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*Commentary*

# Reflection of Challenges and Opportunities within the COVID-19 Pandemic to Include Biological Hazards into DRR Planning

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**Abstract:** COVID-19 has reinforced the need to revisit the integration of health within disaster risk

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several international frameworks, including the Sendai Framework for disaster risk reduction 2015–2030 [2], and more recently in World Health Organization (WHO) Framework for Health-Emergency Disaster Risk Management Framework (Health-EDRM) [3]. The ongoing COVID-19 pandemic has amplified the need to bring the health sector front-and-center in disaster risk management at national and international levels. A hazard is defined by the United Nations Office for Disaster Risk Reduction (UNDRR) within the Hyogo Framework for Action as "a potentially damaging physical event, phenomenon or human activity that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation. Hazards can include latent conditions that may represent future threats and can have different origins: natural (geological, hydrometeorological and biological) or induced by human processes (environmental degradation and technological hazards)" [4]. A pandemic is an example of a biological hazard, which are hazards that may be either "of organic origin or conveyed by biological vectors", would be further defined by characteristics such as "infectiousness or toxicity, dose-response, incubation period, case fatality rate and estimation of the pathogen for transmission" [5], and may have amplified impacts in the age of globalization.

Globally, hazard management planning and response strategies have yet to reflect the non-linear transition of biological hazards, particularly pandemics, which can emerge in overlapping waves with different impacts, and the community must enter a response phase before the initial recovery phase is completed [6]. As a result, the non-linear attributes of biological hazards have rendered the human community vulnerable to protracted crises that persist and increase the community's vulnerability to the cascading risks of multi-hazard that generate complex secondary events and interactions [7]. Many global at-risk communities face cumulative impacts of concurrent geological and hydrometeorological hazard events like earthquakes and cyclones during the COVID-19 pandemic, exacerbating existing issues of food insecurity and social security. Examples of multi-hazards with cascading risks include the cyclone Amphan landfall in India and Bangladesh, which disrupted clean water and sanitation systems, leading to barriers in adequate handwashing and hygiene, which has, in turn, exacerbated not only the spread of COVID-19 but other wa-

## 3. Results

### *3.1. Health System Resilience*

When responding to a biological hazard, the health sector is expected to lead the

socioeconomic indicators should be made available to identify and minimize the impact of determinants that may exacerbate biological risks [6]. To achieve DRR that is inclusive of the vulnerable and the forgotten, risk assessments during emergency settings must therefore include disaggregated data and analysis for groups facing vulnerabilities such that policies may holistically address the 6

in a community must be revisited and defined for relevant DRR planning and capacity building.

### 3.4. Risk Communication

Risk communication can only be made effective when taking the "whole of government, whole of society" approach [3]. The global impact of biological hazards highlights the importance of effective communication between stakeholders at all levels, from the international level, among experts and policymakers, to the community level, within the general public, within households, and among individuals. As the fundamental component to enhancing community cooperation, mobilization and resilience, risk communication should include a top-down approach from government or authorities that participate in cross-country dialog to enable early and effective warning systems. These warning systems should trigger national or international standard operating procedures to mitigate the impact as early as possible [3,6]. Communication also requires the bottom-up input of the whole society to ensure that the information disseminated is tailored and relevant to all members of society and their protection. Efforts should be taken to extend this dialog to groups facing vulnerability, such as indigenous communities, migrants and refugees, for whom information transfer tends to be complex and indirect. The participation and engagement of local government, faith-based groups and religious leaders, as well as civil society groups, are essential in this process [6]. Moreover, it should be recognized that resource information channels vary with user demographics, acceptability, and access. Studies have shown that health literacy and risk perception are negatively correlated with income, education and social status. The European Health Literacy Survey conducted in eight countries demonstrated that 50% of adults have problematic or inadequate levels of access, understanding, appraisal and application of health or risk information [34,35]. A study in Australia showed that people with low health literacy and people whose native language is not English demonstrated poorer understanding of COVID-19 symptoms and prevention measures, more difficulty accessing government information, difficulty accessing prescription medication, and experienced greater anxiousness and financial difficulties [36]. Studies conducted in Australia and the United States showed that factors increasing vulnerability to COVID-19, such as age, underlying chronic diseases, and income are also factors associated with the ability to access and understand health information and decision-making [36,37]. During the COVID-19 pandemic and widespread lockdown, digital media has become a convenient and rapid tool for people to gain information. It is important that risk communication ensure equitable access and understanding by all groups and mitigate against misinformation.

