

Disasters and COVID-19: two models to reduce risk in Mexico
Desastres y covid-19: dos modelos para reducir el riesgo en México

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ABSTRACT

The objective is to analyze the scope of the National Civil Protection System (SINAPROC) and the National Health System (SNS), and its relationship to the attention of the COVID-19 pandemic. The study is within the approach to disaster risk, considering how the concretion of a threat, exposition and vulnerability can affect society. The first part makes a diagnosis of the impact of disasters associated with natural phenomena, as well as the evolution of the Covid-19. Subsequently, the legal framework underpinning both systems is discussed, considering their structure and components for identifying possible mechanisms of collaboration. Among the conclusions is that, despite being two vertical models of intervention, the legislation incorporates both health and disaster risk, which could complement each other. At the end of the pandemic, the strategy to strengthen the health risk management model should be evaluated from the disaster risk approach.

Keywords: 1. risk management, 2. COVID-19, 3. national health system, 4. states, 5. Mexico.

RESUMEN

Se analizan los alcances del Sistema Nacional de Protección Civil (Sinaproc) y el Sistema Nacional de Salud (SNS), y su relación con la atención de la pandemia de covid-19. El estudio se ubica dentro del enfoque del riesgo de desastres, considerando cómo la concreción de una amenaza, la exposición y la vulnerabilidad pueden afectar a la sociedad. En la primera parte se hace un diagnóstico sobre el impacto de los desastres asociados a fenómenos naturales, así como la evolución del covid-19. Posteriormente, se discute el marco legal que sustenta ambos sistemas, considerando su estructura y componentes a fin de identificar posibles mecanismos de colaboración entre ambos. Entre las conclusiones se destaca que, a pesar de ser dos modelos verticales de intervención, la legislación incorpora tanto el riesgo sanitario como el de desastre, con lo que pueden complementarse. Al final de la pandemia, se deberá evaluar la estrategia para fortalecer el modelo de gestión del riesgo sanitario desde el enfoque del riesgo de desastres.

Palabras clave: 1. gestión del riesgo, 2. covid-19, 3. sistema nacional de salud, 4. entidades federativas, 5. México.

Received: September 11, 2020

Accepted: February 8, 2021

Available online: January 30, 2022

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INTRODUCTION

Disasters associated with natural phenomena in Mexico are recurrent. The country is exposed to the impact of tropical cyclones, heavy rains, droughts, and earthquakes, among others. Each year, an average of four to five tropical cyclones moves across its territory, causing considerable damage. The Mexican National Civil Protection System (SINAPROC), the response model used to reduce damages related to disasters, was created in 1986 and comprises the set of strategies implemented by government institutions at the time of an emergency, whether associated with a natural or anthropogenic phenomenon.

The current situation of the SARS-CoV-2 virus that causes the COVID-19 disease poses a challenge for governments and healthcare systems. By November 23, 2020, a total of 59,539,267 cases and 1,404,755 deaths had been reported worldwide. At the same time, Mexico had recorded 1,049,358 cases and 101,926 deaths (Coronavirus Resource Center, 2020). The first responses to confront the pandemic were enforcing a lockdown, postponing non-essential business services, and closing public spaces to prevent the spread of the virus. Lockdown measures have led to job loss, economic crises, and changes in daily life. To address public health issues, as well as the health risk response, the then Ministry of Health and Assistance, currently known as the Ministry of Health (SS), established the National Health System (SNS) in 1984, in which public and private health sector institutions participate at the federal, state, and jurisdictional levels.

The research question driving this analysis is: How can the disaster response and public health models be coordinated to face the COVID-19 pandemic? To provide an answer, SINAPROC and the SNS are analyzed in the context of the ongoing COVID-19 from a perspective of disaster risk. The response to disasters resulting from natural phenomena along with the response to the effects of COVID-19 constitute two risk management models that can complement each other to be improved upon and become more efficient, so long as they can integrate collaboration mechanisms.

To contextualize the analysis, on the one hand, this paper presents a diagnosis of the main disasters associated with natural phenomena from 1982 to 2018 as well as SINAPROC's response; on the other, the evolution of COVID-19 as of November 2020, which has been addressed by the SNS. The following section lays out the legal framework that gave rise to these national systems, determining the scope of each and identifying the collaborative strategies they carried out to provide a more unified response to disaster risk reduction. The next section puts forth a discussion of the scope and limitations of these models, highlighting some recommendations for disaster risk management, regarding natural hazards or health-related emergencies. Finally, this paper analyzes the disaster risk management and its response to the COVID-19 pandemic, aiming to propose a new approach in the understanding of disasters, from a health perspective to a global one—in other words, through a comprehensive outlook on risk. As part of the concluding remarks, it emphasizes that, despite being vertical models for health and disaster risk response, they can be coordinated and used to take advantage of the experiences acquired over the last three decades. Given that both

cases consider health and disaster risk, it is possible to address the pandemic from the disaster risk approach, not only as a public health problem.

BACKGROUND

Due to its geographic location, Mexico is exposed to the impact of natural phenomena that, assuming they reach a certain magnitude, can become threats to the population, productive activities, and ecosystems. The damage associated with disasters will not only depend upon the intensity of the natural phenomena that trigger them in the first place, but also on the vulnerability contexts, i.e., the social shortcomings to confront them, such as lack of preparation, marginalization, exposure, risk perception, etc.² Table 1 presents the main disasters associated with natural phenomena that occurred in Mexico between 1982 and 2018.

