

## COVID-19, Beyond the Virus: An Outlook to the Anatomy of a Syndemic Pan-Disaster

### *COVID-19, más allá del virus: una aproximación a la anatomía de un pandesastre sindémico*

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**Abstract.** The World Health Organization declared the COVID-19 outbreak as a global pandemic on March 11, 2020. Beyond the medical and scientific challenges to understand the SARS-CoV-2 virus as the cause of this disease and develop a vaccine to mitigate the effects of its spread, the ensuing crisis makes it urgent to reflect on the meaning of this pandemic as a consequence of human intervention on the planet. This article outlines a reference framework for understanding both the social construction of disaster risk and the disaster triggered by COVID-19, viewing the latter as a socio-biological hazard. The importance of addressing this issue from an integrated transdisciplinary perspective is highlighted in order to supplement the epidemiological approach documented by specialists on the subject.

The current disaster triggered by COVID-19 does not leave behind apparent debris, rubble, and damage, contrasting with other disasters triggered by natural or socio-natural hazards (for instance, earthquakes or floods). However, its global consequences lead us to characterize it as a syndemic pan-disaster, that is, a multiscale disaster with global impact in a syndemic context. This involves an extreme disruption of the functioning of society with adverse social, economic, cultural, political, and institutional consequences caused by multiple public health issues exacerbated by the particular susceptibility of people to the virus, exposure to individual and collective contagion, and preexisting vulnerability conditions in society. To conclude, some final considerations are put forward aimed at framing transformation efforts towards integrated disaster risk management in the current risk society.

**Keywords:** COVID-19, root causes, disaster risk drivers, disaster risk, social construction, syndemic pan-disaster.

**Resumen.** El 11 de marzo de 2020, la Organización Mundial de la Salud declaró el brote de la COVID-19 como una pandemia mundial. Más allá de los desafíos médicos y científicos para entender el virus SARS-CoV-2 como causante de dicha enfermedad y, por ende, desarrollar una vacuna para mitigar los efectos de su propagación, la crisis resultante instiga a reflexionar con urgencia acerca del significado de esta pandemia como resultado de los procesos de intervención de los seres humanos en el planeta. En dicho tenor, este artículo tiene como objetivo proporcionar un marco referencial para la comprensión de la construcción social del riesgo de desastre y del desastre desencadenado por la COVID-19, visualizada esta última como una amenaza sociobiológica. Asimismo, de manera complementaria al enfoque epidemiológico documentado por especialistas en el tema, se enfatiza la importancia de abordar esta encrucijada, desde una perspectiva integral transdisciplinaria.

A pesar de que en el caso del desastre actual detonado por la COVID-19 no es posible observar directamente los escombros y los daños característicos de otro tipo de desastres, como aquellos desencadenados por amenazas naturales o socio-naturales (por ejemplo, sismos o inundaciones), las consecuencias a nivel global nos llevan a proponer su tipificación como un pandesastre sindémico. Ésto es, un desastre de orden multiescalar con impacto global en un contexto de sindemia que involucra un estado de disrupción extre-

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ma del funcionamiento de la sociedad con consecuencias adversas de índole social, económica, cultural, política e institucional, generado por la concatenación de problemas de salud de la población exacerbados por condiciones de susceptibilidad particular de las personas al virus, así como de la exposición al contagio individual y colectivo, y las condiciones de vulnerabilidad preexistentes en la sociedad. Para concluir, se hace referencia a una serie de consideraciones

finales orientadas a enmarcar esfuerzos de transformación dirigidos hacia la gestión integral en la actual sociedad del riesgo.

**Palabras clave:** COVID-19, factores subyacentes, factores inductores del riesgo, riesgo de desastre, construcción social, pandeastro sindémico.

## INTRODUCTION

Throughout history, humanity has gone through several episodes linked to disease, outbreaks, epidemics, and pandemics (Figure 1; Table 1), whose influence on the social environment has disrupted the memory of civilization, often leading to economic, social, ideological, political, institutional, and cultural transformations that have had great impact in the short, medium, and long term. The horizon of the world has been repeatedly modified and its architecture — bounded by territory and society — reveals the complexity of these socially induced cycles of order and disorder.

The unrestrained expansion of the population over thousands of years — especially since the development of sedentary agricultural settlements, pastoralism, and domestication of animals — was the initial source of contact between humans

and pathogens from other animal species. The intensification of this relationship in the context of globalization and global change in a planet inhabited by 7.7 billion inhabitants poses complex transformation challenges at various scales that demand coherence between knowledge, awareness, decision-making, and practice. This highlights the need to analyze the various dimensions of the globalization of COVID-19 and its materialization as a disaster from the social construction paradigm.

It is increasingly difficult to ignore the complex socio-environmental relationships involved in the construction of disasters. The global impact of the COVID-19 pandemic made of 2020 a milestone in the awareness of the impact of human interventions on the environment and, thus, the social construction of risk.

Although public health plays a fundamental role in addressing the current crisis derived from



Figure 1. (A) Representation of mortality in the Aztec Empire between 1544 and 1545 in the Codex Telleriano-Remensis, Folio 46 (National Library of France, Paris). (B) Nahua people infected with smallpox, Folio 54, Book XII of the Florentine Codex.

