

Systematic Review

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Emergency Medical Care Provided by Humanitarian Organizations in Response to Sudden Onset Disasters in Southeast Asia: A Scoping Review

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Abstract

Objectives: The objective of this scoping review is to identify the types of EMC provided by humanitarian organizations in response to sudden-onset disasters in Southeast Asia in the last 10 years.

Methods: We followed Arskey and O'Malley method and Joanna Briggs Institute guidance. Limited to online-based journal databases (PubMed, Embase, and ProQuest) and ReliefWeb and PreventionWeb for grey literature between 2014 and 2023. Study was performed from January–June 2024.

Results: Finally, 33 studies were included covering 17 disasters (Indonesia, Philippines, Laos, and Myanmar). Fourteen disasters were caused by a single hazard: earthquakes (6, 35.3%), floods (4, 23.5%), cyclones (2, 11.8%), tsunamis (1, 5.9%), and volcanic eruptions, and 3 were multi-hazard: earthquakes and tsunamis (2, 11.8%) and flood and landslide (1, 5.9%). The main services provided were mental health and psychosocial support; assessment, resuscitation, and stabilization; referral and transfer; and health promotion and community engagement.

Conclusions: Humanitarian organizations should prioritize services to meet demands: mental health and psychosocial support; assessment, resuscitation, and stabilization; referral and transfer; and health promotion and community engagement. This can guide national governments in scaling up preparedness and response efforts, ensuring that demands are met at a local level but also aligned with international disaster response.

Southeast Asia is one of the most disaster-prone regions in the world, accounting for more than 50% of global disaster mortalities from 2004–2014.^{1,2} In 2015, it was reported that an average of 62% of the population in 6 countries in Southeast Asia live in high multi-hazard risk areas.³ Southeast Asia experiences heavy seismic and volcanic activities as the region lies near the intersection of geological plates, with some countries located in the Pacific Ring of Fire. Most of the region has a tropical climate, experiencing rainfall all year round, especially during monsoon season. In addition, it is one of the most vulnerable regions to climate change, with rapid urbanization and population growth increasing their susceptibility to disasters as well. Such disasters ultimately exacerbate social and economic inequalities, making marginalized populations more vulnerable.^{3–6}

Sudden-onset disasters occur quickly or unexpectedly and can be caused by various hazards that Southeast Asian countries are constantly at risk of, such as earthquakes, typhoons, flash floods, and volcanic eruptions.⁷ These disasters can cause direct health effects, such as physical injuries, wounds, burns, and fractures, as well as indirect health effects, such as exacerbated chronic diseases, mental health issues, and infectious disease spread. Indirect health effects can be caused by several factors, including prolonged displacement and damage to essential infrastructure.^{8–10} These health effects can be prevented or minimized through effective disaster risk reduction and management (DRRM) measures and interventions. Preparedness and response to such disasters are mainly the responsibility of national governments, and rapid response has been proven to lessen morbidity and increase chances of survival. However, sudden-onset disasters can cause damage that may surpass national response capacities and even lead to temporary or protracted displacement.^{11–13}

While national capacity should ideally be sufficient for disaster response, large-scale emergencies may need external aid, such as in addressing gaps and limitations in emergency medical care (EMC).^{11,14} This has been evident in previous events in Southeast Asia, such as the Indian Ocean earthquake and tsunami in 2004 and Super Typhoon Haiyan or Yolanda in 2013, among others.^{15–17}

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Such events have proven that international aid has been critical during the first few weeks.¹⁸ According to lessons learnt, external aid should be needs-driven, complement national systems, and contribute to the improvement of national resilience, ensuring that EMC is safe, people-centered, timely, equitable, integrated, and efficient while teamwork is underscored and proper interactive platforms are used.^{11,18} On the other hand, how these objectives can be achieved remains an essential research topic because Southeast Asian countries are especially diverse in terms of culture, religion, legal frameworks, and health needs; humanitarian organizations must ensure that the EMC they offer is also appropriate and responsive. Accordingly, more research is needed to both examine and develop appropriate and responsive strategies based on cultural sensitivity and legal frameworks. Emergency Medical Care provided by humanitarian organizations in response to sudden onset disasters has gaps in the current literature, so our findings may help to cover those gaps.