Table 1. Main disasters associated with tropical cyclones and earthquakes in Mexico (1982-2018)

Event	Year	Region	Deaths	Total damages (millions of dollars/pesos)*
Chichonal volcano eruption	1982	Chiapas and Tabasco	187	117
Mexico City earthquake	1985	Mexico City and State of Mexico	6,000	4,104
Hurricane Gilbert	1988	Quintana Roo, Yucatán, Campeche, Tamaulipas, Nuevo León, and Coahuila	225	76
Hurricane Pauline	1997	Oaxaca and Guerrero	228	448
Floods in Puebla	1999	Puebla	263	245
Hurricane Isidore	2002	Yucatán and Campeche	4	8,877
Hurricane Stan	2005	Chiapas, Oaxaca, Veracruz, Puebla, and Hidalgo	98	21,061
Tropical cyclone Dean	2007	Veracruz, Hidalgo, Quintana Roo, and Puebla	9	8,962
Hurricane Alex	2010	Tamaulipas, Nuevo León, and Coahuila	21	25,015
Hurricanes Ingrid and Manuel	2013	Guerrero, Sinaloa, Nuevo León, Durango, Hidalgo, Tamaulipas, and Michoacán	119	34,371
Hurricane Odile	2014	Baja California Sur	6	24,133

² In this sense, Giddens (2000) established two types of risks: external risk, which comes from the outside or from nature, and manufactured risk, which is created by situations inherent to knowledge about nature, i.e., socio-environmental risks (Giddens, 2000).

September 19th earthquake	2017	Mexico City, Morelos, Puebla, State of Mexico, and Guerrero	368	60,626
Tropical cyclone Willa	2018	Nayarit and Sinaloa	9	3,627

* Between 1982 and 1999, total damage is in the millions of dollars, at 1999 prices.

Source: Author's compilation based on information from Bitrán (2001), Bitrán, et al. (2003), and National Disaster Prevention Center (Centro Nacional de Prevención de Desastres 2006, 2009, 2012, 2014, 2015, 2019, & 2021).

Tropical cyclones and earthquakes have been the disasters causing the greatest impact on Mexico, in terms of death toll, economic losses, and damage stemmed from a single natural phenomenon. In 2013, hurricanes Ingrid (in the Gulf of Mexico) and Manuel (in the Pacific Ocean) affected a large part of Mexico's territory due to their almost simultaneous occurrence during September. Furthermore, in September 2017, the earthquake that affected the center of the country, particularly Mexico City, was the most significant geological event after the 1985 earthquake in the region, in which social networks and volunteer groups played a leading role (Anzaldo, Estrada, Maisterrena, Galindo, & Ramos, 2020).

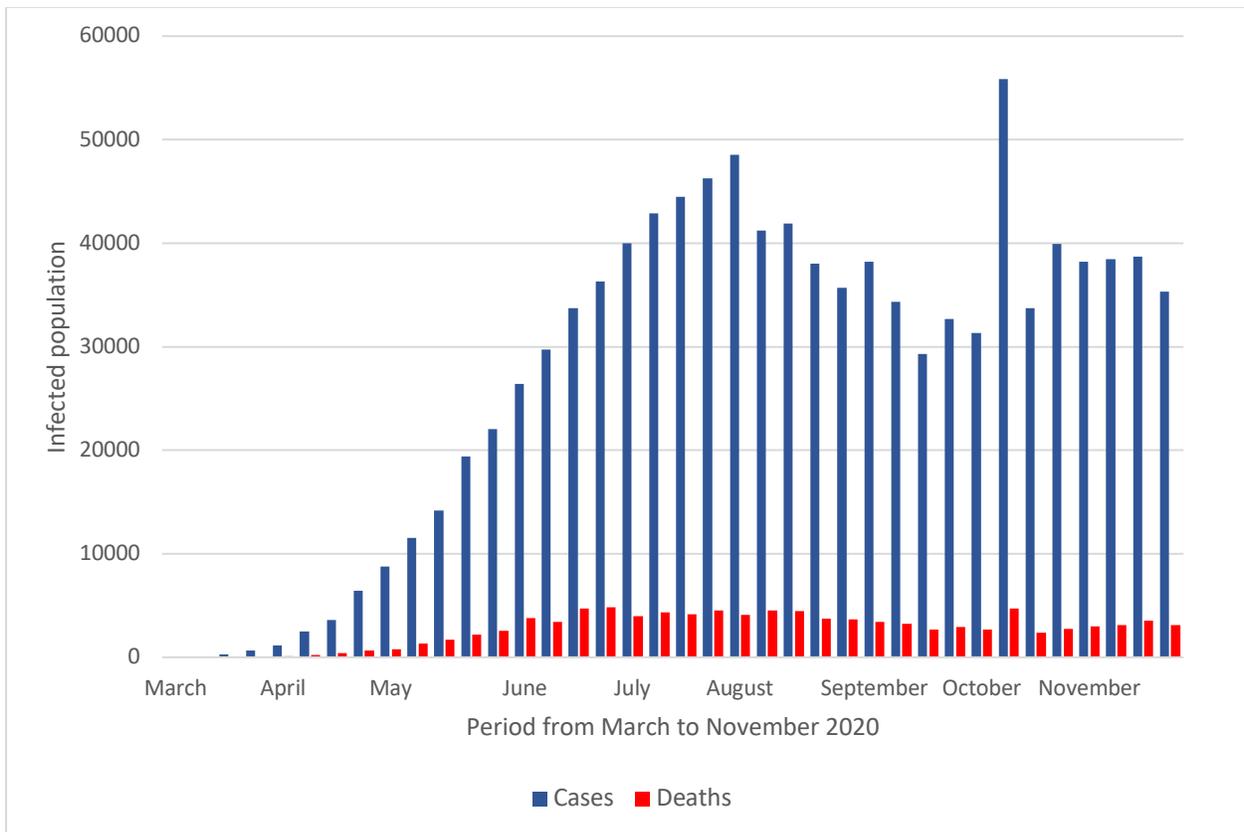
According to Maskrey (2016), disaster risk can be defined according to three variables: hazard, exposure, and vulnerability. First, a hazard is the trigger that can cause significant damage to a society. Second, exposure relates to human societal relationships, which organize the territory. Third, vulnerability will be a function of the social, economic, political, and cultural conditions that a community develops to withstand risk (Maskrey, 2016). The causes of these risk contexts must also be explained by the social, economic, and political systems, among others, which particularly affect specific sectors of society; that is to say, their degrees of vulnerability (Wisner, Blaikie, Cannon, & Davis, 2004). Therefore, the effects of disasters do not have an equal impact on society. There will be communities that experience greater consequences due to their income level, access to public services, or political power, to name a few examples.

