**Table 5.** All extracted data from the selected articles based on the primary research questions

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **No** | **Author (s)** | **Earthquake location** | | **Earthquake Features** | **Purpose of the Study** | **Challenges and Complications** | **Lessons Learned** | **Recommendations** |
| **1** | Čivljak et al, 2020  **Earthquake in the time of COVID-19: The story from Croatia (CroVID-20)** | Croatia | | on 22 March 2020, the  citizens of Zagreb, the capital of Croatia, home to a quarter of the total Croatian population, were awakened at 6:24 am by an earthquake of 5.5 magnitude on the Richter scale, followed in the next 24 hours by 57 aftershocks. | **-** | **MAJOR ISSUE:**  **managing the pandemic and earthquake together by the health care system**  **The challenges:**  -Due to extensive property damage, several hospitals had to be evacuated, including the UHID, where there were 86 patients at the moment, including 22 COVID-19 patients, 15 of whom were in the ICU.  - The earthquake would accelerate the spread of the COVID-19 epidemic in Croatia since the earthquake, which left many homeless and fearful of earthquakes to come, triggered migrations to other parts of the country.  - However, in combination with a natural disaster, such as earthquake, the risk for increasing the number of the infected, as well as outbreaks of other infectious diseases.  - Current challenges, including extensive damage to hospitals, shortage of hospital personnel, and disruption of supply chains. | **OVERALL SUCCESSFUL INFECTION PREVENTION**  **RESPONSE PHASE**  - On the national level, no increase in  the incidence of COVID-19 was experienced in the post-earthquake period  - due to a **well-organized public health system** and **coordinated outbreak response**,  **We have learned that** we cannot do without one another: physicians without nurses, patients without HCWs, HCWs without non-medical staff, parents without children, and children without parents.  Conscientious public compliance with social distancing and other preventive measures have successfully prevented the COVID-19 epidemic from spreading in our country. | **-** |
|  | **Author (s)** | **Earthquake location** | | **Earthquake Features** | **Purpose of the Study** | **Challenges and Complications** | **Lessons Learned** | **Recommendations** |
| **2** | Ivanusa,  2021  **Adaptation of outpatient cardiovascular rehabilitation in Zagreb**  **to the emerging conditions due to the COVID-19 pandemic and the large earthquake in March** | Croatia | |  | Reporting how the life quality of cardiovascular patients has been enhanced following COVID-19 isolation and uncertainty from the sudden earthquake, all leading to health disruption | **MAJOR ISSUE:**  **Managing high risk cardiovascular (CV) patients**  **The challenges:**  Rapid and significant changes in everyday life, especially in those who can marshal less mental resilience, have resulted in a deterioration of lifestyle habits and impairment of the quality of life.1  The COVID-19 pandemic and the that hit Zagreb in March not only reduced the availability of health care and caused higher morbidity and mortality in the population of the Republic of Croatia, but also limited the use of secondary prevention measures in cardiovascular (CV) patients.  These high-risk patients were faced with a drastic change in the quantity and quality of daily activities, quarantine and isolation as a result of COVID-19, and fear of the consequences and uncertainty from a sudden earthquake, all leading to a health disruption. | **SUCCESSFUL MEASURES**  **Infection prevention measures for traditional form of rehabilitation for CV patients**  **Outpatient rehabilitation**  We recommenced performing the traditional form of rehabilitation in our center (12 weeks, 36 sessions), starting with previously enrolled patients and followed by newly admitted patients two weeks after.  In order to reduce the possibility  of accidental infection of CV patients and healthcare professionals with COVID-19, we have adapted  the organization and protocols of all therapeutic interventions, ensured the application of hygienic  procedures and social distancing, and, in addition to the use of personal protective equipment, we have installed protective glass on reception desks  **Measures for online treatments and interventions (outpatient CV rehabilitation)**  The program of outpatient CV rehabilitation of the Srčana Institute for Cardiovascular Prevention and Rehabilitation in Zagreb embraced digitalization and reorganized its traditional patterns2 to implement a fully virtual program for the first time. The virtual program has been running for 60 days, and we will outline the full scope of adjustments made to the program since March until the end of 2020.  During the period from March 23 to May 28, 2020, we used easy-to-reach methods of communication, such as telephone-delivered or text messaging interventions that we accompanied with structured therapeutic education and digital materials sent to CV patients by e-mail. Additionally, we dedicated a  section on our web portal to publishing all digital content (PDF, mp4) with recorded medical exercises for CV patients and advice from psychologists and other members of the CV rehabilitation team, covering topics such as nutrition and other important information.3 To maintain patient engagement after the earthquake, 80 patients who remained virtually involved in the program were also included in the weekly newsletter program.4 |  |
|  | **Author (s)** | **Earthquake location** | | **Earthquake Features** | **Purpose of the Study** | **Challenges and Complications** | **Lessons Learned** | **Recommendations** |
| **3** | **Šago et al, 2020**  **Telepsychiatry in the time of the covid-19**  **and earthquake in zagreb as odysseus**  **between scylla and charybdis** | Croatia | In Zagreb where we are stationed, during COVID-19 pandemic there was an earthquake of magnitude 5.5 on the Richter scale which caused a lot of devastation in the town center, leaving people homeless and in a state of acute stress. | | Reveal some of the many challenges during the time of the twofold simultaneous trauma; the  COVID-19 pandemic and the devastating earthquake in Zagreb. | **MAJOR ISSUE:**  **Problems of psychiatrists and mental health workers**  **The challenges:**  Intensive daily psychotherapy and psychosocial treatment at Day Hospitals has been replaced overnight by social isolation and the collapse of the normal functioning of the health care system and public transportation.  - The additional distress caused by an earthquake brought some new, but contradictory measures. It was difficult to reconcile the diametrically opposite recommendations at the same time; social distancing, which meant staying home, and going out because of the risk of possible following earthquakes, which meant social gathering.  - We were given conflicting messages, as is the case with double-entry bookkeeping. For a brief moment in time, we all experienced a psychotic experience filled with fear, uncertainty, and double blind messages.  - Isolation, fear of contagion, stigmatization, frustration, anxiety, insomnia, depression, impaired daily functioning, limited social contact, inadequate health care these were all new challenges to which the general population, including therapists, had to adjust.  The implementation of strict quarantine measures has kept a large number of people in isolation and affected many aspects of people’s lives (Qiu et al. 2020). In Zagreb where we are stationed, during this pandemic there was an earthquake of magnitude 5.5 on the Richter scale which caused a lot of devastation in the town center, leaving people homeless and in a state of acute stress. The additional distress caused by an earthquake brought some new, but contradictory measures. | **SUCCESSFUL MEASURES**  **Mental health management**  **Mental health problems; impacts of earthquake co-occurring with COVID-19 pandemic**  **Turning challenges into opportunities by choosing a variety of tele-psychiatry modalities**  **The challenges have given us the opportunity to grow and develop personally, both therapists and patients** (Shalev & Shapiro 2020).  The psychotherapeutic approach and the capacity for mentalization allowed us to turn challenges into opportunities. Rapid changes without delay extended our scope of practice in these extraordinarily difficult times.  National health authorities paid little attention to the practical implementation of psychological interventions in these situations, so we chose a variety of tele-psychiatry modalities to provide assistance, treatment and availability to those who need support (Duan & Zhu 2020, Fagiolini et al. 2020, Flodgren et al. 2015, Zhou et al. 2020). Considering various aspects, including patients’ and therapists’ capabilities, familiarity with new online technologies, socioeconomic status, previous experience of therapists, we opted for Skype therapy,  and for those patients who were unable to do so, we used regular telephone support and consultation (Fagiolini et al. 2020, Flodgren et al. 2015, Liu et al. 2020, Wright & Caudill 2020). | - Findings of the recent study suggest more attention needs to be paid to vulnerable groups, especially for psychological first aid during major disasters, potentially delivered through telemedicine.  - The emerging situation required the therapist's flexibility and resourcefulness. |