Table 1. Major epidemics that have affected the world population.

Pandemic	Main features
<b><i>The plague of Athens</i></b> (430-429 B.C.)	The plague of Athens might have been measles. It took the lives of some 155,000 inhabitants, or 25% of the population of the city.
<b><i>The Antonine plague</i></b> (165-180)	The Antonine plague was possibly smallpox. It was the first to affect the western world, especially the Roman Empire, lasting over 23 years with sporadic outbreaks and causing between 3.5 and 5 million deaths.
<b><i>The Justinian plague</i></b> (541-542)	The Justinian plague was caused by bubonic plague bacteria transmitted by infected fleas and, presumably, by body lice. It killed between 25 and 100 million people.
<b><i>Japanese smallpox epidemic</i></b> (735-737)	This smallpox epidemic was presumably triggered by a Japanese fisherman who travelled to Korea. Approximately one million people, or one third of the Japanese population, are estimated to have lost their lives.
<b><i>The Black Plague, Bubonic Plague, or Black Death</i></b> (1346-1353)	The global outbreak of bubonic plague started in China in 1334 and is believed to have reached Europe through the "silk road" in 1347, although the greatest impact occurred in 1343-1351. The estimated toll was 150 million deaths, or one-third of the global population.
<b><i>Smallpox epidemic</i></b> (1520)	Associated with the spread of diseases and infections from the Old World, especially by the Spaniards, the smallpox epidemic, called huey zahuatl in the Nahuatl language, claimed the lives of between 12 and 15 million indigenous people of the Aztec Empire. From the Aztec territory, it spread to Guatemala, and then to the Inca Empire possibly in 1525-1526.
<b><i>Russian Flu</i></b> (1889-1890)	The Russian flu was the first influenza-A pandemic. It started in St. Petersburg and spread across Europe, killing some 1 million people. It is believed to have been caused by virus A subtype H2N2 or virus A subtype H3N8.
<b><i>The 1918 flu pandemic or Spanish Flu</i></b> (1918-1920)	The Spanish Flu is considered the first global pandemic that took advantage of modern medicine discoveries. It was caused by the influenza-A H1N1 virus, with the first cases observed in the United States and France. People aged 20 to 40 years were particularly susceptible to this virus. Estimates of its impact indicate a global mortality between 20 and 100 million deaths, and about 500 million people affected, or one-third of the world's population.
<b><i>The Asian flu or influenza A (H2N2)</i></b> (1957-58)	The Asian flu was first reported in Singapore in February 1957 and reached the American continent by the summer. It is believed to have originated from a mixture of strains of avian and human flu viruses. After 10 years of evolution, this Asian flu virus disappeared, but gave rise to a subtype that caused a new pandemic in 1968. The estimated number of deaths related to this disease is between 1 and 4 million people worldwide.
<b><i>The Hong Kong flu, virus H3N2</i></b> (1968)	The Hong Kong flu was caused by strain H3N2 of the influenza-A virus. It first appeared in China in July 1968 and was highly contagious. It reached the Panama Canal zone and the United States over several months, carried by soldiers returning home from the Vietnam war. Estimates indicate between 1 and 4 million lives lost worldwide.
<b><i>AIDS/HIV</i></b> (1981 to date)	Since the human immunodeficiency virus (HIV) first appeared, it has claimed an estimated 32 million lives worldwide.
<b><i>Severe Acute Respiratory Syndrome, SARS</i></b> (2002-2003)	The SARS epidemic was the first new severe, easily spreading disease of the 21st century via international air travel routes. Some 8,422 cases and 1,000 deaths were recorded in the 29 countries on the five continents hit by this epidemic.

Tabla 1. Continúa.

Pandemic	Main features
<b><i>H1N1 flu or Swine flu</i></b> (2009-2010)	Globally, at least one in five people became infected with H1N1 within the first year of the pandemic. This influenza type was first identified in the United States in April 2009; Mexico was one of the first countries where cases were detected. Children were among the most affected groups. The estimated global mortality is 100,000 to 400,000 people in the first year, and a total of 600,000 lives lost.
<b><i>Ebola</i></b> (2014-2016)	The Ebola epidemic first appeared in Guinea; recording a total of 28,616 cases and 11,310 deaths in Guinea, Liberia, and Sierra Leone. Isolated cases were also recorded in Nigeria, Senegal, and the United States, as well as in Spain, Mali, and the United Kingdom.
<b><i>Zika virus epidemic</i></b> (2015-2016)	Between 2015 and 2016, autochthonous cases caused by vector transmission of the Zika virus were recorded in 48 countries and territories in the American continent; sexually transmitted cases were reported in five countries. A total of 707,133 autochthonous cases were identified between May 15, 2015, and December 15, 2016.
<b><i>COVID-19</i></b> (2020)	Circa 1.3 million deaths and 57.7 million infections as of February 2021.