Following the contagions registered by the new coronavirus at the end of 2019 in Wuhan, China, and the spread of the virus to other countries, the World Health Organization (WHO) declared a global public health emergency on January 30, 2020, citing it constituted a risk to the public health of other states given the international spread of the disease (Organización Mundial de la Salud, 2016). On March 11 of the same year, WHO Director-General declared COVID-19 a pandemic, after more than 118,000 cases had been reported in 114 countries and 4,291 people had died (Adhanom Ghebreyesus, 2020).

The SARS-CoV-2 virus, associated with the COVID-19 disease, has produced a pandemic whose effects are not only limited to public health, but also have economic, political, and social consequences (Lazcano-Ponce and Alpuche-Aranda, 2020). As of January 30, 2020, Mexico began executing public health emergency preparedness and response plans, implementing lessons learned during the AH1N1 influenza pandemic of 2009 (Alpuche-Aranda, 2020). While the first

case in the country was recorded on February 26, 2020, the first death associated with the disease occurred on March 19. Figure 1 shows the development of the COVID-19 pandemic in Mexico until November 2020.

Graph 1. Evolution of COVID-19 in Mexico according to number of cases and deaths (per week) in 2020



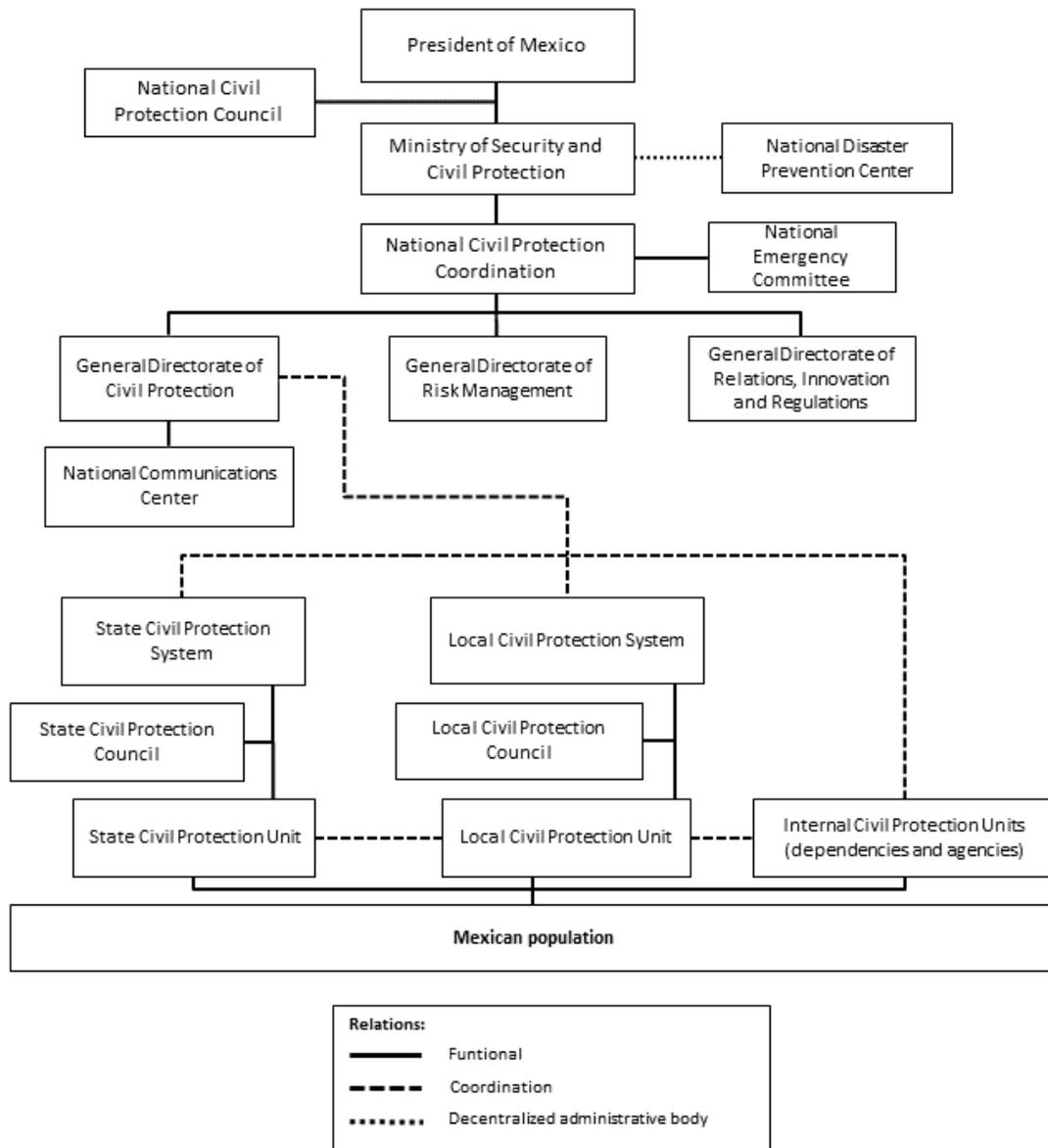
Source: Author's compilation based on data from the Ministry of Health (Secretaría de Salud, 2020a).

By November 22, 2020, overall, 1,041,875 cases and 101,676 deaths associated with COVID-19 had been reported in Mexico. As of that date, the rate of cases by gender showed that 51 percent were men, and the median age was 43 years. The five states with the highest number of accumulated cases were Mexico City, State of Mexico, Nuevo León, Guanajuato, and Sonora (Secretaría de Salud, 2020b). This list of infections, however, fluctuates because it can change from week to week, due to restriction strategies, lockdown measures, and the opening of productive activities implemented by each state. Graph 1 shows the downward trend, in cases and deaths, starting in August; albeit there was a peak on October 5, corresponding to a shift in methodology used for recording cases.

THE NATIONAL CIVIL PROTECTION SYSTEM

The bedrock for establishing SINAPROC and the Civil Protection Program was approved in 1986 (Secretaría de Gobernación, 1986). It stated that the Mexican Ministry of the Interior would oversee joint actions together with the remaining federal agencies (Secretaría de Gobernación, 1986, article 3). Similarly, this collaboration scheme is repeated locally through state and local civil protection systems. Figure 1 shows the structure of SINAPROC.