|  | **Author (s)** | **Earthquake location** | | **Earthquake Features** | **Purpose of the Study** | **Challenges and Complications** | **Lessons Learned** | **Recommendations** |
| **4** | TIŠLJARIĆ et al, 2020  **Mixed impact of the covid-19 pandemic and the earthquake on traffic flow in the narrow city center: a case study for zagreb-croatia** | Croatia | | March and April 2020, when COVID-19 pandemic and earthquake in Zagreb occurred. The day when the earthquake with the magnitude of 5.5 ML hit Zagreb was 22nd March 2020. | Try to investigate traffic flow trends before and during the COVID-19 and the earthquake | **MAJOR ISSUE:**  **Impacts of COVID-19 and earthquake on traffic flow**  **The challenges:**  - The traffic volume was unexpectedly increased due to the fear of staying in the old buildings in the city center. | **SUCCESSFUL MEASURES**  **Traffic Management**  **presenting an analysis of the traffic state parameters in a case of disaster events**  The results can be useful for traffic managers dealing with post-disaster traffic management strategies  This research showed some notable traffic mobility patterns during the natural disasters.  One of the important patterns related to the psychological effects of the disasters is captured during the time after the earthquake.  The traffic volume was unexpectedly increased due to the fear of staying in the old buildings in the city center. This information and captured pattern could be useful for the large amount of the interdisciplinary studies like influence of the psychological effects on the mobility pattern during the crisis.  Only one radar detector can be a valuable source of the information because it can provide useful insights into extraordinary situations like earthquakes and COVID-19 pandemic, emphasizing the importance of real-time traffic data collection for implementation in an intelligent transport system.  This information also gives the insights for traffic managers dealing with post-disaster traffic management strategies. |  |
| **5** | Marko et al,  2020  **Stay home while going out – Possible impacts of earthquake co-occurring with COVID-19 pandemic**  **on mental health and vice versa** | Croatia | | The city of Zagreb, capital of the Republic of Croatia, was afflicted by a devastating earthquakes,  5.5 and 5.0 on Richter scale hit the capital, the pandemic  “hotspot”, in early morning hours (6:24 and 7:04 AM) on March 22nd,  2020. | Going through the psychological impact of the two threats | **MAJOR ISSUE:**  **The dual mental pressures of COVID-19 and earthquake**  **The challenges:**  Mental health here seems of crucial importance, as the current SARS-CoV-2 pandemic is characterized by psychological reactions arising from feelings of uncertainty alongside limited availability and possibility for “healthy” coping.  Restrictive public health measures have severe unintended psychological and social consequences, characterized by deprivation of fundamental right and freedoms and restrictions on work, mobility and social support (Brooks et al., 2020; Galea, et al., 2020).  It has been widely reported that such a setting has deleterious effects on mental health in persons (in)directly in contact with the infectious agent; persons that are vulnerable to biological and psychological stressors; | **ANALYSIS-ONLY ARTICLE**  **The significance of mental health problem when two crises co-occur**  **PTSD Analysis**  During pandemics, the number of people whose mental health is affected tends to be greater than the number of people affected by the infection. This is certainly going to be more pronounced in a context were peri-traumatic phase of the COVID-19 was reinforced by another deeply traumatic experience.  Even if most people prove to be resilient in the long-term, and a significant minority expresses mental health disruptions, this could mean an enormous mental health burden, further impeding recovery process.  Disastrous events have various effects on individuals, as some may be more susceptible to its adverse effects, while others may be more resistant or resilient. These effects are not only driven by different states and/or traits of individuals, but also by their pre-disaster as well as post-disaster context | Hopefully, widespread  activation and digital transformation of mental health resources and  systems will be able to provide much needed care (Druss, 2020; Duan  and Zhu, 2020; Fiorillo and Gorwood, 2020). |
| **6** | Quigley 2020  **A multi‑hazards earth science perspective on the COVID‑19 pandemic:**  **the potential for concurrent and cascading crises** | Croatia | |  |  |  | **ANALYSIS-ONLY ARTICLE**  **Rapid and decisive measures to prevent cascading crises**  The Croatian earthquake is not an extreme natural disaster scenario. However, it provides a useful perspective of compound risks.  For example, in the immediate aftermath of a natural disaster, measures imposed to ensure social distancing may collapse temporarily.  Due to the moderate size of the event and relatively localized damage zone, the Croatian government managed to clamp سختگیری down on partial lockdown measures within about a day by issuing new directives, whereby the natural human behavior of congregating in numbers and comforting each other in the aftermath of such an event was disrupted.  Nonetheless, it is evident that the risk of COVID-19 transmission increased in a short-time window immediately following the Zagreb earthquake.  The daily new infectee rate (Fig. 3) shows an apparent increase following the Zagreb earthquake on 22 March 2020 within the COVID-19 incubation time range.  **We learned** that Therefore, the importance of acting rapidly and decisively by governing bodies in the immediate aftermath of a natural disaster is highlighted by the Zagreb earthquake. Identifying probable natural disasters and advance preparation might enable enforcing such actions more efficiently and systematically, reducing risks posed by the COVID-19 virus. | Further analysis is needed to ascertain the exact cause of this apparent signal although it is not unreasonable to presume that temporary disruption of social-distancing measures not only in Zagreb but also in other parts of the country in the immediate aftermath of the earthquake might have played a role. |
| **7** | Adhikari et al, 2020  **Earthquake rebuilding and**  **response to COVID-19 in**  **Nepal, a country nestled in**  **multiple crises** | **Nepal** | | Gorkha (2015)  Mortality associated to Gorkha earthquakes was high among vulnerable population. | To explore long-term impact of Gorkha earthquake in the communities threatened by COVID-19 pandemic and vice versa. We specifically explored how the long-term impacts due to the earthquakes are compounded by the evolving current pandemic. | The cumulative impacts due to COVID-19, lock down and the damages due to Gorkha earthquakes.  More importantly, Nepal’s health system and its functioning is enervated/exhausted by corruption, and has deterred/prevented Nepal’s earthquakes rebuilding and COVID-19 response.  COVID-19 pandemic will escalate the vulnerability and poverty. For instance, the mobility restriction (particularly across the border) against COVID-19 stranded a mass exodus of labor migrants in poor conditions, and the government could not reach the optimal capacity in testing them [11].  The poor living conditions in urban areas (crowded living, poor hygiene) are a great risk to an explosion of COVID-19 as it also can compound the other infectious diseases.  In absence of effective testing, tracking and tracing strategy, lockdown has been the only option, which however, can have plethoric ramifications in the country’s economy, health and the infrastructure with patent/obvious impacts on rebuilding.  Acutely, current drop in remittance—a major source of Nepal’s economy is likely to have chronic consequences for years to come and may reduce and shift the budget allocated for earthquake rebuilding.  At five years post Gorkha earthquakes, the country’s rebuilding process has been nestled in the current COVID-19 crisis. Many systemic health challenges have emerged impacting population that needs atten­tion. | **ANALYSIS-ONLY ARTICLE**  **The impacts of an earthquake being compounded by the pandemic**  Devolving/decentralizing resources from central to provincial, municipal and community testing centers, and importantly, private sector’s engagement is critical to mitigate the current crisis.  At five years post Gorkha earthquakes, the country’s rebuilding process has been nestled in the current COVID-19 crisis. Many systemic health challenges have emerged impacting population that needs attention.  Immediate measures are required to support the health system including strategies to curb/restrain/limit the COVID- 19 pandemic and maintain the rebuilding for future. | - |
