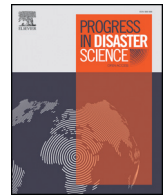




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Invited ViewPoint

Are we there yet? The transition from response to recovery for the COVID-19 pandemic



Bapon (SHM) Fakhruddin^{a,b,*}, Kevin Blanchard^c, Durga Ragupathy^a

^a Tonkin + Taylor, New Zealand

^b Committee on Data of the International Science Council (CODATA), 105 Carlton Gore Road, New Market, Auckland 1213, New Zealand

^c DRR Dynamics Ltd, United Kingdom

ARTICLE INFO

Article history:

Received 4 May 2020

Received in revised form 7 May 2020

Accepted 8 May 2020

Available online 12 May 2020

Keywords:

COVID-19

Disaster response

Transition

Recovery

ABSTRACT

There is no corner of the planet that has not been impacted by the rapid spread of the novel coronavirus, COVID-19. While the COVID-19 pandemic has already had far-reaching socioeconomic consequences commonly associated with natural hazards (such as disruption to society, economic damage, and loss of lives), the response of governments around the world has been unparalleled and unlike anything seen before.

Governments are faced with a myriad of multi-dimensional effects of the pandemic, including direct impacts on public health systems and population health and indirect socioeconomic effects including disruption to every single sector of the economy and mass unemployment. There is, additionally, the growing realisation that the timescale associated with this crisis may permanently change the very foundations of societies 'normal' day-to-day life.

As the world transitions to recovering from COVID-19, those developing that recovery need support in adjusting and improving their policies and measures. The situation seems dire, the stakes are high. Literature about the transition between the response and recovery phase in relation to pandemics is scarce. Further complication is that the pandemic will not allow countries to simply transition to the full-scale recovery, instead, a rebound from recovery to response phase is expected for a certain period until the immunization is in place. Pandemics indeed force us to think beyond typical emergency management structures; the cycles of the disaster risk management in the case of biological and other natural hazards are not exactly the same and no one-size-fits-all approach may be used. Still, some parallels may be drawn with the efforts to combat natural hazards and some lessons may be used from previous and the current pandemic.

Based on these experiences and reflections, this paper provides a set of policy directions to be considered during the transition towards, as well as throughout, this transition phase. It is suggested that meeting this global, multi-dimensional, and complex challenge will require considerable international collaboration (even convention) and macro-scale changes to global and national policies. The recovery issues are mainly going to be dominated by politics, economics and social science. Necessary for an effective recovery, the pandemic response needs to be a holistic response, combined with an improved data ecosystem between the public health system and the community.

We should also view this outbreak and our response to it as an opportunity to learn lessons and reaffirm our universal commitment to sustainable development and enhancing wellbeing around the world.

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1. Beyond typical emergency management

The consequences of any new virus are always unforeseen and become more and more multisectoral as time compounds them, at all levels, from an individual to the macro level.¹ These consequences, although uncertain,

* Corresponding author at: Tonkin + Taylor, New Zealand.

E-mail address: smfwater@gmail.com. (B.(S.H.M.) Fakhruddin).

¹ At an individual level, a person's income, access to food, other health care (outside of that related to the pandemic) are all impacted. At the macro end of the consequences, financial structures (of both public and private institutions), political stability (or instability and tensions) are impacted.

can be reduced with sound policy. However, the policy for pandemic crisis is unlike that applied to natural hazards. Pandemics force us to think outside of the box, or in this case, outside the typical emergency management cycle (Fig. 1). In other words, while four phases to reduce the impact of a natural hazard (preparedness, response, recovery, and mitigation) are principally linear, the response and recovery phases for a pandemic are essentially non-linear. To illustrate, unlike earthquakes, cyclones or other natural hazards, which are usually one-off events occurring within a limited period, COVID-19 or any other pandemic, tend to come in several waves over a protracted period – until the effective vaccine or herd immunity is in place such as 1918 influenza pandemic and Ebola virus disease occurred

in multiple waves [13]. Also, natural hazards tend to impact relatively confined areas. The COVID-19 outbreak was declared a global pandemic by the World Health Organization (WHO) on March 11, 2020 and already in April 2020, the virus has affected 185 out of 195 countries (Johns Hopkins University, 2020).

Biological disasters present challenges for both the response and recovery stages due to their sheer complexity (Jeremias & Martin, n.d.). Due to the very nature of pandemics, there will be a constant change in the way we approach and implement organization structure, tools and technologies, as well as emergency management, recovery, and business continuity plans. Each new wave of a pandemic is distinct, where the same approach in policy may not be applicable, and revisions after each wave may be required to minimise the new consequences (Fig. 2).

