Increasing Global Resilience to Systemic Risk: Emerging Lessons from the COVID-19 Pandemic
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The United Nations Office for Disaster Risk Reduction works towards the substantial reduction of disaster risk and losses to ensure a sustainable future. UNDRR supports the implementation of the Sendai Framework for Disaster Risk Reduction 2015-2030, which sets out a people-centred approach towards achieving a substantial reduction in disaster losses from man-made and natural hazards and a shift in emphasis from disaster management to disaster risk management.

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Executive Summary

Since the start of the pandemic in late 2019, over 175 million COVID-19 cases have been reported, and the virus has led to over 3.7 million deaths worldwide by mid-2021. As of mid-2021, although cases are dropping rapidly in many parts of the developed world, there is a stark global inequality in access to vaccination and health services. COVID-19 has proved to be far more than a health crisis. The impacts of the virus have grown exponentially, and have cascaded into the global economic, social and environmental systems, and disrupted almost every aspect of our interconnected world.

Today's globalized systems have contributed to the ease with which the disease spread, and to its systemic, compound, cascading, and non-linear impacts. Economically, the pandemic triggered a global recession. The global lockdowns and confinements had dramatic, cascading impacts on global supply chains (GSCs), with sharp declines in the supply and demand of a large range of products and industries. Workplace closures affected 94 percent of the global workforce and during the first quarter of 2020, 165 million full-time jobs were lost. The pandemic caused international air travel to slow by up to 90 percent and disproportionately affected Micro, Small, and Medium Enterprises (MSMEs) and the informal economy.

Socially, the consequences have been devastating. There has been an estimated 82 percent rise in acutely food insecure people in the world compared to pre-COVID times. Already-vulnerable people have been most affected. There has been historic rise in global poverty, felt most acutely in South Asia and Sub-Saharan Africa. An estimated four billion people globally who have little or no social protection have been disproportionately negatively affected by the crisis.

Women, who represent 70 percent of healthcare and social workers globally and make up 70 percent of the world’s poor are now bearing the brunt of pandemic related job losses. Many women also had to take on additional work to care for the sick at home, or assume additional home-schooling, household and childcare responsibilities. Fatality rates due to COVID-19 among the elderly have been five times higher than the global average. Children's education and social development has been disrupted especially in developing countries where too many lack access to online schooling.

Throughout the pandemic many places and populations had to confront both a major health crisis and the catastrophic conditions of natural hazards. Just as vulnerable populations suffer the impacts of the pandemic disproportionately so too natural disasters affect the vulnerable in larger measures. In 2020 there were 379 natural disasters that occurred at the same time as the pandemic. People living in these areas faced multiple hazards simultaneously.

Migrant labourers and their families who depend on remittances, people living in fragile and conflict-affected areas; as well as refugees and internally displaced persons all faced decreased access to basic services, and challenges in being able to effectively physically distance to prevent infection. Caregivers and other essential workers; people who live or work in crowded places, such as densely populated ghettos and slums, prisons, and those who face discrimination and have been subjected to increased hate speech, racism, and xenophobia. The crisis has also fueled a surge in false communications about the pandemic, often impacting care-seeking behaviour, particularly among those lack who lack exposure to legitimate information due to barriers related to age, gender, disability, mobility, or language.

Environmentally, although global transport emissions dropped by 40 percent and emissions from the power and industry sectors declined by 22 and 17 percent, respectively, these improvements were temporary. The global volume of medical and pharmaceutical waste increased by up to 40 percent since the beginning of the pandemic, creating environmental and human health risks.

Moving forward it is essential the pandemic foster learning and adjustments in global systems. There has been a global increase in emerging infectious diseases, or zoonoses, spread between animals and humans. These diseases are frequently associated with land-use change that has led to increased human-animal contact, increasing opportunities for pathogens to pass from wild and domestic animals to people, although the exact mechanisms of the spillover are still being studied. Their spread is fueled by the globalization of trade and travel, among other drivers. Climate change which destabilises ecosystems will exacerbate this trend.

This report outlines the importance of applying a systemic risk lens to help prevent the escalation and reduce the impact of future pandemics. It also outlines a number of key reforms required within global governance systems to facilitate this change. This includes not only strengthening and integrating health agendas into governance systems but also looking more holistically to address the root causes of zoonoses spillover. Action now to address the climate crisis, protect ecosystems and reduce extreme poverty and inequality can temper the conditions that allowed COVID-19 to emerge. Putting this into action requires stepped up efforts beyond just the health sector to strengthen disaster risk reduction, prevention and resilience, and to work across traditional silos to address systemic risks. Finally, it is essential that global systems do not aim just to ‘recover’ to where they were before but instead use this crisis as an opportunity to ‘bounce forward’ and build back better.
Integrate a Systemic Risk Lens into Disaster Risk

Governance structures, policies, plans, research, and actions need to be based on an evolving perception of risks and how to govern them that builds resilience into the interconnected systems that are characteristic of contemporary society. A systemic risk lens acknowledges the probability of future catastrophic disruptions and stresses the need for core systems to be flexible and have the built-in capacity to respond, adapt, and prevent lasting damage.

Reform and Strengthen Global Governance

The pandemic and its health, economic, social, and environmental impacts underscore the need for better globally coordinated, collective, multi-level governance. It reveals the significance of interdependence among, and the need for cooperation between countries, at local, national, and global levels. This includes whole-of-society and whole-of-government approaches.

- **Strengthen Multilateralism**
  Stronger global governance includes improved multilateralism, which involves cooperation among many parties and among many levels of governance, from local, municipal, regional, and national, to international.

- **Create and Strengthen Regional Partnerships**
  Bilateral, regional, and interregional partnerships are especially important. Regional institutions and agencies throughout the world need better and more innovative governance, as well as increased cooperation, integration, solidarity, and sector-wide approaches. This creates coherent response and recovery processes across territories experiencing the impacts of the same natural hazards and health risks.

- **Engage All Stakeholders**
  Governance of risk needs the full, inclusive, and equal participation of developing nations, women, indigenous people, youth, civil society, municipalities, the media, and the private sector, among others, to co-create conditions for successfully adopting solutions and protocols that can efficiently respond to disasters and build resilience in addressing future risks.

- **Adopt a Multisectoral, Multidisciplinary Approach**
  Response, recovery, and development need to be addressed simultaneously and holistically, requiring coherent multidimensional and multisectoral plans and actions. Systemic risks cannot be treated separately in governmental and scientific "silos".

- **Leave No-one Behind: Prioritize a Rights-based Approach**
  The world’s most vulnerable people have been disproportionately affected by the health crisis, overlapping hazardous events, and their cascading and systemic economic and social impacts; progress towards achieving many of the SDGs has been reversed. Risk governance needs to be guided by universal values, as espoused by the Universal Declaration of Human Rights and enshrined in the nine, core international human rights treaties. Progress towards achieving the SDGs needs to be accelerated. Governance must take a people-centred approach to empower the most vulnerable to build resilience into their lives as they face the disproportionate impacts of climate change and a future in which infectious disease is likely to be more prevalent.
The COVID-19 pandemic clearly demonstrates our interdependence: we are all in this together and we must work together to respond, recover, and build back better while addressing the disparities in vulnerability to disasters. It is also historical in global affairs during which two things became clear: global crises require concerted global response, and there is need to improve the way assessments and mitigation measures are undertaken in preparation for future events.

**Purpose and Scope**
This report is a global review and policy note on COVID-19 whose impacts cause systemic risk, with preliminary key lessons and recommendations to strengthen risk management approaches. It is based on the evidence to date, as the pandemic continues its global spread. It builds on insights from UNDRR teams, including those in regional offices in Asia and the Pacific, Latin America and the Caribbean, the Arab Region, and Africa. It is further informed by a selective literature review. It focuses on understanding the cascading and systemic aspects of the pandemic, especially in areas and among vulnerable populations that already experience the impacts of other hazards especially the impacts of climate-related weather disasters. The report provides a set of recommendations on how countries with recurring multiple hazards better cope with the added risk of COVID-19 can and increase their resilience to existing and future risks.

The systemic nature of the risks that are the subject of this report describing and analyzing in discrete sections and in a linear fashion. The issues are inter-related in complex ways. This report is organized into four major parts: part I provides background of COVID-19 pandemic; part II describes how this pandemic is a systemic risk and details its cascading economic, environmental and social impacts; part III analyzes the compounding effects of COVID-19 and climate-related and other hazards; and part IV synthesizes recommendations and lessons learned from the study.
Part I: Background

The COVID-19 Pandemic

To fully remedy global shocks like COVID-19 and mitigate future loss and destruction, the underlying physical causes need to be understood (Pinner, Rogers, & Samandari, 2020). The timing, place, and source of the first human infections of COVID-19 are still unclear. It is known that animals have transmitted almost all of the newly emerging or re-emerging viral infections (UNDRR, 2019a).

Zoonoses accounts for 70 percent of emerging infectious diseases and nearly all known pandemics and there has been a global increase in emerging zoonotic diseases or zoonoses (IPBES, 2020). Zoonoses are caused by pathogens that become Emerging Infectious Diseases (EIDs) when anthropogenic environmental changes alter the population structure of their reservoir hosts, and bring wildlife, livestock, and people into contact, illustrated in the centre of Figure 1.

"Disease emergence in humans is a multi-step process, as illustrated in Figure 1: introduction into the human population followed by perpetuated transmission. Once an infection breaks out, changes in societal conditions then contribute to its spread.

Demographic pressures and the increase in global consumption and trade patterns driven by developed and emerging economies, including human-made networks, such as roads, urban centres, and global travel and trade routes, are conducive to its spread (Galvani, 2004); (IPBES, 2020).

The COVID-19 pandemic is the most recent in a long, recorded history of pandemics of which the Black Death, or the Plague, in the 14th century was the most fatal; it killed some 75-200 million people. The Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) reports that increasing anthropogenic change, intensified human-animal contact, and globalization are contributing to a rapid increase in the risk of pandemics (IPBES, 2020).

The COVID-19 pandemic did not feature on a list of most likely events in the near future produced by the World Economic Forum. The survey produced a list of the top-10 long-term risks in terms of likelihood. Environmental concerns feature in the top five, but infectious disease does not appear in the list (WEF, 2020). This illustrates the extreme difficulty in predicting EIDs.

Figure 1: The origins and drivers of emerging zoonotic diseases and pandemics

Source: (IPBES, 2020)
Part II: The Covid-19 Pandemic and Systemic Risk

The emergence of COVID-19 initiated a series of complex, cascading impacts that spread across the world through networks in global sectors of society and the economy. Cascading effects are typical of the dynamics of disasters: a triggering event leads to a series of complex impacts that affect physical, social, and economic systems (Pescaroli & Alexander, 2015). For example, the initial COVID-19 outbreak cascaded from the health sector to the economy, social systems, and to the environment (Figure 5). The United Nations Comprehensive Response to COVID-19 report, "the pandemic is more than a health crisis; it is an economic crisis, a humanitarian crisis, a security crisis, and a human rights crisis" (UN, 2020, June (b)).

Cascading Risks

As COVID-19 spread, the impacts cascaded to health care systems worldwide, which suffered from the lack of enough Personal Protective Equipment (PPE), ventilators, hospital beds, testing capacity, and health care workers. The risk simultaneously affected the economy due to lockdowns, border closures, physical distancing, quarantine, and isolation measures to control the spread of the disease (Collins, 2020). These and other national and local strategies to stem its spread led to job and business closures and losses, migration, school closures, and long-term homestays that have social and economic repercussions, especially on those who are already vulnerable (UNDRR, 2020, 29 May).

Systemic Risk

Cascading impacts are a major feature of systemic risk. The pandemic's success in spreading was not only based on the virus's basic reproduction number, it also depended on the degree of contact between people enabled by the systemic nature of the world's complex, nested, interconnected, and interdependent systems. This system evolved to favour efficiency in the operation, management, and delivery of goods and services around the globe by optimizing the supply chain to minimize costs, reduce inventories, and increase asset use.

The pandemic has been characterized as a systemic risk because its appearance and cascading developments took advantage of these increasing global interconnections. The impacts of the health crisis cascaded in a non-linear fashion onto the economy and grew exponentially to disrupt every aspect of our interdependent world (OECD, 2020, April). In addition to the health care sector, systemic risks affect all those systems upon which society depends, including transport, energy, telecommunications, trade, health, finance, etc., and they intersect with natural events, such as climate change and natural disasters, as well as policy actions at all levels of government (Florin, 2016).

There are five major features of systemic risks: they are highly complex, transboundary and global in nature, nonlinear in their cause and effect, they include tipping points, and are underestimated in public policy arenas (Schweizer, 2019). The International Risk Governance Center (IRGC) (2018) notes that "interconnectivity within and between complex adaptive systems is one of the defining and determining features of our modern world." It points out that although collapses can often be predicted, they are usually unavoidable because they are part of the nature of "systems of distributed interacting components, whose conditions can change in response to their environments and to each other" (IRGC, 2018). Box 1 explains the difference between complex systemic risks and conventional risks, categorizing pandemics in the former.
## Box 1: Comparison of conventional and systemic risks

<table>
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<th>Type of risk</th>
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| Conventional risks | Known and well defined risks                                              | • Familiarity - recognisable patterns and management regimes that are relatively stable and have proven to be effective if implemented according to certain rules | • Bicycle Theft  
• Salmonella infection  
• Car accidents  
• Obesity | Use standard risk management practices, e.g., regulation                    |
| Emerging risks*  | New risks or known risks that become apparent in new context conditions (IRGC 2015) | • Uncertainty regarding causes, potential consequences and probabilities of occurrence  
• Lack of familiarity with the risk | • New processes and product in the field of synthetic biology  
• Malaria spreading to higher latitudes | Focus on early detection and analysis of elements that trigger emerging risks. Prepare to revise decisions and adapt |
| Systemic risks   | Threats that individual failures, accidents or disruptions present to a system through the process of contagion | • Highly interconnected risks with complex causal structures, non-linear cause-effect relationships  
• Lack of knowledge about interconnections in an interdependent and complex environment | • Desertification and collapse of the Aral Sea  
• 2008 global financial crisis  
• Pandemics  
• Cyber-security  
• Global climate change  
• Fish stocks depletion | Focus on adaptation and transformation of the organization of the system |

* Some emerging risks may manifest themselves in complex systems and thus require a systemic approach to their assessment and management. Some systemic risks may be first seen as emerging.

Source: (IRGC, 2018)
Environmental Impacts

**CO₂ Emissions**

Global carbon dioxide emissions have been rising for the past few decades, making the largest contribution to the greenhouse gases (GHGs) that are responsible for anthropogenic climate change. With the lockdowns and the precipitous decline in airline travel, global carbon dioxide emissions fell by 6.4 percent, or 2.3 billion tonnes, in 2020 (Tollefson, 2021). Global transport emissions dropped by 40 percent and the power and industry sectors declined by 22 and 17 percent, respectively (PIK, 2020).

Although the global decline is significant, representing about double Japan’s yearly emissions, climate experts say it is smaller than expected and they predict it will not last once the pandemic has ended (Tollefson, 2021). They draw important lessons from the temporary slowdown of GHG emissions: the pandemic has revealed that although individual behaviour can cause significant declines in CO₂, it will not amount to the needed long-term emission reductions to stop runaway climate change. Rather, energy production and consumption systems need structural and transformational changes to reduce the global economy’s carbon intensity (PIK, 2020).

**Waste**

Improper management of medical waste like the Personal Protection Equipment (PPE) has the potential to expose patients, health workers, and waste managers to injuries, infections, toxic effects, and air pollution (Asumadu & Owusu, 2020). PPE is considered infectious waste and can be a threat to human and environmental health if improperly managed, potentially escalating the spread of COVID-19 via secondary transmission. In areas not served by regulated municipal and industrial waste collection and management services, there is the potential for illegal dumping, open burning, and incineration, which in turn can affect air quality and human health due to the exposure to toxins (Sarkodie & Owusu, 2020).

In addition, such dumping and the indiscriminate littering of single-use plastics cause discarded items to enter water bodies. Components added to inert plastics can leach into the environment, affecting soil and water quality and the organisms that eat them or are otherwise exposed. Discarded plastic waste may also create breeding grounds for zoonotic disease vectors, such as those that cause dengue and Zika, threatening public health and safety (Ford, 2020; Silva, et al., 2021). Thus, through a domino effect inherent in systemic risks like the pandemic, the very plastic garb that protects us from infection, can eventually create new risks to human health.
Economic Impacts

Before the end of 2020, it was clear that the COVID-19 pandemic had caused a global recession. By the second quarter of 2020, 400 million full-time jobs had been lost, affecting lower- and middle-income countries and women the hardest (CCSA, 2020).

Economic Impacts Among Countries and Regions

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In terms of working hours lost, lower and middle-income countries are the hardest hit, with declines of 16.1 percent in working hours, although the Americas suffered an estimated reduction of 18.3 percent, or 70 million Full Time Equivalent (FTE) jobs in the second quarter of 2020, compared with the previous estimate of 13.1 percent. The ILO Monitor reports that among the world’s major geographical regions, this is the highest working-hour loss and the largest upward revision since the previous edition (CCSA, 2020). Box 2 provides a glimpse of the overall economic impacts of COVID-19 at the regional level, based primarily on preliminary UNDRR reports early in the year.

Figure 2: Economic decline by country (where data available) in the second quarter of 2020
## Box 2: Regional economic impacts

### Latin America and the Caribbean
At the beginning of the pandemic, it was projected that the Caribbean region’s economy would experience the deepest recession in more than half a century. Travel restrictions and border closures would lead to the collapse of tourism arrivals and the loss of livelihoods and remittances from labour migrants, leading to unemployment, increased poverty and inequalities, and the emergence of mental health problems (Nurse & Charley, 2020, 25 May).

### Asia and the Pacific
The region’s relatively weak economies and lack of access to capital markets meant less developed countries in the region were unable to roll out timely and sufficient stimulus packages, potentially trapping them in their vulnerable status (UNDRR, 2020, 16 July). In May, growth in Asia was expected to stall at zero percent in 2020, the worst performance in 60 years (UNDRR, 2020, 29 May). Small and medium enterprises (SMEs), which account for 90 percent of all businesses in most of the region’s countries are especially hard hit (UNDRR, 2020, 14 May).