|  | **Author (s)** | **location** | | **Earthquake Features** | **Purpose of the Study** | **Challenges and Complications** | **Lessons Learned** | **Recommendations** |
| **8** | Dhungana, Nimesh, 2020  **2015 Nepal earthquake and COVID-19: A comparison**  **of the politics of crisis governance** | **Nepal** | | April 25 2015, an earthquake of magnitude 7.8Mw (and its subsequent aftershocks) triggered a major humanitarian crisis in Nepal, killing over 8,790 people and injuring over 22,300. The socioeconomic damage wrought by ‘the Great earthquake’ (Mahabhukampa) was unprecedented, from which the country is yet to recover. |  |  | **ANALYSIS-ONLY ARTICLE**  **Citizen-centric policies of crisis governance**  Beyond the deaths and destruction triggered by the 2015 Nepal earthquake, the immediate aftermath of the 2015 Nepal earthquake also triggered a range of citizen-centric initiatives, aimed at questioning, challenging and reversing the governmental and international actors’ response to the crisis.  The initial phase of sporadic citizen invigoration was followed by several locally organized campaigns that sought to exercise closer oversight over the relief and recovery efforts. Such citizen-driven initiatives embodied ‘politics of present’ – to follow the thinking of Luc Boltanski – evoking a sense of urgency towards the well-being of disaster survivors. But they also combined a longer-term vision of democratic governance of crisis, attending to the voice of disaster affected communities , while also safeguarding them against the burden of ‘second disaster’, characterized by abuse of resources and exclusionary form of recovery.  The COVID-19 crisis in Nepal has ignited/exploded various forms of citizen-centric politics that is reminiscent of the post-earthquake political climate.  There has been talks about an independent, citizen-driven **Ombudsman/supervisory body** to oversee the immediate and longer-term response.  Such Ombudsman, leveraging/influencing/controlling expertise of actors from various sectors, could monitor the mobilization and use of funds, as well as the implementation of relief and recovery packages at the local level.  Existing civil society campaigns could go further community-based, for instance, to monitor government budget and expenditure at the local level.  Media scrutiny could be much more targeted, focused on the conduct and performance of officials who are handling the response both at the national and local level.  These may prove to be important steps in the direction of pushing the State to assume fundamental responsibility to protect its citizens confronting a major crisis.  Disasters are known to trigger various forms of participatory and accountability politics that reveal fundamental weaknesses in the governance that may have been hidden from the public view. | - |
| **9** | Basnyat & Tamang (2020)  **2015 Nepal Earthquake lessons for COVID-19: How to**  **put women at the forefront of the crisis and recovery** | **Nepal** | | Five years ago today, Nepal was hit by a 7.6 magnitude earthquake that claimed 8,790 lives and injured 22,300 more. It is estimated that eight million people, almost one-third of Nepal’s population, were affected. The experience of the earthquake and its aftershocks was traumatic; an unreal time when uncertainty and fear ruled our lives. | What these two disasters have in common: the gendered nature of our government’s responses so far. | Following the natural disaster, the government drew harsh criticism for its inefficiency and its lack of transparency and accessibility in providing basic necessities, undertaking relief efforts and channeling comprehensive social security benefits to the most marginalized, namely those at the bottom of our society’s class ladder. The consequences were even more disastrous for women.  Today, a similar scenario is unfolding in the government’s response to the COVID-19 crisis, which has shone a spotlight on how it is still failing to take questions of gender and class into account.  The reverse migration of male migrant workers back to their villages during the coronavirus pandemic and the ensuing lockdowns has severe implications for women in the Mahakali basin, with the loss of income in the form of remittances curtailing their ability to provide for the household. Additionally, men’s return will mean the reversal of current gender regimes, with women being driven out of open spaces and back to the confines of their houses and their household chores and duties. Moreover, we are already seeing an increase in gender-based violence, mainly domestic violence, compounding the difficulties faced by women’s in addition to rising poverty, hunger and an economic crisis. | **ANALYIS-ONLY ARTICLES**  **Women at the forefront of the crisis and recovery**  Women at the forefront of crisis  The 2015 earthquake is a case in point, and an event that should have allowed the Nepali government to learn from its mistakes and do better next time.  Environmental and economic hardships in the Mahakali river basin have spurred most men in the region to seek work in the Indian states of Uttarakhand and Uttar Pradesh across the border, and send back remittances/payments/fees to their families. In the absence of so many male members of these communities, women have found new ways to survive and create spaces of empowerment for themselves, and to engage in community development programs. In doing so, they have found their voices, emerging as community leaders who participate and engage with decision-making at the community level.  Despite being vulnerable and severely affected by the earthquake’s impacts, in 2015 Nepali women were in the forefront of rebuilding communities and mitigating the impact of the disaster. They became frontrunners, aided by a range of non-state actors, in rebuilding their communities and the nation.  Afterward, women of the lowest strata went on to be engaged as community workers in numerous community development programs, particularly in disaster-prone areas where the majority of men migrate to seek work. Women in the Mahakali basin, for example, have grown as community leaders, taking on new roles and responsibilities and building skills in disaster management through such programs.  The socio-economic fallout of the COVID-19 epidemic is bound to be worse than the economic crisis that began in 2008, or the devastation brought by the earthquake in 2015.  In the weeks and months to come, the countless Nepali families relying upon income from migration across borders or working in agriculture are bound to experience the most severe impacts of the crisis – and of any inadequacies in our government’s response to it.  In the aftermath of 2015, women have shown their leadership at multiple levels in the community, challenging stereotypes, confronting patriarchal, social and economic obstacles and emerging as strong pillars of society in Nepal. In engendering its responses to the current disaster, Nepal’s government, acting on behalf of the whole nation, has the opportunity to show that it has learned the lessons of the past, and committed to building a stronger, fairer and more resilient country for all.  In the current crisis, the government must remember how women were key to Nepal’s recovery and resilience post-2015.  It must include women in decision-making and planning structures at local levels, with the aim of gender-inclusive policies becoming the norm. Women must also be reflected, consulted and addressed by state programs for welfare and socio-economic policy designed to mitigate the impacts of coronavirus pandemic. | In the current crisis, the government must remember how women were key to Nepal’s recovery and resilience post-2015. It must include women in decision-making and planning structures at local levels, with the aim of gender-inclusive policies becoming the norm. Women must also be reflected, consulted and addressed by state programs for welfare and socio-economic policy designed to mitigate the impacts of coronavirus pandemic.  