and crowded households. After a year of school closure during the West African Ebola epidemic, it was reported that teenage pregnancy rose, although there do not seem to be clear data on this. There are other population groups that may already be without social protection. Ongoing research in Sierra Leone has identified isolated elderly residents of informal settlements who have no children or who are suffering abandonment.⁽³⁸⁾

³⁵Asia-Pacific Gender in Humanitarian Action Working Group (2020), *The COVID-19 Outbreak and Gender: Key Advocacy Points from Asia and the Pacific*, available at <https://www2.unwomen.org/-/media/field%20office%20eseasia/docs/publications/2020/03/ap-giha-wg-advocacy.pdf?la=en&vs=2145>.

³⁶Brooks, S K, R K Webster, L E Smith, L Woodland, S Wessely, N Greenberg and G J Rubin (2020), "The psychological impact of quarantine and how to reduce it: rapid review of the evidence", *The Lancet* Vol 395, No 10227, pages 912–920, available at [https://doi.org/10.1016/S0140-6736\(20\)30460-8](https://doi.org/10.1016/S0140-6736(20)30460-8).

³⁸See reference 15.

As with many infectious diseases, people or groups who have contracted COVID-19 or who become associated with it may suffer from stigma. Messages about “social distancing” could exacerbate this. Stigma often follows existing forms of social marginalization and can have serious short-term impacts (e.g. being asked to leave accommodation, losing jobs) as well as long-term consequences for integration and participation in social and economic life. This could occur within informal settlements but also across an urban centre as a whole if the area and people within it become associated with the spread of disease.

IV Local Action and How to Support it

Lessons from previous humanitarian and health crises⁽³⁹⁾ in informal urban settlements, as well as non-urban settings⁽⁴⁰⁾ highlight that locally led and adapted responses that take into account the diversity and complexity of urban settings are key to effectiveness and reduction of harm. States of emergency and “emergency thinking” can sometime preclude bottom-up approaches but ultimately will depend on them. In China’s unprecedented quarantine of Wuhan, for instance, neighbourhood-based groups were involved in ensuring movement control.⁽⁴¹⁾ Community-led initiatives are spreading across the world. Partnerships with local authorities and support for local action will be essential. This section discusses approaches to local action, local data, partnerships and support.

There can be a high level of local organization within informal settlements, including for the provision of basic services (e.g. water maintenance and supply, sanitation and cleaning groups, security patrols and neighbourhood watch); social protection (e.g. savings groups, after-school clubs or tutoring groups); livelihoods (e.g. unions and professional associations, particularly in informal sectors); spiritual needs (e.g. mosques, churches); socializing (e.g. social or sports clubs); health (e.g. peer support groups, community health worker networks, community health management committees); disaster relief (e.g. disaster management teams and committees); advocacy (e.g. women’s rights, LGBTQ rights); and many more – often filling gaps in state provision or welfare, and participating in development processes. In addition, many settlements also have traditional leadership structures that overlap with these groups. It is crucial that responses to COVID-19 are organized through these groups and through leaders who know their settings best and have existing links to residents. Solidarity and crowdfunding groups and networks are also emerging in response to COVID-19.

While many of these groups are well versed in community-led development or disaster relief, including responding to previous outbreaks, adaptations for COVID-19 are required. The West African Ebola outbreak offers precedents for the power of urban organization to address an acute infectious threat. There, neighbourhood taskforces were formed, bylaws implemented movement restrictions, and local groups carried out “house to house” checks and surveillance, and in some cases home care. However, these are not appropriate wholesale for COVID-19 as they may facilitate spread. Community organization processes

³⁹Satterthwaite, D (2017), *The Possibilities and Limitations of Community-Based Disaster Risk Reduction and Climate Change Adaptation: Findings across the City Studies*, Urban ARK Briefing No 8, Urban Africa Risk Knowledge, available at https://www.urbanark.org/sites/default/files/resources/UrbanArk_briefing_8_web.pdf; also Macarthy, J

⁴⁰Richards, P (2016), *Ebola: How a People’s Science Helped End an Epidemic*, Zed Books.