### The Arab Region
By the summer of 2020, expectations were that the Arab region’s economy would shrink by 5.7 percent, with those of some conflict countries declining by as much as 13 percent for an overall loss of US$ 152 billion. The number of poor is estimated to grow by 14.3 million people to reach a total of more than 115 million, or one quarter of the total Arab population (UN, 2020, July b). The region was projected to lose at least US$42 billion in terms of GDP, businesses across the region to lose about US$420 billion in market capital, and to see the loss of at least 1.7 million jobs in 2020 (UNDRR Arab Region, 2020, 17 May).

### Africa
By May 2020, the COVID-19 outbreak had precipitated the first recession in Sub-Saharan Africa in 25 years (UNDRR Africa, 2020, 5 May). It was also estimated that a one-month full lockdown throughout Africa would cost about 2.5 percent of the continent’s annual GDP, or about US $65.7 billion a month. In addition, Africa would suffer from the wider external impact of lower commodity prices and investment flows. The tourism sector was hard hit with the loss of US $55 billion in the first three months of the pandemic (Mishra, 2020).

### Europe
During the first half of 2020, real GDP in both the euro area and the EU fell at double-digit rates. It was projected that GDP in the EU overall would contract by about 71 percent and the economy in the euro area would shrink by 7.8 percent during the year (EC, 2020).

### North America
During the second quarter of 2020, U.S. economic output declined by a record 9.1 percent and in April, total nonfarm employment fell by 20.5 million jobs relative to business cycle peaks (Bauer, Broady, Edelberg, & O’Donnell, 2020). Canada too experienced the sharpest drop in real GDP since 1961. During the first three months of the pandemic, widespread lockdowns contributed to almost all indicators of GDP declining to record lows (Press, 2020).
Global Supply Chains

Given the global lockdowns and confinements required to arrest the spread of COVID-19, the pandemic has had dramatic impacts on global supply chains (GSCs), illustrating the cascading impacts characteristic of systemic risk. Global trade in a large range of products and industries that rely on GSCs declined sharply, including pharmaceuticals, food, electronics, garments, and the automotive industry, to name a few. Initially, constraints were felt by the supply side of global trade patterns, but they quickly cascaded to affect demand. On the supply side, the health impacts of the pandemic reduced the number of workers and productivity while lockdowns and physical distancing measures led to business closures. On the demand side, deaths, quarantines, layoffs, and lost income reduced consumption and investments by firms (ILO, 2020, June).

For example, as the domino effect progressed, the garment industry suffered declines in demand with cancelled contracts while simultaneously being affected by supply disruptions, affecting southeast Asia in particular (ILO, 2020, June).

In the GSC’s complex networks of interconnected businesses, the behaviour of large companies downstream that experience sharp variations in demand in a supply chain, seriously affect upstream actors. All levels of the global supply chain are affected, including extractive industries, manufacturing, processing, assembling, distribution, logistics, and sales, as are all the major production sectors that rely on the GSC. The pandemic has significantly affected the flow of raw materials, from their supply to the delivery of products, with disruptions taking place during all phases of the GSC, as shown in Figure 3 (Xu, Elomri, Kerbache, & El Omri, 2020).

**Figure 3: Example of supply and demand side disruptions due to COVID-19**

![Diagram of supply and demand side disruptions due to COVID-19](image-url)

Note: Only the GSCs of the products manufactured and consumed globally and make the greatest contribution to the world economy are illustrated. Source: (Xu, Elomri, Kerbache, & El Omri, 2020)

Source: (Xu, Elomri, Kerbache, & El Omri, 2020)
These features of the COVID-19 pandemic differ from those of other earlier disasters that abruptly damaged GSCs, such as Japan’s 2011 mega-earthquake, the 2003 SARS outbreak in China, and the tsunami in Indonesia in 2004, after which production recovered within several weeks.

Figure 4 illustrates the scope and magnitude of the pandemic’s systemic impacts on the GSC, related to its duration, the global reach, and impact on industry demand and supply chains (Xu, Elomri, Kerbache, & El Omri, 2020). The shock to the GSC has had huge economic and social repercussions on firms and workers around the world at local, regional, and global levels (ILO, 2020, June).

At the business level, four out of five enterprises globally function in the informal economy (UNDRR, 2020, 16 July). Micro, Small, and Medium Enterprises (MSMEs) are particularly vulnerable (UNDRR, 2020, 14 May) as are women, who are over-represented in the informal economy as well as in the hardest hit sectors, such as tourism, hospitality, and services (ILO, 2020b); (UN, 2020, July (a)). Regionally, an estimated two thirds or more of Asia-Pacific’s employed population work in the informal sector. Women head about 85 percent of the region’s Small and Medium Enterprises (SMEs) operating in the informal sector (UNDRR, 2020, 14 May).

Informal food markets are significant sources of food security for smallholder farmers, vendors, and customers in many regions; their closures due to COVID-19 risks increased food insecurity and poverty (ILO, 2020a).

The restrictions imposed by COVID-19 forced informal businesses to close temporarily or shut down permanently. Physical distancing is difficult to apply in many underdeveloped regions, especially when the workplace is also home where conditions are often crowded and access to water and strict hygiene measures are difficult to abide by; in these cases, workers are already exposed to higher occupational health and safety risks. They also already have relatively low productivity without the decline in revenue brought on by the pandemic (ILO, 2020a). Potential cascading impacts include a steep rise in child labour, and lower school attendance, especially among young girls. Without access to health care, the virus can spread more easily and widely among the vulnerable, with disastrous outcomes (ILO, 2020a).

Poverty

Human health depends on access to safe water, sanitation, and hygienic facilities, which are even more essential during a pandemic. Poverty is often associated with overcrowded homes that can optimize the spread of disease, a lack of hygienic conditions needed to wash hands, and poor nutrition and health that increase susceptibility to infection (UN, 2020, June (b)). Globally, some 4 billion people lack access to safe sanitation and the homes of 3 billion do not have clean water and soap (UN Women, 2020). The lack of handwashing facilities has put 74 million people at a higher risk of contracting COVID-19 (UN, 2020, June (b)). As well, the poorest workers are likely to be unable to work online from home, depriving them of jobs and social connections (Evans & Kovesdi, 2020).
Global poverty levels have been increasing since the onset of the pandemic. Until the arrival of COVID-19, extreme poverty globally had been declining over the past two decades. The result of the rippling effect of the pandemic on the economy includes an historic rise in global poverty, or the proportion of the world’s population living on less than $1.90 per day, the first increase since the 1998 Asian financial crisis. By one estimate made in April 2020, it was projected to force about 71 to 100 million people into extreme poverty (CCSA, 2020). Since then, the global south is projected to be hit harder, with increased poverty in low- and middle-income countries.

South Asia and Sub-Saharan Africa are projected to be the hardest hit (Figure 5) (CCSA, 2020). Two thirds of the 176 million people expected to decline into poverty at the $3.20 poverty line under the baseline scenario are in South Asia. At the poverty level of $5.50, there are expected to be 177 million more people, many of whom are in East Asia and the Pacific, with fewer newly poor at this level in Sub-Saharan Africa, since few people have living standards at this level (Gerszon Mahler, Lakner, Castaneda Aguilar, & Wu, 2020).

**Figure 5: The regional distribution of the COVID-19-induced poverty**

![Figure 5: The regional distribution of the COVID-19-induced poverty](source)

Source: (Gerszon Mahler, Lakner, Castaneda Aguilar, & Wu, 2020)

**Food Insecurity**

Reduced incomes and disrupted supply chains due to the pandemic have caused a rise in food insecurity. The UN World Food Programme estimated an 82 percent rise in acutely food insecure people in the world compared to pre-COVID data; in Latin America and Caribbean countries, acute hunger has quadrupled. The poor and vulnerable are most affected, including the 690 million people who were already food insecure prior to COVID-19. Countries highly dependent on food imports, remittances, and revenues from exports have been affected by declines in these resources as have those in which currency depreciation has driven up the cost of food imports and where commodity prices have collapsed, reducing the capacity to import food (de Preneuf, 2020).
Social Impacts

Although it spreads indiscriminately, some groups are disproportionately affected by the pandemic, depending on epidemiological and socioeconomic vulnerabilities, such as gender, age, ethnicity, income, and health and nutritional status, among others. Examples include women; informal workers; the elderly; migrant workers; caregivers and other essential workers, especially in the informal sector; as described in this section of the report (UNDRR, 2020, 9 April); (UNDRR, 2020, 27 April).

There are also geographic vulnerabilities, as people living in areas subject to the systemic and cascading risks of natural and human-induced hazards must cope with the added burden of restrictions and risks due to COVID-19. The impact of multi-hazards that compound the burden of the pandemic are explored further on.

Women

Women workers are disproportionately affected by the cascading impacts of the pandemic in several ways. First, a large proportion of women work in sectors that have been hard hit, such as food and accommodation services; wholesale and retail trade; real estate, business and administrative activities; tourism; and manufacturing. Globally, about 40 per cent of all employed women work in these sectors compared to 36.6 per cent of employed men (CCSA, 2020). By one estimate, female job loss rates due to COVID-19 are about 1.8 times higher than male job losses globally (Madgavkar, Krishnan, White, Mahajan, & Azcue, 2020). The socioeconomic impact of the crisis will affect rural women, who represent 41 percent of the world's agricultural labour force, more than their urban counterparts. They make up over 60 percent of workers in the agricultural sector in many countries of Southeast Asia and Sub-Saharan Africa (FAO, 2020, 7 April).

Women represent 70 percent of healthcare and social workers globally, and in some regions for as much as 80 percent of the health workforce, so they are more often on the frontlines of response to the virus and thus more exposed to infection, while still subject to a gender pay gap and access to fewer leadership positions than their male counterparts (CCSA, 2020); (IPBES, 2020); (ILO, 2020b); (UNDRR, 2020, 9 April). The UN reports that the gender pay gap in the health sector is 28 percent compared to the overall gender pay gap of 16 percent (UN Women, 2020). Female health-care workers tend to be employed in jobs requiring fewer skills and that pay less. Those working with COVID-19 patients often work long, arduous shifts and have higher risks of infection (CCSA, 2020).

COVID-19 containment measures and the lack of social security have made women in domestic work highly vulnerable to job losses. Because of these constraints, by the beginning June, 55 million or 72.3 per cent of domestic workers around the world, of whom the vast majority are women, were at significant risk of losing their jobs. The loss of work along with school closures and other impacts of the health crisis has increased the number of women doing unpaid child-care and housework (CCSA, 2020).

Before the pandemic, data show that women undertook about 75 percent of all unpaid care work. With school closures and elderly relatives unavailable to help out with childcare due to the pandemic, women are taking on more unpaid care work and household chores. Single parents, of which 78.4 percent are women, have even more difficult situations regarding childcare and work (CCSA, 2020). Cross-country surveys conducted by the UN reveal that although both men and women have taken on more unpaid care and domestic work since the onset of the pandemic, women engage in these tasks more than do men, as shown in Figure 6 (UN Women, 2020). Furthermore, they cannot accept paid work from home or follow academic pursuits when minding children and elderly or ill relatives (CCSA, 2020); (Grigoli & Sandri, 2020).
Another risk that some women face during the pandemic is the potential for increased exposure to gender-based violence and less access to protection measures due to lockdown or confinement protocols (UNDRR, 2020, 9 April). Data are emerging showing an intensification in violence against women and girls since the outbreak of COVID-19. Confinement may enable violent partners to have more power and control while at the same time, women have less money and fewer opportunities to leave and seek community support (UN Women, 2020). In addition, there is evidence of an increase in female genital cutting across East and West Africa as pandemic-related lockdowns allow it to occur undetected, exacerbated by the lack of health services and economic hardship, among other underlying conditions (Reliefweb, 2020).

COVID-19 is not just affecting people’s physical health. Women’s mental and emotional health is disproportionately affected. In almost all countries surveyed, high rates of mental and emotional distress are reported, with women reporting higher rates than men. Increases in unpaid care and domestic work, job and income loss, and increased gender-based violence may be some of the leading reasons for this increase (CCSA, 2020).

Those Affected by Social Protection Gaps
Currently, an estimated four billion people globally have no access to any form of social protection (UNDRR, 2020, 16 July) and almost half of the global labour force is not legally entitled to sickness benefits (ILO, 2020b). In the Asia-Pacific region, 60 percent of the population lacks access to social protection (UNDRR, 2020, 14 May). There are 690 million people living with a disability in Asia-Pacific who need more health care than others and who are thus more vulnerable to the potential for less care during the pandemic (UNDRR, 2020, 9 April).

National social protection systems have not been able to expand before or during emergencies because they are either underdeveloped or lack flexibility. Furthermore, when income is the main criteria for assistance, the multi-dimensional and evolving nature of vulnerability is overlooked (UNDRR, 2020, 16 July). COVID-19 is intensifying the pre-existing vulnerabilities of the unprotected, inciting many to search for healthcare and economic security elsewhere (IOM, 2020, 13 October).
Labour Migrants

The loss of jobs, livelihoods, and social support among labour migrants at the beginning of the pandemic led to increased migration both within countries and across borders. It had been rising before the pandemic, from 150 million in 2013 to 164 million in 2018, an increase of 9 percent (ILO, 2018). However, the pandemic began to drastically curtail human mobility around the world through border closures to stem the virus from spreading. This affects migrant workers and those already displaced, while simultaneously forcing others to move (UNDRR, 2020, 20 April); (UNDRR, 2020, 19 June). It has thus affected both the labour market’s demand and supply sides and led to increased poverty and inequalities (UNDRR, 2020, 29 May).

Migrant workers all over the world have been affected by various lockdown strategies resulting in the reverse migration of millions of workers attempting to return home. For example, in one week in March 2020, 60,000 Afghans returned from Iran during the peak of that reverse migration. By April, a record estimated 1,500 people were returning daily (UNDRR, 2020, 20 April). In India, more than 100 million migrant workers and their families were forced to return home when a lockdown was instituted to curb the pandemic. It had the opposite effect of increasing the risk of infection for these migrants as they returned to their rural homes (Felgentreff, 2020). The UN reports that mobility restrictions due to the pandemic left nearly three million migrants throughout the world stranded on their journeys (IOM, 2020, 13 October).

Mass labour migrations like this increase the spread of COVID-19 across borders and from urban areas where they work to their rural homes, while increasing the migrating population’s exposure to it (UNDRR, 2020, 20 April). In the Arab region, migrants make up 40 percent of all workers; the pandemic will cause the joss of jobs, access to services, and the ability to return to their home countries (UN, 2020, June (b)).

When migrants return home to already precarious situations, economic hardships can deepen as communities attempt to feed and house the returnees (UNDRR, 2020, 20 April). Often, migrant workers are forced into debt, which can lead to generations of economic bondage and to child slavery (UNDRR, 2020, 19 June). Furthermore, they are frequently unable to access healthcare and national social security systems, especially if they have no official status (IOM, 2020, 13 October); (UNDRR, 2020, 20 April); (UNDRR, 2020, 19 June).
Even without the added risk of forced return migration, migrant workers are already more vulnerable to the risks of catching the virus; they often live in crowded dormitories where it is difficult to practice physical distancing, air circulation may be poor, and the proper hygienic measures may be absent (UNDRR, 2020, 20 April). This is also the case in developed countries. For example, during the summer of 2020, more than 600 migrant farmworkers in southeastern Canada tested positive for COVID-19, and there were several deaths. Migrant rights groups report that overcrowded living conditions, a lack of protective outfits, and the pressure to work while sick contributed to the spread of the virus (Doyle, 2020).

Many economies depend on remittances from labour migrants. The risks to these migrants of the COVID-19 crisis include the economic fallout to their families and communities at home who depend on remittances to survive (UNDRR, 2020, 20 April).

In addition, historically, remittances have been an important resource for people when responding to disasters and during recovery (IOM, 2020, 13 October).

Of the world’s top ten remittance-receiving countries, seven are in Asia-Pacific where almost 400 million people are either senders or receivers (UNDRR, 2020, 20 April). The region receives 43 per cent of global remittance inflows (CCSA, 2020). Entire communities depend on these monies to grow their economies, so the loss affects more than just the receiving family. In 28 of the region’s countries, remittances made up at least an estimated 10 percent of GDP in 2019 (UNDRR, 2020, 20 April). In the Philippines, remittances make up almost 10 per cent of GDP, while they represent 40 percent of Tonga’s (IOM, 2020, 13 October). Figure 7 shows the amount of money received in personal remittances, by country, in 2017.

Figure 7: Personal remittances received, 2017

Personal remittances received, 2017

A remittance is a transfer of money, often by a foreign worker to an individual in their home country. This is measured in current US dollars.

Source: (World Bank)
Remittances are also one of the biggest sources of external financial flows in Africa. The incomes among migrant workers in the African diaspora declined because the pandemic severely strained the finances of OECD and oil-producing countries where they worked. The World Bank estimates that remittance flows to Sub-Saharan Africa will fall by 23.1 percent, compared to the global decline of 20 percent (Mishra, 2020).

Refugees and Internally Displaced Persons

According to the UN Refugee Agency, almost 80 million people in the world have been forced out of their homes because of war, violence, human right violations and persecution, both within their own countries (internally displaced) or across international borders (refugees and asylum-seekers) (CCSA, 2020). Of these, 26 million are refugees (UNHCR, 2020). About 60 to 70 percent of refugees and internally displaced persons (IDPs) live within host communities while the others live in camps and informal settlements (UNDRR, 2020, 20 April). It has been estimated that the Kakuma refugee camp in Kenya has almost 200,000 residents and a population density about 1,000 times that of the host Turkana community (CCSA, 2020). Figure 8 shows the global distribution of the refugee population by country or territory of asylum in 2017.