1. The government must ensure accountability, transparency and accessibility in terms of allocation of resources to marginalized groups scattered in different parts of the country, without conditionality.  2. The government must accept and incorporate the Feminist and Queer charter of demands presented to the Minister of Defence Ishwar Pokhrel, Ministry of Home Affairs, Ministry of Women, Children and Senior Citizen and also with all the chief ministers of the provinces on April 20, 2020 by the women’s rights network[1] with support from UN Women, so that responses to COVID-19 do not magnify or exacerbate existing inequalities and vulnerabilities.  3. Millions of migrant workers in the Gulf states have lost their jobs and are returning to Nepal, which will result in plummeting remittances. A clear strategy should be developed to absorb the returnee migrant workers through expanding entrepreneurial development projects. Relief in public borrowing should be made more accessible to women and further promote the engagement of women in these spaces.  4. In designing relief packages and financial aid for the post-pandemic reconstruction, the government must pay special attention to addressing the embedded social hierarchies of class, caste and gender. The quality of relief packages should follow human rights standards.  5. The government must ensure that proper mechanisms are put into place to channel funds to small and medium enterprises at the grassroots, and draw on women’s experience in community initiatives.  6. Immediate attention is needed to providing pregnant and lactating mothers with access to health services and providing services to survivors of domestic violence and those suffering from poor mental health. |
| **10** | Punak & lama (2021)  **Orphanage Trafficking**  **and Child Protection in**  **Emergencies in Nepal:**  **A Comparative Analysis**  **of the 2015 Earthquake**  **and the 2020 COVID-19**  **Pandemic** | **Nepal** | |  | compares and contrasts two humanitarian emergencies and their  impact on Nepal  It explains how each emergency has impacted children without parental care or at risk of family separation, **with specific reference to orphanage trafficking, voluntourism, child institutionalization and family preservation**. In relation to each emergency, the article considers the role of disaster preparedness; the roles of the Nepal government, the international  community and civil society; | While the onset of the COVID-19 emergency in Nepal was a gradual process that evolved over several months, Nepal was paradoxically much worse prepared for it than it had been for the earthquake, which struck with no immediate warning.  This can be attributed to significant policy and resources being focused on  earthquake preparedness by aid agencies in the decades leading up to it.6 For example, NGN had an earthquake policy and procedures in place prior to the earthquake occurring, which all staff had been trained in, and which went into immediate operation when the earthquake struck.  Yet NGN had no similar policy for an infectious disease outbreak. Furthermore, the rise of orphanage trafficking during the 1996–2006 conflict enabled child protection actors to anticipate similar patterns occurring, following the earthquake, and use this to their advantage. But there was no similar precedent in Nepal for a prolonged lockdown and social distancing restrictions. | **SUCCESSFUL MEASURES**  **Child protection practices**  It also shows that while these emergencies have increased the risk of harm and exploitation for children and families, they have also driven forward innovation in child protection practices, particularly through the use of reintegration, case management and family preservation programs.  It also considers how well actors working towards family-based care solutions for children were prepared for each emergency and how well they have been able to adapt and respond. It argues that while humanitarian emergencies in Nepal have increased the risk of harm and exploitation for children and families, these emergencies have also helped to drive forward innovation in child protection and anti-trafficking work.  Nepal could therefore benefit from broadening the scope of its **emergency response** repertoire by perhaps learning from African countries with more experience of effective child protection responses to epidemics such as Ebola (Obern, 2020). (Related to the challenge)  The experience of three emergencies in Nepal—the conflict, earthquake and COVID-19 pandemic—have all demonstrated the ability of child protection actors to innovate in response to new and challenging circumstances. The conflict in Nepal not only created the phenomenon of orphanage trafficking and increased levels of child institutionalization but also inspired the first advocates for family reintegration and their initial pilots into case management (Grennan, 2011).  Ten years later, the earthquake led to significant international media coverage and professional recognition of orphanage trafficking.  Finally, the COVID-19 pandemic pushed forward innovation in remote case management and family support. This is particularly helpful in a county like Nepal with very challenging terrain, which traditionally has made face-to-face case-management approaches logistically complex and resource-intensive due to the complexity of travel arrangements.  Following the earthquake in 2015, Nepal was flooded with international donors and humanitarian response organizations, which led to some criticism of an uncoordinated and inefficient use of resources, a lack of transparency in how resources were used and the disempowerment of local actors, thus undermining the very principles of development (Troutman, 2015; Zakaria, 2015).  However, despite the severe impact of the COVID-19 emergency on Nepal’s population, it has been merely a part of a much bigger global emergency, and, as such, has not received anywhere close to the same level of financial and technical support from the international community as the earthquake did.  Yet paradoxically, this situation has actually created the space and opportunity for government actors at the local level to embrace the increased responsibility offered to them in the absence of international interference.  The Government of Nepal showed different styles of leadership in promoting family-based care in each emergency. During the earthquake, it did this through its clear directives on gatekeeping procedures. During the COVID-19 emergency, its strengths have mainly been demonstrated at the local level through its high levels of engagement by officials, while, at the national level, actors in NCRC have focused on sharing information and data (it publishes a monthly newsletter on child protection issues). This reflects the decentralization of power as envisaged by the move to federalism. | - |
|  | **Author (s)** | **Earthquake location** | | **Earthquake Features** | **Purpose of the Study** | **Challenges and Complications** | **Lessons Learned** | **Recommendations** |
| **11** | Hori and et, 2021  **Exacerbation of Subthreshold PTSD Symptoms in a Great East Japan Earthquake Survivor in the Context of the COVID-19 Pandemic** | **Japan** | | Great East Japan Earthquake (GEJE), 2011 complex of earthquake, tsunami, and nuclear accident.  . | Discussing the effects of subthreshold PTSD in a previous disaster on an exacerbation of PTSD symptoms in another disaster.  The case of this study is GEJE survivor. | Lack of knowledge about mental illnesses such as PTSD and considered mental illness as shame and avoided confronting it after disaster.  The nuclear accident or COVID-19 pandemic can cause PTSD.  Lack of social support and a dependent personality that made him attached to the stricken area soon after the disaster were considered factors Contributing to his symptoms’ chronicity.  Despite a lack of corroborating evidence and expert opinion, popular media frequently reported adverse effects of radiation exposure due to the nuclear accident that triggered anxiety within the general population.  This case demonstrated the characteristics of subthreshold PTSD caused by two disasters that shared a similar sense of insecurity, the scale of impact on the society, invisibility of the threat, restricted movement, and authoritative conflicts. These commonalities led to a recurrence and exacerbation of initial symptoms. | **ANALYIS-ONLY ARTICLES**  **PTSD Analysis**  The urgent atmosphere of the town, resulting from the COVID-19 outbreak was similar to that of the nuclear accident and acted as a trigger for the patient’s traumatic reactions, namely, insomnia and impatience.  The involved professionals should be aware of the possibility that PTSD may occur not only in those who experience the actual life-threatening like ICU admission but in those who experience the atmospheric change of society during a disaster.  Stakeholders should be aware that recognizing the horrors of a large-scale disaster can have a calming effect on patients’ emotions; at the same time, lack of recognition can be highly frustrating for patients.  On the contrary, we should also inform the community about the great psychological damage that an atmosphere of harsh condemnation (disapproval/criticism) of certain people could cause during a disaster.  Established remote support system for mental care can be useful for mental support in same disaster such as covid-19 | برداشت کلی من از این مقاله این است که افرادی که تجربه حوادث و بلایای بزرگ را داشتند و در آن فضا قرار گرفته اند در مواجهه با حوادث دیگر احتمال بروز آسیب‌های روانی مانند PTSD در آنها بسیار زیاد است. در ایران این موضوع بیشتر به چشم میخورد زیرا مردم تجربه حوادثی مانند جنگ، زلزله و سیل را داشتند. |
