# Strategy on the Practices and Responses of Health Emergency Disaster Risk Management in Several Countries: A Scoping Review

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**Abstract.** The impact of COVID-19 extends beyond the boundaries of human health. The emergence of COVID-19 provides empirical evidence that a health disaster is inevitable. The COVID-19 pandemic and its effects provided a basis for this research paper to extend the view by revisiting the global policy framework of Sendai Framework Disaster Risk Reduction (SFDRR), as it has several limitations as stated by the World Health Organization (WHO) and hence the urgency to respond to the current global policy framework as proposed, known as Health-EDRM. The expected outcome of Health EDRM is that “countries and communities have stronger capacities and systems across health and other sectors, resulting in the decrease of the health risks and consequences associated with all types of emergencies and disasters.“ Some case studies present the success of the Health-EDRM application, such as the improvement of the existing surveillance databases, their use as a new study tool, innovations, and methodologies. It helps to identify population health risks to support Health-EDRM policy development. Therefore, this paper would like to explore to what extent the potential application of health-EDRM can be explored by using a scoping review based on the experiences of several countries. The findings using content analysis found several applications of Health-EDRM. This paper contributes to the analysis of the potential practices and responses to the components of Health-EDRM. Finally, this paper will also explore the potential recommendations on Health-EDRM practically and conceptually in Malaysia.

**Keywords:** Health-Emergency Disaster Risk Management · application · practices · response · countries

## 1 Introduction

### 1.1 Health Emergency Disaster Risk Management

The COVID-19 pandemic challenged the health system of the country in coping with the multiscale and massive health impact on human lives. This requires the need to provide a basis for coherent action to facilitate building resilience and health security in communities and countries. The World Health Organization (WHO) developed


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the Health Emergency and Disaster Risk Management (Health-EDRM) Framework to provide global guidance to countries on putting in place the capacities and functions, within and across health and other sectors, to reduce health emergency risks and impacts. (WHO 2019). However, the application of this framework is still under-researched in many countries. There are ten (10) components of WHO Health-EDRM which are (1) Policy, regulation & legislation of this practice, (2) Planning and coordination, (3) Human Resources, (4) Financial resources, (5) Information & knowledge management, (6) Risk communications, (7) Health infrastructure logistics, (8) Health & Related Services, (9) Community Capacities for Health-EDRM, and (10) Monitoring and Evaluation. Health –EDRM framework has been applied to all countries to prepare for future health disasters. It promotes changes in approach from conventional to change in Health-EDRM in the aspects of (1) Event-based to risk-based, (2) Reactive to proactive, (3) Single-hazard to all-hazard, (4) Hazard-focus to vulnerability & capacity focus, (5) Single agency to whole-of-society, (6) Separate responsibility to the shared responsibility of health systems, (7) Response-focus to Risk Management, and (8) Planning for communities to Planning with communities.

Health Emergency and Disaster Risk Management (Health-EDRM) is described by World Health Organization as a concept that covers the intersection of health and disaster risk management (DRM). It refers to the "systematic analysis and management of health risks, which covers areas of emergencies and disasters, through a combination of (1) hazard and vulnerability reduction to prevent and mitigate risks, (2) preparedness, (3) response and (4) recovery measures" [1]. The concept encompasses an area of emergency and disaster medicine, health systems strengthening and 'resilience, disaster risk reduction, humanitarian response, and community health resilience. Due to that, health-EDRM provides an effective policy framework to unite diverse stakeholders to comprehensively and effectively address this complex field, from strengthening health and Disaster Risk Reduction (DRR) efforts to building health resilience across populations. Hence, Health-EDRM is therefore multidisciplinary, multisectoral, and collaborative thus recognising the holistic approach required to reduce the negative health outcomes from all hazards, in this case, the infectious disease, COVID-19 [2].

To a certain extent, the WHO health-EDRM is very contextualised in nature which requires a local socio-economic profile and health information at the localities for the framework to be implemented. Several countries have done the translation in various mechanisms. In China, the health planning model was established in rural areas [3]. Meanwhile, in the Philippines, a strong clinical-based database is needed in assisting emergency health service planning [4]. In addition, in South Korea, legislation and leadership influence is needed for intergovernmental response systems [5]. Theoretically, there are many other aspects of the health-EDRM component that are not analyzed in its practicality. Therefore, the underpinning of this paper is to identify the strategy towards practices and response related to Health Emergency Disaster Risk Management from the year 2015 to 2021 through the following research question: To what extent the strategy for the practices and response on the Health Emergency Disaster Risk Management being implemented and what are the challenges and its solution?