Figure 8: Refugee population by country or territory of asylum, 2017

Refugee population by country or territory of asylum, 2017

Source: (World Bank)
and systemic health and socioeconomic impacts of COVID-19. Crowded living conditions in refugee camps and other housing arrangements for displaced persons are not conducive to physical distancing and usually lack the necessary hygiene measures to conform to COVID-19 prevention protocols (UNDRR, 2020, 20 April). In addition, camps lack testing and adequate healthcare facilities, or access to them, as well as shortages of personal protective equipment (PPE), medicines, and health professionals, making it difficult to contain the spread of COVID-19 (Phillips, Caldas, Cleetus, et al., 2020); (UNDRR, 2020, 20 April). As well, most refugees live in developing countries that already have weak health systems.

There are some 3.5 million refugees, 1.9 million internally displaced people and 1.4 million stateless people in the Asia-Pacific region, with Afghanistan and Myanmar the source of the majority of refugees. Pakistan and Iran host about 90 per cent of the world’s 2.7 million Afghan refugees, who have been affected by lockdown measures. The health care systems are under severe strain and the economic crisis means basic needs are often unmet (UNDRR, 2020, 20 April). In the Arab Region, there are 26 million forcibly displaced persons and millions who need humanitarian assistance (UN, 2020, June (b)); (UNDRR Arab Region, 2020, 27 July).

Humanitarian and health workers in refugee camps and settlements are at risk of exposure to COVID-19, and the movement of staff and supplies is hampered by travel restrictions and border closures (UNDRR, 2020, 20 April).

Border closures and other measures to limit the spread of COVID-19 have curtailed the rights of people fleeing war and persecution to access the protection they need. Refugee registration and asylum applications dropped with the onset of the pandemic and there is evidence that refugees are increasingly less able to meet their needs. UNHCR reports that the number of Syrian refugees in Lebanon living below the poverty line increased from 73 to around 90 percent, and the percentage of households eligible for cash assistance rose from 55 to about 80 per cent (CCSA, 2020).

The Elderly

Of all age groups, the elderly, especially people over the age of 85, are most at risk of dying from COVID-19 or of suffering from acute symptoms and health complications, mostly because of underlying conditions (CCSA, 2020); (UNDRR, 2020, 9 April). Fatality rates for those over 80 years of age is five times the global average and about 66 percent of people aged 70 and over already have at least one underlying condition (UN, 2020, May).

Their vulnerability is increased if they are exposed to the virus in nursing homes or residences where many elderly live in close quarters. Large outbreaks have occurred in care facilities all over the world, including France, Spain, Belgium, Canada, and the U.S., affecting both the residents and health workers (Thompson, et al., 2020). In Canada, for example, the elderly living in long-term care homes have suffered large numbers of deaths. In June 2020, the fatality rate of nursing home residents in Canada was estimated to be 25 percent, compared to the average rate of 8.2 percent among the larger population. This is explained in part because underpaid staff often work in several different care homes, increasing the risk of spreading the disease from one to another (Estabrooks, Straus, & Flood C.M., 2020); (Liu, et al., 2020). Many older people live alone and have difficulty accessing social support. It is estimated that in G20 countries, nearly one-third of people over the age of 65 live alone, and compared to men, twice as many older women live alone; in addition, they have lower pensions. The elderly are almost three times more likely to lack social support than younger people (OECD, 2020, April). About half of older persons in some developing countries did not have access to essential health services before the pandemic (UN, 2020, May). Figure 9 provides more details on the impacts of COVID-19 on older persons.

Figure 9: COVID-19 impact on older persons

<table>
<thead>
<tr>
<th>Economic well-being</th>
<th>Life and Death</th>
</tr>
</thead>
<tbody>
<tr>
<td>The pandemic may significantly lower older persons’ incomes and living standards. Already, less than 20% of older persons of retirement age receiving a pension</td>
<td>Fatality rates are five times higher than global average. An estimated 66% of people aged 70 and over have at least one underlying health condition</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mental health</th>
<th>Vulnerability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical distancing can take a heavy toll on our mental health. Living alone and being more digitally included than others, the risks are higher for older persons</td>
<td>Essential care that older persons often rely on is under pressure. Almost half of COVID-19 deaths in Europe occurred in long-term care settings. Older women often provide care for older relatives increasing their risk to infection</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Responders</th>
<th>Abuse and neglect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Older persons are not just victims. They are also responding. They are health workers, carers and among many essential service providers</td>
<td>In 2017, 1 in 6 older person were subjected to abuse. With lockdowns and reduced care, violence against older persons is on the rise</td>
</tr>
</tbody>
</table>
Fragile and Conflict-Affected Areas

Fragile and Conflict-Affected Situations (FCAS) are likely to become increasingly fragile due to the pandemic (World Bank Group, 2020). In some areas of the Arab Region, the presence of armed conflict has impeded health responses to COVID-19, destroyed healthcare facilities, and caused the death or fleeing of healthcare workers (UN, 2020, June (b)); (UNDRR Arab Region, 2021). In addition, many of the fragile and conflict-affected contexts in the Arab Region were already harbouring large numbers of refugees and internally displaced persons; Jordan and Lebanon host among the highest number of refugees per capita worldwide. In addition to the burden of ongoing conflict and the pandemic, some Arab countries have particularly weak and unstable governments with a lack of institutional capacities to address the health crisis effectively, especially given overcrowded conditions (UNDRR Arab Region, pending release).

In conflict-torn Yemen, which is experiencing the world’s worst humanitarian crisis, the country’s health care system has collapsed with the rise in COVID-19 case numbers (IEP, 2020). Located in an area facing multiple conflict situations, it is also struggling with political unrest, weak infrastructure, poverty, malnutrition, food insecurity, and on top of the pandemic, other infectious diseases such as cholera, malaria, dengue, typhoid and Chikungunya as well as natural hazards such as flooding (UNDRR Arab Region, pending release).

In Palestine, there have been problems with border controls and coordination between Palestinian and Israeli authorities, which have posed challenges to effectively containing virus transmission (UNDRR Arab Region, 2020, 17 May).

In Ethiopia, a new conflict in the Tigray region has erupted on top of the devastating health and economic impacts of the pandemic and a desert locust invasion that is larger and more widespread because of extreme weather due to climate change. Restricted movement has prevented the adequate delivery of humanitarian aid. These overlapping crises have contributed to the loss of crops and left millions of people in dire circumstances (Reliefweb, 2021a).

Children

According to UNICEF, as of November 2020, children and adolescents account for 11 per cent of reported COVID-19 infections in the 87 countries reporting. The impacts of measures to curb the disease’s spread include the interruption of essential services, in particular, schooling. In late-April 2020, about 90 per cent of students worldwide, or more than 1.5 billion schoolchildren, suffered from disrupted learning due to nationwide school closures.

As of November 2020, 30 country-wide closures affected 33 per cent of total enrolled students (UNICEF, 2020 (a)).

Almost 70 per cent of schoolchildren representing more than 1 billion children worldwide were offered some form of online learning. This left about 30 percent of schoolchildren without schooling because they lack the technology for remote learning or the policies did not reach them. Sub-Saharan Africa has the highest rate of children that cannot be reached. Only 24 percent of schoolchildren globally have access to Internet channels, reflecting socioeconomic inequalities and a deep digital divide (UNICEF, 2020 (a)). Figure 10 shows the proportion of students reached by remote learning policies.

**Figure 10:** Share of students reached by remote learning policies, 2017

Source: (UNICEF, 2020 (a))

Poorer children are most affected by disruptions to their schooling. Previous shutdowns show that children who are out of school for extended periods, especially girls, are less likely to return. An estimated 11 million primary and secondary school students worldwide, of which 5.2 million are girls, risk not returning after the pandemic subsides (WVI, 2020).

Another important impact of school closures that has enormous repercussions is the rise in teenage pregnancy linked to increased unsupervised leisure-time interaction between girl and boy teenagers, as well as to vulnerabilities related to the lack of sex education, increased poverty and
insecurity, and child marriage. There are more children out of school due to COVID-19 in Sub-Saharan Africa than in any other of the world’s regions and it has the highest global teenage pregnancy rates (WVI, 2020).

Children who cannot attend school due to COVID-19 suffer from the loss of meals and other support that many schools provide, such as health care and child protection interventions (OECD, 2020, April). Along with the global recession, these impacts are deepening existing childhood poverty and inequalities. The knock-on effects of the pandemic on children include steep declines in child birth services, immunizations, and health care for severe childhood malnutrition and other illnesses, particularly in a number of countries in South Asia, the Middle East, and Latin America. By mid-2020, UNICEF estimates there had been a 15 percent rise in the global number of children living in multidimensional poverty (UNICEF, 2020 (a)).

Vulnerable Residents of Cities
Many densely populated cities are more vulnerable than their rural hinterlands to exposure to COVID-19. Reporting in July 2020, the UN notes that urban areas had an estimated 90 percent of all reported COVID-19 cases, making them the epicentre of the pandemic (UN, 2020, July (a)).

Risk factors include the size of the city; population density; pollution levels; numbers of elderly and migrants; and the level of economic and social disparities, where poorer residents live in ghettos or otherwise crowded conditions (WEF, 2020, May). Cities with a high concentration of urban poor, informal settlements, poor planning, and lack of adequate infrastructure are more likely to be vulnerable to disasters than well resourced, less crowded, inclusive and more sustainable cities (UNDRR Arab Region, 2020, 27 July).

Sixty percent of the global urban population lives in Asia-Pacific, the region has 65 percent of the world’s slum population, and many cities are highly congested, making physical distancing difficult and thus conferring a higher likelihood of infection (UNDRR, 2020, 9 April). In Africa, about 56 percent of the urban population lives in overcrowded slums with poor services (Mishra, 2020). In the Arab region, residents of informal areas represent a quarter of the urban population. These areas are characterized by overcrowding, the lack of safe water and hand-washing facilities, adequate waste management, and other essential services that are needed to curb the spread of COVID-19 and provide a safe and healthy environment (UNDRR Arab Region, 2020, 27 July).

Shutdown measures have had numerous impacts on municipal governments, including the loss of transit ridership and associated revenue, resulting in the forced cutting of even more services. Before the pandemic, only about half of the world’s urban population had convenient access to public transport. If the public transit does not recover, it “could jeopardize the transition to safe and sustainable transport for all and constrain efforts to tackle climate change and air pollution” (UN, 2020, July (a)).

There has also been a trend among wealthier segments of society to move out of the city during the pandemic, which has the potential to increase urban sprawl and exacerbate income, racial, and gender inequalities (UN, 2020, July (a)).

Inequalities in the Digital World
Business, school, restaurant, and gym closures, lockdowns, and other pandemic-related measures significantly accelerated the trend towards a digital world, as office workers transferred their jobs online; children began virtual learning; groceries, other consumer items, and restaurant meals were ordered on the Internet and delivered; health services delivered through telemedicine; court hearings held virtually; and social connections satisfied through zoom calls, among others. However, the benefits have not been enjoyed by everyone, with disadvantaged and rural populations lacking access to digital technologies and connections, and the loss of business to countless small firms without the required infrastructure to trade online (Cairns & Whittaker, Will COVID Recovery Be a Tipping Point for the Circular Economy?, 2021).

As shown in the case of children, the digital divide affects developing countries most, especially in Africa, where only one in four people have web access. Women too are disproportionately affected, as men in least developed countries are 52 percent more connected than women. High income countries also experience the divide, with poverty and rural isolation preventing the least fortunate from enjoying the benefits of a digitally connected world; for example, this affects 60,000 children in the U.K. and some 12 million in the U.S. (Berners-Lee, 2020).

Those Facing Discrimination
Crisis can exacerbate existing social discrimination, abuse, and inequality within societies (UNDRR, 2020, 9 April). There is evidence that minorities, migrants, and refugees have often been subject to hate speech and xenophobia since the emergence of COVID-19, both from their own countries of origin and in host communities (UNDRR, 2020, 20 April); (UNDRR, 2020, 19 June). Some societies attach a stigma to the disease that has resulted in certain communities being victimized, and in a few countries, some minorities have been blamed for carrying and spreading the virus. Misinformation has been used to further societal divisions that fuel such
discrimination (UNDRR, 2020, 20 April); (UNDRR, 2020, 19 June). In Asia Pacific, there is evidence that hate speech, racism, and xenophobia are increasing against minorities, refugees, and migrants in the context of COVID-19, which may also discourage them from seeking testing or treatment (UNDRR, 2020, 19 June).

**Essential Workers**
In the world’s more developed regions, many jobs have shifted from the workplace to the home. However, essential workers (hospital, child-care, grocery, delivery, factory, farm, and restaurant workers), need to be on-site to fulfil their jobs and are more at risk of contracting COVID-19 (The Lancet, 2020, 23 May). In the US, essential workers make up about 40 percent of the adult population (McCormack, Avery, Kahn-Lang Spitzer, & al., 2020). A large proportion of the essential workforce in the U.S. is made up of Black and Latino Americans, who have been disproportionately affected by COVID-19 (Krieger, 2020); (The Lancet, 2020, 23 May). They often suffer from inequities in the social determinants of health putting them at increased risk of exposure to the disease (Bauer, Broady, Edelberg, & O’Donnell, 2020).

In the U.S., Germany, Portugal, England, and Wales, slaughterhouses and meat packing plants have seen major outbreaks of COVID-19 infection due to a combination of socioeconomic factors, including overcrowding, limited hygiene measures, and poorly paid workers who fear penalties if they disclose symptoms, among others (Middleton, Reintjes, & Lopes, 2020).

**Other Vulnerable Populations**
Indigenous Peoples also appear to be at higher risk from COVID-19, limited available data show that their risk of becoming affected and of dying is higher than the average. There are 476 million indigenous people around the world, accounting for 6.2 percent of the global population; by some estimates, they represent more than 19 percent of the extreme poor. They all share a history of discrimination, inequality, and marginalization that can be exacerbated by the context of COVID-19, putting them at higher risk of the health and socioeconomic effects of the pandemic (FAO, 2020, 9 August). They may live on isolated reserves or in crowded urban areas where there may be long-lasting inequalities in income, transport, housing, and access to services compared to the rest of the population (IPBES, 2020). Before the pandemic, indigenous peoples in remote communities generally had less access to essential services and adequate health care, situations that challenge prevention and care efforts when they are exposed to COVID-19 (UNDESA, 2020).

Prisoners and others deprived of social liberties are also more vulnerable to COVID-19 infection when they live in prolonged confinement and conditions are overcrowded and under-resourced. Prisons in several countries in Asia-Pacific have high rates of overcapacity: over 200 percent in Indonesia, Cambodia, and Bangladesh and 464 percent in the Philippines.
The region also has a large population of pretrial detainees (UNDRR, 2020, 20 April); (UNDRR, 2020, 19 June). Prisoners are also disproportionately affected in some high-income countries. In the U.S., the number of COVID-19 cases is 5·5 times higher among people who are incarcerated compared with the general population. Black people represent a large proportion of the approximately 2.3 million people currently incarcerated in prisons and jails in the U.S. (Macmadu, et al., 2020).

**Exposure to Poor and False Risk Communication**

Inaccurate, misleading, and false information via mobile internet and social media about the disease and its transmission has often overshadowed scientific and accurate information and essential health guidance. The Director-General of the World Health Organization (WHO) has characterized this aspect of the COVID-19 crisis as an “infodemic”.

People already experiencing fear and powerlessness are particularly vulnerable to conspiracy theories and rumours of cures and preventive solutions (UNDRR, 2020, 25 May); furthermore, the believing public is now actively disseminating the falsehoods (Pazzanese, 2020).

In addition, many people have limited access to legitimate information due to barriers related to age, gender, disability, or language. Others, such as the homeless, nomads living in remote areas, and the poor may have no access to mass media or mobile technology (UNDRR, 2020, 20 April); (UNDRR, 2020, 25 May). One unique challenge relates to the ever-evolving science about the disease and the changing directives from governments, which require frequent updating and transmission to the public (UNDRR, 2020, 25 May).

Because COVID-19’s impact is most severely felt in already-vulnerable populations with lower resilience, areas struggling to cope with other hazards are disproportionally impacted by the health impact and containment measures of the health crisis. For example, as shown earlier, the pandemic disproportionately affects refugees and migrants. People are forced to flee their homes when natural hazards such as floods, drought, wildfires, and earthquakes evict them, exposing them to conditions that spread disease. With the onset of COVID-19, they face multiple hazards simultaneously.

The UNDRR has created a compendium of natural, biological, man-made/technological, chemical, societal, and environmental hazards. In total, 302 hazards are included in the list, with 88 biological, 60 hydrometeorological, 53 technological, 35 geohazards, 25 chemical, 24 environmental, 9 extraterrestrial, and 8 societal hazards (UNDRR, 2020 (a)). At any time, one or more of these hazards can occur anywhere on the planet.

Weather-related disasters account for an important percentage of hazards. According to the International Federation of Red Cross and Red Crescent Societies (IFRC), over the last decade, 83 percent of all disasters triggered by natural hazards were caused by extreme weather- and climate-related events (IFRC, 2020). They cause significant loss of life and damage throughout the world and their frequency and intensity is growing due to climate change. These hazards include hurricanes, wildfires, floods, heat waves, droughts, and tropical storms. Some of these events may occur at the same time, in the same place (Salas, Shultz, & Solomon, 2020). Over the past 20 years, recorded extreme weather events have increased by 90 percent, affecting more than four billion people worldwide (IOM, 2020, 13 October). Furthermore, biological hazards like EIDs can be the result of, or occur simultaneously with, natural, technological, or environmental hazards (UNDRR Asia Pacific, 2020). Data from countries reporting through the Sendai Framework Monitor (SFM), an official global indicator system comprised of seven targets and 38 indicators, shows that multi-hazard disasters affected 88 million people between 1997 and 2017 (UNDRR, 2019b). In a future that is likely to include more pandemics, 2020 shows what the world looks like under a scenario of multi-hazards. The IFRC warns that “we can expect not only less time to recover between disasters, but that multiple disasters will happen at once, in a manner described as compounding shocks” (IFRC, 2020).

