

# COVID-19: The Ultimate Stress Test for Our Global Futures

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## ***Vulnerability in a globally connected world***

COVID-19 must be seen as the largest shock that has hit global society since World War II, with this globally spreading disease resulting in an accelerating loss of lives and societal and economic disruptions of staggering proportions. This global pandemic brings into stark relief the increasingly complex, interconnected and vulnerable systems that define the modern world.

One certainty in this uncertain world is the increasing extremes of many types.

Despite this reality, the world's population was patently unprepared for COVID-19. In principle, we knew from previous events such as the SARS and MERS outbreaks, the Ebola virus occurrences, or — a century ago — the 1918 Pandemic (H1N1 virus), that it was only a matter of time before we would be hit by another, possibly more devastating epidemic. Although the exact time and location of these events remain unpredictable, science had suggested how to prepare for such a shock. Reality laid bare our vulnerability across all sectors, scales and boundaries.

COVID-19 hit global society like an earthquake, and it is an event we can expect to happen again, but cannot predict when. This places extreme hardship on most people on our planet because there is little time to respond, and because of the potential for significant loss of human life. A great many authors have addressed various aspects of this crisis, especially the epidemiological dynamics, projections of spreading rates and patterns and the effects of mitigation and suppression scenarios. Here, we focus on the connection of this current crisis to another that is steadily building, although at a much slower pace and on longer time scales: How will a globally interconnected society design, shape and manage its future, in light of all the challenges related to human-induced perturbations of the Earth system?

Possible trajectories of global futures will depend crucially on how the globally interconnected Earth system, including the human domain, can withstand and respond to: (a) known and ongoing changes that frequently occur on long time scales, and (b) shocks that can be anticipated in principle, but whose timing and impacts cannot be predicted. An example of the former are already unfolding changes in the climate system and their consequences, including migration, biodiversity loss, sea-level rise, etc. COVID-19 falls into the latter category. This raises the fundamental question: What do we know about the basic dynamics of the globally interconnected Earth system and its resilience to shocks?



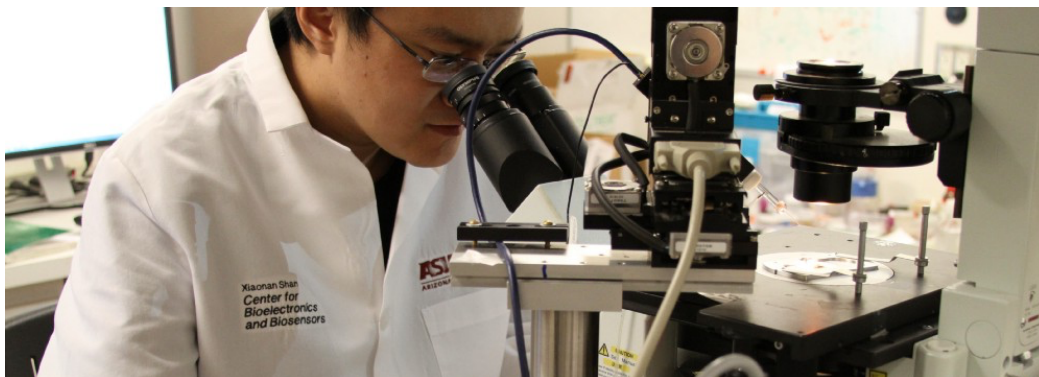
## ***The ultimate stress test***

If one was asked to design a stress test to evaluate the current capacity of the Earth system to respond to shocks, the current pandemic could be viewed as the ultimate design. In the aftermath of the financial crisis in 2008, central banks developed a series of stress tests to gather data about individual banks' preparedness in the face of certain types of shocks. The banks that failed to meet certain criteria were asked to comply with new rules, recognizing that any weak bank could endanger the whole system. The stress test was also intended to rank banks based on their endurance to repeated perturbations, and their ability to increase people's confidence that they could reliably fulfill their central function. Although such stress tests are not perfect, they offer valuable information on the state of a system, and can guide the enhancement of its resilience to perturbations and/or shocks.

A virus, such as the one that spawned the COVID-19 pandemic, hits at the heart of all human interactions including social contact and behavior. And a new virus, with no known treatments or vaccines plus the additional challenge of a very long incubation time, means that the traditional functions of health care systems — designed and optimized for treating illness and making vaccinations available to the population for prevention — do not work. This situation then tests if other societal structures and actions can substitute for the absence of the primary measures that should have buffered the impact of a particular shock, such as COVID-19.