Source: Compiled by the author from various sources: Littman and Littman, 1973; McNeill, 1976; Johnson and Mueller, 2002; Ledermann, 2003; OPS, 2016; Sáez, 2016; WHO, 2016; Ikejezie, 2017; JHU, 2020.

the pandemic, its causes and consequences should be seen as a disaster scenario and analyzed from the disaster-risk perspective, understanding its root causes and risk drivers. That is, they should be analyzed from the forensic investigation of disaster perspective, FORIN (Oliver-Smith *et al.*, 2016; 2017; Alcántara-Ayala *et al.*, 2021).

While the magnitude of the adverse impacts of the disaster triggered by the spread of COVID-19 is unprecedented in recent history, the environmental transformations that characterize the Anthropocene reflect the severity of human interventions on the environment over the past several decades (Crutzen, 2002; Steffen *et al.*, 2015a, b). This leads us to accept that, in the context of global environmental change and globalization, the various dimensions of pre- and post COVID-19 vulnerability are related to social inequalities, both in wealth as in ways of life, unsustainable development practices and livelihoods, environmental degradation, loss and degradation of habitats and biodiversity, and the lack of an informed governance of disaster risk (Alcántara-Ayala, 2021).

For more than two decades, several studies have evidenced the crucial role of the social construction of disaster risk (Blaikie *et al.*, 1994; Canon, 1994;

Wisner *et al.*, 2004) as a fundamental paradigm for its management from an integrated transdisciplinary perspective (IRDR, 2013; Alcántara-Ayala *et al.*, 2015). However, there is growing concern about the obstacles for implementing an integrated public policy on disaster risk management if the identification and understanding of the root causes and factors inducing vulnerability and exposure are overlooked by focusing the efforts on emergency response and disaster management (Oliver-Smith *et al.*, 2016; 2017).

Although important efforts have been made so far to understand the pandemic from an epidemiological perspective, many questions remain unanswered with regard to understanding the underlying causes and the dynamics and complexity of vulnerability and exposure to COVID-19 at a multiscale global-to-local level and vice versa.

It is therefore important to examine the anatomy of the disaster triggered by COVID-19 from a disaster risk perspective. Such analysis could prompt a transdisciplinary debate and attain a broader vision to supplement the epidemiological perspective. This article aims to adopt a simplified approach to understanding the main root causes and disaster risk drivers that have influenced the

development of the pandemic as a global disaster, from a social-construction-of-disaster-risk approach, which might serve as a reference framework for further research. This would contribute a different but supplementary vision to the inherent epidemiological perspective of the pandemic.

The document is organized into three sections. First, brief reference is made to the methodological approach used. The second section addresses the theoretical dimensions of disaster understanding in terms of the hazard-vulnerability-risk triad. It is followed by an overall discussion on how the social-construction-of-disaster-risk paradigm evidences the need to understand root causes and disaster risk drivers in response to the urgency of exploring the critical dimensions or the anatomy of the disaster triggered by the COVID-19. Finally, the *Discussion* and *Conclusions* sections summarize the reflections made along the article and identify the challenges to integrated disaster risk management.

## METHODS

The research approach adopted for this study was the systematization of experiences and secondary information sources. An exploratory analysis of the factors conditioning the social construction of disaster risk before the COVID-19 was carried out. Based on own experiences in this matter, at the national and international level, a descriptive and analytical research design was used. The latter refers to the cardinal aspects necessary to conceive the multidimensional nature of the spatio-temporal construction of the global multiscale disaster triggered by the spread of COVID-19 from an integrated, reflection-oriented perspective.

### Social Construction of the Disaster Risk Triggered by COVID-19

The key assumption of the social-construction-of-disaster-risk paradigm, which emerged in response to the physical or technocratic vision of disasters based on a hazard-centered approach (Hewitt, 1983; Smith 2002; Hilhorst, 2003), points to understanding risk as a function of various underlying

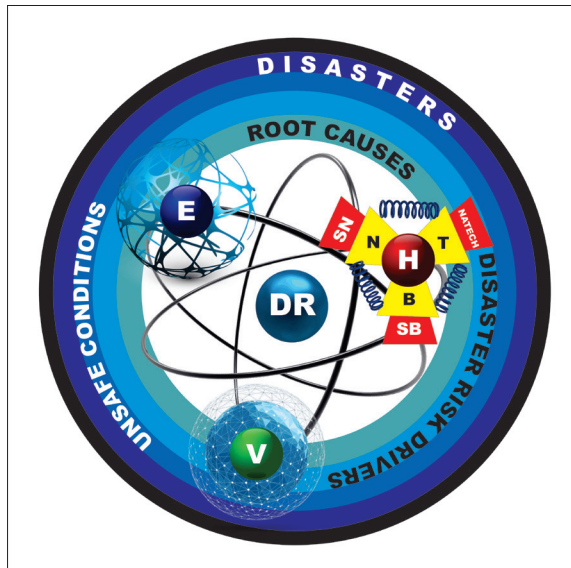


Figure 2. Key relationships and processes in the social construction of disaster risk. RD means disaster risk, E exposure, V vulnerability, A indicates various hazards including natural (N), socio-natural (SN), biological (B), socio-biological (SB), technological (T) and Natech (resulting from the combination of natural and technological threats) (adapted from Oliver-Smith et al., 2016).

or root causes and risk drivers derived from the configuration and dynamics of social, political, and economic processes over time. From the above, hazards, vulnerability, and exposure are identified as the necessary ingredients to demystify the natural — as opposed to the social — causality of disasters (Blaikie *et al.*, 1994; Canon, 1994; Oliver-Smith, 1998; Wisner *et al.*, 2004).