⁴¹Kuo, L (2020), “Paranoia and frustration as China places itself under house arrest”, *The Guardian*, 1 February, available at <https://www.theguardian.com/world/2020/feb/01/across-china-cities-turn-into-ghost-towns-as-coronavirus-infects-more-than-10000>.

that usually happen in person and with the involvement of community elders may not be safe as they involve contact with high-risk groups. The physical distancing imperative requires adaptation of established methods. Many communities have vibrant WhatsApp or Facebook groups (e.g. neighbourhood-based, identity- or topic-specific), which can be a channel for mobilization. Already social media is being used to advocate for greater support for residents, including for supplies of hand sanitizer (e.g. #sanitizersforslums on Twitter) and handwashing stations.⁽⁴²⁾ Radio is also an important tool for communication. It will be key to manage misinformation and rumours, which foster confusion, distrust or panic.⁽⁴³⁾

a Local strategies for isolation and physical distancing

During the Ebola outbreak in West Africa, quarantines were widespread, and to an extent social distancing. However, this was on a much smaller scale than what is needed for COVID-19. Even so, it was an incredibly complex logistical feat (ensuring that quarantined households had their health, food, and psychosocial and security needs adequately addressed to ensure they did not break quarantine). Attempts at settlement-wide quarantines caused violence and were ultimately abandoned as ineffective.

Aside from the welfare concerns, each settlement has physical characteristics that make population movement (within and externally) more or less feasible (e.g. the number of entry points, physical barriers, road networks, housing density), and actions will need to be determined by local residents. There may be tough choices between strategies aiming for absolute containment and mitigation strategies. Although externally imposed restrictions are now common for COVID-19 across the world, they are more likely to curtail survival in informal settlements. Thus they run the risk of resistance and unrest unless they are developed with local participation, or allow for local adaptation. Potential options, based on actions emerging in response to COVID-19 internationally and from previous epidemics, include:

- **Local taskforces/committees:** These would be comprised of local leaders and community representatives (identified and trusted by residents rather than self-identified) to develop and implement area-based strategies. Such strategies could cover home and decentralized care, self-isolation, movement controls (within and outside the settlement), closure of high-risk public spaces, support to vulnerable people and communication.
- **Physical distancing planning and protection:** Particularly needed are local strategies and guidance for home isolation or group isolation of the sick or vulnerable (not in the same place) alongside ideas for reducing contact in highly congested areas. Local groups could develop simple signage systems for homes that are self-isolating and/or require support (e.g. help with collecting water or food), which would reduce physical contact and ensure basic welfare. For sick or vulnerable groups, existing facilities could be repurposed or temporary low-cost structures built (as with Ebola community care centres and holding centres),

⁴²Kejitan, V (2020), “Kenyan online ask government to provide sanitisers in slums”, *UReport*, 17 March, available at <https://www.standardmedia.co.ke/ureport/article/2001364601/kenyans-online-ask-government-to-provide-sanitisers-in-slums>.

⁴³See reference 3, *Anthrologica* for SSHAP (2020b).

to separate larger numbers of people safely and in line with food and security considerations.

- **Communication:** Effective use of communication technology (e.g. radio and social media) will enable physical distancing. It must include opportunities for two-way dialogue, such as Q&A sessions with experts. Special efforts are required to communicate with vulnerable groups, including the elderly and disabled, who may be less well connected. Different communication channels and groups, and information on how to join them, seek advice or request help – including for local groups, local governments, humanitarian agencies and NGOs – should be publicized (via TV, radio, social media, print media, flyers). The establishment of focal points for case identification and reporting, social protection, general information, etc. should be considered.
- **Livelihoods and protection:** Specific guidance is needed for people who cannot stop working, and who provide essential services for the rest of the city (e.g. garbage collectors). Protective equipment should be provided for these groups. Local unions (formal and informal) could be influential here. Some professional associations and networks have already begun to redirect their work to support the response to COVID-19 (e.g. garment factories sewing protective masks and equipment).
- **Spiritual adaptations:** Religious leaders should be engaged to create alternatives to mass religious gatherings, and to safely provide spiritual assistance, in order to ensure religious needs are also cared for, e.g. over radio or social media.

Urgent consideration is needed for the management of the deceased, including deaths occurring in the community and in hospitals potentially far from family. The treatment of the dead was a major source of tension during the Ebola response in West Africa, when bodies were not treated and buried according to local norms of love and respect. This produced resistance among local populations and was a motivating factor for people not to report cases. Plans should be made with local communities about how an increase in the number of deaths will be managed to ensure there is either safe burial locally (if space allows) or respectful and timely retrieval of bodies from communities. In both scenarios, local populations must be consulted to devise approaches that enable a chance to say goodbye and allow social and spiritual rites to be performed (or safe adaptations of these, e.g. viewing but not touching the body). Neglecting this will increase individual and collective trauma.⁽⁴⁴⁾

b Enabling local action

As residents face continued emergencies, crises and shocks, they may be fatigued by the need to be self-organizing and resilient again. If they have not been adequately engaged by external agencies they may also be wary of government and humanitarian actors, especially regarding broken promises about benefits once the disaster is over. The response has to