| **12** | Nogami , 2021  **Mandatory annual disclosures for listed companies during crises in Japan: COVID-19 and the Great East Japan Earthquake** | **Japan** | | Great East Japan Earthquake (GEJE), 2011 | Discussing the effects of Covid-19 comparing earthquake on industries. | Japan has experienced two significant emergency situations within the past decade. On March 11, 2011, the Great East Japan Earthquake (hereinafter “GEJE”) struck. Nine years later, on March 11, 2020, the World Health Organization determined that COVID-19 was a global pandemic. The former triggered a sudden change in energy policy, and the latter triggered major changes in how and where individuals work and interact, a situation that persists as this analysis is being written.  The impact of both emergencies (radioactivity versus virus) was not physically visible, so people tended to rely on social media to obtain related information.  destroyed industrial supply chains, in both disasters, at first directly and in Covid indirectly.  Behavioral economics theory teaches that investors will hesitate to invest in stocks when the condition of many companies is unclear, as was the case under these uncertain circumstances.  In tourism industry operations have to suspended for several month but in GEJE this time was shorter  Decrease the level of financial institution incomes such as banks in Covid 19  **Lesson learned:**  **A disaster has various effects on many companies, and the type, magnitude and duration of these effects vary. Even essential businesses could be so heavily damaged as to require government support to sustain them through the crisis. The total amount of support needed is difficult to reasonably estimate within a short period of time. Stakeholders should understand the need to sustain essential businesses and make a timely decision about supporting** them.  **Lesson learned:**  **Thus, providing high quality information from management is so important in times of crisis. In other words, cooperation between management and other stakeholders is key to surviving through hard times.** | **A public policy analysis of mandatory annual disclosures for listed companies**  A disaster has various effects on many companies, and the type, magnitude and duration of these effects vary. Even essential businesses could be so heavily damaged as to require government support to sustain them through the crisis. The total amount of support needed is difficult to reasonably estimate within a short period of time. Stakeholders should understand the need to sustain essential businesses and make a timely decision about supporting them. | Providing high quality information from management is so important in times of crisis. In other words, cooperation between management and other stakeholders is key to surviving through hard times |
| **13** | **Hashimoto et al,2020**  **Need for more proactive use of pharmacists in the COVID-19 pandemic following lessons learnt from the Great East Japan Earthquake** | **Japan** | | East Japan (2011)  After Earthquake pharmacists worked with local pharmaceutical wholesalers and other professionals to establish a supply system for drugs and sanitary materials, | In this context, we believe the experience of the 2011 Great East Japan Earthquake (GEJE) will provide helpful information to better define the role of pharmacists in ongoing COVID-19 pandemic and future disasters. | It appeared that the lessons learnt in past major disasters, particularly with regard to drug or sanitary material were not applied during the COVID-19 outbreak in Japan. T  With any large-scale disaster, the shortage of medical and sanitary resources is a common problem [3,4]. As such, pharmacists may play a certain role in such circumstances, particularly with respect to the supply of drugs and other materials.  **Nevertheless, pharmacists have not been ready to utilize their advanced skills fully in the current medical and social framework in Japan, especially in times of emergency,** while physicians and nurses already have their specific roles in major disasters, and limited information is available on how pharmacists can be engaged in relief activities in large-scale disasters.  Pharmacists, who took turns supporting the disaster-stricken areas and who had contributed to the construction of drug distribution systems following the GEJE, had been using handwritten notebooks to record their work because the regular functioning of medical facilities had been rendered inoperable due to the tsunami, these efforts might help guide efforts in helping to cope with the COVID-19 pandemic.  after the GEJE, pharmacists could have helped raise the awareness of evacuees to the appropriate use of disinfectants or sanitation of temporary toilets, as well as the temperature and humidity in evacuation sites. would be valuable during the COVID-19 pandemic for pharmacists to proactively intervene in the improvement of the living environment where infections are likely to occur.  . In Minamisanriku Town, Miyagi Prefecture, a municipality badly affected by the tsunami, evacuees were forced to live in narrow spaces because the main part of the evacuation center was used to store dead bodies and relief materials. Because water and sewage services were shut down for five months, the use of water other than drinking was limited to once a day. Hand sanitizer was very useful to disinfect and cleanse hands directly under the guidance of pharmacists in evacuation sites. It would be valuable during the COVID-19 pandemic for pharmacists to proactively intervene in the improvement of the living environment where infections are likely to occur. | **PREPAREDNESS**  **Pharmacists’ role: Supply of medical and health service products**  Maintaining an appropriate and sustainable supply of medical and health service products, including drugs, vaccines and sanitary materials, is of paramount importance in any crisis that impacts on public health in any population.  Management of the living environment by pharmacists was also helpful during the GEJE, which could be applicable to the COVID-19 pandemic. Basically, pharmacists have controlled environmental factors in schools and other public facilities, such as temperature, humidity, water quality, dust level, and pests, in Japan [7]. For that reason, after the GEJE, pharmacists could have helped raise the awareness of evacuees to the appropriate use of disinfectants or sanitation of temporary toilets, as well as the temperature and humidity in evacuation sites.  After the Great East Japan Earthquake (GEJE) of March 11, 2011, pharmacists worked with local pharmaceutical wholesalers and other professionals to establish a supply system for drugs and sanitary materials, and this experience can be applied for the Coronavirus Disease 2019 (COVID-19) pandemic.  Reflecting the GEJE, the training was started for “Pharmacy Disaster Life Support (PhDLS)” personnel who were destined to be responsible for the supply of drugs and the planning of pharmaceutical support activities in a large-scale disaster [8]. Large quantities of relief materials were haphazardly piled up at evacuation centers after the GEJE and on-site health care professionals (HCPs) were confused due to the mix of brand name drugs and generics. Pharmacists had checked the ingredients of drugs and suggested alternatives to prescriptions written by physicians based on availability. The practical role of such pharmacists is one of the most insightful and important points for future disasters preparedness.  