Figure 1. Structure of the Mexican National Civil Protection System



Source: Author's compilation based on data from the World Bank (Banco Mundial, 2012) and the Ministry of Security and Civil Protection (Secretaría de Seguridad y Protección Ciudadana, 2019).

The coordination of SINAPROC changed in 2018, when the Ministry of Security and Civil Protection undertook this duty, shifting its focus from being an internal policy to becoming a public safety issue (Secretaría de Gobernación, 2018). The General Civil Protection Law (Secretaría de Gobernación, 2012) defines SINAPROC as an organic set of structures, functional relationships, norms, instances, instruments, policies, procedures, and actions which government agencies establish jointly with public sector entities; organizations of various voluntary, social, and private groups; federal and municipal entities, and Mexico City, in order to carry out coordinated actions regarding civil protection (Secretaría de Gobernación, 2012, article 14).

In SINAPROC's structure, the President of Mexico holds the highest responsibility, which is exercised through the Ministry of Security and Civil Protection. The General Directorate of Risk Management (DGGR) coordinates the operation of financial instruments for risk management, analyzing requests for the provision of aid to federal entities, as well as submitting projects to qualify for a declaration of emergency or natural disaster. The disaster risk management model at the state and local levels is a mirror of the federal system, which is intended to implement actions and strategies in a systematic manner. The local level is the first instance of disaster prevention and response; the state and federal levels intervene, should it be necessary.

A core component for disaster response was the Natural Disaster Fund (FONDEN) trust fund.³ FONDEN was a financial instrument for disaster prevention, emergency response, and reconstruction of affected areas in municipalities, states, and Mexico City. To access FONDEN resources, a Declaration of Disaster had to be issued, then be endorsed by technical federal agencies, and later be recognized by the General Directorate of Risk Management. For the fiscal year 2020, FONDEN was allocated 3,353 million pesos, while 647 million pesos were authorized for the National Disaster Prevention Fund (FOPREDEN) (Secretaría de Hacienda y Crédito Público, 2019).

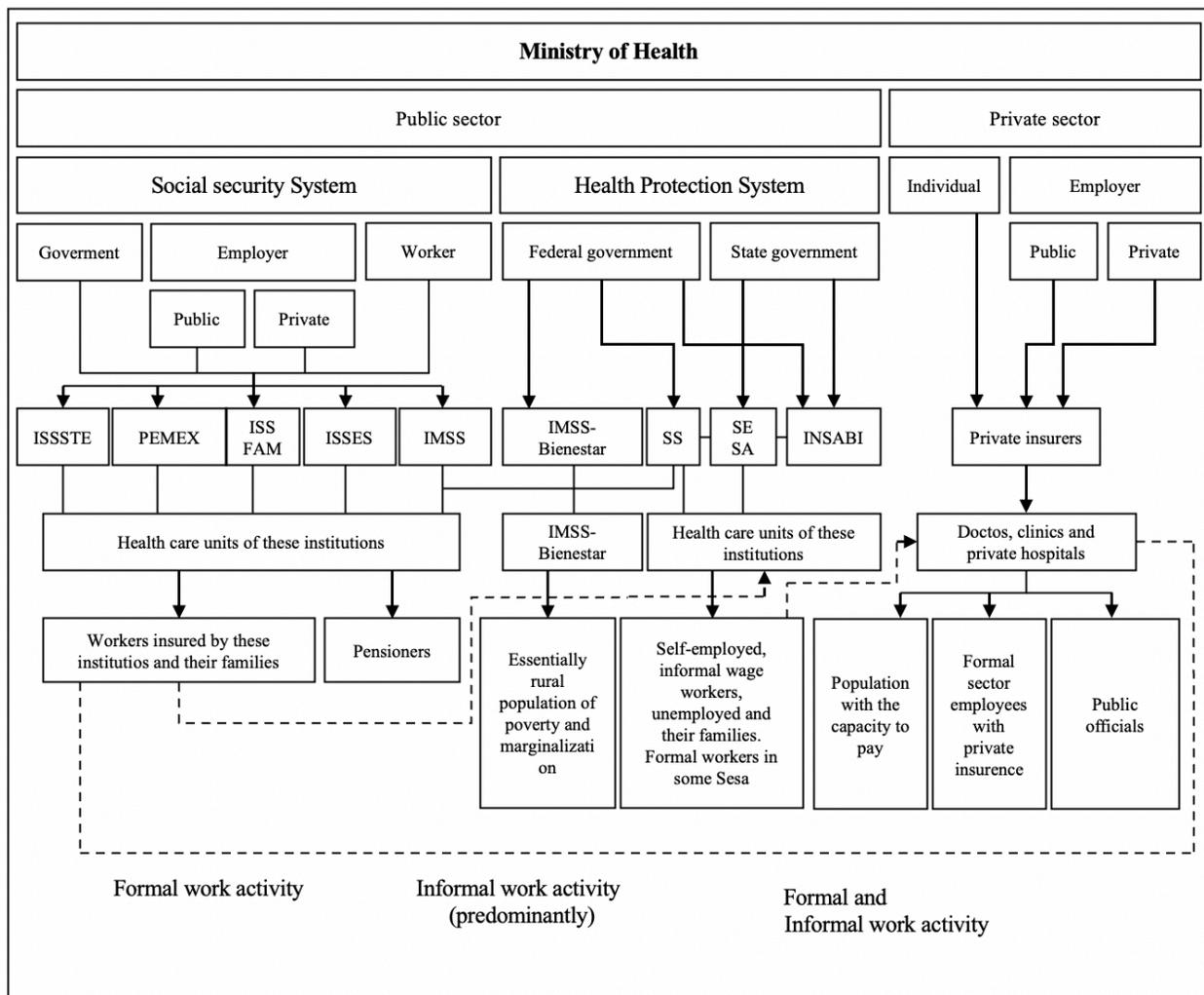
Since 1986, SINAPROC has recurrently responded to disasters associated with natural phenomena. Nonetheless, the General Civil Protection Law (LGPC) itself, which legally supports SINAPROC, also defines a sanitary-ecological phenomenon as a “disturbing agent generated by the pathogenic action of biological agents that affect the population, animals, and harvests, causing death or health problems” (Secretaría de Gobernación, 2012, article 2). Therefore, an epidemic is a health disaster which would fall under the purview of SINAPROC, to the extent that there are people affected by disease or mortality.