Hazards During the 2020 Pandemic

During 2020, as COVID-19 swept the globe, many places and populations had to confront a major health crisis at the same time as they were coping with difficult or even catastrophic conditions imposed by one or more disasters that were ongoing, or that befell them during the pandemic.

Figure 11, created before the actual multi-hazard events during the 2020 period of the COVID-19 pandemic were known, illustrates the potential geographic concurrence of climate-related hazards.

Floods, Droughts, and Storms

The IFRC reports that 92 of the 132 identified unique extreme weather-related disasters in 2020 at the time of reporting overlapped with the COVID-19 pandemic and that by September 2020, 51.6 million people globally suffered from the simultaneous impacts of floods, droughts, or storms and the pandemic and some 3,000 people had been killed in these events (Walton & van Aalst, 2020).

India and Bangladesh recorded the most disastrous of these types of hazards, with the health crisis occurring at the same time as Cyclone Amphan in May and monsoon floods or storms from June to September 2020, affecting almost 40 million people across the two countries (Box 3). An estimated 24-37 percent of Bangladesh was submerged. Secondary disasters as a result of the flooding include land and mudslides that contributed to the size of the disaster (Walton & van Aalst, 2020).

Source: (Phillips, Caldas, Cleetus, & al., 2020)
**Table 1: Top ten droughts, floods and storms overlapping with the COVID-19 pandemic by number of people affected**

<table>
<thead>
<tr>
<th>Type</th>
<th>Countries Affected</th>
<th>Event Month (2020)</th>
<th>Total Affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flood</td>
<td>India</td>
<td>June-August</td>
<td>17,000,000</td>
</tr>
<tr>
<td>Storm</td>
<td>Bangladesh, India, Sri Lanka</td>
<td>May</td>
<td>15,101,100</td>
</tr>
<tr>
<td>Flood</td>
<td>Bangladesh</td>
<td>June-August</td>
<td>5,000,000</td>
</tr>
<tr>
<td>Drought</td>
<td>Lesotho, Zimbabwe</td>
<td>March-August</td>
<td>4,720,000*</td>
</tr>
<tr>
<td>Flood</td>
<td>Bangladesh</td>
<td>July</td>
<td>1,500,000</td>
</tr>
<tr>
<td>Flood</td>
<td>India</td>
<td>June</td>
<td>1,400,010</td>
</tr>
<tr>
<td>Flood</td>
<td>China</td>
<td>June</td>
<td>1,400,000</td>
</tr>
<tr>
<td>Flood</td>
<td>Ethiopia, Somalia</td>
<td>April</td>
<td>1,219,020</td>
</tr>
<tr>
<td>Flood</td>
<td>Kenya, Uganda</td>
<td>March-April</td>
<td>810,855</td>
</tr>
<tr>
<td>Storm</td>
<td>China</td>
<td>May</td>
<td>600,000</td>
</tr>
</tbody>
</table>

**Note:** *Figure is based on the number of people in high food insecurity due to this drought in two countries*

*Source:* (Walton & van Aalst, 2020)

**Box 4: COVID-19 and natural hazards in Central America**

On the 3rd of November, Hurricane Eta made landfall on the northern Caribbean coast of Nicaragua, with 240 km/h winds. Heavy rainfall led to catastrophic, life threatening flash flooding and river flooding, resulting in landslides in Central America’s higher regions. An estimated 4.6 million people were affected in Belize, Costa Rica, El Salvador, Guatemala, Honduras, and Nicaragua, of which some 1.8 million are children. Thousands of families, already affected by COVID-19, lost homes and livelihoods. As of mid-November, before the major impacts of Eta, there were over 536,000 COVID-19 cases and 12,483 deaths. The humanitarian and socioeconomic impacts of the pandemic devastated families and children affected by extended lockdowns, school and business closures, declining migrant remittances, rising violence against children and women, and interrupted water, sanitation, and key health services, including childhood vaccinations. It has been estimated that some two million more people could fall into poverty in these countries due to COVID-19 alone, numbers that will rise from the impacts of Eta and the arrival of another hurricane, Iota (UNICEF, 2020 (b)).
**Wildfires**

The IFRC notes that major wildfires and heatwaves are underreported in the EM-DAT data used. They estimate that wildfires affected some 2.3 million people during 2020, mostly in the U.S. (Walton & van Aalst, 2020). During the pandemic, there were unprecedented fires on the country’s west coast from June to September that burned some 19,000 km², killed at least 34 people, and affected over 2.2 million people (Walton & van Aalst, 2020). There were also large wildfires, linked convincingly to climate change, in Siberia that had huge impacts (Walton & van Aalst, 2020). Table 2 lists the top wildfires that overlapped with COVID-19 in 2020.

**Table 2: Top wildfires overlapping with the COVID-19 pandemic by number of people affected**

<table>
<thead>
<tr>
<th>Wildfire region</th>
<th>Event Month(s) (2020)</th>
<th>Total Affected</th>
<th>Total Killed</th>
</tr>
</thead>
<tbody>
<tr>
<td>West Coast, United States</td>
<td>June-September</td>
<td>2,260,000</td>
<td>34</td>
</tr>
<tr>
<td>Liangshan Prefecture, China</td>
<td>March-April</td>
<td>1,200</td>
<td>19</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>2,261,200</strong></td>
<td><strong>53</strong></td>
</tr>
</tbody>
</table>

*Source: (Walton & van Aalst, 2020)*

**Heatwaves**

IFRC underscores that heatwaves “are among the most deadly and rapidly rising climate-related extremes, with significant overlapping risks with COVID-19” (Walton & van Aalst, 2020). Recent data show that 2020 tied with 2016 as the warmest year on record (NASA, 2021). The dangerous rise in global temperatures due to climate change will no doubt increase the risk of wildfires and heatwaves. As the pandemic continues, 2021 may see the risk of even more of these overlapping events and their systemic impacts. Heatwaves in 2020 affected 431.7 million people globally (Walton & van Aalst, 2020).

Heat waves affected the largest number of people in East Asia and the Pacific during the year, with over 145 million already-vulnerable people exposed to extended periods of extreme heat. At least one extreme heatwave took place in Europe and Central Asia, affecting 75.5 million vulnerable people and resulting in the excess mortality of about 9,300 people (Walton & van Aalst, 2020). High temperatures impacted some 73 million people in vulnerable populations in sub-Saharan Africa during the pandemic, with unknown numbers of deaths (Walton & van Aalst, 2020). Table 3 shows extreme heat events by geographical region during 2020.
Some regions of the world were hit by natural hazards other than those related to the climate at the same time as the pandemic was causing a health crisis. For example, in Croatia, an earthquake struck the capital of Zagreb while COVID-19 lockdown measures were being imposed (UNDRR Europe, 2020). In some vulnerable areas, the double catastrophe of natural hazards or human-made disasters along with COVID-19 occurred during unstable political situations, economic hardship, war and civil unrest, food insecurity, or other situations that combine to characterize multi-hazardous systemic risk. For example, Beirut suffered a massive explosion while the pandemic was spreading; the two disasters arrived on top of a stressful Syrian refugee situation, pervasive political instability, deteriorating economic conditions, and social unrest (Box 5).

### Table 3: Regional extreme heat events overlapping with the COVID-19 pandemic

<table>
<thead>
<tr>
<th>Region</th>
<th>Event Month(s) (2020)</th>
<th>Total Affected</th>
<th>Total Killed</th>
</tr>
</thead>
<tbody>
<tr>
<td>East Asia and Pacific</td>
<td>July-September</td>
<td>145,667,190</td>
<td>Unknown</td>
</tr>
<tr>
<td>Europe and Central Asia</td>
<td>July-September</td>
<td>75,539,826</td>
<td>9,334*</td>
</tr>
<tr>
<td>Sub-Saharan Africa</td>
<td>July-September</td>
<td>73,016,939</td>
<td>Unknown</td>
</tr>
<tr>
<td>Latin America and Carribean</td>
<td>July-September</td>
<td>42,289,847</td>
<td>Unknown</td>
</tr>
<tr>
<td>Middle East and North Africa</td>
<td>July-August</td>
<td>35,455,319</td>
<td>Unknown</td>
</tr>
<tr>
<td>South Asia</td>
<td>July-August</td>
<td>33,603,380</td>
<td>Unknown</td>
</tr>
<tr>
<td>North America</td>
<td>July-September</td>
<td>23,005,486</td>
<td>Unknown</td>
</tr>
<tr>
<td>Other regions</td>
<td>Various</td>
<td>3,168,355</td>
<td>Unknown</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>431,746,342</td>
<td>9,334*</td>
</tr>
</tbody>
</table>

Source: (Walton & van Aalst, 2020)

Increasing Global Resilience to Systemic Risk: Emerging Lessons from the COVID-19 Pandemic

Multi-hazards and Systemic Risks

Pandemics are similar to natural, technological, and biological disasters, since they can be seen as physical shocks (unlike financial crises); they are also systemic, with cascading and non-linear effects, and regressive in that they disproportionately impact the most vulnerable populations. As well, they are both nonstationary, since future projections cannot rely on past probabilities and the distribution of events. Finally, they are both risk multipliers, reinforcing and exacerbating vulnerabilities (Ghany & Pierre, 2020, 25 May); (Pinner & Rogers, 2020, April); (Pinner, Rogers, & Samandari, 2020).

The occurrence of multi-hazards compounds and complicates the systemic risks brought about by COVID-19, increasing the numbers of people directly and indirectly affected. As seen earlier in this report, vulnerable populations suffer the health and cascading secondary impacts of the pandemic disproportionately. Likewise, natural disasters affect the vulnerable in larger measures. Developing countries generally already have insufficient resources, inefficient disaster preparedness capabilities, and unsafe infrastructure. More people live in highly disaster-prone regions because of global population growth, poverty, and urbanization (Sohrabizadeh, Yousefian, Bahramzadeh, & Vaziri, 2020). The consequences of this double vulnerability in the time of COVID-19 are amplified in untold ways and to greater degrees than are yet known, as expressed by the IFRC: “when hazards combine, they can multiply each other’s impact in ways governments, civil society and the humanitarian sector have not faced before” (IFRC, 2020).

Disasters require emergency measures, including evacuation, the distribution of humanitarian aid, and the supply of temporary shelters. With the overlap of the COVID-19 pandemic, these relief measures are more difficult to perform safely and efficiently, creating greater risk for affected populations. The systemic risks from the severe disruption in global supply chains due to the recession, as well as lockdowns, closed borders, and other pandemic responses, have slowed relief aid and recovery equipment at the same time as the need is ever greater (Walton & van Aalst, 2020).

Healthcare facilities are doubly stretched when dealing with the impacts of both COVID-19 and a natural or human-made hazard. Hazards may generate a surge in people needing care in health centres already full of pandemic patients while the converse can also occur. Disasters can damage infrastructure, cause power outages, disrupt supply chains,

Box 5: COVID-19 and the port explosion in Beirut, Lebanon

On the 4th of August 2020, some 2,750 tonnes of ammonium nitrate accidentally ignited and caused a massive and devastating explosion in the port of Beirut. The explosives had been stored in highly unsafe conditions. The explosion killed 203 people, injured 6,500 others, left an estimated 300,000 citizens homeless, caused $15 billion in property damage and contributed to a surge in COVID-19 cases after the event. Two of the city’s five hospitals were severely damaged, one of which was a dedicated COVID-19 facility (Casmier, 2020); (OCHA, 2021).

The pandemic and the explosion occurred on top of precarious conditions already affecting Lebanon: a stressful Syrian refugee situation; persistent political instability, declining economic conditions, and social unrest. The city’s emergency response capacity was overstretched with the arrival of injured citizens and the crisis of tending to the homeless during a pandemic requiring physical distancing and lacking places in which to quarantine (Casmier, 2020); (OCHA, 2021). The economic crisis meant that many of Lebanon’s hospitals were underfunded, subject to unreliable electricity, lacking enough personal protective equipment, and dependent on foreign aid, leaving fewer resources for the strapped government.

The pandemic increased income inequality due to COVID-protocols that restricted important economic sectors, such as retail and construction. The most vulnerable were more apt to contract the disease due to their lack of access to preventative resources. The 1.5 million refugees living below the poverty line faced impoverished circumstances, especially since the explosion destroyed 15,000 metric tonnes of wheat and the loss of port facilities meant that ships carrying goods had to dock further away, which raised the already high prices of food (Casmier, 2020).
and prevent staff from attaining health care facilities; when overlain by the influx of COVID-patients, service provision fails, displaced people suffer health and security risks, and a cascade of disruptions follow (IOM, 2020, 13 October); (Salas, Shultz, & Solomon, 2020).

It is beyond the scope of this report to provide case studies of the compound and systemic risks from the pandemic and multi-hazards in all of the world’s regions. The following paragraphs and Table 4 provide brief illustrations.

In East Africa, destructive swarms of desert locusts occurred in 2020 as COVID-19 cases continued to rise. They followed the 2018 invasion that hit the Arabian Peninsula where more than 20 million people were already facing food insecurity. The outbreak spread through Djibouti, Ethiopia, Eritrea, Kenya, Tanzania, Uganda, Somalia, South Sudan, Yemen, and over the Persian Gulf. Fighting the locusts was hampered by restricted movement due to the pandemic (Sallent, 2020). Seasonal rains were exacerbated by Cyclone Gati that caused flooding in northern Somalia, threatening to provoke more locust infestations and their spread. Already the double crisis threatens the agricultural and pastoral livelihoods of millions of people in the Horn of Africa (FAO, 2020).

The previous section highlighted the risks felt by migrants and IDPs in light of the pandemic. The impacts on people displaced by natural disasters are multiplied by the arrival of the pandemic. Every year, there are an average of 6.8 million displaced in China, 3.7 million in India, and 3.6 million in the Philippines (IEP, 2020). Some migrant and refugee settlements are located in hazard-prone areas. For example, Cox’s Bazar in Bangladesh, which is now the world’s largest refugee settlement, houses millions of Rohingya refugees who fled in a mass exodus from Myanmar. In addition to being vulnerable to COVID-19, they are at risk from natural hazards such as cyclones, floods, and landslides during the monsoon and cyclone seasons (UNDRR, 2020, 20 April). Sheltering in a small space within the country and exposed to COVID-19 and weather hazards has impacted social cohesion and augmented fear and socioeconomic hardships that are now heightened by the potential for violence (Reliefweb, 2021b).

Where COVID-19 and heatwaves co-exist, the impacts are compounded, with vulnerable populations, such as the elderly, most at risk. In addition, health measures to stem the spread of disease often conflict with advice related to overcoming the heat: people are instructed to wear masks but advised to remove restrictive clothing due to the heat, while gathering in dedicated cooling centres may contravene protocols to stay at home. Similarly, evacuees of floods, earthquakes, wildfires, and other disasters such as industrial accidents, often find themselves in overcrowded shelters where physical distancing is impossible and there are few facilities to wash hands. Occurring at the same time as COVID-19, which compromises human respiratory systems, wildfire smoke exacerbates the health hazard by increasing the likelihood of lung infections. Air pollution from large fires can extend over hundreds of kilometres, with the potential to affect people far from the event (Walton & van Aalst, 2020). Table 4 is a snapshot of some of the disasters that occurred in 2020 where impacts and response efforts were exacerbated by the simultaneous COVID-19 health crisis.
### Table 4: Examples of hazards during the 2020 pandemic and their impacts

<table>
<thead>
<tr>
<th>Region/country</th>
<th>Hazards</th>
<th>Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pacific, Vanuatu, Fiji</td>
<td>Cyclone Harold (Category 5) Drought</td>
<td>• Lockdowns and quarantines hampered disaster response efforts, including arrival of equipment and humanitarian assistance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• In Fiji, around 600 people were still displaced as of mid-May</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Destroyed 20 percent of health centres</td>
</tr>
<tr>
<td>Africa: Ethiopia, Kenya, Rwanda, Somalia, South Sudan, Tanzania, Uganda</td>
<td>Heavy flooding Historic locust invasion</td>
<td>• 300 deaths</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Slowed humanitarian response</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Stretched community coping</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Overburdened disaster management</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Mobility restrictions due to pandemic hampered efforts to combat locusts devouring crops</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 2.6 million people severely food insecure in at least 8 countries</td>
</tr>
<tr>
<td>India and Bay of Bengal Bangladesh</td>
<td>Heatwaves (+50°C) Cyclone Ampham</td>
<td>• More than 100 deaths</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Thousands of houses damaged or destroyed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• One million people were evacuated in India</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Nearly 2 million people and 500,000 livestock evacuated in Bangladesh before the storm hit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 4.3 million in the West Bengal and Odisha states of India evacuated from low-lying delta areas</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 15,000 shelters set up in the region with COVID19 prevention measures, far more than ever before, to allow shelter residents a degree of physical distancing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Efficient mass evacuation and sheltering process likely produced a spike in new COVID-19 cases in Kolkata, India, and other storm-affected regions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• COVID-19 travel and physical distancing restrictions hampered preparedness and response efforts</td>
</tr>
<tr>
<td>Uganda, Kasese District</td>
<td>Heavy rains</td>
<td>• 4 rivers burst banks, houses destroyed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Hydroelectric power station, hospital destroyed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Villages buried in mud</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Thousands of people displaced while observing physical distancing</td>
</tr>
<tr>
<td>Kenya, Rwanda, and Uganda</td>
<td>Floods and landslides</td>
<td>• 300 deaths</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Half a million people displaced in Kenya, Rwanda, and Uganda</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Thousands needed emergency food</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Thousands seeking temporary shelter while observing physical distancing</td>
</tr>
<tr>
<td>Philippines</td>
<td>Tropical Cyclone Vongfong (known locally as Ambo)</td>
<td>• Pandemic complicated evacuation and response efforts ahead of cyclone</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Damaged or destroyed nearly 20,000 homes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Caused about 30 million US dollars in agricultural damage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Some 180,000 people were evacuated</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Evacuation slowed by lockdown measures</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Evacuation centres only half filled</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Bicol Region’s only COVID-19 testing facility damaged</td>
</tr>
<tr>
<td>Region/country</td>
<td>Hazards</td>
<td>Impacts</td>
</tr>
<tr>
<td>-------------------</td>
<td>-----------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Florida, U.S.     | Tropical Storm Isaías       | • Testing sites closed in preparation for storm  
• Physical distancing in evacuation shelters difficult                                                                                     |
| South Africa      | Flooding                    | • Difficulty social distancing in informal settlements                                                                                     |
| Zimbabwe          | Drought                     | • Millions without access to clean water and at risk of acute food insecurity  
• Power cuts (countries heavily dependent on hydropower) affect ability to respond to pandemic                                         |
| Western U.S.      | Wildfires                   | • Burned about 20,000 square kilometres  
• California LNU Lightning Complex fire destroyed more than 900 structure, killed 5 people, forced thousands to evacuate  
• Concerns about risk of COVID-19 as evacuees and rescue workers cluster together                                                |
| Atlantic Basin, U.S. | 6 major hurricanes, 25 named storms | • More than double 1981-2010 historical averages  
• 400 deaths                                                                                                                                          |
| Central America   | Hurricane Eta, Category 4,  
Hurricane Iota, Category 4 | • Flash flooding, landslides  
• About 4.6 million people affected in Belize, Costa Rica, El Slavador, Guatemala, Honduras, Nicaragua  
• Thousands of families affected by extended lockdowns, school and business closures, declining migrant remittances, rising violence against children and women, and interrupted water, sanitation and key health services, including childhood vaccinations  
• Honduras’ El Cajon dam at or over capacity causing evacuations  
• International airport in San Pedro Sula submerged by 2 m. of water; humanitarian flights unable to land for weeks  
• Up to 70 percent of crops threatened in Honduras  |