## 2 Materials and Method

Reference [6] has developed an extension to Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) for the reporting of scoping reviews to improve the quality of the methodology and its reporting [6]. A scoping review can be viewed as a five-step process, which includes i) identifying the research question or objective, ii) identifying relevant studies, iii) selecting relevant studies, iv) charting the data, and v) collating, summarizing and reporting the results.

The following explanation will include the five-step process. Firstly, step (i) identifies the research question or objective which is to identify the pattern how are the practices and responses to Health Emergency Disaster Risk Management. The tenets of the research are to analyze and interpret the findings for the recommendation of future research in Health-EDRM. The selection of literature was performed according to several selection criteria, which include 1) publication from 2013- 2021, 2) Having at least keyword(s): 1) Health Emergency Disaster Risk Management, and 2) Focusing on practices and response. The decision to limit the country of origin was made to help define the strategy for Health Emergency Disaster Risk Management.

The purpose of the selection is to identify the objective of the review, therefore, to define the research, hence the scope should be as wide as possible to allow the review to capture as much of the available evidence as possible. However, these steps should be balanced against practicalities such as feasibility, time and resource constraints. Moreover, it identifies the relevant literature, which begins with defining the search strategy and identifying the key concepts in the research questions or objectives. Below is the search string used to achieve the step process (ii) identifying relevant studies, iii) selecting relevant studies, and iv) charting the data.

**Phrase Searching.** With double quotes get a higher relevancy boost over the same word.

**Boolean Operator:** Use OR, AND or NOT.

**Truncation:** Enables to search different forms of words by placing a symbol at the end of the word (*/?/$)

**Wild Card:** Variables of spelling (American/British) by placing a symbol within the word.

The literature search was performed in the Scopus and Science direct search. The initial search results were 86 articles from (SCOPUS) and 14 (Science Direct) articles. However, 75 articles were removed due to their premature results and anecdotes or were not discussing practices and responses on Health EDRM. Some of the articles were also found incomplete, or the full articles are not accessible, have broken links and overlap. The metadata is incomplete. Therefore, the final paper is reviewed based on 25 articles (Table 2). Hence, the last step of the process is a scoping review which is collating, summarizing and reporting the results (Table 1).

## 3 Results and Discussion

The year of publication and the number of publications reflects the overall trend, development speed and research hotspots in this field to a certain extent [7]. The number of publications related to health disaster risk management retrieved from Scopus and Science Direct was counted and the growth of publication by year is presented in Table 2.

Table 2 shows the development of literature discussed as health disasters become a worrying phenomenon. The table shows the research trend on health disaster risk management. Overall, the number of journal articles dramatically increased from 2013 to 2020. It can be illustrated that the significance and attention of health disaster risk management research have increased. This increased from the year 2019 with five (5) publications, and 2020 had the highest number that is eleven (11) publications on health resilience that showed a growing number of viral diseases emerged in recent decades, including the most recent COVID-19, avian and pandemic influenza, the Middle-East respiratory syndrome (MERS), the Ebola virus disease, severe acute respiratory syndrome (SARS), and severe acute respiratory syndrome (SARS) [8, 25].

Table 3 shows that several countries such as Belgium, Canada, China, New York, and South Korea had made a prompt response to the strategic application of Health-EDRM. The Health-EDRM focuses to reduce the risk of disaster through the implementation of collaborations and policies. The components in the Health-EDRM require improvement to update with current health disasters, especially with the emergence of COVID-19. However, the framework of Health-EDRM requires an immediate response towards the current global policy framework on risk management. This includes the revision of the policy at the national level that incorporates the latest global components. These are also experienced by some other countries such as Pakistan, Vietnam, Thailand and Malaysia realized the limitations or weaknesses of Sendai Framework Disaster Risk Reduction (SFDRR). Several countries in Southeast Asia countries had made their response by reviewing their global policy to respond to the COVID-19 pandemic. The indicator is needed to respond to the global policy framework according to these two case studies which happened in Thailand and Vietnam. Marome, & Shaw [17] found that one opportunity for enhancing resilience in Thailand is to strive for more multilevel governance that engages with various stakeholders and supports grassroots and community-level

