Forward planning for disaster-related mass gatherings amid COVID-19

The landfall of cyclone Amphan around the India and Bangladesh border on May 20, 2020, which resulted in the most severe storm in the region since 1999, highlights the limitations to standard disaster responses during pandemics such as the current COVID-19 crisis. The frequency of geophysical, meteorological, and biological hazards is on the increase, their causes and impact might be intertwined, and only few of them are predictable.\(^1\)^\(^3\) Occurrences of extreme humid heat, higher than the optimal human survivability limit of 35°C, have more than doubled in frequency since 1979,\(^1\) leading to an increased frequency of tropical cyclones (also known as hurricanes or typhoons; panel). These are formed when ocean temperatures increase to greater than 27°C, and can move at speeds greater than 322 km/h; at landfall, they cause tornadoes, torrential rains, high winds, and flooding. Additionally, climate change is increasing the risk of extreme and longer wildfire seasons.\(^3\) Floods and landslides related to seasonal monsoon rains in the Indian subcontinent (typically starting in mid-June each year) have become frequent. In east Africa, the path of the monsoons and the new vegetation they provide are followed by an ongoing outbreak of desert locust swarms, decimating crops and livestock that depend on the vegetation.\(^4\) Further distal effects of the weather extremes might be unpredictable, such as extreme rainfalls triggering volcano eruptions, landslides, or breakage of dams.\(^5\) El Niño Southern Oscillation, which affects countries in the Pacific Rim from Peru to Indonesia and Australia, can also bring heavy rainfall and long droughts.

Irrespective of the nature of the disaster, whether a slowly occurring process or an emergency, all disasters cause displacement, food crises, and diseases for people and livestock. Even in non-pandemic times and high-income countries, disasters overwhelm national response systems. However, the outcomes of disasters, amid the COVID-19 pandemic, will be compounded the most in low-income and fragile countries. Disasters represent situations similar to mass gatherings. The COVID-19 lockdowns in southeast Asia, Africa, and Latin America resulted in mass gatherings of stranded workers who risked both starvation and transmission of COVID-19.\(^6\)

Congregate shelters and large-scale population movements—hallmarks of a natural disaster response—can determine the rate of COVID-19 transmission and challenge the physical distancing requirements of lockdowns. In a natural disaster scenario, evacuees susceptible to COVID-19 will mix with asymptomatic carriers of the virus, and the prevalence of other airborne, water-borne, and vector-borne diseases might add to comorbidities. Facilities for handwashing and hygiene are severely disrupted during and in the aftermath of natural disasters due to breakage and lack or contamination of water and sanitation systems, if they exist in the first instance. In regions where open defecation is prevalent, which can range from 6% to 75% of the population, potential faecal–oral transmission of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and exacerbation of the spread of endemic diseases should be a concern. Additional challenges include cholera and other diarrhoeal infections, intestinal helminths that cause anaemia, and soil-transmitted infections particularly among people who walk barefoot. Even environmental sampling techniques such as sewage sampling for SARS-CoV-2 surveillance would be challenging where open defecation is most common. Contact tracing would seem impossible when so many

Panel: Global hotspots for tropical cyclones and their timing

1. The Atlantic basin; cyclone season June–November; around six of 12 storms reach category 3–5 in strength (5 being the highest).
2. The Eastern Pacific basin (includes the Central Pacific); cyclone season May–November; around 13 of 16 storms reach category 3–5.
3. The Northwest Pacific basin; cyclones throughout the year; the most active region, between three and 28 named storms are of category 3–5.
4. The North Indian basin; cyclone season April–December; around four to six storms occur of category 3–5.
5. The Southwest Indian basin; cyclone season October–May; average of ten cyclones throughout the year; storm category 2–4.
6. The Australian and Southeast Indian basin; cyclone season October–May; five of nine cyclones reach category 3–5.
7. The Australian and Southwest Pacific basin; cyclone season November–April; average of 16 cyclones per year of storm category 3–4.
people are on the move and intermingling.

Contingency for continuity of pandemic mitigation during natural disasters is required. Principles for managing mass gatherings and disaster responses need to be adapted to accommodate COVID-19 transmission dynamics. Plans are crucial for known disaster hotspots, particularly in low-income and fragile countries, to avoid exacerbation of the challenges observed during COVID-19 lockdowns.6

During this COVID-19 era, plans should identify facilities for phased relocation of hospitalised patients, or outline capacity arrangements for on-site emergency care, and special care options for people with pre-existing conditions. Resources should also be identified for disease outbreaks and post-disaster follow-up to counter the increased burden of infections, and crucial medical resources should be stockpiled.7 Intensive care unit (ICU) capacity could be increased by making use of a range of hospitals and non-ICU staff under supervision.8 Oxygen is a critical resource, and compressed gas cylinders are an option to ensure an uninterrupted supply.9 To achieve sufficient physical distancing between family clusters during disaster-related evacuations, past estimates of requirements for shelters and transportation for mass movement of people should be revised by at least a 3-times increase, to account for physical distancing.

An inventory of available dwellings (for example, school buildings, community halls, and places of worship) or temporary structures such as tents should be developed. Envisioning options for adequate portable water and sanitation infrastructure is also crucial. Distribution sites for basic necessities such as food and medicine can serve as venues for continued pandemic-risk communication and distribution of face coverings and preventive care for common water-transmitted and soil-transmitted conditions. COVID-19 testing capacity would need to be augmented to help respond to outbreaks. Disaster preparedness and planning should include staff from the national communicable disease control units, and focus on diseases that are likely to spread the fastest in displaced congregations with inadequate water and sanitation resources. A natural disaster plan that includes the triaging of a volunteer workforce, use of national defence forces for supply chain management, facilitations of domestic philanthropies to substitute social support needs, and rapid access to UN resources can all help to optimise the use of shrinking domestic and global assets during this ongoing pandemic.

We declare no competing interests.

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