Understanding disasters demands an in-depth knowledge of the causality chain of the various dimensions of existing and emerging risks — and, hence, hazards and vulnerability — produced by the set of interactions between humans and nature, which are expressed in space and time in the exposure through and across territorial and governance scales (Alcántara-Ayala *et al.*, 2021).

### (1) The Hazard: COVID-19, a Socio-Biological Perspective

According to Liu et al. (2020), December 1, 2019 was the earliest date when symptoms related to a new type of human pneumonia first appeared in

Wuhan City, China; however, it was until the end of that month that the first signs were identified. The virus responsible for this type of pneumonia was officially designated as Severe Acute Respiratory Syndrome Coronavirus 2, SARS-CoV-2. Although the disease was initially called Wuhan Pneumonia, the World Health Organization (WHO) preliminarily named it as a new Coronavirus (2019-nCoV) and later officially coined it as Coronavirus disease (COVID-19) (Liu *et al.*, 2020).

While SARS-CoV-2 is a natural virus that causes the Coronavirus disease (COVID-19), in technical terms the latter stems from the interspecies transmission of an animal coronavirus, that is, the passage of a virus or other pathogen from an animal carrier to a first human carrier, the “patient zero”, followed by and the acquisition of human-to-human transmission capacity (Liu *et al.*, 2020).

The United Nations Office for Disaster Risk Reduction defines hazard as “a process, phenomenon or human activity that may cause loss of life, injury, or other health impacts, property damage, social and economic disruption, or environmental degradation” (UNISDR, 2017, p.19). Biological hazards are conceived as “of organic origin or conveyed by biological vectors, including pathogenic microorganisms, toxins, and bioactive substances” (UNISDR, 2017, p. 20). Considering the latter term, COVID-19 is then defined as a biological hazard.

In the context of characterizing pathogenic biological agents from an ecological viewpoint, Dobson and Carper (1996) identified three fundamental processes for determining the impact, persistence, and spread of pathogens and parasites: size and spatial distribution of the host population, movement of infected and susceptible hosts and vectors, and nutritional status of the human host population.

Although these aspects concern the impact, persistence, spread, and dynamics of pathogenic biological agents and are, therefore, linked to the characterization of the COVID-19 hazard, it is important to recognize that they are strongly linked to the susceptibility, vulnerability, and exposure of the human population. Thus, the current consequences of the pandemic — over

59 million cases and more than 1.4 million fatalities recorded worldwide so far (February, 2021) (JHU), in addition to economic losses estimated in 82 billion dollars over the next five years (Centre for Risk Studies), and the effects on mental health — undoubtedly describe a global disaster, even a catastrophe (Lavell and Lavell, 2020).

Current events associated with the impact of the pandemic have renewed the interest in understanding the complex relationships of pathogen transmission from animals to humans. According to Johnson *et al.* (2020), those species that are abundant and have become adapted to anthropized landscapes will likely continue to be an important source of such transmission. These authors also emphasized that human actions, particularly wildlife exploitation through hunting and trade, not only threaten species with extinction, but also promote the spread of viruses. In other words, among threatened wildlife species, those with populations that have declined as a result of exploitation and habitat loss share the most viruses with humans.

The UNISDR (2017) terminology referred to above, together with the definition of natural hazards, encompasses the socio-natural hazard concept proposed by Lavell (1996). He considered that socio-natural hazards are produced or exacerbated by some type of human intervention on nature, so they can be mistaken with natural events; often, there is no strict correspondence between the space of causality and the space of impact. In other words, the consequences of hazards are not always or not only experienced by the social agents that created or induced them.

Consequently, this study states that COVID-19 should not be regarded as a merely biological hazard. This disease should be classified as a socio-biological hazard for two fundamental reasons. On the one hand, in a context of global change and biodiversity loss, the exploitation of wildlife associated with human practices or interventions, such as the often illegal wildlife trade, induce the spread of viruses. On the other hand, the asymmetry between its causality space in Wuhan, China, and the space of its worldwide impact is a clear example of an effect spread far beyond the source of the hazard.

The need to decipher and understand COVID-19 as a new hazard and develop a vaccine to mitigate its spread poses a challenge for scientific and technological development. Since the onset of the pandemic, numerous research groups from many disciplines around the world are dedicated to understanding the various medical and biomedical research dimensions of the virus, as well as the public policies and governance of disaster risk, with complex socioeconomic, political, institutional, environmental, and cultural aspects of the population exposed to and affected by COVID-19. These perspectives allow identifying several factors linked to the susceptibility, vulnerability, and exposure to this disease.

## **(2) Susceptibility, Vulnerability, and Exposure to COVID-19**

### *Susceptibility and Vulnerability*

The current conceptual framework of disaster risk reduction lacks an implicit distinction between susceptibility and vulnerability, which are often used interchangeably. However, setting a differential connotation seems appropriate in the case of COVID-19.