³ On October 21, 2020, the disappearance of 109 trusts was approved, and FONDEN was among them (Senado de la República, 2020). However, this only affects the figure of the trust, considering that resources continue to be disbursed to respond to emergencies associated with natural phenomena, such as the floods in the state of Tabasco during November 2020 (Secretaría de Seguridad y Protección Ciudadana, 2020).

THE NATIONAL HEALTH SYSTEM

The SNS encompasses the agencies and entities of the public administration and the individuals or legal entities that provide health services, as well as the coordination mechanisms, whose purpose is to comply with the right to health protection (Secretaría de Salubridad y Asistencia, 1984, article 5). The coordination of the SNS is the responsibility of the Ministry of Health, which formulates and implements national health policy, in coordination with the governments of the states, which will plan, organize, and develop state health systems in their own regions (Secretaría de Salubridad y Asistencia, 1984, article 9). Figure 2 shows the structure of the national health system in Mexico.

Figure 2. Structure of the Mexican National Health System



Acronyms and initialisms: Institute for Social Security and Services for State Workers (ISSSTE), Petróleos Mexicanos (PEMEX), Social Security Institute for the Mexican Armed Forces (ISSFAM), Mexican Social Security Institute (IMSS), Mexican Social Security Institute-

Wellness Program (IMSS-Bienestar), Ministry of Health (SS), State Health Services (SESA), Health Institute for Well-being (INSABI).

Source: Gómez, et al. (2011), Muñoz (2012, p. 20), from Martínez and Murayama (2016, p. 45).

The SNS involves both the public and private sectors in the provision of health services. Regarding the public sector, there are two types of subsystems: social security and health protection. These complement each other to serve the population entitled to access health care under the social security subsystem, and the general population under the health protection subsystem. Funding is provided by the federal government, the employer, and the worker, in the first case; while the federal and state levels, via the State Health Services (SESA) and the Health Institute for Well-Being (Instituto de Salud para el Bienestar) provide funding in the second case. Health care users and providers are at the bottom two levels of the system (Martínez & Murayama, 2016). Regarding the private sector, it is made up of insurance companies, hospital networks, and private medical services, which provide their services to people who lack public health coverage and individuals with the ability to pay (Martínez & Murayama, 2016).

Among the coordination mechanisms is the National Health Council, as a permanent body for coordination between the federal and state entities, and Mexico City. The National Health Council is constituted by the Ministry of Health and the heads of the Ministry of National Defense, Mexican Navy, Mexican Social Security Institute (IMSS), Institute for Social Security and Services for State Workers (ISSSTE), Social Security Institute for the Mexican Armed Forces (ISSFAM), Petróleos Mexicanos (PEMEX), National System for Integral Family Development, Network of Municipalities for Health, and the 32 State Health Services (SESA) heads (Secretaría de Salud, 2019).

For its part, the General Health Council (CSG) declared a national health emergency due to the epidemic caused by the SARS-CoV-2 virus on March 30, 2020, with the Ministry of Health as the body that would determine all necessary emergency response actions. The CSG also issued health safety measures such as the suspension of non-essential activities, implementation of health measures, shelter-in-place orders, as well as a phased return to work and social activities, among others (Consejo de Salubridad General, 2020). The National Committee for Health Safety (CNSS) is the body controlling the health safety strategies at SNS public institutions, aiming to establish a shield of care and prevention from epidemiological emergencies and disasters (Ministry of Health, 2003, Article 1).

A key element for monitoring the pandemic is the Mexican National Epidemiological Surveillance System, which gathers epidemiological information from 20,005 health care units. The coordinating body of this system is the National Epidemiological Surveillance Committee, consisting of representatives from all SNS institutions at the federal level. At the state level, there are State Epidemiological Surveillance Committees, and at the local level there are Jurisdictional Committees. The information collected is entered into the Unified Information System for Epidemiological Surveillance (Secretaría de Salud, 2020c). Based on these agencies' information, the Undersecretary of Prevention and Health Promotion issues daily reports on the number of cases

and deaths, incidence rate of active cases, and so forth, which are used to monitor the COVID-19 pandemic.

Two models for disaster risk reduction

Based on the analysis of the models above, Table 2 shows the main components for disaster and health risk response, as well as the relationship between agencies according to their level in each structure.

Table 2. The SINAPROC and the SNS organization and response to disaster risk

Components	SINAPROC	SNS
Year of creation	1986	1984
Coordination	Ministry of Security and Civil Protection	Ministry of Health
Members	All public administration units (federal and local)	Public administration units (federal and local) and private agencies that provide health services
Institutions for prevention	Nacional Disaster Prevention Center	National Center for Prevention Programs and Disease Control
Monitoring systems	Tropical Cyclone Early Warning System, Mexican Seismic Warning System, Popocatepetl Volcano Monitoring System, National Tsunami Warning System, Fire Early Warning System, National Seismological Service, National Meteorological Service	National Epidemiological Surveillance System
Funds	Natural Disaster Fund, Natural Disaster Prevention Fund	Health Services Contribution Fund, Health Fund for Wellness

Source: Author’s compilation based on data from the Ministry of the Interior (Secretaría de Gobernación, 2012), Ministry of Health and Assistance (Secretaría de Salubridad y Asistencia, 1984), National Disaster Prevention Center (Centro Nacional de Prevención de Desastres, 2020b), and Ministry of Health (Secretaría de Salud, 2020d).

SINAPROC addresses a broad range of natural hazards that can trigger disasters, such as those associated with earthquakes, floods, and volcanic eruptions, to name a few. Since its inception, it has incorporated several specific initiatives created in the 19th century, such as the National Meteorological Service, created in 1877, and most recently, the National Tsunami Warning System in 2013 (Centro Nacional de Prevención de Desastres, 2020b). SINAPROC’s major advance is

that “since its establishment... it has institutionalized disaster management in Mexico” (Banco Mundial, 2012; Morán, 2017, p. 161).