Hence, this scoping review aims to identify which types of EMC were provided by humanitarian organizations in response to sudden onset disasters caused by natural hazards in Southeast Asia in the last 10 years. Thanks to the diverse data of the study, as well as the longevity of the selected research period, the results of this scoping review can be used by humanitarian organizations to ensure the appropriateness and efficiency of the services they deliver. National and local governments can also recognize gaps and possible improvements in their national medical response policies and strategies to improve national resiliency and lessen dependence on external aid.

Materials and Methods

As of writing, no reviews have been done on this topic yet, thus a scoping review methodology was chosen to produce a broad snapshot using existing evidence. This scoping review adopted the methodological framework developed by Arskey and O'Malley in 2002¹⁹ and the formal guidance for conducting scoping reviews developed by the Joanna Briggs Institute.²⁰ This review aimed to answer the question: *What types of EMC were provided by humanitarian organizations in response to sudden onset disasters caused by natural hazards in Southeast Asia in the last 10 years?*

Search Strategy

The literature search was limited to online-based journal databases, including PubMed, Embase, and ProQuest. For grey literature, searches were also done on ReliefWeb and PreventionWeb, the online platforms of the United Nations Office for the Coordination of Humanitarian Affairs (UN OCHA) and the United Nations Office for Disaster Risk Reduction (UNDRR), respectively. These were included in the scope of technical reports from humanitarian organizations that are usually not analyzed or published in peer-reviewed journals. The searches were conducted in November 2023. The search terms focused on disaster medical response in Southeast Asian countries since 2014. The search was limited to documents published from 2014–2023 to provide a 10-year perspective, especially after the initial implementation of the World Health Organization (WHO) Classification and Minimum Standards for Emergency Medical Teams (EMTs) in Typhoon Haiyan in 2013.¹¹

Inclusion and exclusion criteria

The study data were extracted from the selected documents: disaster event, hazard type, country, year, organization, and medical

response details. Non-specific statements (e.g., “provided support” or “provided medical support”), as well as financial support that funded medical services, were not included in the extraction as these were not considered as actual provision of services. Disagreements in inclusion or exclusion were settled together by reaching on consensus to include accessible full text studies while inaccessible ones are excluded.

While biological hazards, such as epidemics, are also considered natural hazards, they were excluded from this review due to the bulk of information published on the recent COVID-19 pandemic and other infectious disease epidemics in Southeast Asia. Only documents published in English were included as this is the main language of the author. These exclusions were considered due to limitations in time and resources.

Screening process

Search results from PubMed, Embase, and ProQuest were uploaded into Rayyan, a collaboration platform used to screen studies for scoping or systematic reviews. Meanwhile, search results from ReliefWeb and PreventionWeb were collated on Microsoft Excel due to the limitations of these search engines to produce a file format compatible with Rayyan. Prior to the initial screening, duplicate entries were removed. Two independent reviewers, both researchers in public health in disasters, conducted the initial screening of titles and abstracts/executive summaries following the inclusion criteria listed in Table 1.

After initial screening, the full texts were obtained and reviewed by the 2 reviewers separately. Articles or documents that had no accessible full texts were excluded. Documents were scoped for clear statements regarding the medical service delivered. To gather more data, disasters covered in the initial results were also manually searched on ReliefWeb. Accordingly, the search yielded 538 results. After removing 49 duplicates, 489 items underwent initial screening, which resulted in 440 being excluded. A total of 49 items passed the initial screening. Upon full-text review, 28 were included. In addition, 9 items were manually scoped from ReliefWeb, from which 5 were included. A total of 33 documents were included for analysis: 1 journal article and 32 technical reports. Figure 1 summarizes the screening process and reasons for exclusion.

Data extraction and analysis

The data were charted using Microsoft Excel. The WHO list of clinical care standards for EMTs was used to categorize the data

Table 1. Inclusion criteria

Category	Inclusion criteria
Disaster	Sudden onset disasters caused by natural hazards, including geophysical (e.g., volcanoes, earthquakes), climatological (e.g., drought, wildfire), hydrological (e.g., floods), and meteorological (e.g., storms) ²¹
Medical response	Provided by a humanitarian organization not affiliated with the national government
Location	Southeast Asian countries, including Brunei, Cambodia, East Timor, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam
Timeframe	2014–2023
Language	English