2. Beyond managing single hazards

In the midst of the COVID-19 emergency, on March 22, 2020, Zagreb, Croatia was hit by a 5.3 magnitude earthquake, as the country dealt with 206 COVID-19 patients [15]. In Canada, Manitoba Province and Ottawa City fought against flooding caused by snow melting. A month later, Cyclone Harold wreaked havoc on the Solomon Islands, Fiji, Vanuatu and Tonga, placing extra stress on their already stretched governments, as the need for additional funds, medical supplies and food rose [8]. In Vanuatu, this was further strained by the measures put in place for the COVID-19 response (SBS, 2020).² While local governments in Japan suspended receiving volunteers engaged in rehabilitation works in areas devastated by Typhoon Hagibis in 2019, the Bangladesh government prepared for both cyclones and a COVID-19 outbreak in the Cox's Bazar camps which shelter some 900,000 Rohingya refugees [6].

The world is facing the same type of difficulties to manage natural hazards as pre-pandemic whilst also investing in considerable efforts to flatten the COVID-19 curve. And yet, with rapidly changing climate and ecology, hastily marching urbanisation, and increased travel, pandemics will become more frequent and more complex. Perhaps the single common thread of pandemics, cyclones, floods and earthquakes is that they become ever more intense, magnified and complex in nature.

Fundamentally the issues to respond to these events are political at a number of levels including within the scientific community, with competing interests between the various sciences (social, biological and health-based) particularly noticeable. This will be no different in the recovery phase. Ensuring consideration at all levels on government response, policies, plans and logistics regarding the process in which they respond to other emergencies during the pandemic, whilst ensuring scientific harmony, is crucial in ensuring effective response, recovery times, and financial and political stability.

The existing framework of disaster risk management policies (national, regional and global) has largely been designed to ensure a swift and effective recovery along the traditional disaster risk management cycle. The Sendai Framework for Disaster Risk Reduction, agreed in 2015, focused the attention of signatory member states on preparing for a range of hazards including those of a geophysical, hydrological, climatological and meteorological nature. Importantly, it also included a strong public health focus and consideration of the risks from biological hazards [9]. However, the Sendai framework did not distinguish the cascading impact of biological and other hazards in a systematic risk management approach. The emerging thinking is that the concept of pandemic must evolve from crisis response during discrete outbreaks to an integrated cycle of preparation, response and recovery [1]. The recent Global Risk Assessment Framework (GRAF) promises to inform and focus action within and across sectors and geographies by decision makers at local, national, regional and global levels to improve the understanding and management of current and future risks, at all spatial and temporal scales (Gordon, 2020).

² As one of the few countries that did not have any case of COVID-19, Vanuatu quarantined supplies that were sent from other nations for seven days and therefore the emergency supplies were not immediately available to people.

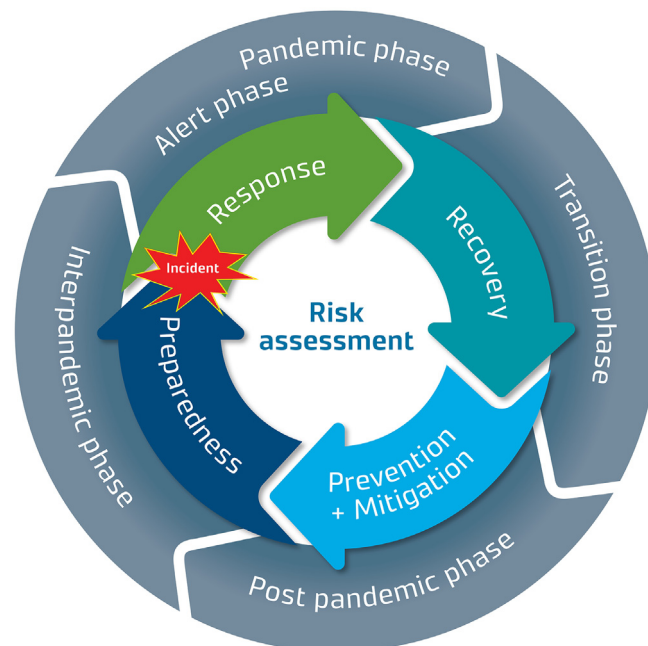


Fig. 1. A response to biological and natural hazards follows the same disaster risk management cycle – but in the case of pandemics, *alert* and *pandemic* phases (reporting the increase of the global average of cases, with the highest number in the pandemic phase) correspond to the *response* phase of disaster risk management, while a *transition* phase (reporting the significant decrease of the global average of cases) correlates with the *recovery* from a disaster.