SINAPROC emerged at a time when reactive approaches prevailed, focusing its actions on population preparedness to cope with and respond to the effects of disasters, coordinated by government institutions responsible for civil defense and the armed forces, and based on a humanitarian approach (Alcántara-Ayala, et al., 2019). At the outset, SINAPROC had mainly a reactive approach, in which hazards “are catalogued according to their origin, nature, and degree of predictability, as well as by their destructive effects” (Alcántara-Ayala, 2019, p. 11). A relevant aspect that may be associated with the implementation of SINAPROC in recent years is that from 2014 to 2018, the number of deaths associated with natural phenomena had remained constant, except for the September 2017 earthquake that increased the number of fatalities (Centro Nacional de Prevención de Desastres, 2020a, p. 8).

Currently, the focus on civil protection has evolved to new ways of managing disaster risk. This evolution was a response to the sustained increase in damages associated with intense natural events, which required new damage reduction models. A crucial factor in this shift of approach has been the institutionalization of processes, which is oriented on risk knowledge, and not just the disaster itself. In the institutionalization of disaster risk management processes, not only is the analysis of hazards and vulnerability included, i.e., knowledge of risk, but also new interinstitutional and intersectional cooperation mechanisms are strengthened or designed, resulting in forms of collaboration at the local and national levels (Fontana & Barberis, 2017).

Notably, “[p]art of pandemic planning and dealing with a pandemic disaster is to incorporate immediately the disastrous aspects brought by lockdowns,” considering that the consequences of mass isolation had already been identified in the past (Kelman, 2020, p. 297). The General Health Law empowers health authorities to use all the existing medical and social assistance resources of the public, private, and social sectors in the affected and neighboring regions (Ley General de Salud, 1984, article 148). Additionally, the Ministry of Health is in constant communication with the WHO to inform and follow up on the measures adopted countrywide for epidemiological surveillance (Ley General de Salud, 1984, articles 181 and 359).

According to a statement from the Secretary of Health in Mexico, Alcocer Varela, there are two types of lessons that the pandemic has brought:

First, the pandemic opened a window for us to get to know the country’s healthcare system [...]. Second, fortunately the population was receptive to this, not only to the uncertainty, but also to the benefits brought by the pandemic [sic], what it is, what we can do, what we were able to do, and what we are learning to deal with on our own risks facing the virus. We know, just as everyone else around the world, what the virus is, how it attacks, who it attacks, why it attacks, how to counteract it, the vaccine, the medicines, etcetera, but we are taking our own risks and learning along the way how to understand them, how to take care of them and how to prevent what could be in store for us in the future with this pandemic, and others that humanity may be waiting for (Alcocer, 2020, min. 20:48 to 21:52).

Four relevant aspects are striking in this statement. First, the pandemic put the current SNS to the test, which translates into having awareness of its strengths and weaknesses in responding to the pandemic (structure, organization, resources). Second, there was a high degree of uncertainty in understanding the course of the pandemic because it was triggered by a new virus whose nature and impact were unknown, meaning the characteristics of the hazard were unknown. Third, new epidemiological knowledge emerged, which is being advanced as the pandemic progresses, new treatments are developed, and the administration of a vaccine is in the horizon. Finally, this experience may—or may not—become an element in improving the SNS in its response to new epidemiological emergencies. Consequently, once the epidemic has been controlled, it would be possible to understand the relationship between hazard, exposure, and vulnerability, as conceived by the disaster risk approach, but now oriented to epidemiological risk.

For providing an adequate pandemic response, the three levels of government must ensure that services are accessible to the population, where the role of government in health funding is essential (Yamey, Bekeler, Wadge, & Jamison, 2017). Funds allocated to disaster prevention and response associated with natural phenomena, via SINAPROC, have this function, although sometimes greater emphasis is given to reconstruction than to mitigation.

Thus, the SNS is a specialized model for only one type of hazard: health risk. In this case, the National Center for Prevention Programs and Disease Control is a decentralized body that implements 18 programs for disease prevention and control, including the prevention and control of respiratory diseases and influenza as well as the response to epidemiological emergencies and disasters (Centro Nacional de Programas Preventivos y Control de Enfermedades, 2020). At this point, between SINAPROC's National Disaster Prevention Center and SNS's National Center for Prevention Programs and Disease Control, the first collaboration mechanisms could be set in place to bolster risk management, sharing information and organizational schemes aimed at disaster risk prevention, but from a disaster risk approach, in which hazard, exposure, and vulnerability intervene (Maskrey, 2016).

In any organizational and operational structure, funding is a critical component that must guarantee the actions and functions of the bodies it serves. The SNS has the Health Services Contribution Fund (FASSA), whose main objective is to contribute financial resources to the states for providing health services to the population that is not part of the social security system and to implement mechanisms supporting activities to protect against health risks. In 2020, FASSA had a budget of 103,371,546,526 pesos (Secretaría de Hacienda y Crédito Público, 2019). Moreover, with the creation of the Health Institute for Wellbeing, there is now the Health Fund for Wellness, similar to the public health area of the Mexican Social Security Institute-Wellness Program, where epidemiological surveillance processes are coordinated and controlled, providing healthcare services to indigenous communities as well as rural and urban marginalized areas in light of epidemiological emergencies and natural disasters (Instituto Mexicano del Seguro Social-Bienestar, 2020). If it were possible to coordinate these funds and those of FONDEN—despite how it shapes up in the coming years—, there would be a financial baseline exclusively focused on disaster risk prevention, regardless of the type of hazard.

Both national systems have institutions, strategies, and monitoring systems designed to respond to disaster risk, including different funds that can guarantee, to a certain extent, the prevention and response to the affected population. The cost of responding to COVID-19 is an example of an extraordinary health disaster. During the first half of 2020, the response budget had been increased by 40 billion pesos to take care of the affected population (Secretaría de Hacienda y Crédito Público, 2020).

DISASTER RISK MANAGEMENT AND COVID-19

The disaster associated with the COVID-19 pandemic presents a challenge for risk management in Mexico and the entire world. Drawing on the public policy approach to manage COVID-19, the study of disaster risk must be based on current theoretical and methodological advances. To this end, we are required to understand the underlying causes of risk, in other words, the social construction of disaster risk.