**Table 1.** Search String from Scopus and Science Direct

| | | |
|---|---|---|
| SCOPUS | TITLE-ABS KEY (health AND emergency AND disaster AND risk AND management) AND (LIMIT-TO (PUBYEAR, 2021) OR LIMIT-TO (PUBYEAR, 2020) OR LIMIT-TO ( PUBYEAR, 2019) OR LIMIT-TO ( PUBYEAR, 2018) OR LIMIT-TO ( PUBYEAR, 2017) OR LIMIT-TO ( PUBYEAR, 2016)) AND ( LIMIT-TO ( DOCTYPE, “ar”)) AND ( LIMIT-TO ( SUBJAREA, “SOCI”)) | 86 results |
| Science Direct | Health Emergency Disaster Risk Management OR Health Disaster Risk Planning Year: 2013–2021 | 14 results |

**Table 2.** Journals Based on the Year

| Journals | 2006 | 2013 | 2015 | 2017 | 2018 | 2019 | 2020 | Totals |
|---|---|---|---|---|---|---|---|---|
| American Journal of Public Health | - | 1 | - | - | - | - | - | 1 |
| Australian Journal of Emergency Management | - | - | - | - | - | - | 1 | 1 |
| Frontiers in Public Health | - | - | - | 1 | - | - | - | 1 |
| Health Security | - | - | - | 1 | - | - | - | 1 |
| Health Systems & Reform | - | - | - | - | - | 1 | - | 1 |
| Healthcare | - | - | - | - | - | - | 1 | 1 |
| International Journal of Disaster Risk Reduction | - | 1 | - | - | - | 1 | 1 | 3 |
| International Journal of Disaster Risk Science | - | - | 1 | - | 2 | 1 | 1 | 5 |
| International Journal of Environmental Research and Public Health | - | - | - | - | - | 1 | 2 | 3 |
| International Journal of Environmental Research and Public Health Article | - | - | - | - | - | 1 | - | 2 |
| Journal of Risk Research | - | - | - | - | - | - | 1 | 1 |
| Progress in Disaster Science | - | - | - | - | - | - | 3 | 3 |
| Public Health | - | - | - | 1 | - | - | - | 1 |
| Revue scientifique et technique (International Office of Epizootics) | - | - | - | - | - | - | 1 | 1 |
| Total | - | 2 | 1 | 3 | 2 | 5 | 11 | 25 |

networks. Furthermore, a document entitled “Integrated Plan for Multilateral Cooperation for Safety and Mitigation of COVID-19” was released. The various ministries and departments are given important duties under this comprehensive plan. The local COVID-19 initiatives should be in line with this plan, according to instructions given to the province governors. Furthermore, to evaluate the consequences of disaster risk management, it is crucial to find synergies between the health emergency and disaster risk management rules and, where appropriate, to review laws related to epidemics and pandemics. It should be explored to expand the scope of disaster risk management policies or legislation to cover biological hazards. Additionally, the pertinent plans and policies also must be modified.

Malaysia has implemented International Health Regulations (IHR) to comply with the health security threats through the development of the MySED-II work plan 2017–2021. Malaysia's three-tier health disaster risk government has the potential to support this policy framework. However, the application of the MySED-II work plan 2017–2021 does not commensurate with the current global policy on health-risk mitigation and the governance aspect needs to consider other government agencies and NGOs to get involved in health-EDRM. Moreover, Policy Directive No.20 was developed initially based on the Hyogo Framework for Disaster Risk Management, HFDRM (2005–2015), and it is not based on the latest Sendai Framework for Disaster Risk Management, SFDRM (2015–2030) which prioritise health as the key element of disaster. SFDRM also shifts the management paradigm from disasters to risks and the inclusion of epidemics and pandemics as biological hazards. Due to that, biological hazards such as epidemics and pandemics are not addressed properly in Policy Directive No. 20 and changes are inevitable. Currently, health disaster in Malaysia is governed by Act 324 for the prevention of control and local diseases and the Malaysia Strategy for Emerging Diseases and Public Health Emergencies (MYSED-II) Workplan (2017 -2021). The work plan, even though developed based on WHO's International Regulation Health, IHR 2005, is rather outdated to manage the COVID-19 pandemic.