⁴⁴SSHAP (2020), *Assessing Key Considerations for Burial Practices, Death and Mourning in Epidemics*, Social Science Humanitarian Action Platform, available at <https://www.socialscienceinaction.org/resources/assessing-key-considerations-burial-practices-death-mourning-epidemics/>

allow local groups a real sense of control, and if possible resources. Otherwise it runs the risk of damaging existing relationships and demobilizing or undermining local community structures. Priority areas for support include:

- **Extending basic services:** Local governments, utilities and private companies should be encouraged to rapidly scale up affordable provision of water and safe sanitation in settlements. This is happening already in some places, for example in Kibera (Kenya),⁽⁴⁵⁾ in Rwanda⁽⁴⁶⁾ and in Freetown (Sierra Leone), with the provision of handwashing stations. Community groups must be involved in distributing these services and resources.
- **Financial resources:** Financial support may be required to help consolidate informal networks and for communities to self-organize and access resources and information during the outbreak. Cash transfer systems and the use of mobile money offer potential mechanisms to make resources directly available quickly and safely.
- **Social protection:** Interventions are needed that address informal livelihoods and protect low-paid insecure workers, both to keep them in (safe) work and to fund hospitalization when needed for vulnerable groups, childcare support and food distribution.
- **Protective equipment:** Protective equipment such as masks and gloves should be provided to at-risk workers, including community health volunteers and garbage collectors.

Vulnerability is often a function of support structures breaking down, with the most vulnerable being those who fall through the gaps. COVID-19 is likely to create new vulnerabilities; there will be marginalized groups and households who fall outside local support structures. While transmission is relatively low, steps should be taken to understand which supportive social networks and institutions exist, how they may be put under strain, and who is missing from them. These may vary widely from context to context and may not be replicable across informal settlements. By identifying them and representatives of key groups it will be possible to better understand how COVID-19 may debilitate them, or strengthen their relevance/role. This should clarify how to invest scarce resources. Predefined protocols about vulnerability may not be helpful, as a shock can shift priorities and vulnerabilities.

c Kinds of data needed for planning epidemic response

A range of data is required for epidemic response planning, including for the modelling of disease impacts and control measures, and for the effective delivery and monitoring of relief. It should include:

⁴⁵GlobalGiving (2020), *Reduce the Spread of Covid19 in Kibra Slum*, available at <https://www.globalgiving.org/microprojects/reduce-the-spread-of-covid19-in-kibra-slum>.

⁴⁶YouTube (2020), *Rwanda Installs Hand Washing Points in Kigali in Readiness for Imminent Coronavirus Outbreak*, Kenya CitizenTV, available at <https://www.youtube.com/watch?v=Ws0Jf8P6vGc>.

- **Basic demographic data** on the numbers of people living in an area (including settlement density and household overcrowding), disaggregated by age, gender, and social characteristics. This information is relevant to understanding disease impact and spread, and to targeting responses and relief.
- **Health status of populations**, especially the prevalence of non-communicable disease risk factors and potential risk factors, e.g. communicable diseases such as HIV and tuberculosis, or nutritional status. Also-needed are population-wide rates of morbidity and mortality in order to detect unexpected rises in sickness and deaths, and to plan for surge capacity.
- **Economic data** on livelihoods (type and distance from homes), savings schemes, supply chains, and costs of living and basic goods and services (including water and sanitation but also hand sanitizer, soap, etc.)
- **Health and social services**, including the existence, distance to and utilization of formal and informal health providers, to assess capacity and also likely health-seeking practices, as well as information on education and care services.
- **Spatial data** including maps and GIS data on settlements and points of interest, including schools, water points, sanitation, markets, transport hubs and religious buildings.
- **Social data and knowledge** analysing social networks, behaviour and culture, including kinship, mobility, availability and use of space, social roles and status, and how such factors may influence transmission. Also needed is information on “social infrastructure”, e.g. what kinds of social support structures exist, who the trusted people and channels are for different population groups, and how threats have been dealt with in the past.
- **Citizen-generated data**. With the wider coverage of mobile phones in many urban areas, electronic and social media data can support community responses. Tools such as Facebook and Twitter can capture crisis alerts from communities and facilitate timely response during emergencies.