@Unsplash/Ramin Khatibi


<table>
<thead>
<tr>
<th>Region/country</th>
<th>Hazards</th>
<th>Impacts</th>
</tr>
</thead>
</table>
| Southern Texas, U.S.             | Hurricane Laura                  | • Evacuation shelters filled too quickly  
• Physical distancing in evacuation shelters difficult  
• COVID-19 testing centres closed in preparation for hurricane making it difficult to track cases as schools opened up  
• Threat of infections lowered number of volunteers |
| Zagreb, Croatia                  | Earthquake, 5.5 magnitude        | • Several hospitals had to be evacuated, including 86 patients, of which 22 COVID-19 patients, 15 of whom were in the ICU  
• Many left homeless  
• Triggered migrations to other parts of the country, with the potential spread of the pandemic |
| Beirut, Lebanon                  | Port explosion                   | • Killed 203 people, injured 6,500 others, left an estimated 300,000 citizens homeless  
• Caused $15 billion in property damage  
• Contributed to a surge in COVID-19 cases |
| The Arab Region, especially Sudan, Somalia, Yemen and Saudi Arabia. | Desert locust attacks            | • Severe repercussions on the agricultural sector, food security and livelihoods |
| Yemen                            | Heavy rains and flash floods     | • Infrastructure destroyed or severely damaged roads, canals, services (water and electricity), health sector, educational sector, civil defense  
• Thousands of hectares of agricultural land destroyed |

Sources: (CDP, 2020); (Civljak, 2020); (IFRC, 2020); (NOAA NCEI, 2021); (Persaud, 2020); (Phillips, Caldas, Cleetus, & al., 2020); (Shultz, Fugate, & Galea, 2020); (Sottile & Arkin, 2020); (UNDRR Arab Region, pending release); (UNDRR Asia Pacific, 2020)
Part IV: Recommendations

The COVID-19 pandemic is an historic and catastrophic global event and as such, has stimulated huge governmental and academic attention. Even though COVID-19 appeared only a year ago, this interest has already generated a vast literature examining its systemic intrusion into all aspects of our lives, especially those of the most vulnerable, and suggesting ways to better address its impacts now and how to adapt to, and mitigate, the potential for a future in which multi-hazards are more common. With this in mind, all international organizations and governing institutions, as well as other levels of government, are formulating new policies and action plans.

This section of the report provides a number of recommendations about how the global community might improve governance of systemic risk and multi-hazards drawn from the literature and UNDRR regional consultations, and provides references to some of the main guiding documents and policy briefs to date on the relevant topics.

Integrate a Systemic Risk Lens

COVID-19 has exposed how disasters occur on the backdrop of interdependent and unresolved political, socioeconomic, and environmental challenges. “The COVID-19 pandemic has more than ever shown the changing risk environment, as well as the systemic and overlaying nature of risks that affect and threaten all sectors” (FAO, 2020). In recognition of the systemic nature of risks, the Sendai Framework adopts the concept of integrated risk governance, at all scales (UNDRR, 2019b). With the emergence of COVID-19, the UNDRR stressed the urgency in adopting a systemic approach to disaster and risk reduction (UNDRR, 2020 (b)). System risk outside the financial sector is a new and evolving field. The International Risk Governance Center has published two guides to the governance of systemic risks: see (IRGC, 2017); (IRGC, 2018).

Policies, plans and actions need to be based on an evolving perception of risks and how to govern them that builds resilience into the interconnected systems that are characteristic of contemporary society. The Global Commission on Adaptation reports that investments in resilience generate tenfold in net economic benefits and that investing “US$ 1.8 trillion in five areas—early-warning systems, climate-resilient infrastructure, improved dryland agriculture crop production, global mangrove protection, and water security—could generate US$ 7.1 trillion in total net benefits” (GCA, 2021).

Increase Resilience

In assessing risk, resilience approaches resemble traditional risk assessment, but extend the analysis into “the unknown, uncertain and unexpected at the scale of systems rather than individual components” (Florin, 2016). The main difference is that the resilience lens focuses on outcomes. It acknowledges the probability of future catastrophic disruptions and stresses the need for core systems to have built-in capacity to respond, adapt, and prevent lasting damage. The result is a particular focus on preparation, flexibility, and adaptation for both people and systems (Florin, 2016); (Trump, Florin, & Linkov, 2018).

Resilience needs to be built into the process of governing risk by including the approach in policies, plans, strategies, research, and practices; developing quantitative metrics with which to assess resilience; and using appropriate instruments to manage it (Florin, 2016). The IRGC has produced two comprehensive resource guides on resilience and systemic risk: see (Florin, 2016) and (Trump, Florin, & Linkov, 2018).

Reform and Strengthen Global Governance

The UN Secretary-General António Guterres has called for a “new model for global governance (...) based on full, inclusive and equal participation in global institutions” (Guterres, 2020b). Indeed, many observers note that the pandemic and its health, economic, social, and environmental impacts underscores the need for better globally coordinated collective, multilevel governance (Kreienkamp, 2020); (Levy, 2020); (Luckhurst, et al., 2020). Similarly, António Guterres stresses the need to improve multilateralism in global governance: “We urgently need multilateral institutions that can act decisively, based on global consent, for the global good” (Guterres, 2020a).
Although it is not clear what new and stronger global governance models would look like (Kreienkamp, 2020), their features need to include the integration of a systemic risk lens and building resilience, as suggested above. To operate, they need improved multilateralism, which includes whole-of-society and whole-of-government approaches, as advocated by the UN, which notes how the COVID-19 pandemic reinforces the importance for governments to adopt approaches that consider local communities, affected populations, civil society, and the private sector, as part of the solution to the epidemic (UN, 2020, October).

Strengthen Multilateralism

UNDRR has expressed an "urgent need for a whole-of-society and whole-of-government approach towards risk-informed recovery" (UNDRR, 2020 (b)). The pandemic revealed the importance of interdependence between countries, at local, national, and global levels (UNDRR Arab Region, 2020, 27 July).

Given the breadth and scale of systemic risk that characterizes the present overlapping crises and the disproportionate impacts on vulnerable regions and populations, it is even more important that multilateral cooperation and partnerships involve a whole-of-society approach (UN, 2020, October). The IFRC highlights the significance of local organizations during the pandemic, when international and other-level deployments were often prevented from supporting communities by restrictions to stem the spread of COVID-19, or simply because needs were greater than means. Grassroots groups stepped up, taking action in various ways, such as sourcing food, raising funds, collecting relief items, and delivering logistics. Thus, these groups need proper representation in multilateral partnerships to address systemic risks (IFRC, 2020). Active coordination and cooperation between national and sub-national levels can help ensure local levels integrate disaster risk management in their agendas. The capacities of local groups need strengthening by devolving authority to them, increasing their funding, and ensuring they are represented in coordinating and decision-making arenas (UNDRR Asia Pacific, 2020).

Create and Strengthen Regional Partnerships

Bilateral, regional, and interregional partnerships are especially important. At a regional level, multilateralism in the wake of the pandemic and natural hazards shared across countries in the same geographic region includes creating or strengthening regional institutions to address systemic risk reduction and build resilience in mutually reinforcing ways. Regional institutions and agencies throughout the world need better and more innovative governance, as well as increased cooperation, integration, solidarity, and sector-wide approaches (Nurse & Charlery, 2020, 25 May); (UNDRR, 2020, 29 May).

For example, the African region called for "enhancing, sub-regional, national and sub-national coordination mechanisms for ensuring multi-sectoral engagement and a whole-of-society, multi-hazard and holistic approach to risk management, including those associated with biological hazards such as COVID-19" (UNDRR Africa, 2020, April). This includes increasing information sharing, managing knowledge, and creating partnerships to address transboundary risks (UNDRR Africa, 2020, April).

Likewise, the Latin America and the Caribbean region recommends a joined-up regional strategy to address the complex, cross-border nature of the pandemic and natural disasters, and to assess different capacities to ensure multi-hazards that affect the region can be effectively managed (UNDRR, 2020, 25 May). This need is echoed by the Asia and Pacific region, which calls for regional cooperation in sharing data from hazards monitoring, early warning systems, and research, and in helping neighbouring countries in disaster response efforts (UNDRR Asia Pacific, 2020). Likewise, the Arab region stresses the need to cooperate regionally, especially on the issue of food security (UNDRR Arab Region, 2020, 17 May).

The OECD underscores the advantages of cooperation across regions in addressing systemic risks; it helps minimise disjointed responses and competition for resources and allows for collaborative procurement, among other mutually supportive strategies. This creates a coherent response and recovery process across territories experiencing the impacts of the same natural hazards, health risks, and challenges (OECD, 2020, October). The World Economic Forum suggests that the EU might serve as a model of a regional organization that is institutionally prepared to foster close cooperation among its members (WEF, 2020, May).
Engage All Stakeholders

In a whole-of-society approach, multilateral cooperation must improve the involvement of all actors. It requires the full, inclusive, and equal participation of developing nations, women, and indigenous people, especially given they are some of the most vulnerable to systemic risk. Youth leaders, who are increasingly visible on the world stage in defending human, animal, and environmental rights, must also be represented, especially since they will inherit a future dominated by the impacts of climate change (IFRC, 2020); (UNDRR Arab Region, 2020). Civil society, municipalities, the private sector, and the media have important roles to play in raising awareness and ensuring the proper implementation of laws, regulations, and health and safety measures during disasters and they need to be included in decision-making (UNDRR Arab Region, 2020, 17 May). The focus of ensuring a whole-of-society approach is also highlighted further on regarding the need to respect human rights.

To ensure all stakeholders’ voices are heard and their needs are met, new and mutually supported methods for cooperation are needed so they can co-create conditions for successfully adopting solutions and protocols that create resilience in addressing future risks (Guterres, 2020a).

Take a Multisectoral, Multidisciplinary Approach

Since the pandemic is related to human-animal contact and ecosystem loss, produced a global health crisis that disproportionately affects socioeconomically vulnerable populations, and its impacts are multiplied in areas of the world affected by climate-related and other natural hazards, addressing this complex, systemic challenge requires a holistic, intersectoral, and multidisciplinary approach to identifying, assessing, managing, and responding to multi-hazards and risks at all levels of government, and in all multilateral efforts (FAO, 2020); (UNDRR, 2020, 27 April). Response, recovery, and development need to be addressed simultaneously and holistically, requiring coherent multidimensional and multisectoral plans and actions (Salazar, 2020, 9 June); (UNDRR, 2020, 25 May); (UNDRR Africa, 2020, 5 May).

The systemic approach accounts for the crucial linkages among issues that are often treated separately in governmental and scientific “silos”. Systemic risks cannot be addressed by a single agency nor by many siloed ones (Hynes, Trump, Love, & Linkov, 2020). No one agency has the mandate, ability, or resources to address all aspects of disaster risk, especially in situations of multi-hazards (UNDRR Asia Pacific, 2020); rather, many sectors of the government should work together on response, recovery, prevention, and resilience building. Clear roles and functions need to be defined with significant roles for the ministries of planning and finance (UNDRR Asia Pacific, 2020). For example, policies and practices related to zoonotic diseases need the mutual involvement of sectors related to environment, agriculture, and public health. Integrating pandemic and disaster risk response and recovery requires intersectoral collaboration, solidarity, and action on all these fronts (Nurse & Charley, 2020, 25 May).

The inclusion of stakeholders from government, civil society, and the private sector is important. For example, government agencies can include disaster management and public health; civil society might include national human rights institutions, universities, conservation groups, and grassroots community organizations; while the private sector could be represented by science and technology, the tourism sector, and businesses involved in planning and building resilience at the local level (UNDRR, 2020, 25 May); (UNDRR, 2020, 19 June).

A multidisciplinary approach requires that within a single ministry or institution, people from multiple disciplines collaborate on policies to address the common challenge (WHO; FAO; OIE, 2019). Multidisciplinary collaboration, as well as multinational research, is needed to uncover and address linkages among ecological dynamics, climate change, disease vectors, trade, pathogens, health, and human vulnerability (UNEP, 2016); (Di Marco, et al., 2020). Thus, multidisciplinary planning involves experts in these domains, such as physicians, nurses, other health professionals, veterinarians, epidemiologists, scientists, wildlife specialists, and ecologists in collaboration with disaster risk professionals (WHO; FAO; OIE, 2019).

Leave No-one Behind: Prioritize a Rights-based Approach

Although COVID-19 can affect anyone and everyone, it clearly impacts the most vulnerable and has revealed the inequalities in our social systems. Multilateralism is also pertinently characterized by the principles that guide the partnership, especially universal values, such as those espoused by the Universal Declaration of Human Rights (Fukushima, 1999); (Guterres, 2020a). All sectors and all levels of government need to make sure policies, strategies, and actions are constantly and consistently people-centered to ensure no one is left behind and human rights are protected (UNDRR, 2020, 9 April).

All multilateral efforts to address the health crisis and hazard emergencies, and to reconstruct and build back better after the pandemic, need to be based on the nine, core international human rights treaties. Countries that have ratified these treaties should ensure that domestic measures
and legislation are compatible with their treaty obligations and duties. Then human rights standards can be enforced at local levels through the procedures and mechanisms available at regional and international levels. These international human rights instruments oblige countries to respect, protect, and fulfill the right to health, including preventing epidemic disease, protecting the environment, and addressing climate change.

Increased inequalities among the world’s most vulnerable due to the pandemic has reversed progress towards achieving many of the SDGs (IISD, 2020). It is imperative that efforts are strengthened to get back on track and exceed the milestones that had been achieved prior to COVID-19 so that those hardest hit not only recover but can be empowered to build resilience into their lives as they face the disproportionate impacts of climate change and a future in which infectious disease is likely to be more prevalent. The United Nations has produced guidelines to this effect in its document “Shared Responsibility, Global solidarity: Responding to the Socio-economic Impacts of COVID-19” (UNSDG, 2020).

Reversing the human-rights impacts of the pandemic include addressing the loss of freedoms experienced by many who were affected by restrictive lockdowns and border closures that unintentionally may have prevented them from accessing health care, food, work, education, hygiene necessities, and human connections and leisure. The UN calls for measures to mitigate these consequences.

Indeed, it is important to protect the human rights of all those who have been disproportionately affected by the health crisis, overlapping hazard events, and the cascading and systemic economic and social impacts, as outlined in the first part of this report—people living under the poverty line, women, the elderly, migrant labourers, refugees and internally displaced persons, caregivers and other essential workers, and children, among many others. The United Nations (2020, April) has produced a policy brief called "COVID-19 and Human Rights: We are all in this together" that provides a guide to addressing human rights needs among these populations during a pandemic and how to build resilience afterwards.

In sum: “Robust global cooperation and governance with a human rights-centred approach—supported by appropriate legal and institutional frameworks—is a prerequisite for successfully confronting these multi-dimensional, overlapping challenges with integrated solutions” (Phillips, Caldas, Cleetus, & al., 2020).

Strengthen and Integrate Health Agendas in Governing Structures

Governments should coordinate disaster and health risk reduction among government ministries and partners using multisectoral and multidimensional approaches. At the national level, states have the capacity to engage all stakeholders in the decision-making process and allocate powers to them to accomplish their missions (Meerpoël, 2020). In involving all levels of government in its coordination role, the State prevents strategy conflicts from arising across agencies, sectors, and scales (Phillips, Caldas, Cleetus, & al., 2020). Multiple sectors would also collaborate to integrate pandemic preparedness, risk prevention programs, research, and control measures (IPBES, 2020).

National responses to the COVID-19 health crisis reveal significant differences in strategies to stem the pandemic’s spread and treat and vaccinate citizens (Kreienkamp, 2020). Multilateral cooperation is needed to share lessons learned from the pandemic and create coherent mutually beneficial risk reduction and resilience-building strategies that can be collaboratively and efficiently implemented across many regimes in preparation for a future health crisis.

Mainstream Emerging Infectious Disease Risks in Disaster Risk Reduction (DRR) Governance

Pandemic preparedness should be mainstreamed into national and local disaster preparedness, contingency planning, and risk reduction, with a focus on addressing systemic risk (IOM, 2020, 13 October); (UNDRR Africa, 2020, 5 May); (UNDRR Africa, 2020, July); (UNDRR, 2020, 29 May). There is a need for a collective and coordinated strategy and actions, as well as increased investment, to prevent biological hazards and their impact on public health, as recognized by international agreements to integrate biological hazards in whole-of-society and all-hazard approaches in risk management (UNDRR Africa, 2020, April); (UNDRR, 2019b). Box 6 suggests some actions that integrate DRR and health agendas.
The WHO has created a Thematic Platform for Health EDRM (Emergency and Disaster Risk Management) Research Network (Health EDRM RN), which developed a reference book about methods to guide Health-EDRM research. The overarching aim is to reduce the risks and consequences for the many millions of people worldwide whose health is affected by emergencies and disasters each year (WHO, 2020b).