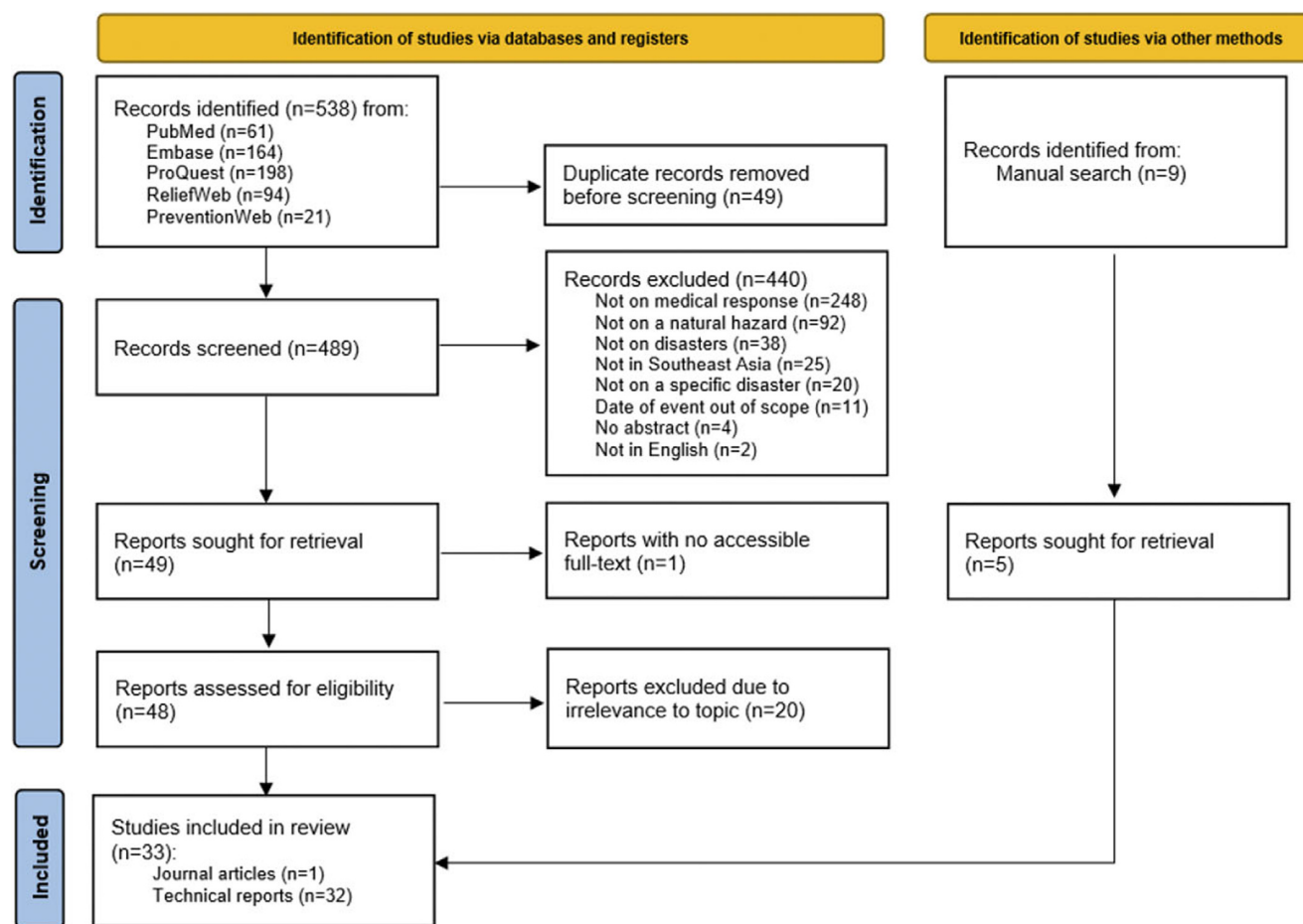


Figure 1. PRISMA flow diagram of scoping review screening (Source: Authors, adapted from²²).

gathered on medical response. The list includes 27 categories: triage; assessment, resuscitation, and stabilization; referral and transfer; ward management; wounds; burns; fracture management; spinal cord injuries; communicable diseases; non-communicable diseases (NCDs); reproductive, maternal, and newborn health care; child health; analgesia and anesthesia; intensive care; surgery and perioperative care; malnutrition; palliative care; rehabilitation; mental health and psychosocial support (MHPSS); blood transfusion services; laboratory services; medical imaging and reporting; clinical pharmacy; sterilization; infection prevention and control (IPC); health promotion and community engagement; and chemical, biological, radiological, and nuclear (CBRN), toxicology, and toxinology.¹¹ The results were then analyzed (a) per country, (b) per hazard type, and (c) per clinical care category.