Although much of the above data is typically missing on informal settlements, at least from formal data sources, there are locally led alternatives. Local data are essential for the response, especially if these data can be translated into knowledge that helps response strategies in close to real time. Networked savings and community-based groups such as SDI (formerly Slum/Shack Dwellers International) have collected their own sociodemographic data about their settlements (e.g. counts of households, who lives there, income, access to services, physical infrastructure and space). Such networks have the advantage that these groups consist of residents and so have in-depth social knowledge about their communities. Open-source tools exist to allow communities to map themselves, complemented by online crowdsourced mapping. Increasingly, there are online networks (e.g. bike riders and delivery drivers) drawing on deep local knowledge and generating smartphone-based data. National and local urban observatories affiliated to the Global Urban Observatory managed by UN-Habitat, make up another local and global network of local data producers. Urban observatories include trained urban data practitioners who have a mandate to gather data,

along with knowledge of where essential urban data can be sourced and where it should be channelled and reported to support response planning.

d Partnerships and coordination

It is crucial to connect and support local efforts. The approaches of SDI and urban observatories have been used to engage with local community structures, leaders and authorities to provide support during emergencies. In some urban centres, these relationships are now well established, and groups have regular dialogue with city authorities. Given the urgency of the COVID-19 situation, and without time to collect or synthesize data, potentially the most impactful thing to do would be to engage with these group. Many international networks exist that connect governments and agencies with local and community-based groups. These include WIEGO (Women in Informal Employment: Globalizing and Organizing), the Huairou Commission, the Asian Coalition of Housing Rights (ACHR), GPR2C (the Global Platform for Rights to the City), UN-Habitat's Participatory Slum Upgrading Programme in 40 countries, and GWOPA (Global Water Operators Partnership Alliance), which have already begun to organize and develop messages and solutions for their constituencies (e.g. waste pickers, water operators). Links to these resources are provided at the end of this paper.

Access to basic services and implementation of public health interventions will depend on the involvement and capacity of city authorities and municipalities. There are differences in access to resources in different cities, and the extent to which power and control of resources has been decentralized to cities. Nevertheless, mayors and local government have an important role to play in tailoring the response to their city contexts and connecting key stakeholders by building on experience in co-production for urban development issues such as water/sanitation and citywide planning.

Health and non-health urban stakeholders are not always well connected, with poor coordination between health authorities and sectors dealing with land, local government, the environment, water or sanitation. Epidemic response units (e.g. the Emergency Operation Centres and Centres for Disease Control that have been set up in many African countries following the West African Ebola outbreaks) have strengthened expertise in disease surveillance, case management and risk communication. These units, along with national-level coordinating structures, will likely be leading responses in LMICs, but may be less used to urban governance and complexity. They need to be connected to mayors and local governments that are familiar with urban contexts and have established relationships with community leaders and experience in participatory and community-based processes led by groups like SDI, described above.

V Discussion

This paper has outlined key considerations for protecting informal urban settlements from COVID-19. Some relate to the physical environment and basic services, for example how population density and inadequate access to water and sanitation make advice on “social distancing” and frequent handwashing implausible. Other challenges are to do with the

social, political and economic contexts that will influence vulnerability and possibilities for action in each context.

Fundamentally, many of these key considerations relate to poverty and inequality, which has impacts for short- and long-term responses that require elaboration. Residents of informal settlements tend to be the poorest and most vulnerable sections of society, but within this there is variation, including pockets of wealth and deeper pockets of marginalization. This means that there will be varied vulnerability profiles. When wealth and poverty are side-by-side (within informal settlements, and between the settlement and the rest of the city), perceptions of injustice can be palpable and could hinder collective action to fight a pandemic. In settings where rationing and ill-equipped health services are the norm, people are not used to their health being considered a priority. Sudden interest in particular diseases or standards of public health can arouse suspicion or resentment. Already, waste pickers in India, who are at the bottom of the Indian caste system, have noted the irony that they are only being provided with protective equipment now that the health threat of their work extends to people beyond them.⁽⁴⁷⁾ Historically, informal settlements and their residents have been stigmatized and blamed for problems they have little control over. Responses to COVID-19 should not repeat these mistakes. Collaborating with local residents and trusting them as stewards of their community, with unsurpassed knowledge of relevant spatial and social infrastructures, will enable effective control measures.