Just as health should be integrated into disaster disk reduction, so responding to, and reducing the risks of disaster should be integrated into health agendas. Health-EDRM is particularly relevant in addressing COVID-19 and action, climate change, and sustainable development (WHO, 2019).

The Framework is derived from the disciplines of risk management, emergency management, epidemic preparedness and response, and health systems strengthening (WHO, 2019). The guidance document advises about how to conduct studies to inform policies and programs (Box 7). National and multilateral governance structures should promote Health-EDRM so that it can be used in conjunction with other responses to COVID-19 and to address the likely risk of new emerging infectious diseases in the future (Djalante, Shaw, & DeWit, 2020).

Box 6: Actions to integrate DRR and health responses to disaster

- Integrate disaster risk reduction into health education and training and build capacity among health workers in disaster risk reduction
- Incorporate disaster-related mortality, morbidity, and disability data into multi-hazards early warning systems, health core indicators and national risk assessments
- Advocate for, and support cross-sectoral, transboundary collaboration, including information sharing, and science and technology for all hazards, including biological hazards
- Promote coherence and further develop local and national policies and strategies, legal frameworks, regulations, and institutional arrangements

Source: (UNDRR Arab Region, 2020, 17 May)

Box 7: The WHO Guidance on Research Methods for Health-EDRM

This Guidance offers practical advice about how to plan, conduct and report on a wide variety of quantitative and qualitative studies that can inform questions about policies and programs for health-related disasters and emergencies across different settings and level of resources. Given the current context of the COVID-19 pandemic, WHO plans to continually update the contents in 2021, and also include additional chapters on COVID-19 and other emerging topics. Case studies of direct relevance to Health EDRM provide real-life examples of research methods and how they have modified policies. The book is useful for health professionals in Health-EDRM, academia, government agencies and ministries, international organizations, and community groups and civil society organizations” (WHO, 2020b).
Institutionalize “One Health” at All Levels of Government

Before the pandemic, the WHO/FAO/OIE Tripartite observed that in most countries, there was a lack of coordination across sectors and disciplines related to zoonotic disease threats. Administration and technical coordination were inadequate, and poor planning, information sharing, assessment, and control actions resulted in ineffective disease control programs and poor health outcomes (WHO; FAO; OIE, 2019).

To introduce pandemic preparedness into policies and actions, all levels of governance could institutionalize “One Health” in their programmes (Box 8). At the national level, the State can undertake the political, legal, administrative, and economic reforms to institutionalize and integrate One Health into their agendas. Emerging Infectious Diseases is one of the global issues within its scope, and the approach emphasizes the interconnections among human, animal, and environmental health, in alignment with a systemic approach to governing (IPBES, 2020).

Strengthen Disaster Reduction, Prevention, and Resilience

The focus of disaster risk management is often too attentive to response at the expense of prevention. In planning for the future, it is important to become more adapted and resilient to future health and hazard risks as well as to mitigate the causes, triggers, and underlying conditions that contribute to their emergence. Holistic and simultaneous response, recovery, and prevention plans and actions are needed that focus on strengthening adaptation and building resilience to meet future hazards. Responses to COVID-19 revealed that countries with pre-existing national emergency or DRR plans and strategies coped better with the crisis (UNDRR Arab Region, 2020, 27 July).

Adopt a Multi-Hazard Lens

The emergence on COVID-19 in an era of increasing weather-related disasters highlighted the need to enhance efforts to prepare for “Multi-Hazard Disasters” (UNDRR, 2020, 27 April). Preparation plans need to broaden the focus to consider the many unknown hazards and risks that may occur rather than taking a single hazard approach (UNDRR Arab Region, 2020, 27 July). All potential threats need to be considered and mitigated against. The multi-hazard approach also means that hazards can be prioritized for mitigation and response (UNDRR Asia Pacific, 2020).

Thus, in addition to disaster response, anticipatory prevention efforts require the integration disaster hazards and the risk of biological hazards (FAO, 2020). Risk reduction strategies can no longer focus on single disasters such as a flood or wildfire; they must respond to simultaneous, overlapping, or sequential hazards caused by systemic change rather than on a single trigger (McClean, 2020). To respond to current hazard disasters and prevent future emergencies, it is critical to apply a multi-hazard lens to health and disaster reduction systems and to increase resilience by developing strategies that address a large range of hazards (UNDRR Europe, 2020). Planning and response, therefore, requires close coordination among government agencies and partners at all levels of government (UNDRR Africa, 2020); (UNDRR, 2020, 27 April).

Address the Social and Health Protection Needs of the Most Vulnerable

After the pandemic, there is an opportunity to speed up progress towards the SDGs by embedding greater societal equality and sustainability into economic recovery (UNDRR Arab Region, 2020, 17 May); (WEF, 2020, 2 December).

As already underscored, human rights must be respected in managing and preventing such crises. The most vulnerable have unique needs that disaster risk reduction (DRR) and pandemic planning must strive to plan for in advance of disaster events (UNDRR, 2020, 9 April); (UNDRR, 2020, 20 April). To help build resilience, there is a need for greater understanding of the reasons why some populations are more vulnerable and have less capacity to cope with crises than others, recognizing that experience and circumstances can vary significantly within and between groups (IFRC, 2020); (GRAF, 2019). For example, there is evidence from past disease outbreaks and disasters that gender analysis should be included in preparedness and response efforts so...
health interventions are equitable and gender sensitive. As well, women’s voices should be integrated into DRR planning since they are often on the front lines during disasters and empowering them will improve preparedness and community resilience (Wenham, Smith, & Morgan, 2020).

Investments need to be made in the following: social protection, including against social exclusion, increased stigma, discrimination and risk of violence, in particular, sexual and gender-based violence; access to health care and hygienic conditions; economic recovery; including investment and economic stimulus programs to meet specific recovery needs; inclusion in DRR and pandemic decision-making and management; and free access to information; among others (ILO, 2020b); (UNDRR Arab Region, 2020, 17 May); (UNDRR, 2020, 9 April); (UNDRR, 2020, 20 April); (UNDRR, 2020, 19 June).

Investing in social protection before a disaster builds in resilience and can improve recovery speed. It has been found that pairing social protection programmes and early warning systems is effective in responding to slow-onset disasters, such as COVID-19 (UNDRR, 2020, 16 July). For example, early warning efforts and social protection are enhanced when household registries and the bank accounts of target groups are already in place (UNDRR, 2020, 29 May). Streamlining administrative requirements for emergency access to social protection before disasters occur increases the efficiency of response (Mishra, 2020). Resilience can be strengthened by targeted policies now that strengthen unemployment benefits and expand access to paid sick leave, free child care and family leave, security to workers who lose their jobs in the event of disasters, and preventing the widening of inequality (ILO, 2020b); (Grigoli & Sandri, 2020).

Refugee camps, migrant workers’ dormitories, nursing homes, industries where essential jobs are carried out in crowded warehouses, prisons, and other spaces that have been disproportionately affected by outbreaks of COVID-19 should have comprehensive plans for preventing and managing infectious disease outbreaks. They should also be subject to regular unannounced inspections by authoritative health officials to ensure plans are in place and properly implemented (Liu, et al., 2020).

**Introduce More Interdisciplinary, Cross-Sectoral Risk Assessments**

The COVID-19 crisis is dramatically highlighting the significance of low-probability, high-impact risks. There is always a low probability of risks such as an emerging virus ballooning into a pandemic that costs millions of lives and shuts down economies across the globe. The fundamental question is how to plan for such events? By far, most of the risks in recent years were identified in advance by experts—from oil spills to chemical disasters to nuclear accidents and the slow onset of climate change impacts. But not all risks evolve in the same manner: some go on to create a massive crisis while others recede. Thus, governments and research institutions need to cooperate to identify and prepare for low-probability, high-impact risks (Phillips, Caldas, Cleetus, & al., 2020). Such events can cause massive turmoil but preparing for everything is unbearably costly, so it is important to identify those that are most likely.

Given that hazard risks are increasingly interconnected and transboundary, disaster and health risk management agencies should integrate and together conduct risk assessments and surveillance, set up early warning systems and resilient infrastructure, and coordinate incident management in a coherent approach (UNDRR Africa, 2020, 5 May). It is recommended that inter-operational emergency centres be strengthened or established to operationalize multi-hazard early warning and assessment systems (UNDRR Africa, 2020, July).

A recent article in the journal Nature provides the following advice:

> These assessments must explicitly consider spatial and temporal coincidence of physical hazards and health or socioeconomic risk factors, interdependencies between sectors (for example, the food–energy–water–health nexus) and the potential for feedback loops. Solutions must similarly be more integrated and robust, taking into account interactions, trade-offs and co-benefits across sectors and at different scales — and therefore across traditional jurisdictions of government agencies — under a range of scenarios” (Phillips, Caldas, Cleetus, & al., 2020).

Traditional approaches for dealing with conventional risks are not adequate for systemic risks because they have limited capacity to account for the high uncertainty, system complexity, and chaos in the event of unforeseen and unavoidable disruptions (IRGC, 2018). Given the systemic nature of risks in the contemporary interconnected world, risk governance institutions need to gather knowledge about the impacts of all potential hazards on all potential populations, places, and sectors of the economy, and on the feedback mechanisms that may counteract those effects, at any given time; this is a complex undertaking. Systemic risk assessments should also collect information about people's concerns about the causes and consequences of risk (IRGC, 2017). Thus, DRR organizations need to review and update their strategies to incorporate lessons learned from the COVID-19 pandemic and collaborate with institutions with expertise in many different fields to identify effective options.
for reducing systemic risks. This includes building multi-hazard risk scenarios (UNDRR Asia Pacific, 2020).

Multi-scenario risk assessment is a tool that can be applied to the study of multi-hazard occurrence. More research is needed in this field, however, since it has been noted that multi-hazard scenarios of extreme and compound events need further development (Sadegh, et al., 2018).

The IRGC, which developed Guidelines for the Governance of Systemic Risks and two edited volumes of articles on resilience in risk management, suggests that ultimately, “developing resilient social and economic structures that are able to respond and rapidly adapt to sudden change is the best and often only way to cope with risks in complex systems” (IRGC, 2018).

A new UNDRR initiative is developing a Global Risk Assessment Framework (GRAF) to address questions about how to reduce the risk of disaster and help inform and focus action across sectors and among decision makers at all levels. It seeks to better understand the dynamic nature of risk and how it is magnified by the increasing complexity and interconnectedness of society (GRAF, 2021).

Address the Root Causes of Zoonoses Spillover

As revealed in the first part of this report, the human-animal-environment interface plays a defining role in the emergence of EIDs. It is essential to understand these links and to strengthen the protection and regeneration of natural systems as an integral part of disaster risk reduction.

Strengthen Efforts to Achieve SDGs 2, 3, and 15

The Global Assessment Report on Disaster Risk Reduction (GAR) called for “urgent action to deal with simultaneous systemic change around land, ecosystems, energy, industrial and urban systems, and the social and economic transformations that these infer” (UNDRR, 2019b). This speaks to the need to address environmental and climate change in disaster prevention as they are key root causes of both zoonoses and weather-related hazards: “the same factors that mitigate environmental risks (…) are likely to help mitigate the risk of pandemics” (Pinner, Rogers, & Samandari, 2020).

The link between the emergence of infectious disease and environmental change (see Part I of this report) is not usually integrated into sustainable development planning, DRR, or health agendas. SDG Goal 15 calls for the sustainable protection, restoration, and use of terrestrial ecosystems to reverse land degradation and biodiversity loss. Given that habitat loss has a key role in driving pathogen transmission, conserving the world’s terrestrial ecosystems has direct implications for mitigating EID risk.

Protecting forests and reversing deforestation has important health and economic benefits related to EIDs. A study and analysis on the comparative costs and benefits of reduced deforestation versus the potential costs of the COVID-19 pandemic suggests that the associated costs of preventive efforts would be substantially less than the economic and mortality costs of responding to a pandemic once it has emerged. The authors of the study conclude that “the clear link between deforestation and virus emergence suggests
that the associated costs of preventive efforts would be substantially less than the economic and mortality costs of responding to a pandemic once it has emerged. The authors of the study conclude that “the clear link between deforestation and virus emergence suggests that a major effort to retain intact forest cover would have a large return on investment” (Dobson, et al., 2020). Similarly, avoiding or reducing land degradation is more cost effective than efforts to reverse past degradation (Potočnik & Teixeira, 2020).

Efforts to create and protect parks, as agreed to in the Convention on Biological Diversity (CBD), should be stepped up by multilateral and transboundary agreements and actions so as to set aside and protect shared ecosystems. In the Aichi targets stemming from the CBD, nations agreed to mainstream biodiversity agendas across government and society and to protect at least 17 percent of terrestrial and inland water areas and 10 per cent of coastal and marine areas by 2020. To date, terrestrial protected area coverage globally has reached 15.0 per cent (Gannon, et al., 2019).

Addressing goals 2 and 3 of the SDGs, which relate to the integrated systems of food security and human health, require an integrated approach to mitigating the impacts of environmental change on EIDs. A recent study on sustainable development and pandemic risk notes that “Crucially, the processes that drive disease emergence risk interact with those necessary to achieve multiple societal goals.” Figure 12 illustrates interactions that have the potential to either increase or decrease key elements of the systems that underpin the achievement of each of SDG Goals 2, 3, and 15, all of which are influenced by environmental change (Di Marco, et al., 2020).

Figure 12: The links between emerging EIDs, environmental change, and SDGs 2, 3, and 15

Note: Risk of EIDs is a key component of sustainable development planning. UN Sustainable Development Goals 2, 3, and 15 are linked through the shared influence of environmental change. These interactions increase (↑) or decrease (↓) key elements of the systems underpinning the achievement of each goal.

Source: (Di Marco, et al., 2020)
These SDG goals address several overlapping issues related to EID and climate hazards. Preventing deforestation, conserving protected areas, and other actions to reduce biodiversity loss prevent animal migrations into new areas. They also prevent human developments, such as urbanization and livestock and agricultural industries, from invading wildlife habitat, thus reducing contact in the wildlife-livestock-human interface and helping to prevent the emergence and spread of novel pathogens (Bernstein, n.d.; IPBES, 2020). By sequestering carbon dioxide, forests help to mitigate climate change and the increase in weather-related natural hazards; protecting mangrove forests is especially important in hurricane and cyclone-prone areas since they buffer storm surges. In addition, the illegal trade in wildlife species has less success in well-protected areas.

Goal 2 of the SDGs, however, aims to increase agricultural productivity to enhance global food security. If this leads to expanding crop and livestock production into new areas, particularly in developing countries, the risk of EID will increase. As expressed in di Marco et. al, (2020): “Efforts to reduce EID risk involve trade-offs with other societal goals, which ultimately rely on the same planetary resources.” The authors suggest promoting “land sparing” policies and strategies that aim to reconcile biodiversity conservation and agricultural activities while also reducing human-livestock-wildlife interactions.

Nations should increase their efforts to integrate environmental protection into their DRR and health risk agendas and to study how to prevent negative trade-offs.

The WHO/FAO/OIE Tripartite’s One Health framework mentioned earlier could provide a platform for multilateral cooperation in integrating EID risk within sustainability and DRR policies (Di Marco, et al., 2020).

More needs to be known about the human-environment-animal interface and how zoonoses spill over into humans. Multisectoral and multidisciplinary research could be conducted to uncover the links between environmental change and EID risk to evaluate how a specific land-use change alters the diversity of wildlife and pathogens, and investigate those human activities, such as bushmeat hunting and farming, that increase human-animal contact (Di Marco, et al., 2020).

Given the large role human actions play in catalyzing disease emergence, some experts are recommending developing a more holistic framework to predict EIDs and to inform their management that accounts for the interplay of the underlying drivers of disease risks, including land-use change, demography, and climate change (Fischhoff, et al., 2020); (Pinner & Rogers, 2020, April); (UNDRR Asia Pacific, 2020); (Woolhouse, 2011).

**Introduce a Global Plan to Encourage Less Meat and Dairy Consumption**

Tackling the systemic risks of the livestock industry includes examining the global demand for meat and dairy products, which continues to climb along with population growth and rising affluence, especially in China and developing countries (Godfray, et al., 2018) (Figure 13).
Part IV: Recommendations

Lowering the global demand for meat would decrease the industrial livestock practice of keeping millions of animals in close quarters and the potential for increased land-use change to livestock production, thus potentially reducing the transmission of EID from animals to humans (Bernstein, n.d.); (IPBES, 2020). In addition, diets high in meat and dairy are associated with elevated risks of non-communicable diseases such as cardiovascular disease, type 2 diabetes, some cancers, and obesity, making people with these illnesses more susceptible to the health impacts of EIDs should they contract them. As well, there is a body of research revealing that growing crops to raise livestock is inefficient compared to using the same areas to grow crops for human consumption, raising issues of food security and GHG emissions (Pais, Marques, & Fuinhas, 2020). The rise in demand for meat contributes to the rise in GHG emissions and resulting climate change (Godfray, et al., 2018), since the livestock industry contributes between 5 and 14 percent of global GHG emissions per year, depending on the approach to calculations (Mottet & Steinfeld, 2018). Finally, livestock production in water-stressed areas competes with other water uses, including the needs of natural ecosystems whose services underpin human health and welfare (Godfray, et al., 2018).

To help stem the rise in EIDs and the impacts of climate change, it is important to reduce the increasing rate of meat consumption; in terms of the risk of EIDs, this is especially the case in developing countries with high biodiversity (Di Marco, et al., 2020). However, since about half of the 767 million people living in extreme poverty are pastoralists, smallholders, or workers who rely on livestock for food and livelihoods, any program to lessen meat consumption needs to consider the food security and cultural norms of these populations (Mottet & Steinfeld, 2018).