Without an effective treatment and with no vaccine, our health systems find themselves in a position characteristic of earlier centuries. All they can do is to care for the sick (albeit with modern technology, now short in supply) and isolate the rest of the population. This so-called social distancing (a better expression would be “physical distancing” as we should use all measures available and innovate new ones to keep people socially and emotionally connected) is the modern equivalent of closed medieval city walls.

But the stress on and potential local collapse of our health systems is only the tip of the iceberg. Shutdown of all but essential business is already causing mass unemployment. Projections are that the economy could shrink by 20, 25, 30 percent, or even more. The size of the needed financial rescue packages grows by the day and will soon surpass the annual budget of states or even their annual GDP. What this does to the long-term health of the financial system is anybody’s guess. Some supply chains are disrupted as others approach disarray, anxiety levels are skyrocketing, there is a real danger of elevated levels of domestic violence and child abuse, and it may be only a matter of time until social unrest challenges the power structures struggling to contain the pandemic. These impacts of the pandemic, which are rapidly affecting the functioning of virtually all parts of the Earth system, raise the central question: Why are our societies not better prepared to respond to such shocks?



### ***Human preparedness and response to shocks***

Although viruses do not discriminate based on whether you are rich or poor, people who have greater access to financial resources and/or are part of societies with a developed social safety net are better equipped to respond to disruptions such as COVID-19. As schools are closed around the world, many families depend on the income of low-wage laborers whose jobs require them to show up. As a double impact of sorts, those jobs put them at the greatest risk of contracting a virus; not only do their jobs lack a work-from-home option, they require human contact. These families are the least likely to afford alternative childcare options or medical care to allow them to tend to a sick family member. In the US, paid sick leave is available very unevenly, with high numbers of uninsured or under-insured people. Even among those who have health insurance, many have prohibitively high deductibles (unlikely to have been met so early in the year), which will influence decisions to seek testing or treatment.

In periods of crisis it is common to ask how much of it was predictable, both in terms of the origin of the crisis and its consequences. In what way was COVID-19 predictable and to which extent did we know in principle that such a crisis would happen? Many have warned about the rapid increase of diseases that spread between animals and people (zoonotic). Going back to the late 19th century, German pathologist Rudolf Virchow noticed the link between human and animal pathogens and argued that their health cannot be separated. As the number of known zoonotic diseases increased, the concept of "One Health," describing a paradigm integrating human, animal and ecosystem health, took hold internationally. The direction of the risk was clear.

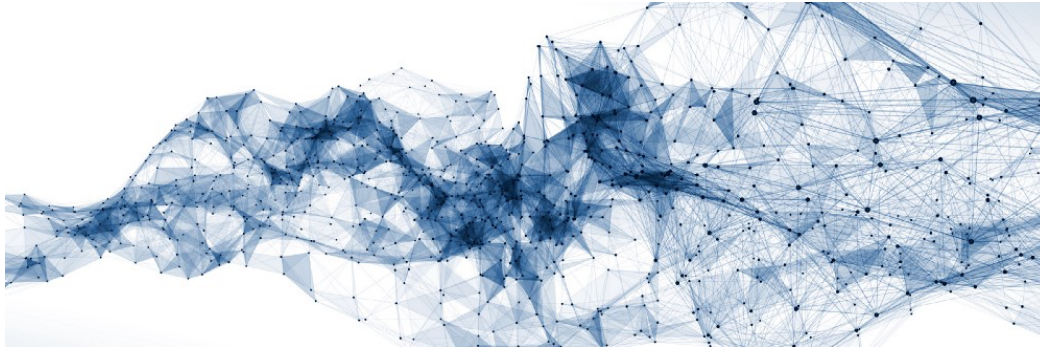
[Historically](#), epidemics have caused widespread change across social, economic, political and cultural spheres. In *Plagues, Priests, and Demons: Sacred Narratives and the Rise of Christianity in the Old World and the New*, Dan Reff showed that infectious diseases contributed to the acceptance of Christianity among populations in the late Roman Empire and, centuries later,

in colonial America. More broadly, the epidemics across the Americas that were brought on by European settlers bolstered the colonizers' conquest of land and peoples. The Black Death of the 14th century killed between 75 to 200 million people across Europe and Asia, including approximately 30 to 60 percent of Europe's population. It had traveled along the Silk Road, thus highlighting the early modern connection between economic and social networks. The loss of life destabilized feudalism, saw wages rising in response to labor shortages and led to reforestation as a result of vacant land, among other effects.