**Table 3.** Summarization Strategy on the Practice and Response of the Health Emergency Disaster Risk Management

| Authors | Countries | Strategy on the Practice and Response of Health Emergency Disaster Risk Management |
|---|---|---|
| He, R., Zhang, Mao, Degomme, & Zhang [9] | Belgium | ● The Belgian COVID-19 responses process according to the WHO's (World Health Organization) Health Emergency and Disaster Risk Management Framework (Health-EDRM) Framework the aspect of:<br>i. legislation and organizational structure<br>ii. Response mechanism<br>iii. Emergency resource<br>iv. Planning<br>v. Information management<br>● Belgium has achieved intensive cooperation between stakeholders based on an existing multisectoral emergency organization framework, and the health department has provided scientific advice to decision-making through the Risk Assessment Group (RAG) and Risk Management Group (RMG).<br>● Legislation and medical insurance also played a role in limiting the spread of viruses.<br>● The Belgian epidemic data is open, transparent and comprehensive.<br>● The authorities established a variety of information communication channels with the public. |

(*continued*)

**Table 3.** (*continued*)

| Authors | Countries | Strategy on the Practice and Response of Health Emergency Disaster Risk Management |
|---|---|---|
| Tam, Chan & Liu [3] | China: Rural community in Sichuan (Hongyan Village) | ● The lack of disaster preparedness is a problem found in many disaster-prone areas, especially in rural communities. By experiencing using Nutbeam's planning model intended to develop a tailored Health-EDRM programme, future programmes could be planned and expanded to different disaster-prone areas.<br>● Using a planning model ensures a systematic approach to planning and is useful for defining the scope of an intervention, particularly where scarce pre-existing information is available regarding the local situation.<br>● The planning model only can serve as a framework for organizing and combining multiple sources of information, thereby translating evidence-based planning into a health promotion programme applicable to the local context. |
| Salazar, Law, Winkler [10] | Philippines | ● Showed how an existing clinical-based database might be useful in assisting emergency health service planning decision-making during outbreaks in armed conflict.<br>● Even with the database limitations to report injuries and death, this existing data system was nevertheless useful to support non-communicable diseases' service caseload planning |
| Gruebner, Lowe, Sykora et al. [11] | New York | ● Using social media data from Twitter. Showed how the spatiotemporal distribution of negative emotions varied in New York City after a natural disaster.<br>● Their study showed that pre-disaster status could be used as a significant predictor of post-disaster emotional outcomes in communities. |
| Lee, & Jung [12] | South Korea | ● Showed that legislation and leadership influenced the overall emergency response process and the establishment of intergovernmental response systems and the success of risk communications during infectious-related events. |

(*continued*)

**Table 3.** (*continued*)

| Authors | Countries | Strategy on the Practice and Response of Health Emergency Disaster Risk Management |
|---|---|---|
| Généreux, Lafontaine, & Eykelbosh [13] | Canada | ● Blending the best of traditional and modern approaches<br>i. *Traditional approaches*: most structures rely on the incident command system (ICS) for coordinating disaster responses, consider all phases of the disaster management continuum (mitigation, preparedness, response, and recovery) and are supported by laws, policies, plans, and procedures. Existence routine surveillance and epidemiological investigations are fairly well integrated during the response phase, as are conferences, meetings, training activities, and exercises during the preparedness phase)<br>ii. *Modern approaches:* modern all-hazard approaches as promoted in many key documents, including the Sendai Framework, are currently integrated into disaster management preparedness and response in some jurisdictions and the Sendai Framework is not known or not a priority<br>● Proposed:<br>i. fostering community engagement; cultivating relationships<br>ii. Investing in preparedness and recovery<br>iii. Putting knowledge into practice, and ensuring sufficient human and financial resources.<br>iv. Several promising knowledge-to-action strategies were also identified, including mentorship programs, communities of practice, advisory groups, systematized learning, and comprehensive repositories of tools and resource<br>● However, there is no single roadmap to incorporate Environmental Public Health (EPH) expertise and research into disaster management. |
| Ahmed Zubair et al. [14] | Pakistan | The Disaster Management Act 2010 in Pakistan (PNDMA 2010) Act emphasizes mainly institution building and action plan development for mitigating disasters in the country.<br>● PNDMA 2010 falls short of covering the complete spectrum of DRM and there are two main lacunae in the Act which are (i) the definition does not cover damage to the 'environment', although environmental degradation is a major cause of the frequency and intensity of natural hazards, (ii) the 'threat' of disaster does not fall under the Act, which currently deals with the actual occurrence of significant loss.<br>● Therefore, the Act does not directly mention disaster risk reduction and there are no directions concerning the budgetary mechanisms and extent of funds from disaster risk management (DRM) in the country.<br>● Disaster Risk Reduction in Pakistan requires not only the right policies at the right place but also the application of the solutions for DRR that also are well known. |