The population in different age groups is differentially susceptible to COVID-19 due to various genetic, morbidity, and age-related aspects, which are still under study. Therefore, susceptibility to COVID-19 should be understood as the uniqueness or singularity of the individual stemming from his/her genetic, health, and immune system attributes, as well as his/her oxidative stress condition or old age, all of which determine his/her intrinsic sensitivity to contagion as a physical process inherent to the organism.

The degree of vulnerability of people to COVID-19 and other hazards is determined by the existence and combination of various socioeconomic conditions historically grounded on models, priorities, and processes of unsustainable development that have gone hand in hand with globalization and its effects over the past decades. Such conditions are evidenced as inequality, lack of access to health services, sanitation and education, malnutrition, addictions, and poverty, among others (Alcántara-Ayala *et al.*, 2020).

Therefore, vulnerability to COVID-19 is linked to the pre-existing and current psychosocial and economic status of a person or group of people, derived from extrinsic social processes that, in addition to the intrinsic natural susceptibility of the individual, increase the predisposition to being adversely affected by the disease.

The current multi-dimensional disaster triggered by COVID-19 shows that, together with the poor healthcare service architecture and institutional fragility linked to a weak disaster risk governance and lack of comprehensive risk management strategies, other factors including marginalization, poverty, inequality, and exclusion are the main drivers of vulnerability and exposure in various parts of the world; Mexico is no exception (Figure 3).

### *Exposure*

Although mosquitoes, ticks, and fleas are among the major vectors of disease, the COVID19 pandemic has evidenced the substantive role of humans as vectors, as SARS-coV-2 is quickly transmitted from one individual to another. The spread, spatial distribution, and prevalence of COVID-19 throughout the world are strongly intertwined with exposure and vulnerability factors of societies. All these factors are key inputs for understanding the negative impact of COVID-19 as a consequence of various conditions stemming from globalization. The exposure of the population to COVID-19 is strongly linked to the mobility of individuals and, the nuclear family or group of people with whom they live on a daily basis to meet their economic, social, and emotional needs, both in urban and rural areas.

Despite the extremely simplified view of associating urbanization with greater exposure and rural areas with less exposure, given the accessibility to material goods and mobility of persons, the essential vulnerability-exposure binomial moves dramatically and bidirectionally across the urban and rural spheres, and global to local and individual dimensions. In line with the above and as per the Index of Vulnerability to COVID-19 in Mexico proposed by Suárez *et al.* (2021), regardless of the nil or low initial contagion in municipalities with low population density, the most marginalized

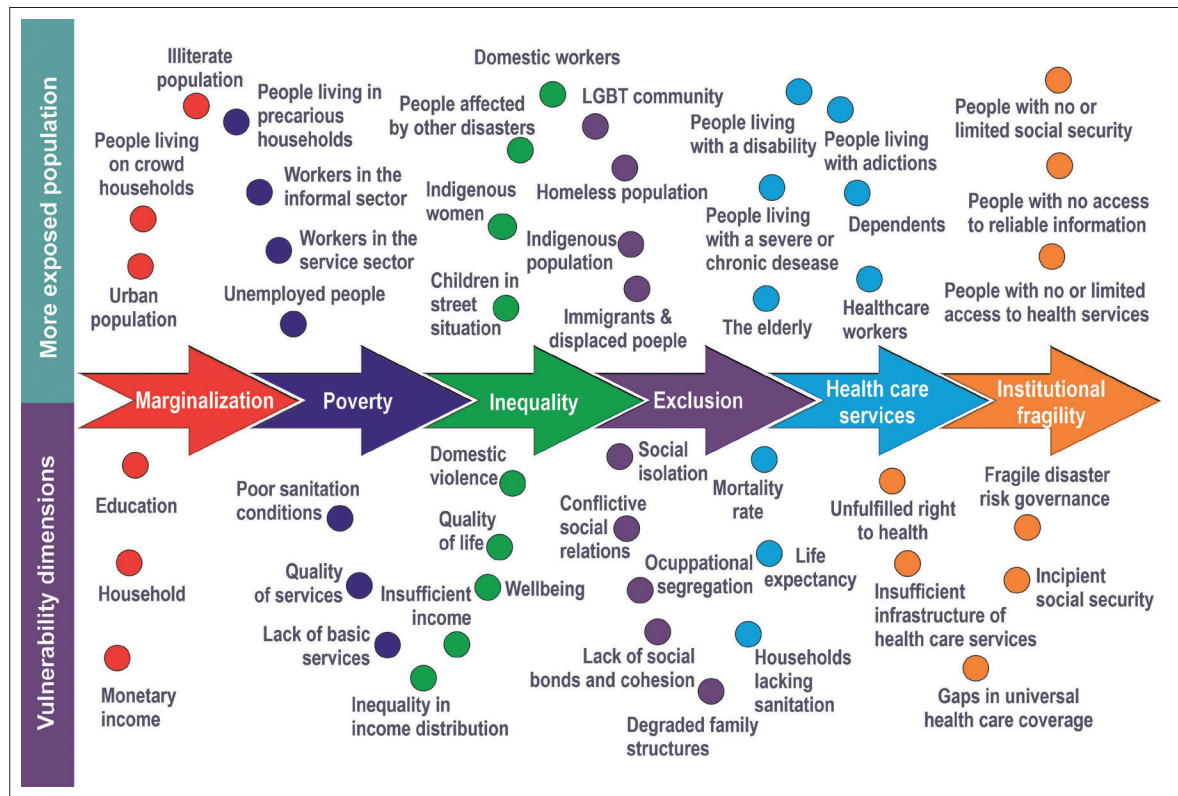


Figure 3. Main drivers of disaster risk by COVID-19 and their associated dimensions of vulnerability and exposure of the population (own elaboration).

municipalities of Mexico, whose character is not urban, were documented as the most vulnerable ones.