To date, there is no global plan or coordinated strategy to effect dietary change to reduce meat and dairy consumption in the growing human population. This is an important gap that needs to be addressed, and since it is a global issue, it requires international cooperation (Pais, Marques, & Fuinhas, 2020). It is also a very challenging goal since there are complex social factors associated with meat eating that need to be accounted for in developing effective policies (Godfray, et al., 2018). It requires cooperation among many sectors, including civil society and the health sector, among multiple levels of government, and among multiple disciplines, including the social sciences, anthropology, health, nutrition, agriculture, food security, water, land-use planning, and marketing, among many others.

Prevent the Trade in Reservoir Species

Preventing the emergence and spread of zoonotic disease also requires global efforts to stop the national and international trade of species that harbour high-risk diseases (reservoir species) and to enforce laws against such trade. Increased research and funding to uncover the ultimate cause of COVID-19 may assist in the effort to stem this trade. It has heightened the need for coordinated international policy responses across national governments, international organizations, and the private sector. To date, however, there is no global agency whose mandate it is to keep track of and control the wildlife trade (Dobson, et al., 2020); (Wittig, 2020). It is worth initiating a global body to address this issue.

Research and policy collaboration should be multidisciplinary and multisectoral and account for the systemic interlinkages between wildlife trade, cultural norms, poverty, land-use change, supply chains, epidemiology, animal health and welfare, food security, human health and nutrition, and sanitary standards, among others. For example, in biodiversity developing regions where wild animals are consumed, governments and development agencies need to respect the right to traditional diets and food security; however, they also need to include “education and awareness on animal handling, sanitation, and disease transmission as well as sustainable wildlife management and support to develop village-level alternative foods. Legal hunting and marketing of wildlife that meets basic nutritional requirements sustainably can be regulated to reduce the risk of emerging pandemics” (Dobson, et al., 2020).

Aggressively Address Longer-Term Climate Change Goals

As revealed in the first part of this report, the human-animal-environment interface plays a defining role in the emergence of EIDs. It is essential to understand these links and to strengthen the protection and regeneration of natural systems as an integral part of disaster risk reduction.

Climate change reduces biodiversity and directly and indirectly intensifies the global burden of disease; it is also exacerbating natural hazards. Furthermore, climate change impacts, especially when combined with COVID-19, affect the most vulnerable disproportionately. Thus, we need to aggressively and urgently mitigate global warming in our efforts to address the risk of both EIDs and natural disasters (Ostfield, 2009); (UNDRR Africa, 2020, 5 May); (UNDRR Europe, 2020). Indeed, “to make human and non-human systems more resilient to future shocks, economic recovery must be tied to ecological and climate recovery” (Kreienkamp, 2020).

The recovery phase in the pandemic is an opportunity to increase efforts to achieve sustainability goals and
alternative development approaches (UNDRR, 2020, 29 May); (WEF, 2020, 2 December). Coherent laws and policy reforms should be enacted to increase resilience to climate hazards that will also increase resilience to disaster risks and EIDs and their systemic impacts (IFRC, 2020).

Without renewed commitment and increased investment post-pandemic, years of progress could be lost, risking a “vicious cycle of continued environmental degradation, biodiversity loss and further zoonotic infectious disease outbreaks” (WEF, 2020, 2 December).

National governments should “devote a portion of the vast resources deployed for economic recovery [from the pandemic] to climate-change resiliency and mitigation... The returns on such investments encompass both risk reduction and new sources of growth” (Pinner, Rogers, & Samandari, Addressing climate change in a post-pandemic world, 2020); (Pinner & Rogers, 2020, April).

Box 9 lists some of the well-known actions that are urgently needed as we “build back better” after the pandemic.

Box 9: Invest in climate-smart solutions

- Support the green economy
- Transition away from fossil fuel dependency
- Invest in renewable energy
- Expand power grid capacity and resiliency to support increased electrification
- Build infrastructure that is sustainable, technologically advanced, and resilient
- Retrofit buildings
- Finance green and clean development, green jobs, and climate smart technology
- Promote sustainable consumption
- Facilitate trade in environmental goods
- Promote nature-based solutions through informed environmental management and dedicated conservation
- Reconfigure the tourism sector to prioritize high value for the environment
- Shorten and diversify supply chain

Sources: (Ghany & Pierre, 2020, 25 May); (Mishra, 2020); (Nurse & Charlery, 2020, 25 May); (Pinner, Rogers, & Samandari, Addressing climate change in a post-pandemic world, 2020); (Salas, Shultz, & Solomon, 2020); (UNDRR Africa, 2020, 5 May); (UNDRR, 2020, 29 May); (UNDRR, 2020, 25 May); (UNDRR, 2020, 29 May)
Bounce Forward and Build Back Better

Strengthening commitments to climate change solutions and investing in green technology, energy, and infrastructure is part of the agenda to “build back better” (Box 13), which is Priority 4 of the Sendai Framework. It urges that action be taken in anticipation of events, including ensuring capacities are in place to respond to disasters effectively, hallmarks of building resiliency (UNDRR, 2015). Learning from COVID-19, by building back better, countries can avoid the liabilities that made them vulnerable to the pandemic in the first place (UNDRR Europe, 2020).

The recovery and rebuilding phases of the COVID-19 pandemic are opportunities to use the enormous stimulus packages available to the effort to build back better (Box 10). The aim is to make economic and social systems and communities that depend on them more resilient in a future in which climate change and pandemics are permanent features (IFRC, 2020).

A resilience approach advocates that following a crisis, systems take advantage of opportunities to undergo broader changes to improve how they function, so as to “bounce forward” rather than bounce back. In the context of the current pandemic and systemic risk, this notion is explained as follows:

“An instinctive reaction to the Covid-19 outbreak would be to limit or reduce such interconnectedness, yet such sweeping policy changes would not better protect countries or international markets against future systemic threats. Instead, an emphasis upon developing resilience within the international economic system is a necessary evolution for a post-Covid-19 world, where systems are designed to facilitate recovery and adaptation in the aftermath of disruption” (Hynes, Trump, Love, & Linkov, 2020).

Thus, it is important to keep the resilience lens in focus in the post pandemic era.

Box 10: Build Back Better

One Health is a collaborative, multidisciplinary, and multisectoral approach that can address urgent, ongoing, or potential health threats at the human-animal-environment interface at subnational, national, global, and regional levels (WHO; FAO; OIE, 2019). This approach is advanced by the WHO/FAO/OIE Tripartite Zoonoses Guide (2019). At the action level, the One Health policy framework focuses on increasing farm biosecurity and surveying disease in animals and people (Di Marco, et al., 2020).
Part IV: Recommendations

Increasing Global Resilience to Systemic Risk: Emerging Lessons from the COVID-19 Pandemic

Enhance Supply Chain Resilience

A study of the impacts of COVID-19 on global supply chains (GSCs) suggests that the key driver of recovery in disruptive times is to enhance GSC resilience (Xu, Elomri, Kerbache, & El Omri, 2020), as implied in the quote above. Resilience does not mean rejecting globalization, which would not be universally adopted, and it does not include reverting to protectionism. However, it is likely that revamped chains will be shorter, focusing on relocation, repatriating some production to home countries, increasing domestic employment, and adopting leaner manufacturing strategies, such as advocated in a circular economy, that minimize inventory (Xu, Elomri, Kerbache, & El Omri, 2020); (Shih, 2020). Box 11 explains that the danger of opting for exclusively local supply chains would increase susceptibility to natural disaster and shows the advantages of resilient ones.

To instill resilience, leaders should make their businesses and supply chains work better by identifying vulnerabilities and hidden risks, taking advantage of innovations, creating sustainable supply chains, and remaining flexible, among other strategies (Shih, 2020). Resilience to shocks is already being improved through new digital supply networks (DSNs), which are transforming conventional linear supply chains and functional silos. New supply-chain technologies are enabling businesses to “become connected to their complete supply network to enable end-to-end visibility, collaboration, agility, and optimization” (Kilpatrick & Barter, 2020).

Box 11: Resilient supply chains

“Calls for the creation of exclusively local supply chains ignore that, taken to extreme, these would also be susceptible to other local disruptions, such as natural disasters or upheaval. Nature teaches us that diversity and redundancy are the key to resilience, and that is true also for supply chains. The key will be in finding a resilient and diversified balance between strengthened global and local supply chains, using materials to their greatest efficiency and highest purpose, and accelerating the use of secondary materials already abundant in local economies.” (Cairns & Whittaker, 2020).
At the national level, a whole-of-government approach should be used to examine supply chain resilience and vulnerability, including the stakeholders who advocate for greening the GSC and challenge “business as usual” in a post-pandemic economic recovery (Momani, 2020); (Potočnik & Teixeira, 2020). And, as urged by the UN Secretary General António Guterres (2020b): “We also need a more inclusive and balanced multilateral trading system that enables developing countries to move up global value chains”.

**Support the Circular Economy**
Engaging in the circular economy helps to build resilience by decoupling economic growth from resource use and environmental impacts. It helps to reduce the negative systemic impacts of current global supply chains and linear economics. A recent policy paper on the circular economy advocates that after the pandemic, “it is crucial for policymakers to address the global systemic risks of our current linear economies as they aim to deliver more jobs and equitable growth in the short-term, and reduce long-term risks linked to climate change and biodiversity loss” (Ellen MacArthur Foundation, 2020).

The constraints resulting from COVID-19 lockdowns and border restrictions accelerated digitization, which is a major catalyst for the circular economy, since it reduces resource use intensity while accounting for human and community needs, as demonstrated by the surge in remote work, and virtual meetings and schooling (Cairns & Whittaker, Will COVID Recovery Be a Tipping Point for the Circular Economy?, 2021). See further on for more about how digitization can improve resilience in a post-COVID-19 world.

While the decline in air travel and associated greenhouse gas emissions and pollution, although temporary, has been positive for the aims of the circular economy, the surge in single-use plastics and medical waste due to the health crisis has been a major setback. It underscores the need to reuse or effectively recycle plastics in a “circular plastics economy”, which will use less energy, emit fewer greenhouse gases, and cause less pollution. Building back better should include bold new policies that support a circular economy based on resilience and renewal (Cairns & Whittaker, 2021).

**Box 12: What is a circular economy?**

A circular economy is an industrial system that is restorative or regenerative by intention and design. It replaces the end-of-life concept with restoration, shifts towards the use of renewable energy, eliminates the use of toxic chemicals and aims for the elimination of waste through the superior design of materials, products, systems and business models. Nothing that is made in a circular economy becomes waste, moving away from our current linear ‘take-make-dispose’ economy. The circular economy’s potential for innovation, job creation and economic development is huge: estimates indicate a trillion-dollar opportunity.” (Masterson, 2020).
Build Back Resilient Health Systems

Hospitals and medical facilities will need to become more resilient to the health impacts of multi-hazards, including climate-induced and other natural and human-made disasters, conflicts, and EIDs. A comprehensive approach to preparedness could include promoting more private-sector investment in primary healthcare, including emergency operation centres, labs, disease surveillance, diagnostic services, pharmaceuticals systems, and more efficient delivery systems, such as supply chains, as well as expanding stockpiles of protective equipment and essential medical supplies (IOM, 2020, 13 October); (IMF, 2020); (Mishra, 2020); (UN, 2020, May (a)).

The global community, including through the support of international organizations, should be more prepared for future disastrous health and hazard crises by financing research, and ensuring adequate ongoing assistance to countries with limited health care capacity, including through support of international organizations (IMF, 2020). One of the lessons from the COVID-19 pandemic is that donors are ever more aware of the need to prepare in advance of disasters and to invest in mitigation and building resilience, which in the long term will reduce the need for humanitarian aid (UNDRR Arab Region, 2021).

Learning from COVID-19, telemedicine and the use of community paramedicine services could be expanded to increase resilience during a future health or climate hazards or simultaneous crises (Salas, Shultz, & Solomon, 2020). The pandemic revealed the enormous mental health risks to frontline medical and support personnel; health systems should ensure that more and better mental wellness and psycho-social care are in place before another disaster (UNDRR, 2020, 29 May); (UNDRR, 2020, 29 May). Public health measures, occupational health and safety regulations, local surveillance mechanisms, and health and safety inspections in workplaces should also be strengthened, especially in industrial and manufacturing facilities with crowded conditions, such as the slaughter and meat packing industries, among others (ILO, 2020b); (Middleton, Reintjes, & Lopes, 2020).

The achievement of Affordable Universal Health Care is key to strengthening the resilience of health systems (OECD, 2020, April). It would help to address the structural inequalities that COVID-19 brought to light and rectify inequitable access to preventative care, such as those needed during the pandemic to address comorbidities from the combined emergencies of both a health crisis and natural disasters, as well as acute care to ensure rapid treatment during emergencies (Phillips, Caldas, Cleetus, & al., 2020).

The United Nations advocates for universal health care coverage, which means everyone should have access to the full spectrum of services, including health promotion, prevention, and treatment. It urges governments to expand their investments in “common goods for health” to prevent future health crises. These common goods include the core functions of health systems that are essential to protecting and promoting health and well-being. “In human-rights terms, this means committing the maximum available resources towards meeting the minimum core obligations under the right to health” (UN, 2020, October).

A healthy environment is essential for supporting human health. It is crucial to protect ecosystems that provide services such as clean air, ample and healthy water, and productive soils. As the pandemic exploded in May 2020, 40 million health professionals wrote to G20 leaders, urging them to invest in health, clean air and water, and to include climate strategies in stimulus packages for recovering from the Covid-19 pandemic (Salas, Shultz, & Solomon, 2020). They understand the link between human health and the environment. Reducing GHG emissions and other air pollutants protects human health from diseases such as COVID-19 that affect the respiratory system and people with compromised health (UNDRR Arab Region, 2020, 27 July).
Include Cities in Decision Making at the Highest Levels of Governance

Climate-resilient cities fare better than others in the face of multi-hazards like weather disasters and emerging diseases. Service provision is more efficient and inclusive, supply-chains are shorter and more flexible, and sources are more sustainable. As they recover and rebuild after COVID-19, cities would do well to implement a range of strategies to ensure that short-term needs do not preclude using the opportunity to achieve long-term sustainability goals, including building disaster resilience using the lessons learned during the pandemic (Pinner, Rogers, & Samandari, 2020); (UNDRR, 2020, 29 May); (WEF, 2020, May). The World Bank has proposed a "Sustainability Checklist" that aims to help city planners and policymakers assess or rank stimulus proposals so they align with the build back better approach (World Bank, 2020, April).

Innovative planning now that focuses on increasing self-sufficiency and cooperation between different levels of government and economic and social sectors ensures that cities of the future will be safer, sustainable, and resilient in the faces of future pandemics and other crises (UNDRR Arab Region, 2020, 27 July).

The strategies to create greener, safer, more resilient and resource efficient cities are well known. The Global Parliament of Mayors (GPM) collaborates to share knowledge and implement them. The GPM is a governance body of, by and for mayors from all continents. It has a vision in which "mayors, their cities and networks are equal partners in building global governance for an inclusive and sustainable world" and where "Mayors take leadership and ownership of the global challenges that they face on a local level" (GPM, 2021).

Mayors and other city leaders are in a position to identify and share lessons and best practices learned at local levels during the pandemic since they are on the ground during crises. The governance of disaster and health crises needs strong civil society and municipal involvement since these levels of government are often responsible for the delivery of critical aspects of health care, education, land-use planning, and waste management, among other services (UNDRR Arab Region, pending release).

In March 2020 the GPM set up the C40 Global Mayors COVID-19 Recovery Taskforce to guide recovery, prepare for future pandemics, address systemic injustices, and reduce global warming (GPM, 2020). This is an example of how Mayors have been at the forefront of addressing global challenges.

To implement sustainability solutions faster and better in the post-COVID era, it is crucial that the role of municipalities is included or elevated in international and other multilateral discussions and cooperative recovery efforts (GPM, 2021); (Potočnik & Teixeira, 2020). Their place at the table will not only inform global policy decisions but support them in improving public health and disaster preparedness in their jurisdictions (GPM, 2020). However, national, multilateral, and international level decision making processes have not included cities. The COVID-19 pandemic has revealed this weakness. The build back better agenda, with its focus on resilience, circularity, and the green economy, needs the full participation of cities and their citizens (GPM, 2020).

In keeping with the goal of adopting a whole-of-government approach, cities should be partners in governance at the international level, within the UN, for example; at the continental or regional level, they should have place in multilateral cooperation with stronger institutions to bring city networks together; and nationally, they need to be included as more than the voices of mayors on behalf of local authorities, but rather as a means to "empowering citizens by moving towards a participatory democracy where there is transparency and room for opening up policies to citizens" (GPM, 2020). The GPM notes that cities are still seen as stakeholders, not a level of governance. They call for mayors to demand change through the actions outlined in Box 13.
Integrate Business Resilience into Recovery Plans

The recovery period is an opportunity to attract financing in climate-sensitive and green solutions and to scale-up the adoption of new digital and green solutions. The pandemic revealed the advantages of diversifying and localizing markets and using more resilient supply lines.

In light of its enormous impact on Micro, Small, and Medium Enterprises (MSMEs), public-private programs and collaboration with civil society, non-governmental organizations, unions, and development agencies need strengthening to ensure economic stimulus programs reach MSMEs and the informal sector. Microentrepreneurs in the informal sector would benefit from access to a one-stop-shop dedicated to helping them integrate their businesses into the formal economy. It could provide them with simple procedures to secure financing and social protection within the framework of existing laws (UNDRR, 2020, 14 May). Efforts should be made now to provide training to managers about how to continue operations during pandemics and other crises (UNDRR, 2020, 14 May).

Scale up ICT Using Lessons Learned

Information and Communications Technologies (ICT) played a major role in contributing to the pandemic response, but the COVID-19 pandemic also showed the results of the ongoing digital divide. In building back better, many experts urge that internet access be considered a basic right (Berners-Lee, 2020). Boosting reforms and investments in digital infrastructure and access to online services is especially necessary in developing countries. It is extremely important for MSMEs; digital technologies will improve trade, help them integrate into global markets, enhance the sharing of knowledge, and strengthen public administration (OECD, 2021).