The concept of social construction of risk “has proved to be an increasingly useful analytical tool among disaster experts and the effects disasters have had in society” (García, 2005, p. 12). A couple of perspectives of analysis can be highlighted by using this concept, “a culturalist perspective, which offers the perception of social groups about risks ... and another arising from the analysis of the origin that leads to situations of vulnerability of specific groups in society” (García, 2005, p. 22). Based on this, the study of vulnerability is a crucial element for risk management, whether associated with natural or sanitary-biological hazards.

According to Adger (2006), vulnerability “is the state of susceptibility to harm from exposure to stresses associated with environmental and social change and from the absence of capacity to adapt” (Adger, 2006, p. 268). But vulnerability does not appear suddenly; it obeys a process of social, environmental, political, and cultural shaping. Additionally, the “process of the construction of risk, and therefore of disasters, starts from the conflicting views on the structures of socio-cultural systems, which lead to an internal functional disorder” (Oliver-Smith, Alcántara-Ayala, Burton, & Lavell, 2016, p. 38).

To face the impacts of disasters and their prevention, as well as to reduce social vulnerability, a multidimensional and participatory planning process must be developed. Disaster risk management refers to the “systematic process of using administrative directives, organizations, and operational skills and capacities to implement strategies, policies and improved coping capacities in order to lessen the adverse impacts of hazards and the possibility of disaster” (UNISDR, 2009, p. 19). To reduce disaster risk, a variety of factors and situations must be considered, including economic and political factors responsible for a more complex process, such as the social construction of risk. Cultural frameworks, determined by diverse ways of interpreting risk, as well as efficient and effective frameworks for action must be developed (Oliver-Smith, 2020).

The concept of risk governance “encompasses the full range of risks recognized by human societies, including health and medical, safety and security, and environmental risks, such as hazards and disasters” (Tierney, 2012, p. 343). Disaster governance involves “interrelated sets of norms, organizational and institutional actors, and practices (spanning predisaster, transdisaster, and postdisaster periods) that are designed to reduce the impacts and losses associated with disasters arising from natural and technological agents...” (Tierney, 2012, p. 344). Vulnerability and its risk-disaster relationship is linked to the preconditions that a society maintains to handle the impact of a hazard, such as exposure, marginalization, access to public and health services, and so on. In other words, it is associated with the contexts of fragility that are manifested when a particular hazard occurs.

Regarding the risk associated with COVID-19, vulnerability is first and foremost related to the previous medical condition of people exposed to the virus and, secondly, to the healthcare system, which includes coverage, medical equipment, and medication. The COVID-19 disease does not affect all people equally—it affects the most vulnerable. According to a statement from the Undersecretary of Prevention and Health Promotion, Lopez-Gatell, more than 80 percent of the people who have died from COVID-19 had pre-existing chronic conditions such as diabetes, heart disease, and vascular issues. In other words, these problems related to poor nutrition had a significant bearing on their susceptibility to die from COVID-19, besides their advanced age (Lopez-Gatell, 2020, min. 29:08 to 30:08).

This statement points out that people’s pre-existing conditions play a vital role in the progression of the pandemic. Vulnerability, exposure, and hazard combine in a way that shows an increase in the number of cases and deaths from COVID-19. As a matter of fact, the disaster risk approach has developed different methodologies to define scenarios of vulnerability to floods, earthquakes, and tropical cyclones, among others; an illustration of this is the National Risk Atlas of Mexico, coordinated by the National Disaster Prevention Center.

In the context of COVID-19, the experience from the disaster risk approach should be used to define the “new contexts of vulnerability” to health risks, which entails rethinking schemes to identify the most vulnerable populations facing new diseases. At the same time, collaboration schemes among SNS institutions should be reinforced to identify and solve problems of coverage, medical equipment, and medication needed to cope with a health disaster.

This analysis found no formal evidence of collaboration or coordination between SINAPROC and the SNS in responding to the COVID-19 pandemic, except for the implementation of the DN-III-E Plan, by means of the hospital reconversion of some military facilities and the support offered in specific surveillance activities. These two models have specific goals and objectives for health and disaster risk response and reduction, but there are no cross-sectional communication mechanisms between both systems, which may limit action framework. Since the early days of SINAPROC, mechanisms have been developed for coordination, monitoring of intense natural phenomena, response protocols, the creation of volunteer networks to assist those affected by emergencies or disasters and, above all, civil protection systems at the local level. These resources

may well be implemented under national and state coordination to shoulder the effects of COVID-19. Nevertheless, some areas of local government have collaborated with the health sector to curtail COVID-19 cases, such as closing of public areas and monitoring business compliance with public health measures.

The two public health decision-making and coordination bodies, the General Health Council and the National Committee for Health Safety, are made up of representatives from the health sector. This integration is justified given that this is a public health issue. The COVID-19 pandemic put the SNS to the test and poses challenges that must be addressed from other fields, ranging from public safety to the economic and social spheres. The WHO serves as a reference for international coordination, which recommends strategies for national healthcare systems around the world. This could explain why Mexico opted for a merely health-related response to COVID-19, by having an international point of reference that offers mechanisms, protocols, and methodologies to control a pandemic, while leaving aside the expertise of civil protection and not offering a perspective of a health disaster that affects other aspects of daily life.

Therefore, this paper proposes that the context of the ongoing COVID-19 in Mexico be seen as an opportunity to consolidate a national policy for disaster risk reduction for any hazard. The SNS's health perspective should be enhanced with the progress made by SINAPROC in recent years. The health disaster unfolding in the country must be addressed from a comprehensive perspective of disaster risk management, given that public health problems also become economic and social crises, as has occurred with the impact of intense hurricanes such as Ingrid and Manuel in 2013 or the earthquake on September 19, 2017 (See Table 1). To this end, modifications are required in the legislation that sustains both SINAPROC and the SNS.