In addition to reflecting the spread of COVID-19 from China to even remote locations around the world thanks to the connectivity of international trade, this situation also reveals the dramatic conditions of inequality, poverty, marginalization, and institutional fragility inherent to the still ongoing social and economic ruralization process, especially, but not exclusively, in countries with emerging and developing economies. This does not mean that the urban space is exempt of this situation; on the contrary, it raises the question of how valid the vulnerability-exposure binomial is as a conditioning factor of risk to COVID-19 in different territorial contexts, although the high population density in urban areas facilitates the massive and dynamic exposure of people to contagion.

In parallel with globalization processes, the connectivity linked to international trade has contributed to the spread of the virus and the increased exposure of the world population. In addition, the mobility patterns of (voluntarily or involuntarily) displaced persons and migrants have fueled the emergence of a group that is highly vulnerable and highly exposed to COVID-19. Relative immobility has also been a factor in increasing both vulnerability and exposure. Closed spaces such as jails, nursing and retirement homes pose adverse conditions and high contagion risk for their residents.

Factors that promote exposure to the virus at the household level are associated with socioeconomic status and conditions, the use and extent of transformation of the territory, as well as the quality of social relations. Although the potential exposure of the population to COVID-19 is largely defined in terms of socioeconomic



vulnerability at the individual or family level, it is also linked to conditions at broader territorial scales.

**(3) The Layout of Disaster**

For the characterization of the current risk and disaster, the early observations suggested that the main root causes of the disaster associated with COVID-19 are related to the human disruption of the natural environment through wildlife exploitation and overexploitation, loss of natural habitats linked to environmental degradation, legal trade and illegal trafficking of wildlife, as well as the ensuing magnification of the emergence and spread of zoonoses in a context of globalization, global change, and deficiencies in healthcare governance and disaster risk management systems. In parallel, the intrinsic susceptibility of people to be infected by the virus, as well as the vulnerability and extrinsic exposure of individuals and societies as a whole (largely derived from marginalization, poverty, inequality, and exclusion), are conceived as the key risk drivers (Figure 4).

Due to the unique features of this pandemic, rethinking the nature of disasters from the global to the local scale and vice versa will be mandatory and utterly important for future policies. At the

same time, policy matters will have profound implications for the living conditions of people at risk, at individual, collective, and global levels.

Although characterizing the susceptibility of individuals to COVID-19 is a complex issue, the common denominator of risk is the spread of the socio-biological hazard due to the connectivity of territories at the global and local levels. Nevertheless, the key explanation lies in the temporal and multi-scale spatial dimensions of the disaster, which are configured — similar to other types of disasters triggered by natural or socio-natural hazards — in decision-making and practices inherent to risk governance. In turn, these are based on (existing, usable, and used) scientific knowledge and specific interests linked to the prevailing vision of development and socio-territorial equality in communities with varying degrees of pre-existing vulnerability and current exposure to this hazard.

**DISCUSSION**

**(1) A Syndemic Pan-Disaster**

Although the ongoing disaster was triggered by a viral zoonosis (i.e., a socio-biological hazard), the risk of disaster was indeed configured within the

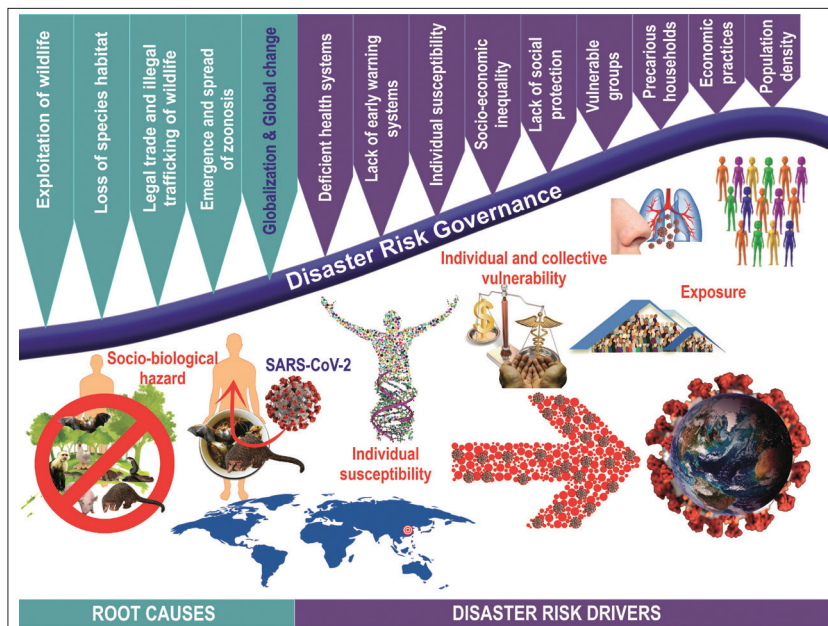


Figure 4. Cardinal elements of the construction of the disaster risk associated with COVID-19 (own elaboration).

spheres of vulnerability and exposure intertwined at the edges of economy, society, and the environment, stemming from globalization and global change.