3. What have we learned?

Despite the two-decade experience of public health crises caused by novel virus infections (such as HIV, Influenza A virus subtype H1N1 and H5N1, SARS-CoV1, MERS-CoV and Ebola), the epidemiological novelty of COVID-19 and its rapid spread caught many governments unprepared (Djalante et al., 2020). The response of all governments, organisations and individuals at all levels, national or international, has been put to the test. A number of governments around the world failed to act on their warnings about a pandemic due to not understanding the magnitude of the problem, so-called ‘strong man’ politicians, lack of updated or public risk registers and other various reasons (Tyler and Gluckman, 2020).

As the world continues to combat the COVID-19 pandemic impacts, rapid evaluations of the strategies of various countries provide insights for all stakeholders to adjust and improve policy options. Not all strategies have yielded positive results; in fact, while some were commended as *effective* (such as the response from Singapore, Germany and New Zealand), others were criticised as *devastating* (for example, high infection and death rates in Iran, Italy, South Korea, and the United States) (Djalante et al., 2020, Djalante, R., et al., 2020).

As an illustration, Singapore's approach to the COVID-19 outbreak has been rated as effective as it managed to keep both the infection rates low and the economy strong [7]. One of the key success factors of Singapore's efforts has been assigned to the fact that Singapore has learned from their recent pandemics experience. In 2000, Singapore experienced an outbreak of hand-foot-mouth disease, which affected more than 3000 young children, causing three deaths. Later in 2003, SARS hit Singapore, infecting 238 people, 33 of whom died of this disease. In 2009, avian influenza H1N1 struck Singapore, affecting 1348 people with 18 deaths (Lai, A. Y., & Tan, S. L., 2015). One of the most important lessons that the Singapore government learned from the SARS epidemic was the detrimental role of the bureaucratic structure in handling fluid and unprecedented situations. Recognising that the effective response and recovery for COVID-19 depends on a large number of stakeholders (“the health of all depends on each of us”, <https://www.gov.sg/>), the Singapore government has led a well-coordinated, multi-stakeholder

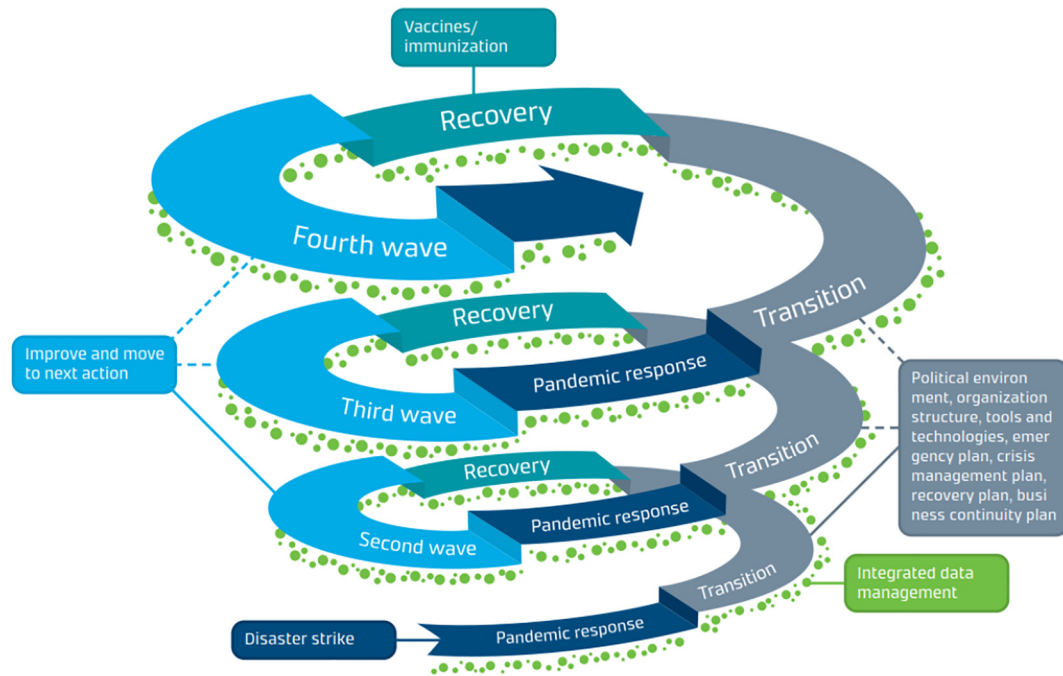


Fig. 2. Transitioning from pandemic response to recovery in a spiral fashion: there is a high probability of the second and even the third wave of a pandemic if there is no vaccine or immunization, each new wave pushing the disaster risk reduction cycle from the recovery back to response phase.