However, it appeared that the lessons learnt in past major disasters, particularly with regard to drug or sanitary material were not applied during the COVID-19 outbreak in Japan. The role of pharmacists in the COVID-19 pandemic, including drug supply and pharmacotherapy planning (Table 1), has been gradually reported [9]. On the other hand, according to Japanese guideline regarding “temporary pharmaceutical distribution at the large-scale disaster” [6], under the leadership of local governments, physicians, pharmacists, local pharmaceutical wholesalers and others have to work together and build systems to ensure drug delivery, with no shortages or coverage at the time of a disaster.  However, supply systems had not functioned effectively during the COVID-19 outbreak, and from March to June 2020, some HCPs were forced to use the same face masks for several days and wear rain gear or other alternatives to proper Personal Protection Equipment (PPE) and as a result, operations for infection control were inadequate in some hospitals [2]. Additionally, during the COVID-19 outbreak, PhDLS [8] had not been engaged in any activities, as far as we know.  Those problems must be reviewed and we HCPs and stakeholders should revisit effective measures to prevent from such inadequate responses in future. The current COVID-19 pandemic is projected to last for several years, based on past experiences with the Spanish Flu [10], and will require additional efforts of HCPs.  In the aftermath of the GEJE, pharmacists contributed to the supply of drugs and improvement of the environment to meet the needs of patients in the affected areas [6]. The participation of pharmacists could help support the treatment for patients in the COVID-19 pandemic.  Temporary pharmaceutical distribution centers tailored to HCPs’ needs.  Building supply systems in cooperation with local pharmaceutical wholesalers and other organizations.  Training of Pharmacy Disaster Life Support.  Construction of hygiene management at evacuation centers.  Raising the awareness of evacuees to the appropriate use of disinfectants or sanitation of temporary toilets.  Promotion of hand sanitizer in narrow evacuation sites. | To the supply of drugs and sanitary materials and management of the living environment, the table summarizes the problems encountered during the COVID-19 pandemic and the measures taken based on GEJE’s experience |
| **14** | **Sakamoto et al**  **2020**  **Implementation of evacuation measures during natural disasters under**  **conditions of the novel coronavirus (COVID-19) pandemic based on a review**  **of previous responses to complex disasters in Japan** | **Japan** | | Different Earthquakes in Japan which have been associated with infectious diseases | Discussing evacuation measures that specifically relate to COVID-19 distinguished from other infectious diseases extracted specific issues that would apply to evacuees during the COVID-19 pandemic. | **Lesson learned**  The deterioration of hygiene conditions in disaster-affected areas and the forced confinement of many victims within small spaces in evacuation centers increase the risk of transmission of infectious diseases. Therefore, a countermeasure focusing on maintaining a sanitary environment within evacuation centers is critical. | **RESPONSE AND RELIEF**  **Evacuation measures**  **Lesson learned**  In the event of a large-scale earthquake, it is likely that administrative agencies themselves will be damaged. In addition, not only the staff of the evacuation centers but also the evacuees must protect themselves against infectious diseases at small evacuation centers because of the lack of human resources. The evacuees are required to be self-reliant. Okada et al. [17] noted that community empowerment has greatly contributed to the maintenance of healthy environments at evacuation centers. |  |
| **15** | Allen, 2021  **Tropical Cyclone Harold And Covid-19: Lessons From The 2010 Haiti Earthquake** | **Haiti** | | **Following the 2010 magnitude 7 earthquake in Haiti, a cholera epidemic that killed thousands of residents was inadvertently started by United Nations’ aid workers who were part of the massive international relief effort**.1 | These cascading disasters offer a lesson and warning to nations considering offering international aid to islands in the Pacific during cyclone season. | **Lesson learned**  While it may be imperative to rush certain forms of humanitarian aid to areas that have been devastated, it is vital that aid workers not bring COVID-19 to these locales.  But this comes at the cost of foregoing international aid personnel. Had the damage from TC Harold been more severe, this choice would become even more ethically challenging. | **Inadvertent spread of a pandemic by international relief efforts**  **RESPONSE AND RELIEF**  **Lesson learned**  As is increasingly being recognized around the globe, we all must assume responsibility for reducing the chances that we will **inadvertently spread COVID-19 to others**. So let us learn from the tragedy of the post-earthquake cholera epidemic in Haiti, and minimize the risk that humanitarian assistance efforts in the Pacific carry the unintended consequence of bringing a novel disease to these locales already reeling from another disaster. Going forward, let us also keep this same COVID-19 risk-reduction strategy in mind when and where other disasters mandate outside aid. | **RESPONSE AND RELIEF**  Leaders and managers of disaster-relief processes, along with the international agencies sending staff, must ensure that all disaster-response personnel entering damaged areas are disease-free.  What may be temporarily practical and possible from an economical, logistical, and social perspective is a vigorous, well-publicized, strongly-supported **masking campaign**. Even crude, homemade masks appear to significantly reduce the spread of the virus.8 If, along with aid supplies, COVID-tested aid workers, and repeated, high-visibility announcements of the need for and value of masking, face masks were to be distributed and worn by all residents, workers and community leaders in the affected areas, the probability of introducing or spreading the disease would be greatly diminished.  As is increasingly being recognized |
| **16** | Banushi, 2020  **Economic Impacts Of An Earthquake Disaster And Covid-19 In Albania** | **Albania** | | **Occurred on 26th November 2019, caused considerable material and financial damages. According to a document compiled by the Albanian Government with the support of several International Institutions, the earthquake affected directly and indirectly over 202,000 people, including 51 victims, 17,000 displaced and about 985 million Euros in damage, mainly to housing and educational infrastructure.** Reconstruction under the same document will cost 1 billion 78 million Euros. As if that were not enough, the vast majority of the decline in economic activity during the post-earthquake period was “due to Covid-19 pandemic” of 2020 | The main aim of this study is to evaluate the long-term impacts of these two major events in the Albanian economy. | Reconstruction under the same document will cost 1 billion 78 million Euros. As if that were not enough, the vast majority of the decline in economic activity during the post-earthquake period was “due to Covid-19 pandemic” of 2020. | **Reformation in the system of economic governance**  **RECOVERY PHASE**  The impacts of earthquake and pandemic damages are expected to have a resultant slowdown in the economic growth of Albania, caused mainly by unemployment, inflation and productivity decline in the main economic sectors.  However, even if not stronger growth what will be needed in the future is the readiness to be **reduced significantly unemployment and poverty.**  **Lessons learned**  This will require progress on a number of **priority reform** areas, including ongoing **reforms to Albania’s system of economic governance,** which is more important than everything in this country.  Loss compensation is the driving force of the post disaster recovery, and social productivity and sustainable economic development are the economic basis of compensation for disaster losses.  To this end, economic development is the most effective way to compensate for disaster losses. |  |