Interestingly, supplementing the social-construction-of-disaster-risk perspective — coined within the public and community health framework based on the medical anthropology approach — the term “syndemic” used herein refers to the co-occurrence of various infections or diseases, and their interactions and links with social, cultural, economic, physical, and environmental factors, especially as a consequence of social inequity and the unfair exercise of power (Singer, 1990).

The correspondence between the two approaches, particularly in the case of the COVID-19 pandemic, involves a multi-scale analysis of the groups exposed because the syndemics theory emphasizes the interaction of the disease at both the population and individual levels (Singer, 1990). This multidimensionality allows identifying the whole range of causes, from those derived from large-scale social complexity to those related to individual biological traits, as well as the ensuing synergistic interactions at the individual and population levels (Gravlee, 2020).

Within the framework of the syndemic concept formulated by Singer (1990), the current pandemic can be understood as a set of intertwined health issues magnified by a context where adverse social and physical conditions occur. These conditions can significantly affect the disease burden and the health status of a population, thus contributing to recognize the causality beyond the disease itself. This causality is inherently conceived through the paradigm of the social construction of risk through the identification of root causes and drivers of disaster risk (Alcántara-Ayala *et al.*, 2020).

Combining the correspondence perspectives just mentioned supports our assumption that, given the planetary dimension of the current crisis arising from the pandemic, it is possible to describe it as a “syndemic pan-disaster”. That is, a multi-scale disaster with global impact within a syndemic context that involves an extreme disruption of the functioning of society. This brings about adverse social, economic, cultural, political, and institu-

tional consequences created by the concatenation of population health issues exacerbated by the intrinsic susceptibility of individuals, exposure to individual and collective contagion, and pre-existing vulnerability conditions of society.

In the current Anthropocene epoch, characterized by social and environmental imbalances (Crutzen, 2002), it is necessary to encourage transdisciplinary approaches to link the effect of human intervention on the emergence of socio-biological hazards whose impact, embedded in a structure of social inequalities in a globalization context, poses highly complex challenges for disaster risk governance.

Reflecting on the role of multi-scale processes in reproducing vulnerability of the population as a whole and the spread of the virus as a fundamental aspect of the exposure of individuals and entire societies to the potential impact of the COVID-19 is indeed necessary. Thus, in addition to analyzing the socio-environmental context, it is important to evaluate the various spheres of human vulnerability based on the relationships produced at the intersection of the global and local scales, and the individuality of people.

A first approach to the anatomy of the disaster triggered by the global spread of COVID-19, herein referred to as a “syndemic pan-disaster”, recognizes the importance not only of the infinite dimensions of the adverse impact for societies in the short, medium, and long-term, but also of its causality and the dynamic factors that place it in the domain of the social construction of disaster risk and the syndemics theory.

## **(2) Comprehensive Management of the Disaster Risk Triggered by COVID-19**

While efforts from the public health perspective are undoubtedly invaluable and urgent, few governments in the world have addressed the COVID-19 crisis from a comprehensive disaster risk management (CDRM) perspective.

Disaster risk management can be understood as “a social process whose ultimate goal is the anticipation, reduction, and permanent control of disaster risk factors in society, in line with, and integrated into the pursuit of, sustainable paths of

human, economic, environmental and territorial development” (Narváez et al., 2009, p. 33). From it, the need to consider its multi-scale dimensions of comprehensive and transverse intervention stemming from coordinated efforts, and encompassing from the global to the family and even the individual level, becomes evident.

These tasks must include both corrective and prospective approaches to undertake actions aimed at reducing existing risks and avoid creating future risks in the short, medium, and long terms, by executing the six essential CDRM processes: generate knowledge on disaster risk in different realms; prevent future risk; reduce current risks; response preparation; respond and rehabilitate; and recover and rebuild (Narváez et al., 2009).

In general, risk management strategies for COVID-19 should address the following cardinal challenges:

#### *Knowledge Generation*

1. Understanding the etiology and pathogenesis of SARS-CoV-2;
2. Ensuring universal availability of means for the detection and diagnosis of COVID-19;
3. Identifying and creating effective clinical treatments;
4. Direct mitigation through the development, testing, and regulation of vaccines and,
5. Analyzing and understanding the multi-scale dimensions of the vulnerability and exposure of populations to COVID-19.

#### *Preventing Future Risk*

1. Recognize and address root causes; especially, implementing multi-scale public policies aimed at comprehensive wildlife conservation and management;
2. Identify and implement intervention strategies to reduce the various disaster risk drivers.