More recently, previous outbreaks of coronavirus-type epidemics, such as SARS and MERS, demonstrated the capacity of these types of viruses to spread and revealed their damaging potential. The yearly waves of influenza with its host ecosystem of poultry, pigs and humans also shows how virus mutation, recombination, coinfection and transmission work. We have enough well-understood models of the dynamics of pandemics to grasp how quickly they can spread and how this will affect global dynamics across many sectors. Similarly, the consequences for global supply chains and the financial systems have repeatedly been modeled. A whole literature on global systemic risk has been warning of how easy it is for these systems to collapse.

So, in light of clear evidence that something with such dramatic and painful consequences would happen, why does humankind once again find itself unprepared, ignoring necessary actions to mitigate known problems and bolster response systems? Though our economies, societies and response systems were caught off-guard by this novel coronavirus, we must resist viewing it as a "Black Swan" event, referring to an event that at any given time has such a low probability that it almost seemed unimaginable (despite how some national leaders present it). Instead, insofar as ample knowledge has not translated into appropriate action, this current global pandemic resembles climate change. But, unlike the consequences of climate change that will play

out most dramatically in a few decades, the systemic shocks we are experiencing still offer the chance to rebuild and redesign the system. The question is: Can we get it right? Can we design systems with the necessary adaptive capacity that decreases the likelihood of pandemics and allow us to react more swiftly and effectively in cases of unpredictable outbreaks?



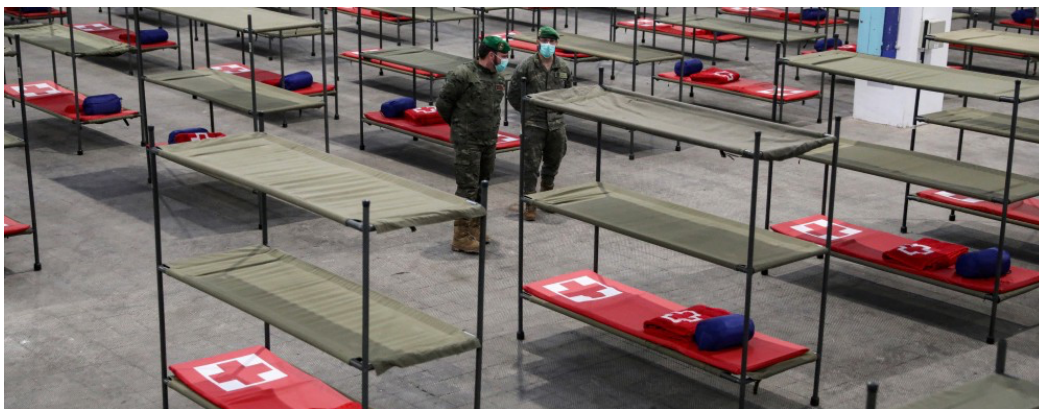
### ***Underlying complexity***

Understanding if societies are prepared for shocks such as the one COVID-19 presents — first in the form of a health crisis, then quickly transcending to disrupting global economic, social, environmental and political systems — requires knowledge of the system-level properties that govern these interconnected systems. What matters most are the varied consequences of positive and negative feedback relations in complex systems. Negative feedback exerts regulatory control by keeping systems within certain bounds, while positive feedback allows systems to grow and exploit opportunities (for instance in so-called innovation dynamics). But negative feedback can also lead to stagnation and intransigence while positive feedback can initiate uncontrolled, runaway effects. Both are clearly important in all complex systems, and those systems that find the right balance are the ones that will thrive.

Over the last centuries, most globally interconnected systems have emphasized positive feedback mechanisms by prioritizing innovation cascades. This has led to the ever-accelerating dynamics of globalization and

the Anthropocene, and, as a consequence, resulted in large numbers of unintended consequences. As certain societies and leaders came to value these advances, they began to reduce what were considered to be impediments. Many of these nations removed or weakened the negative feedback loops and regulatory functions that kept the dynamics of global society in balance. This created the current deregulated system of our globalized economy and supply chains, fueled by a huge and even more deregulated financial system. The financial crisis of 2008 was the first resulting shock to this system; it could still be handled, for better or worse, within the current system. But, then came COVID-19.