| **17** | Kristine, 2020  **Responding to the 2020 Magna, Utah,**  **Earthquake Sequence during the COVID-19**  **Pandemic Shutdown** | **Utah State**  **(Magna city)** | | On 18March 2020, two days after UUSS staff began full-time  work-from-home (WFH) protocols (see the COO Planning section) as the result of the COVID-19 pandemic, UUSS operational capabilities and COO planning were tested when an Mw 5.7 earthquake struck the Salt Lake Valley.  initial estimates  project over $150 million U.S. in damage from this earthquake.  Damage was largely focused near the epicenter in Magna and in downtown Salt Lake City. Trailer parks and historical unreinforced masonry buildings were the hardest hit. Fortunately, there were no deaths and only a few reported injuries. | In this article, we first provide background on the COO planning and protocols that were put in place for the  COVID-19 campus closure.  We then discuss the actual response, providing details about the  sequence, the design and installation  of the aftershock network, and coordination with partners and stakeholders. We follow  these sections with a discussion of public communication efforts.  We share some of these lessons here to help inform others involved in earthquake response. | **APPROPRIATE PREPAREDNESS LEADS TO APPROPRIATE RESPONSE**  **Specific lessons learned include:**  As a consequence of prior planning (long- and short-term), we had an overall successful response to this earthquake.  • Never get complacent. Always expect an earthquake and have all of the equipment needed to respond.  • Have an easily accessible means of communication for the staff. Google Hangouts was accessible without power or direct Wi-Fi connection with mobile devices. It was also easy to scale and spin off subgroups that could easily add members.  • Have backup methods for communicating with partners.  Having cell numbers was key to accessing state facilities.  • Expect the unexpected. We had planned to handle roughly 10 times the network traffic on our website compared with previous events. We actually needed capacity closer to a 100 or more times the network traffic.  • Remember to have plenty of spares and other supplies. Getting normal supplies from a hardware store during a pandemic lockdown and following an earthquake was nearly impossible.  • Make sure the equipment you have is completely ready. We had some cell modems on the shelf, but they lacked SIM cards, so they could not be easily activated. Getting SIM cards was difficult, but Verizon suggested that for future use UUSS should keep a set of unprovisioned (cold) SIM cards on hand. We have those now.  • Know that the public wants rapid information. Once felt the public wanted immediate confirmation that the shaking was an earthquake.  • Recognize that there is a need for rapid and accurate information. It was important for UUSS to be the authoritative source, especially as other, less accurate, information was shared on social media.  • Do not forget to thank your partners. Our local Verizon representatives did a fantastic job streamlining new lines of service so we could stream continuous data from aftershock stations. UETN, although not directly involved, kept their network running, which kept us running.  • Most importantly, have a plan, practice it, and update it. We were not so good about updating the written plan, but our past exercises, plus the capability of our duty seismologists to work remotely, really paid off. | |  |
| **18** | Ramirez-herrera (2020)  The 23 June 2020 Mw 7.4 La Crucecita,  Oaxaca, Mexico Earthquake and Tsunami:  A Rapid Response Field Survey during  COVID-19 Crisis | La Crucecita, Oaxaca, **Mexico** | | Mw 7.4 megathrust event at 22.6 km depth and triggered a tsunami recorded at tide gauge stations and a Deep-ocean Assessment and Reporting of Tsunamis off the coast of Mexico | We describe here the details of the rapid response survey of the vertical coseismic deformation, tsunami, geologic effects, and lessons from working in the field during the COVID-19 crisis | **We faced a few challenges**  **and restrictions imposed by**  **the COVID-19 pandemic.**  Prior to traveling, we contacted our local network in Huatulco, Oaxaca, to rapidly get access to sites along the coast. Traveling to the coast in a rapid way required flying in a packed airplane with no empty seats between passengers. Because of the confinement in some  towns, most hotels and restaurants  were closed; however, we had the support of the La Crucecita, Huatulco, Firemen (Bomberos de Oaxaca) and  Fonatur (the Federal office for tourist affairs) who kindly arranged for us to use a truck and have hotel reservations during the survey. To get rapid access to less accessible sites, the Navy local office provided a Navy boat (Fig. 7). | We followed all recommendations regarding prevention during the course  of the postearthquake and tsunami survey: all of the participants involved wore masks, used alcohol gel, frequently washed their hands, and kept  a 1.5 m distance from each other. Only one vehicle was used during the survey, which was washed and disinfected every day, and the interaction  of people during field work was always at a safe distance and with the use of masks, in addition to the constant vigilance for the appearance of any symptoms by the team members (Fig. 7). | |
| **19** | Silva et al, 2021  Potential Impact of  Earthquakes During the 2020  COVID-19 Pandemic |  | |  | This study analyzes the  potential impact that seismic events may have on the infection rate within regions afflicted by both epidemics and earthquakes and explores open software packages that can be employed to simulate the impact of future destructive earthquakes on  the spread of an emerging virus | Both recent and ancient history have documented the rise and spread of infectious diseases due to destructive earthquakes. The global prevalence of the COVID-19 virus brings unprecedented challenges to disaster risk management, and in particular, to the adoption or development of response and preparedness plans for coincident natural hazard events. National civil protection authorities and international organizations with the remit to prepare and respond to catastrophic events will have to go beyond the consideration of the direct impact of natural hazards and account for the additional requirements and constraints imposed by the COVID-19 pandemic. | This study presented a framework for the analytical estimation of the amount of population left homeless due to an earthquake scenario, and simulation of the expected increase in the number of COVID-19 cases due to the plausible possibility that not all of the safety measures will be respected. Different cases of transmissibility (i.e. optimistic and pessimistic scenarios) were considered, leveraging on data regarding the effective reproduction number (Rt) and deceleration rates observed in Portugal since February 2020. Such analyses elucidate the factors driving the evolution of the number of daily cases in a particular region, and the potential additional strain upon the healthcare system if an event of similar characteristics were to happen. For the particular case of Portugal, it was observed  that if the effects of an event with a localized impact are managed rapidly and efficiently  (i.e. leading to low transmissibility rates), the increase in the number of additional  COVID-19 cases would be negligible. For large events in which a considerable amount of the population is likely to be affected, a rise in the virus spread might be inevitable, even assuming an optimistic scenario of emergency response. Given the results presented herein, governmental agencies with the remit to rapidly estimate and communicate the direct impact of earthquakes could include information in such reports concerning the number of cases and highest observed reproduction number in the region. | Despite the limitations and assumptions in the results, data sets and models presented herein, they can still be relevant to inform decision makers in disaster risk mitigation and to raise risk awareness for the potential impact of earthquakes in the COVID-19 pandemic.  The collection of more data (both in terms of quantity and quality) will be fundamental to carry out additional research to constrain some of the sources of uncertainty described in this study and ultimately improve the reliability and accuracy of the predictions. |