response and recovery, which has been praised by other countries. However, Singapore paid far too little attention to their hundreds of thousands of migrants living in crowded dorms, excluded from government initiatives, among whom SARS-CoV2 is now spreading quickly [12]. Sadly, this was also reported in Germany where there was a rise in cases where refugees were not accommodated properly [11].

New Zealand's success factors were determined leadership and bold action early in the pandemic outbreak. Because of early and strong action, only a small number of New Zealanders got infected, were tested, contact was traced, and they were isolated. This prevented widespread transmission overwhelming the medical system along with the inherent effects such as widespread shortages of tests and personal protective equipment.

Experiences from the previous pandemic crisis offer more insights, and the responses of different governments may broadly be categorised as *effective* or *ineffective* (Table 1).

Parallels may also be made between the effectiveness of the country's response to pandemics and to natural hazards. For instance, the response to the devastation caused by the 2017 Hurricane Maria in Dominica and the surrounding Caribbean nations was characterised by most of the *ineffective* responses from Table 1. The combination of poor technology and data

collection systems, inadequate reporting, lack of public awareness and inclusiveness led to poor information being disseminated to people during the hurricane; this in turn inhibited people from preparing and therefore led to inaction and placed people at greater risk to the hurricane (Tonkin & Taylor International Limited, 2020). These very factors seem to also arise when reviewing the responses to COVID-19 in countries such as Iran and Italy (Djalante et al., 2020).

4. Effective policy alternatives during pandemics

The primary mission during the response phase is saving lives and livelihoods (Jeremias & Martin, n.d.). This, as seen from the response of many governments to the COVID-19 outbreak, relies on the communications policy.

The limited capacity for vaccinating against a novel coronavirus in the early stages results in a more concerted policy direction around communication of public health guidance and instructions (including lockdown and social distancing) [3]. This policy is often targeted at the most vulnerable community members or is aimed at informing the wider public audience about the risks to the most vulnerable [3]. Indeed, much of the work in

Table 1

A pattern emerges, whereas *effective* measures often utilised a number of approaches including collaborative structures, transparent communication, well-developed information technologies and communication systems combined with rigorous public health measures; in contrast, *ineffective* responses were found to rely on bureaucratic structures, weak information and communication technologies, and inadequate public health measures (updated based on [2,7]; and [14]).

Effective responses	Ineffective responses
Transparent governance, collaborative structures	Top-down governance, bureaucratic structures
Efficient and effective information dissemination	Lack of knowledge on how to disseminate information correctly
Modern information technologies and well-developed communication channels	Poor technology and fragmented communication channels
Dissemination of information to targeted population in a transparent manner, resulting in trust and engagement by the public	Inadequate/inconsistent information or misinformation, resulting in mistrust by the public
Strong community vigilance through public education and incentives	Weak community vigilance and lack of public education measures
Strong collaboration of major parties including city councils, citizens, and community volunteers	Lack of collaboration between major parties with the lack of risk management integration into major sectors (e.g., health, infrastructure, tourism, environment)
Evidence-based decision making, with the effective use of big data	Lack of data interoperability and meta data standardisation
Stringent hospital infection control measures, hygiene practices and use of personal protective equipment designating separate zones within the hospital or certain hospitals for infected patients only	Inadequate personal protective equipment and hygiene practices, no separation between the infected and non-infected patients
Continuing support during the lockdown	Lack of support to community in lockdown