#### *Reducing Existing Risk and Response Preparation*

1. Prevention and control of COVID-19: eradication of sources of infection, reduction

of transmission routes, and protection of susceptible populations;

2. Multi-scale surveillance and monitoring of public-health dynamics and evolution;
3. Activating sustainable risk-communication strategies based on scientific knowledge and the ethical and civil responsibility of society as a whole;
4. Preventive and compulsory social distancing schemes;
5. Preventive and compulsory social isolation schemes;
6. Implementation of biosafety programs for healthcare institutions; provision of personal protective equipment, and regulation of access to users;
7. Implementation of programs for the epidemiological evaluation, control, and monitoring of mobility in land, air and sea hubs;
8. Implementation of effective social protection schemes for the entire population, with specific programs for vulnerable groups;
9. Continued strengthening of sanitary, epidemiological, and healthcare infrastructure; and
10. Creation and implementation of risk reduction and mitigation policies and strategies for different territorial areas with a human-rights approach.

#### *Response, Rehabilitation, Recovery, and Reconstruction*

1. Design and sustainable implementation of early-warning systems that consider the intrinsic susceptibility of individuals, as well as the vulnerability and family and collective exposure of the population;
2. Development of sustainable risk communication strategies based on scientific knowledge and the consequences of the disaster;
3. Adoption of comprehensive mitigation measures based on the vulnerability and exposure dimensions of the population;
4. Implementation of economic incentives and recovery programs for vulnerable groups;

5. Improvement and empowerment of public health systems and policies and comprehensive disaster risk management;
  6. Articulation of transverse-intersectoral risk management policies across government levels;
  7. Implementation of CDRM regulations that consider socio-biological hazards, and the concatenation and occurrence of multiple hazards of diverse nature;
  8. Creation of instruments and intervention mechanisms focused on reducing the vulnerability and exposure of the population;
  9. Establishment and implementation of regulations aimed at preventing the emergence of new risks and the magnification of current risks;
  10. Strengthening disaster risk governance systems.
- The effectiveness of risk management policies in the face of the impact of COVID-19 is closely linked to the institutions, resources, and governance of pre-existing disaster risks. Verifying the negative impacts of disaster situations reveals the absence of a public policy on CDRM and questions the relevance of current risk governance schemes.
  - The options or directions of risk management policies frequently depend on the particular interests or views of governments and governors, rather than focusing on those governed.
  - While each individual is uniquely susceptible to catch a viral infection, the social nature of vulnerability must be recognized and tackled from informed risk governance, in which collaboration between scientists, technologists, and decision makers becomes a continued policy and not a one-time act of convenience or sporadic event (Alcántara-Ayala et al., 2020).
  - In the transition from abstract political discourses to decision-making and practice, the implementation of intervention strategies aimed at understanding their causality and committed to reducing risk drivers is unavoidable. Forensic disaster investigation is essential to this end (Wisner et al., 2004; Burton 2010, 2015; Oliver-Smith et al., 2016, 2017; Alcántara-Ayala et al., 2020).
  - The disaster, the consequences of globalization and global change, and the social issues derived from inequality and marginalization of major sectors of the population all evidence the need for new risk-governance paradigms and underline the critical need of building solid and permanent bonds between science and public policy.
  - Various mono-, multi-, pluri-, and interdisciplinary efforts will continue seeking to decode SARS-CoV-2, as well as the short-, mid-, and long-term impacts of COVID-19 worldwide; comprehensive and trans-disciplinary research will be essential to achieve this goal.

## CONCLUSIONS

Based on the approach outlined here on the anatomy of the “syndemic pan-disaster” that is being currently experienced worldwide, the following considerations should be explicitly recognized:

- The disaster triggered by the spread of COVID-19 has left indelible imprints in the world, its development, and its environment.
  - The susceptibility of the population to COVID-19 is physical, individual, and intrinsic, while vulnerability can be individual or collective, but it is always of an extrinsic social nature.
  - The vulnerability and exposure of society to COVID-19 constitute a complex multidimensional binomial that poses the huge challenge of solving countless pre-existing issues. Its connection with global change and globalization involves several socio-economic and environmental dimensions and interactions that entail far-reaching challenges.
  - Global economies and international markets will continue to be the backbone of new emerging hazards and disasters. Therefore, the configuration of unsustainable global societies conveys the emergence of global disasters.
- Finally, it should be emphasized that the multidimensionality of the paradox of the seemingly haphazard “new realities” calls the memory of indi-

viduals and visions associated with transformation processes characteristic of the Anthropocene for acting differently. Unless the underlying risk drivers are recognized and transformed from the global to the local context, the path towards the permanent adaptation of societies to the consequences of their intervention on the environment will continue to be privileged. Sustainable development and disaster risk reduction will remain the biggest fallacies of modern times. Addressing this challenge is not feasible without a profound metamorphosis of the conscience of individuals and societies as a whole.

As a corollary, the essential question that should be put forward is whether the conscience of individuals and populations is sufficient to advance towards transforming current societies into a more sustainable world with no or only small gaps of inequality, in which the generations to come do not suffer again disasters like the one that is currently eroding humanity and compromising even the freedom to breathe.

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