The response to this pandemic, as it currently unfolds, is an attempt to set up regulatory controls and negative feedback mechanisms at different scales. Mostly, this means setting up boundaries such as isolation and quarantine measures at local, regional and national levels in the hope that people follow the regulations. But this inevitably leads to huge disruptions within the interconnected system. We are now confronting significant trade offs and consequences for national and global economies and public health, as well as individual and social well-being. These actions also expose the lack of adequate institutions at the systems level — that is, global organizations to address the need for global governance to the global crisis.



### ***What does the COVID-19 stress test show so far?***



If we treat this pandemic as a stress test and observe and rank current responses, we see mostly failure. Failure at the highest levels to prepare for such an outbreak, despite the available scientific models and lessons from history. Failure to rethink human relationships to wild and domesticated animals. Failure in the nature, timing and scale of the response. Failure to anticipate, and therefore prepare, for the vast array of consequences that such a disruption causes across the tightly interconnected elements of the Earth system. And finally, failure to prepare long-term scenarios that could mitigate the most harmful consequences of immediate actions. Of course, this is not to discount the heroism of those at the front lines of this crisis, including healthcare workers and other first responders.

Now that governments are responding with drastic measures to slow the rate of rise of new cases in order to give overwhelmed health care systems a fighting chance, the ripple effects throughout all aspects of social and economic life are growing exponentially. This in turn leads to a whole range of mainly ad-hoc and uncoordinated responses to contain the consequences for all aspects of life. Among them: rising unemployment, decrease in demand and dramatic drops in economic activities, lack of childcare and missing school meals, existential threats to key industries such as airlines, not to speak of the effects of increasing social isolation. A scenario where these measures would have to be in place for more than a year — the most optimistic estimate for the availability of a vaccine — seem unimaginable. This may play out more severely in places with weak healthcare systems, such as those found in less developed countries. With no global governance and a delayed and ineffectual response in several important nations, we are still stuck without plans for an exit strategy.



## ***Opportunities for optimal future responses***

In order to be effective, the suppression and mitigation measures will have to be highly coordinated across the whole spectrum from the local to the global scale. This includes fully transparent information flows and data sharing, the strategic deployments of resources, planned coordinated interventions to support economic activities and — these are certainly the most controversial decisions — triage at all scales. The whole set of responses will have to be guided by strong institutions at all scales devoted to shared values and guided by common principles. The fact that different nations have radically different political and economic systems — that the world has become more polarized and that inequality has dramatically increased — makes coordination all the more difficult, but also more necessary.

Viruses are transboundary problems, and are thus an expression of our global interconnectivity. This could be an opportunity to overcome anachronistic nationalistic behavior in favor of global solidarity, inviting transparency and a shared sense of humanity. If at another time this call would have seemed naive or fantastical, the current pandemic should reveal how profoundly realistic and necessary it is. As a species, we have chosen economic globalization again and again in varying forms for thousands of years, from the days of the Silk Road and colonial trading networks to today's teleconnected planet. Presently, our system of global interactions is designed primarily to reap the benefits of

global trade but retreats into a nationalistic frame in times of crisis. Perhaps we are at a crossroads that highlights that economic benefits cannot be separated from social responsibilities.

Crises can lead to new alliances and structures. The United Nations is, in principle, the global body that is most apt to provide this more holistic framework. Due to its current lack of capacity, an alternative governance structure to coordinate rapid action across boundaries would be a powerful step in mitigating the impact of a future epidemic or other such crisis. If COVID-19 turns out to be the kind of sustained threat to all societies as it currently seems to be, then there will be no alternative to overcoming the patchwork of uncoordinated responses, and to developing and strengthening those institutions needed to deal with such a crisis. This would then be a lesson learned and valuable outcome from this unprecedented stress test.

Looking forward to the challenges ahead after COVID-19, we also need to be aware of an important sentiment expressed by a member of the Fridays for Future movement, paraphrased in the following: COVID-19 is a major threat to the status quo. Even the initial responses suggest that all societies may be willing to respond in ways that have not been seen outside of wartime. But what about the coming threats to global futures for all of humanity? Are we willing to confront these with the same sense of urgency, even though the main consequences will be in the future and might not directly affect the majority of those currently making decisions? The answer from the global community — indeed, from each of us — will determine whether we only address immediate impacts or recognize the present crisis is an opportunity to design long-term strategies that ensure the healthy, interconnected survival of the human species and our planet.