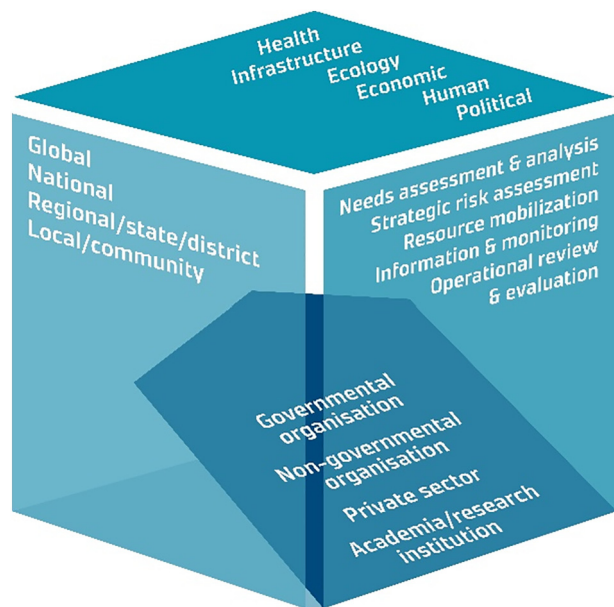


Fig. 3. Effective response and recovery measures for the pandemic crisis require coordination of multiple actors across a number of fields and at various temporal interludes.

the response phase of a biological disaster revolves around the dissemination of information at national or regional levels (Fig. 3).

One of the tried-and-tested approaches to responding to pandemic disasters is the epidemiological process of understanding disease transmission, including by contact tracing (O'Sullivan et al., 2019). This type of response differs to that of a geophysical hazard in that it is concerned with individuals, rather than the wider picture (Lee & Riley, 2006). While this strategy requires a considerable amount of resources, it has been effective in reducing the impacts of an outbreak (for example, in South Korea), implemented along with wide-scale testing and containment [10].

While many countries are only just managing the multiple aspects of the response phase, the COVID-19 outbreak will very likely subside eventually (through herd immunity or vaccination) and there will be a period of recovery. Policy for the recovery from pandemics will differ from traditional recovery in a number of ways, largely due to the global scale and sheer complexity of COVID-19 pandemics [5]. One of the initial policy manoeuvres many governments will want to make will be returning economic activity to normal (or as close to normal as possible). This effort to restart trade, manufacturing, and services will differ from those during natural hazards in both scale and complexity (Table 2).

5. Policy considerations while transitioning to recovery

Unless or until we acquire full natural or vaccine-induced immunity to COVID-19, or if an eventual vaccine is only partially protective, we face the threat of a new endemic disease that will fundamentally change human society. It sounds alarmist – we admit – but it is becoming distinctly possible, based on what we have learned so far.

Like the human immune system, whose reaction may sometimes be part of the cause of death from the viral disease – reactions of all stakeholders and the public to the pandemic can have positive as well as negative consequences. Therein lies the greatest risk and, with it, the strongest need to remain calm and in control. We are now in a global, high-risk situation and the direct threat of COVID-19 may not turn out to be our biggest problem.

As the world is transitioning to recovery, the following policy considerations are important and need to be considered:

Change the mindset from 'if' to 'when'.

Table 2

Some elements of the response and recovery phases during natural hazards (hydro-meteorological and geohazards) and biological disasters (from pandemics) are the same – but each needs to be carefully considered and specified.

Picture the governments playing *whack-a-mole*,³ hammering the new waves of virus re-emerging in hotspots with the yet again forced stay-at-home measures, reactivated temporary hospitals, sourcing extra healthcare personnel and personal protective equipment. This is indeed an unwanted but warranted scenario. As with fire, it is not a question of "if?" but "when?". Wildland fire suppression personnel and equipment serve as an excellent model for preparedness levels and mobility of resources throughout the fire season. Countries shall be in this mindset for pandemics too. COVID-19 hotspot outbreaks may be managed in the same way, with the inclusion of testing, monitoring, and contact tracing. Data-based modelling may provide a framework within which the details are hammered out among key stakeholders (government, private, and non-governmental organisations).

Move towards an integrated approach to pandemics.

Our concept of pandemics shall move to an interdisciplinary science, with an integrated approach of medical science and public health with medical research and development, social sciences, diplomacy, biomedical science, big data, information technology, artificial intelligence, statistics, meteorology, biotechnology, ecology and so on – combined to provide an integrated cycle of prevention, preparation, response and recovery.

Build recovery on existing policy frameworks.

The international community should recognise the opportunity afforded them through already agreed policy frameworks such as the Sendai Framework for Disaster Risk Reduction, United Nations' Sustainable Development Goals, and climate change conventions and agreements. These policy tools have been largely agreed and ratified in each of the countries impacted and as such, many of the processes to respond, monitor and recover are already established within domestic legislations. Building recovery around these frameworks can also provide a greater level of cohesion among member states who may be at different stages of the pandemic.

Invest adequately in preparedness.

We have seen a number of countries reducing the level of public funding for their healthcare systems or internationally focused biological observation and scanning initiatives. These funding reductions have been cited as one reason the COVID-19 pandemic has been so destructive. Governments and international organisations should use the opportunity of recovery and demand from their public to invest in measures to ensure future novel viruses or biological threats are identified early.