Policies to close the digital divide have traditionally focused on increasing physical access. The pandemic has underscored the significant need to improve skills and usage using a global policy perspective (van Dijk, 2020a). Box 14 identifies the five perspectives of digitalization policy.

Box 13: The Parliament of Mayors (GPM) calls for these actions to improve governance

- Appealing for one framework to monitor urban development. Today’s global governance arena is scattered with a vast array of frameworks. Many frameworks are a contradiction in itself.
- Calling for formalised co-decision by local authorities. The UN is a political institution founded by nation states for nation states. If we want to change structures, member states must share and delegate power with cities.
- Collaborating with international networks as a means to have our voices heard and achieve goals.
- Strategically select tools to empower the city and its citizens.
- Co-create to generate comparable diagnosis across the board.
- Share knowledge.
- It is crucial that all cities work with one framework that can also be boiled down to the neighbourhood level.
- Coordination, both horizontally and vertically, between departments. City mayors are able to take the lead to coordinate between the different actors, levels of government, and organisations that are responsible for municipal services.
- Participation of communities to ensure that no pockets of populations are being left out and all voices are heard.

Source: (GPM, 2020)
### Box 14: Five policy perspectives on closing the digital divide

<table>
<thead>
<tr>
<th>Perspective</th>
<th>Goal</th>
<th>Primary indices</th>
<th>Focus in phase of appropriation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technological</td>
<td>Creation and distribution of digital technology</td>
<td>Availability</td>
<td>Physical access</td>
</tr>
<tr>
<td>Economic</td>
<td>Support markets, competition and innovation</td>
<td>Affordability</td>
<td>Physical access, Usage: Collective</td>
</tr>
<tr>
<td>Educational</td>
<td>Formal and adult education of ICT’s</td>
<td>Readiness</td>
<td>Digital skills</td>
</tr>
<tr>
<td>Social</td>
<td>Inclusion and participation of all</td>
<td>Affordability, readiness, relevance</td>
<td>Usage: Collective</td>
</tr>
<tr>
<td>Persuasive</td>
<td>Awareness</td>
<td>Relevance</td>
<td>Motivation / attitude</td>
</tr>
</tbody>
</table>

*Source: (van Dijk, 2020a)*

Many other lessons were learned about the significant role digitization played during the pandemic and the efforts needed to build back better in advance of future crises, as highlighted in Box 15.
Box 15: Lessons learned from the pandemic to close the digital divide

- Explore opportunities for strategic government procurement
- Collect and use disaggregated data to strengthen targeted and intersectional approaches
- Use Big Data to track risk trends
- Employ digital identity and access systems, risk analytics, and geospatial data
- Improve support for teleworking
- Invest in scale-appropriate climate-smart technologies
- Speed up the development of online educational programming
- Invest in long-term digital/social programs for disadvantaged groups in their own communities
- Provide cheaper, affordable, digital technology
- Design technology that is easier to use
- Develop better government and other public regulation for the Internet, especially Internet platforms improving trust (such as data privacy and protection and competition rules)

Sources: (ESCAP, 2019); (Ghany & Pierre, 2020, 25 May); (Mishra, 2020); (Nurse & Charley, 2020, 25 May); (Saliola & Islam, 2020); (UN, 2020, July b); (UNDRR Africa, 2020, 5 May); (UNDRR, 2020, 9 April); (UNDRR, 2020, 16 July); (van Dijk, The Digital Divide and the Covid-19 Pandemic, 2020b)
The pandemic has revealed that countries with developed Information Communication Technology (ICT), strong central governments, and local decision-making performed well in disseminating pandemic-related messages to the public and at-risk populations.

Learning from these examples, national governments should develop public-private partnerships to leverage ICT to its full potential, Korea is a good example of how digital technology and decentralized decision-making allowed for an efficient response and successful control of COVID-19’s spread (Box 16).

**Box 16: Korea’s use of ICT to slow COVID-19 spread**

South Korea’s government-led, all-of-society approach to halt the spread of COVID-19 is a global example. Extensive and effective use of Information Communication Technology (ICT) was a key aspect of the strategy which also drew upon public-private sector partnerships. South Korea used its pre-existing cellular broadcasting service (CBS) – built to transmit emergency text alerts for all disasters – to communicate on COVID-19. To increase efficiency and agility of message dissemination, the central government has decentralized decision making to the local level. Cities and metropolitan authorities have been equipped with the required systems to issue their own public alerts. This improved the speed of message delivery by eliminating intermediary steps in the communication chain. Many of these ICT applications were possible thanks to the use of ‘big data.’ A massive exercise in data collection, management and processing has informed an array of effective policy responses including early detection of patients, the isolation of close contacts of a patient, and coordinated distribution of face masks” (UNDRR, 2020, 25 May).
Humankind is in the middle of an historic crisis. The COVID-19 pandemic’s devastating cascading impacts on the economy, jobs, health, and welfare, is having the most harmful effects on people already suffering from poverty, displacement, civil unrest, inequality—all those whose basic human rights are not being adequately met. The same is true of climate change impacts. And the risks of both are on the rise. It is imperative that we act on the lessons learned from COVID-19 so we are better prepared for a future in which climate change and pandemics are permanent features.

One of the lessons is the need for better globally coordinated collective, multi-level governance that represents the whole of society and is guided by universal values. The economic and social impacts of the pandemic risk to significantly set back progress towards the attainment of many of the Sustainable Development Goals. These goals underpin the solutions to this and future crises—leave no-one behind, build back better, nature-based solutions.

The international community needs to step up these efforts. Strengthening disaster risk reduction means both better integrating the risk of emerging infectious disease into risk governance and integrating hazard preparedness into health agendas. It means pairing early warning systems and social protection programs—strengthening our ability to predict the potential for systemic risks in complex systems while at the same time developing resilient social and economic structures that are able to respond and rapidly adapt to sudden massive upheavals. Thus, response, recovery, and development need to be addressed simultaneously and holistically.

The recovery and rebuilding phases of the COVID-19 pandemic need massive investments and incentives to rebuild better and are opportunities to make economic and social systems and communities more resilient in a future that is ever more uncertain.


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Annex 1: UNDRR Consultation Sources

The following lists the main UNDRR resources that informed this report that emerged from webinars conducted in the UNDRR regions relating to COVID-19 and from recommendations made during interviews with the author.

Asia and the Pacific

As revealed in the first part of this report, the human-animal-environment interface plays a defining role in the emergence of EIDs. It is essential to understand these links and to strengthen the protection and regeneration of natural systems as an integral part of disaster risk reduction.

- “Leave No One Behind” in COVID-19 Prevention, Response and Recovery (UNDRR, 2020, 9 April)
- Reducing the Vulnerability of Migrants and Displaced Populations (UNDRR, 2020, 20 April)
- Combating the dual challenges of climate-related disasters and COVID-19 (UNDRR, 2020, 27 April)
- Business Resilience in the Face of COVID-19 (UNDRR, 2020, 14 May)
- Risk communication and countering the ‘Infodemic’ (UNDRR, 2020, 25 May)
- Opportunities for Resilient Recovery (UNDRR, 2020, 29 May)
- The Human Rights Dimensions of the COVID-19 Pandemic (UNDRR, 2020, 19 June)
- Disaster-Responsive Social Protection (UNDRR, 2020, 16 July)
- Review of COVID 19 Disaster Risk Governance in Asia Pacific: Towards Multi Hazard and Multi Sectoral Disaster Risk Reduction (UNDRR Asia Pacific, 2020)
- The Social and Economic Impact of Covid-19 in the Asia-Pacific Region (UNDRR Asia Pacific, 2020, April)
- Issue brief, report complex road to recovery: COVID-19, Cyclone Amphan, monsoon flooding collide in Bangladesh and India (Reliefweb, 2021b).

Latin America and the Caribbean

- Private sector’ roles, responsibilities and opportunities in the context of Systemic Risk (Ghany & Pierre, 2020, 25 May)
- Public policy and innovation governance in addressing climate-related disasters in times of COVID-19 (Nurse & Charlery, 2020, 25 May)
- The Americas and the Caribbean in the era of systemic risk (Salazar, 2020, 9 June)
- Understanding the complexity of risk: the post COVID-19 challenge invalid source specified.
- How to articulate integrated responses to the health, economic and climate crisis in LAC invalid source specified.
- Hurricane season / COVID-19 invalid source specified.
- Joined-up regional strategy key to cutting pandemic risk, say experts invalid source specified.

The Arab Region

- The Fifth Arab Partnership Meeting for Disaster Risk Reduction (DRR), 2-9 November 2020 (UNDRR Arab Region, 2020)
- Arab States and COVID-19: Lessons Learned in Preparing for & Responding to COVID-19, Virtual Meeting, 17 May 2020, Cairo (UNDRR Arab Region, 2020, 17 May)
- Pandemics in the Arab Region: COVID19 Analysis and Prospects: A Policy Briefing (UNDRR Arab Region, pending release)
Africa

- Addressing Disaster Risk Reduction of multiple hazards during the COVID-19 crisis: Issue Brief (UNDRR Africa, 2020, 5 May)
- Policy Brief: Impact of COVID-19 in Africa (UN, 2020, May (a)).
- Summary of Discussions and Action Points, Meeting 22 October 2020 (UNDRR Africa, 2020, October)
- Africa COVID-19 BRIEF: Virtual Dialogue between national and regional Disaster Risk Reduction Focal Points. (UNDRR Africa, 2020, April)
- African Working Group on Disaster Risk Reduction: Summary of discussions and Action Points (UNDRR Africa, 2020, July)
Annex 2: Recommended Actions From UNDRR Regions

These recommendations are drawn directly from the webinar reports and interviews with the author.

Asia and the Pacific

Leave No-one Behind

- Identify and mitigate unintended economic and health consequences of the COVID-19 response.
- Ensure social distancing does not lead to social exclusion.
- Proactively address increased stigma, discrimination and risk of violence, in particular, sexual and gender-based violence.
- Prioritize a rights-based approach to COVID-19.
- Include vulnerable groups in COVID-19 decision-making and management.
- Ensure targeted messaging reaches all vulnerable groups.
- Collect and use disaggregated data to strengthen targeted and intersectional approaches.
- Scale-up social protection for the most vulnerable.
- Target economic stimulus and recovery programmes for vulnerable groups.
- Leverage networks and provide support for mental health impacts.

Business Resilience

- Develop business continuity and recovery plans for pandemics.
- Protect employee health and livelihoods.
- Ensure economic stimulus and recovery programs reach MSMEs.
- Adapt business operations to a “new normal” and invest in new digital and green solutions.
- Strengthen public-private partnerships.
- Encourage business-to-business cooperation.
- Promote the formalization of the informal economy.

Human rights

- Ensure full transparency, accountability and proportionality of the government emergency measures.
- Strengthen democratic governance to address racism, xenophobia and hate speech.
- Implement inclusive responses and protect the rights of migrants, asylum-seekers and refugees.
- Consider alternatives to detention for those who are incarcerated and pursue justice and prison system reforms.

Resilient Recovery

- Use experience of COVID-19 as an opportunity to build back better.
- Develop risk analysis on social vulnerabilities.
- Adopt a phased approach to recovery appropriate to the context.
- Invest in governance and institutional coordination.
- Strengthen and expand disaster-responsive and adaptive social protection.
- Streamline data and information systems.
- Be innovative in financing mechanisms.
- Fuel resilient infrastructure investments.
- Promote sustainable consumption and nature-based solutions.
- Ensure mental wellness and psycho-social care.
- Promote and strengthen regional integration and solidarity.
• Capitalize on the UN plans for social and economic recovery. Implement inclusive responses and protect the rights of migrants, asylum-seekers and refugees.

**Migrants and Displaced Populations**

- Ensure national COVID-19 response and recovery strategies integrate displaced populations and migrants.
- Rapidly scale-up prevention measures in refugee and IDPs camps, informal settlements and host communities.
- Ensure economic assistance and social protection target migrants and displaced populations.
- Proactively communicate with migrants and displaced populations and address increased stigma and discrimination.
- Strengthen availability and accessibility of health care systems for migrants and displaced populations.
- Maintain the humanitarian supply chain and ongoing assistance for countries with refugees and IDPs.
- Support CSO and community interventions to reach migrants and undocumented populations.
- Harness the capacities of returning migrants, and displaced populations to support communities throughout the COVID-19 response.

**Risk Communication**

- Tailor the message for the audience.
- Tailor the medium to ensure no one is left behind and the ‘last mile’ is reached.
- Actively counter misinformation.
- Currency of Trust: build your networks before the crisis.
- Leverage Information Communication Technology to its full potential.
- Develop a communication strategy around COVID-19 recovery and exit plans.

**Social Protection**

- Invest in social protection before a disaster.
- Promote universal social protection.
- Integrate universal health coverage and social protection.
- Adopt a human rights-based approach to social protection.
- Strengthen digitization to enhance inclusion.
- Adopt intersectional approaches to reduce vulnerabilities and reduce exclusions.
- Adopt flexible assistance delivery modalities.

**Dual Challenge of Climate-related Disasters and COVID-19**

- Strengthen awareness of systemic risk.
- Learn from the pandemic and apply lessons to climate change.
- Enhance multi-hazard disaster preparedness efforts.
- Strengthen overall health system preparedness.
- Proactively reduce the vulnerability from other hazards.
- Plan specifically to protect older people, and other vulnerable groups.
- Prioritise integrated disaster risk management.
- Develop multi-scenario models.
- Protect first responders and frontline workers.
- Support local action to prevent, prepare for and respond to disasters.
- Use remote assessments and community feedback to determine humanitarian needs.

**Latin America and the Caribbean**

**Addressing climate related disasters in times of COVID-19**

- Promote a better understanding of the multidimensional nature of risk from a systemic perspective and integrate this approach in social and economic recovery strategies.
• National and local DRR strategies and plans should acknowledge the increasing complexity and interdependence of human, political, economic and natural systems.
• Engage key stakeholders, including the private sector and the science and technology community, to take part in the design, planning and implementation of recovery efforts, promoting an interdisciplinary, multi-dimensional and multisectoral approach.
• Ensure policy decisions are based on evidence. Information systems and technology can support the generation of data to strengthen planning, preparedness as well as to inform decisions related to basic infrastructure and healthcare services.
• Promote the coherence and articulation of risk reduction, climate and development agendas. Development can only be sustainable if it addresses risks. Put risk reduction and resilience-building at the heart of economic and social recovery, in order to address inequalities and vulnerabilities.
• Use the opportunity of COVID-19 to prioritize resilience-building and build back better and greener in the region. Such efforts can include the adoption of renewable greener energies and increased investment in climate smart technologies that are scale appropriate.
• Finally, strengthen international cooperation to transform learned lessons into effective mechanisms of regional collaboration in the face of systemic risks. Develop multi-scenario models.

Private Sector Role
• Companies to work with Government to resume growth
• Need to be innovative and try new business models
• Need to evaluate risks: vulnerability assessments need to be done for systemic risks
• Make decisions based on longer-term resiliency: e.g. infrastructure services, healthcare systems
• Work on integrating trade in Western Hemisphere
• Shorter more diversified suppliers: considering nontraditional collaborations with partners up and down the supply chain.
• How can resilient businesses support each other
• Teleworking and greater reliance on digital channels
• Digital transformation
• Need to integrate renewable sources of energy.

Africa

Addressing climate related disasters in times of COVID-19

• Use risk as an opportunity for transformative action.
• Strengthen risk understanding and knowledge.
• Strengthen coherence between disasters and health risk management approaches.
• Understand the inter-linkages between disasters and how responding to one disaster may exacerbate the impact of another.
• Harness the role of the youth/young people and innovative solutions.
• Psychosocial support must be prioritized as some communities face the ‘triple whammy’ of multiple disaster impacts.
• Health pandemics must be mainstreamed in disaster preparedness/contingency planning (this is often neglected).
• Support local organizations at frontline of response but with limited financial resources.
• Enhance sub-regional, national and sub-national coordination mechanisms.
• COVID-19 presents an opportunity to strengthen collaboration across different sectors, structures to strengthen ‘integrated’ actions.
• Long-term solutions that are climate smart are critical and must remain a priority as climate change impacts combine with COVID-19 to affect the most poor and most vulnerable.
• Stimulus packages for COVID-19 response provide an opportunity for initiating a transformational and green recovery with the creation of green jobs.
• Build back better health care so all services can continue during a pandemic.
• Support improved remote learning.
• Protect women from further harassment and sexual exploitation.
• Strengthen access to health care and family planning during emergencies to prevent a rise in teenage pregnancies.
• Ensure continued health care for malaria and other illnesses that went unaddressed during the pandemic.
• Prevent limits on people’s freedoms during emergencies from creating opportunities for the use of excess force and authority.
• Ensure armed militia are not able to take advantage of the situation and fuel conflict.

The Arab Region

Addressing climate related disasters in times of COVID-19

• Use COVID-19 pandemic as an opportunity to test/learn from existing DRR strategies and plans to inform future preparedness and response activities.
• Highlight the importance of implementing DRR strategies and actions plans.
• Need a systemic risk approach and whole of government, all-of-society integrated approach.
• Activate multi-sectoral, multi-stakeholder DRR coordination mechanisms (including DRR national Platforms) to support preparedness, mitigation, response and recovery.
• Successful implementation of disaster risk management measures requires coherence and coordination between national and local governments.
• Integrate biological hazards in risk reduction.
• Collect and input disaggregated data on disaster loss databases to support evidence based decision-making.
• Ensure the continuity of critical functions and basic services during disaster (e.g., water and sanitation; energy; food; telecommunications; law & order; education; and transportation).
• Move towards self-sufficiency especially when it comes to food security and decrease dependency on imports.
• Establish a funding mechanism to support implementation of the Sendai Framework in developing countries.
• Need for mitigation and resilience building in countries in conflict.
• Displaced people are very vulnerable and their needs need to be addressed in risk reduction plans.