### 3.5. Digital Literacy

There is growing discussion on the use and functionality of digital tools for information-sharing, contact tracing, and communication. The rapid development of innovative information and communications technology (ICT) has enabled and enhanced the capacity for large-scale data collection, analysis and dissemination. As exemplified during COVID-19, such systems have allowed individuals to remotely conduct normative daily tasks and maintain social cohesion despite extreme physical distancing measures [38]. ICT allows sectors to continue their basic functions, such as the health sector using telemedicine for non-essential patients, the education sector using remote learning, and the business sector to promote teleworking. Furthermore, technology has enabled sectors to conduct extraordinary functions in the context of a pandemic beyond national jurisdiction. For example, governments and private entities have implemented efficient surveillance, reporting, or contact tracing through artificial intelligence other technologies that aggregate and share large-scale data; mapping disease spread for community protection [24]. However, in adopting ICT measures, careful considerations must be made to ensure digital tools are inclusive to all members of the community. For example, barriers of access and adaptability must be considered within ICT infrastructure to guarantee access to information and

services among the elderly, disabled groups, lower-income households, or those living in remote areas [6].

### *3.6. Knowledge Product Marketing*

Updating and generating new recommendations and tools for DRR is a continuous process. Outside of science, these tools can be used to develop effective public communication strategies and raising awareness for community preparedness [6]. The DRR community requires more tools and knowledge-sharing platforms to facilitate planning and strategy development [2], and there is as yet limited availability of updated and relevant DRR knowledge product specialization for biological hazards at a global scale such as the COVID-19 hazards. This has hindered knowledge sharing, scenario planning, and cross-sectoral learning. Although the WHO Thematic Platform for Health-EDRM was formed in September 2016 to "coordinate activities, promote information-sharing, develop partnerships, and provide technical advice to strengthen the Health-EDRM research field", as of 2020, there remains an urgent need to strengthen multidisciplinary learning and

**Table 1.** *Cont.*

| Issues | Opportunities to Expand into DRR | Challenges | Suggested Solution |
|---|---|---|---|
| Risk communication | Review or strengthen top-down government approaches to early warning systems<br>Consider health literacy in disaster risk communication and decision-making frameworks<br>Consider demographic and health factors (e.g., old age, physical disabilities) in ability access to information | Limited evidence of barriers to inclusivity of populations or inclusivity of communication channels<br>Limited but growing political will in managing misinformation or in determining the reliability of the information | Develop inclusive platforms for information dissemination (e.g., used by the elderly, disabled individuals)<br>Community dialog to review and research barriers of information access and understanding<br>Building awareness and appropriate policies for communities facing vulnerabilities and improving patterns of communication under complex circumstances |
| Digital literacy | Use of novel technology to develop tools for DRR data management (e.g., information sharing, data collection, tracking)<br>Use novel technology to improve health DRR (e.g., diagnostics, telemedicine) | Complex access to digital tools for certain groups (e.g., elderly, remote / rural groups, low-income groups) | Build community dialog to promote the use of digital tools and understand barriers to usage<br>Pilot novel and innovative tools for telemedicine, robotic temperature monitoring, or automated dispensary<br>Building awareness and appropriate policies for communities facing vulnerabilities and improving patterns of communication under complex circumstances |
| Knowledge product marketing | Update Health-EDRM and DRR tools, in particular, to consider the multifaceted and adaptive nature of concurrent, cascading and interacting hazards<br>Multi-sectoral participation in the development of updated tools and guidelines | Lack of political or institutional will for multi-sectoral planning | Collect evidence and lessons learned for needs in addressing novel biological hazards<br>Develop adaptive tools and knowledge products<br>Begin a multi-sectoral dialog for DRR<br>Building awareness and identifying knowledge gaps within communities to encourage active research and policy development |

The COVID-19 pandemic has demonstrated the ability for a biological hazard to travel across national borders and the need for governance structures mitigating against transnational risks. There is a role for North-South, and South-South collaboration in jointly developing technological, medical and social innovations, which can accommodate local variation, that lead to creating incentivization for long-term multi-generational resilience [40]. Inter-sectoral coordination such as public–private partnership models

for health service provision should be explored to maximize the functionality of service provision and the range of services available [6].

There is a large number of activities, priorities and stakeholders that must be mobilized, facilitated, and coordinated, not only in response to the pandemic and in the recovery phase but also in developing DRR plans against the next hazard that emphasizes a coordinated response across linked sectors rather than over-burdening one sector [6]. In order to operationalize lessons learned in impactful, cost-effective and sustainable ways, methods in cross-program planning, monitoring and evaluation can be taken from the area of project management. This will involve viewing international development as a transformative public sector project when evaluating delivery constraints such as time, cost and quality. International development and private sector projects are at risk of facing similar challenges in poor stakeholder management, cost overruns, inadequate monitoring, and lack of understanding of local context. However, international development projects often have less tangible goals and certainly face higher socio-political complexities that induce further transaction costs [41].

## 5. Conclusions

COVID-19 has impacted progress across the Sustainable Development Goals (SDG). The economic impact has resulted in an estimated 71 million people pushed into extreme poverty (SDG 1—no poverty); 80 million children under the age of 1 are estimated to

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