Invest in multi-sector pandemic planning.

Beyond health risks, depending on the characteristics of the pathogen, pandemics cause risks and related disasters in multiple sectors such as agriculture, public transport, logistics, finance and security. A very lethal pathogen could cause a total global shutdown, resulting in famine or another unforeseeable secondary disaster. Because each new pathogen usually has unknown characteristics, the response decision making is highly flawed and error-prone. The pandemic response needs to be a holistic response. Multi-sector pandemic planning and active drills with representatives from different sectors can help countries and cities to prepare for such complex chains of decisions and consequences.

Strengthen international collaboration.

International communication, cooperation, collaboration, and even established convention should be considered, reconsidered and strengthened for prevention of pandemics. Leadership (in terms of financial support and policy development) will need to come from established international organisations such as the World Bank, Asian Development Bank and United Nations, and groupings like the G20 and G7. While advanced organisations

³ Whack-a-mole has entered the language as a metaphorical term for a pervasive problem that keeps recurring after it is supposedly fixed, taken from an arcade game Whack-A-Mole which invites players to hit a series of pop-up animals with a mallet.

and groups will need to lead these efforts (they have the financial capacity and resources to do so), the inclusion of developing countries and non-traditional agents (including non-governmental organisations) is necessary and ultimately, inevitable. While a number of countries in recent years have taken domestic policies that have gone against international cooperation and some responses to the COVID-19 pandemic have seen bilateral spats between countries, the scale and complexity of this crisis calls for an international recovery that will only be achieved through global cooperation at all levels. Also, strengthening epidemiology, public health and laboratory capacity in low- and middle-income countries is essential though collaboration.

Address potential disparity in disaster risk management cycle.

The key piece to incorporate somehow is disparity in the disaster risk management cycle. In other words, one town or region can be in an early or late recovery phase, while another part of the country is still in a heavy response phase. Observed from a global perspective, the same principle can be applied between the countries that are in different phases of crisis management. The disparity in cycle may also occur if more than one type of a disaster hits the country simultaneously, impacting recovery differently (for example, power loss or interruption from typhoons in one section while dealing with a pandemic in multiple sections). Therefore, it is necessary to consider and incorporate into policies and plans how various response personnel and recovery actions will be impacted differently.

Design an appropriate information and risk communication system.

Any new pandemic means that people will be confused and trust has to be earned on both sides. Misinformation and fake news may follow the events and developments that are complex to grasp, and have now proliferated. In many developing countries, people consider COVID-19 as a curse. Furthermore, long response and even longer recovery times in the case of this pandemic are causing a great deal of tension and conflict in addition to other cascading problems. In fact, the Director-General of the WHO mentioned an *infodemic*, referring to unprecedented misinformation that spread faster and more easily than the virus, hampering a public health response. Improved information flow between the public health system and the community is necessary for an effective recovery.

Design a community accepted data sharing system

The use of data from people is becoming strictly controlled, whereas contact tracing is needed to better understand how infections spread. A data ecosystem is critical to ensure a stable transition from the response to the recovery phase [4]. A system shall be used, where communities feed information into the public health system and the feedback loop offers a fast and direct way to provide people with details of potential actions they can take.

Learn lessons for our changing climate.

Some have called the COVID-19 outbreak a dress rehearsal for climate change. Large-scale, global impacts on the economy and our day-to-day lives, those living in poverty being among the worst impacted, have been evidenced during the COVID-19 outbreak but are also predicted (and in some cases, already happening) in relation to our changing climate. The international community, as well as individual countries, should use the lessons we are learning through the outbreak, to ensure we are better prepared for the changes happening already and to limit or stop the increasing levels of risk caused by climate change.

Acknowledgment

The authors would like to acknowledge comments and suggestions from Sir Peter Gluckman & Anne Bardsley (Koi Tū; The Centre for Informed Futures, New Zealand); Rajib Shaw (Keio University, Japan); Rizwan Ali (University of Auckland, New Zealand); Qunli Han (IRDR, China); Bill Paton (Former UN, China), John Caffin (Former USFS, USA); Deanne Shulman (Former USFS, USA) Ana Ilic (New Zealand) and Andrew Mcelroy (UNDRR, Fiji).

This policy brief is published under the CODATA Task Group on FAIR Data for Disaster Risk Research and Integrated Research on Disaster Risk (IRDR).

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