SINAPROC needs to step up its actions against health risks, as contemplated in the LGPC, considering how it frequently deals with hydro-meteorological and geological hazards. For its part, the SNS should continue to address the issue of health risk as provided by law, but it can be supported based on the civil protection model by involving the organization and structure of SINAPROC, which is more relevant at the local level, a scale where the consequences of disasters associated with natural phenomena as well as those associated with the pandemic could be better observed.

In the same fashion, “the social study of the construction and accumulation of risks implies that disasters associated with the COVID-19 virus and disease represent the materiality of pre-existing and underlying risk conditions” (Lavell, Mansilla, Maskrey, & Ramirez, 2020, p. 3). In this sense, disaster risk is associated with a hazard of biological origin (SARS-CoV-2), as well as with the conditions of exposure and vulnerability of people, which in turn creates unsafe physical, social, and economic conditions.

According to Lavell and Lavell (2020), there are common elements that can be transferred from the practice of disaster risk management to the current management of the COVID-19 pandemic. Prominent among these practices are:

1. Understanding that the social construction of risk offers elements for grasping the relationship between hazard, exposure, and vulnerability associated with the pandemic.
2. Learning methods for identifying vulnerable populations to the pandemic.
3. Identifying causal factors associated with hazard, exposure, and vulnerability.
4. Using corrective (current risk), prospective (future risk), reactive (emergency response) and compensatory (capacity building) risk management approaches to determine current or future intervention actions.
5. Applying early warning systems to reduce risk in the short term (See Table 2).

These are not the only forms of collaboration between the disaster risk management model and the pandemic response. They could, however, become the turning point in shifting the focus of attention from the disease at this time, and above all, in implementing new risk management mechanisms in the future. Similarly, there is a clear idea of the effects of disasters associated with natural phenomena, particularly regarding the degree and scale of impact in each area, but the COVID-19 pandemic presents complex challenges, especially seeing how its area of impact has global and multisectoral influence, and its temporal scale has not ended. Even so, the experience acquired should be used to minimize the effects of natural phenomena, including biological agents.

CONCLUSIONS

Disasters associated with natural phenomena frequently impact Mexico's territory. On the one hand, tropical cyclones are frequent during hurricane season, which in contexts of vulnerability have triggered disasters with consequences on people's lives, infrastructure, and the development of regions. On the other, earthquakes are unpredictable natural events; even one single occurrence can cause severe damage. Knowing the causes of risk is an essential element to diminish the impact of disasters.

By registering an increasing number of cases and deaths, the COVID-19 pandemic is a public health problem, but it has also brought consequences that translate into economic losses and moving online for work (home office), education, and social spaces, among others. Fortunately, COVID-19 cases and deaths are being controlled by actions taken by the health sector institutions and the participation of civil society, which has changed its daily life routine, although this may vary as the pandemic progresses over time. Even national and international health experts find it difficult to determine when the pandemic will end. In the meantime, there are lessons to be learned in the health sector, as well as in the economic and social fields, or in other areas.

The model adopted by SINAPROC aims to move from a reactive to a preventive model. For instance, it is necessary to overcome the welfare-oriented approach at times of a hazard and move on to risk reduction as a national policy issue, which implies reducing the exposure and vulnerability of communities. Yet, this has not been easy. SINAPROC's structure specializes in

emergency response, which should be set up as a cross-sectional issue in the country's territorial development.

Social, economic, and territorial policies should include a disaster risk reduction approach, aiming to reduce future risk when developing new projects, starting from a long-term vision, and contributing to the reduction of current risk. At this point, the intervention of local governments is relevant since it is at this level where the contexts of vulnerability and risk crystallization can be observed when a disaster occurs.

The SNS model embodies the national effort to address public health problems. It is a disjointed model that involves public and private sector institutions, whose objectives may be oriented towards different goals. On the one hand, the government's welfare approach and, on the other, a private service in which only people with sufficient financial resources to pay for healthcare have access to it. Thus far, the COVID-19 pandemic has been the greatest challenge for the SNS, after which it would be expected to consolidate its approach to health risk. Comparatively to how SINAPROC was created because of the social, economic, and cultural consequences associated with the 1985 earthquake, perhaps the COVID-19 pandemic is the moment of juncture that will propel us forward to engage in substantive and comprehensive risk management and to work more on the reduction of risk, exposure, and vulnerability of local communities.

The COVID-19 pandemic is still active, and it is necessary to wait for new results on its consequences and, above all, on the way in which government agencies respond to the emergency and damage control, regarding epidemiological, social, and economic matters. Therefore, here are some specific recommendations for coordinating both models:

1. Introduce the term “health risk management” into the General Health Law, as well as its relationship with the General Civil Protection Law.
2. Include the figure of the National Civil Protection System in the structure of the National Health System, to guarantee its collaboration and coordination.
3. Establish mechanisms for institutional collaboration between disaster prevention and disease control agencies.
4. Promote institutional coordination among surveillance systems.
5. Align public policies on public health and civil protection with social, economic, and territorial development policy to reduce the vulnerability of society.
6. Use the concept of “disaster risk” in a comprehensive manner between the two models, regardless of whether natural or health events are involved, under the approach of the social construction of risk.

This is not by any means a complete or exhaustive list. These points simply reflect the experience acquired in recent years in terms of prevention and response to the effects of disasters. Likewise, they propose to break down the barrier between the two general legislations by viewing disasters as specific problems: on the one hand, those associated with natural phenomena and, on the other, with biological or health phenomena.

The contributions of this research seek to cover two aspects in the way disasters are dealt with in Mexico. The first is aimed at comparing two models of risk response that are currently separate, but that in the context of the COVID-19 pandemic can be restructured to complement each other, particularly the National Health System now that it has been overwhelmed by these recurring struggles. This restructuring should be based on the concepts used by the disaster risk approach, such as hazard, exposure, and vulnerability, hence being able to identify the nature of the SARS-CoV-2 virus; the previous health, social, and environmental conditions that can affect a community from contracting the disease, as well as the conditions of fragility that certain sectors of the population have developed before the disease. Lastly, this paper proposes that to face the current pandemic as well as new health disasters, the social construction of risk approach should be included, which can explain how people contend with health risk, their attitudes, or their perception of risk, as well as their strategies for recovering from disease.

Translation: Luis Cejudo-Espinoza

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