It is important to understand community power dynamics and political histories in a given settlement. In some urban settings, top-down control measures may be perceived as being used to oppress and further marginalize residents or to curtail political opposition. Many cities already impose unrealistically high regulatory standards – about public health, building standards, trading, etc. – which informal settlements (and other parts of the city) cannot comply with. In practice, these rules are ignored and can become the focus of sporadic and sometimes repressive enforcement by authorities. If COVID-19 control regulations are impractical and out of sync with people’s realities, they risk repeating these patterns of avoidance and crackdowns. Governance structures within informal settlements are often contested and plural. Traditional leadership structures exist alongside (or in competition with) criminal, militia or other groups. The inflow of resources during crises can exacerbate these tensions. It may be that semi-criminal groups provide “security” during the crisis; indeed during the West African Ebola local youth, including gangs, often took on the neighbourhood searches and movement control, which has also been reported in the context of COVID-19.⁽⁴⁸⁾

Clear information and advice are needed, including to explain inconsistencies with prior actions and priorities. People living in informal settlements already live alongside fatal infectious diseases. They should be informed about COVID-19, how it is different from other diseases and why the response asked of them for COVID-19 may be different. This is required to establish trust and mutual understanding given that extraordinary measures

⁴⁷Johari, A (2020), “Coronavirus: they cannot work from home. Or follow social distancing. Here is why”, *Scroll.in*, 17 March, available at <https://scroll.in/article/956385/coronavirus-they-cannot-work-from-home-or-follow-social-distancing-here-is-why>.

⁴⁸Schipani, A and B Harris (2020), “Drug gangs in Brazil’s favelas enforce coronavirus lockdown”, *Financial Times*, 27 March, available at <https://www.ft.com/content/aaef1591-2fe5-4e6f-ab84-0e83b5a146ca>.

are not normally taken for the other fatal infectious diseases they live with. When people perceive undue attention being given to some diseases, especially for the apparent benefit of other people, it can hinder trust and collective action.

VI Conclusions

Informal settlements face considerable challenges around the control of COVID-19, but locally developed strategies could mitigate the worst of the outbreak as long as action is taken fast. Preparedness and early action by local governments and communities are essential. Once an outbreak occurs, escalation can be rapid, leaving little room for further planning. This paper provides an initial mapping of key considerations that, it is hoped, will be of use for advocacy and action among residents, government and agencies to protect informal settlements from COVID-19. It also aims to extend beyond the outbreak, to highlight how the conditions that make settlements vulnerable to infectious disease must be ignored no longer.

The principal approaches for reducing COVID-19 transmission are the same in any context, i.e. reduced physical contact and improved hygiene. The tactics used will differ in informal settlements where there are acute challenges around space, water and sanitation, where people have an increased risk of eviction and where livelihoods are precarious. Informal settlements can be highly organized, with a range of local groups and community structures providing and advocating for services as well as collecting data on residential populations and facilities. These groups are well-placed to mount COVID-19 responses and many already are. They are particularly well-placed to consider options in their area for decentralized forms of care, isolation and physical distancing. Financial and non-financial resources (e.g. information, equipment, supportive policymaking) are urgently needed to enable local residents to develop and implement their own strategies that are feasible and effective in their contexts. Public health interventions must be balanced with social and economic interventions, especially in relation to the informal economy, on which most people in informal settlements depend. Direct and indirect impacts throughout the informal economy must be considered. The vulnerabilities to COVID-19 are immense in informal settlements, but if control measures are poorly executed these could also have deep negative impacts.

Useful Resources

Urban platforms and research centres:

- SDI's "Know Your City", <https://knowyourcity.info>
- United Cities and Local Governments, <https://www.uclg-cisdg.org/en/committee/our-mission>
- African Centre for Cities, <https://www.africancentreforcities.net>
- African Population and Health Research Center, <https://aphrc.org/runit/urbanization-and-wellbeing-in-africa>
- Sierra Leone Urban Research Centre, <https://www.slurc.org>

- Asian Coalition for Housing Rights, <http://www.achr.net>
- IIED's local organization profiles, <https://www.iied.org/environment-urbanization-local-organisation-profiles>
- UN-Habitat, <http://www.unhabitat.org>
- Cities for Global Health, <https://www.citiesforglobalhealth.org>

Mapping initiatives:

- GlobalMapAid, <https://www.globalmapaid.org/maps>
- OpenStreetMap, <https://www.openstreetmap.org>
- Icdrr,b's "Urban Health Atlas" (Bangladesh), <http://urbanhealthatlas.com>

COVID-19 urban resource lists:

- Global Water Operators' Partnerships Alliance (GWOPA), <https://gwopa.org/what-water-and-sanitation-operators-can-do-in-the-fight-against-covid-19>
- WIEGO, <https://www.wiego.org/waste-pickers-essential-service-providers-high-risk>
- Sanitation and Water for All, <https://www.sanitationandwaterforall.org/about/about-us/water-sanitation-hygiene/covid-19-and-wash>
- ARISE hub, <http://www.ariseconsortium.org>
- Ushahidi, <https://www.usahidi.com/covid>

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