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**Table 3.** (*continued*)

| Authors | Countries | Strategy on the Practice and Response of Health Emergency Disaster Risk Management |
|---|---|---|
| Shi, & He [15] | China | ● Using a disturbance management model to estimate logistics constraints in medical supplies during natural disasters.<br>● Examined how medical supplies, which required cold-chain support (e.g., blood and vaccines), might be optimized after natural disasters when transport might be disturbed. |
| Chan, Man, & Lam [16] | Hong Kong (China) | ● Developed a health vulnerability index (HVI) that captures seven main health dimensions with nine indicators.<br>● This index allows the inclusion of the non-communicable disease burden of countries/communities into the disaster risk assessment and may reflect underlying health needs and the capacity required to address Health-EDRM at the country level. |
| Marome, & Shaw [17] | Thailand | ● Need to analyse the health resources in the country and focus on the response through the community-level public health system and legislative measures.<br>● Some lessons on future preparedness, especially concerning the four priorities of the Sendai Framework for Disaster Risk Reduction.<br>● Involve multilevel governance with various stakeholders & support grassroots & community level network |
| Shah et al. [18] | Malaysia | ● Need to analyse action taken by the government<br>● Role of Government and Ministry of Health<br>● Role of media, NGOs and public institutions<br>● Measures to overcome the economic downturn |
| Linh, Hanh, & Shaw [19] | Vietnam | ● Analyze the current responses applied in Vietnam to the Coronavirus disease (COVID-19) pandemic<br>● Link measures to priority actions highlighted in the Sendai Framework for Disaster Risk Reduction (SFDRR)<br>● Response mechanism (well preparation, policies implementation, risk communication and comprehensive approaches |
| Djalante et al. [20] | Indonesia | ● Provide detailed reporting<br>● Analyses the present rapid responses to COVID-19, between January and March 2020<br>● Health-related strategies<br>● Role of different agencies and their responses |
| Olu et al. [21] | African | ● Practical application of resilient health systems as a framework for strengthening public health DRM<br>● Use of the six-health system building blocks as elements in the implementation of public health DRR, preparedness, response and the six-health system building blocks as elements in the implementation of public health DRM, preparedness, response and post-disaster recovery. |

Even so, the application of Health-EDRM by several countries (Belgium, China and Canada) has shown its effectiveness towards risk mitigation. However, the assessment of several components in the Health-EDRM framework could be improved and customized in the context of Malaysia. This can be further integrated with urban resilience. Urban resilience is the capacity of the people that are affected by the disaster to adapt, survive and grow upon the disaster [22]. According to Ribeiro and Goncalves, there are five constructs for urban resilience; physical, natural, economic, institutional, and social. Increasing the level of urban resilience means improving the condition of the affected people by the disaster [23]. The integration of Health-EDRM through a risk reduction framework could increase the local urban's resilience. Thus, this paper allows the area for further investigation which is to recommend a policy strategy for health disasters to improve the planning in terms of urban resilience towards a resilient city. There is an emerging request for health disaster preparedness to be crucially incorporated into the design of urban resilience frameworks since contagious disease outbreaks generally hit cities without any early warning and lead to significant negative socioeconomic setbacks [24]. Policy strategies are needed to be developed through the new framework of Health-EDRM in the context of Malaysia in future.

## 4 Conclusion

The current mechanisms and strategies for disaster resilience, as outlined in the Sendai Framework Disaster Risk Reduction should be enhanced in response to global pandemics such as COVID-19 and the need to integrate the new framework of Health Emergency Disaster Risk Management (Health-EDRM). In this regard, from the review, it is worth noting that the Government of Malaysia plans a strategy and makes several general and Disaster Risk Reduction (DRR) specific recommendations in line with the global policy framework of Health-EDRM and its application from the above countries mentioned. These recommendations should include knowledge and science provision in understanding disaster and health-related emergency risks, and the extension of disaster risk governance to manage both disaster risks and potential health emergencies, particularly for humanitarian coordination aspects thus strengthening community-level preparedness and response.

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