| **20** | McCormack et al 2021  A Critical Assessment of Canadian  Earthquake Monitoring and Alerting  Practice versus the Initial Challenges of  the 2020 COVID-19 Experience | **Situation analysis for**  **Concurrent COVID and Earthquake in Canada** | |  | We describe how the current operational posture evolved and discuss the ways in which the posture was and was not suitable to respond to the challenges and constraints of the COVID-19 situation in Canada. | The Canadian Hazards Information Service (CHIS) is the division within NRCan that delivers the functions.  **CHIS Response to COVID-19 Restrictions**  By 16 March 2020, all NRCan employees, in common with employees across the federal public service, were instructed to stay at home until further notice to help prevent the spread of COVID-19.  **Data center operations under lockdown**  Staff have been able to start the development of new projects remotely, with little apparent impact on productivity. Videoconferencing tools have proved invaluable for formal and ad hoc meetings, staff communication, and even social interactions such as virtual pizza lunches.  **Seismic mon**itoring and earthquake response under lockdown  When the lockdown began, the SOCs were already well used to responding to earthquakes remotely and the system worked robustly. There were many earthquakes that required a response during the lockdown (Fig. 2), all of which were handled remotely without issue. None has yet been significant enough to merit consideration of fieldwork, such as deployment of instruments for an aftershock survey, so that part of the system has not yet been tested.  To support field activities, we have allowed some technicians to return to their normal place of work to help prepare equipment for the field; to ensure proper physical distancing, they have been working on a rotational basis. We have imposed new workplace protocols to reduce risks such as designated vehicles and washrooms, closed kitchens, and increased cleaning and disinfecting of shared workspaces. | |  |
|  | **Author (s)** | **Earthquake location** | | **Earthquake Features** | **Purpose of the Study** | **Challenges and Complications** | **Lessons Learned** | **Recommendations** |
| **21** | **Hariri-Ardabili**  **2020**  Living in a Multi-Risk Chaotic Condition: Pandemic,  Natural Hazards and Complex Emergencies |  | |  | **The paper also discusses the impact of pandemic’s (long-term) temporal effects**  **on the type and recovery duration from these adverse events** |  | Arguably one of the most important tasks in any community is keeping the healthcare system as resilient as possible. Resilience refers to the capacity of a system, community, or society to adapt to potential hazards by resisting or changing in order to reach and maintain an acceptable level of functionality and structure [37,38].  The concept of resilience has risen in popularity during the COVID-19 pandemic, prompting many researchers from various fields to re-evaluate their protocols, systems, and communities to understand how they could recover from adverse effects of COVID-19. Among hundreds of publications, the most notable have focused on medical resilience [47,48], mental resilience [49–51], tourist resilience [52], food system resilience [53], supply chain resilience [54], educational system resilience [55], and socioeconomic resilience [56,57].  **برای مقدمه** A natural disaster may impose extra pressure on the healthcare system by occupying a considerable amount of overall hospital capacity. It can also cause a large evacuation, which in turn increases the risk of viral infections among displaced people.  Recovery in this scenario is also longer because the natural disaster may cause some physical damage to the healthcare system, which would not occur in the pandemic-only scenario.    **Evacuating a large number of people during a pandemic is challenging, given the public health advice to slow the spread of new infections.**  **Evacuation models are divided into two parts: evacuating a** building and heading towards a shelter. For the latter, factors such as duration, length of travel, difficulty of paths, speed of each individual, potential touching of common surfaces/objects, blocked paths by a group of individuals, and violations of social distancing should be considered.  Lastly, sheltering is another major concern during a pandemic, and the capacity of shelters should be recalculated to account for safe distancing between individuals, as well as the length of time evacuees will remain there. Among other factors, the functionality of ventilation systems should be managed to avoid potential damage by a natural hazard.  During all three models, a portion of evacuees might become injured, which should be accounted for in evacuation models and added to the resiliency of the healthcare system, Figure 5. | |
| **22** | Fearnley, 2020  Editorial: Early warning systems for pandemics: Lessons learned from  natural hazards | **Lessons learned from the past:**  **Early warning system (for COVID and Earthquakes)** | | To be used for Introduction and Conclusion  **Contingency plan (my suggestion)**  It is often used for risk management for an exceptional risk that, though unlikely, would have catastrophic consequences. Contingency plans are often devised by governments or businesses. For example, suppose many employees of a company are traveling together on an aircraft which crashes, killing all aboard. The company could be severely strained or even ruined by such a loss. Accordingly, many companies have procedures to follow in the event of such a disaster. The plan may also include standing policies to mitigate a disaster's potential impact, such as requiring employees to travel separately or limiting the number of employees on any one aircraft.  During times of crisis, contingency plans are often developed to explore and prepare for any eventuality. During the Cold War, many governments made contingency plans to protect themselves and their citizens from nuclear attack. Examples of contingency plans designed to inform citizens of how to survive a nuclear attack include the booklets Survival Under Atomic Attack, Protect and Survive, and Fallout Protection, which were issued by the British and American governments. Today there are still contingency plans in place to deal with terrorist attacks or other catastrophes. | | At first glance, Early Warning Systems  (EWS) developed for volcanic, earthquake, tsunami and flood hazards may seem inappropriate for diseases such as COVID-19. Unlike most environmental hazards that require organized evacuation away from a crisis point, epidemics and pandemics require people to stay put so as to cut off transmission routes. Rather than protect themselves by moving away from danger, people must protect others through their immobility. | The provision of timely warnings to people with the aim of minimizing loss of life and reducing the social and economic impacts of disasters.  EWS are intended to convey risk levels in an easy to understand format, ensure credibility and accountability, and help create transparency between different stakeholders.  The report advocated that EWS should comprise of diverse activities spanning four key elements: risk knowledge, monitoring and warning service, dissemination and communication, and response capability.  As more political administrations look to EWS to help mitigate future waves of COVID-19, evidence-based considerations from the study of EWS and environmental hazards can lay the ground for discussion. The key findings to be carried forward are as follows:  1. Translation and multi-way communication is required to ensure that all involved in designing and assigning alerts understand what information is credible and relevant [16]. Common communication tools adopted to achieve this include cooperation plans, protocols and procedures. But, these activities are themselves dependent upon everyday dialogues between stakeholders via differing formats (social networking, internet, phone), and the establishment of joint information centers, meetings, and workshops.  2. Warning systems are complex and nonlinear and a consideration of different understandings of uncertainty and risk is required for decision-making processes in assigning alert/warning [18].  3. EWS need to be scalable and sufficiently flexible for use by local stakeholders via standardized communication products designed to accommodate local contingency, while also adhering to national/ international policy. | |
| **23** | Seddighi, 2020  Trust in Humanitarian Aid From the Earthquake in  2017 to COVID-19 in Iran: A Policy Analysis | **Lessons learned from the past:**  **The officials’ required professionalism** | | The effect of mistrust between authorities and people | | The necessity of maintaining Trust among people during crisis management | Mistrust can be the result of different causes, including but not limited to lack of knowledge on capabilities and efficiencies of humanitarian organizations, engagement of a wide range of organizations from different categories, extension of mistrust of an organization to other emergency organizations in the area or all of operation, lack of unity in emergency response, and poor public relations. | |