Results

Disasters scoped

A total of 17 disaster events were scoped (Table 2). The disasters scoped were in Indonesia (9, 52.9%),^{23,24,26,27,29–33,37–45,49,50,55} Philippines (5, 29.4%),^{25,28,46,48,51–54} Laos (2, 11.8%),^{34–36} and Myanmar (1, 5.9%).⁴⁷ No documents were scoped on the remaining 7 Southeast Asian countries. Of the 17 events, 14 were caused by a single hazard: earthquakes (6, 35.3%),^{27,28,46,48–50,55} floods (4, 23.5%),^{26,34–36,47} cyclones (2, 11.8%),^{25,51–54} tsunami (1, 5.9%),⁴⁴ and volcanic eruption (1, 5.9%).^{23,24} The other 3 were multi-hazard:

earthquakes and tsunamis (2, 11.8%)^{29–33,37–43} and flood and landslide (1, 5.9%).⁴⁵

Most the documents gathered were from the International Federation of Red Cross and Red Crescent Societies (IFRC), usually written by their country counterparts.^{23,25–32,34,42–44,46–48} Other organizations include UN OCHA,^{35,36,46,49–51} Humanitarian Cluster Team (HCT) in Indonesia,^{46–50} UN Population Fund (UNFPA) Philippines,^{52–54} YAKKUM Emergency Unit (YEU) in Indonesia,²⁴ and Association of Medical Doctors of Asia (AMDA) based in Japan.⁵⁵ These reports also mention and discuss response activities done by other international and local humanitarian organizations. While some documents did not mention the specific organization that delivered the medical response, these were still included in the data gathered, as this study is focused more on the EMC delivered than the organization that delivered them. Meanwhile, the only journal article was written by authors based in Indonesia.³³

Emergency medical care

The services delivered the most were MHPSS (12 of 17 disasters, 70.6%); assessment, resuscitation, and stabilization (11 of 17, 64.7%), referral and transfer (10 of 17, 58.8%), and health promotion and community engagement (9 of 17, 52.9%). No data were gathered for 11 of the 27 categories: triage; ward management; wounds; burns; fracture management; intensive care; surgery and perioperative care; palliative care; medical imaging and reporting; sterilization; and CBRN, toxicology, and toxinology. Figure 2 is a

Table 2. List of disaster events scoped

Event	Hazard type	Location	Date
1 Mt. Kelud eruption ^{23,24}	Volcanic eruption	Indonesia	Feb 2014
2 Typhoon Rammasun (Glenda) ²⁵	Cyclone	Philippines	Jul 2014
3 Sumatra floods ²⁶	Floods	Indonesia	Feb 2016
4 Aceh earthquake ²⁷	Earthquake	Indonesia	Dec 2016
5 Surigao earthquake ²⁸	Earthquake	Philippines	Feb 2017
6 Lombok earthquakes and tsunami ^{29–33}	Earthquake, tsunami	Indonesia	Jul 2018
7 Xe-Pian X-Nam Noy dam break ³⁴	Flash floods	Laos	Jul 2018
8 Sekaman hydropower plant break ^{35,36}	Flash floods	Laos	Aug 2018
9 Central Sulawesi earthquake and tsunami ^{37–43}	Earthquake, tsunami	Indonesia	Sep 2018
10 Sunda Straits tsunami ⁴⁴	Tsunami	Indonesia	Dec 2018
11 South Sulawesi flash floods and landslides ⁴⁵	Flash flood, landslide	Indonesia	Jan 2019
12 Northern Philippines earthquake ⁴⁶	Earthquake	Philippines	Apr 2019
13 Myanmar monsoon floods ⁴⁷	Monsoon floods	Myanmar	Jul 2019
14 Mindanao earthquake ⁴⁸	Earthquake	Philippines	Oct 2019
15 West Sulawesi earthquake ^{49,50}	Earthquake	Indonesia	Jan 2021
16 Super Typhoon Rai (Odette) ^{51–54}	Cyclone	Philippines	Dec 2021
17 Java earthquake ⁵⁵	Earthquake	Indonesia	Nov 2022

visualization of the EMC services provided to the scoped disasters caused by natural hazards in Indonesia, the Philippines, Laos, and Myanmar.

Indonesia received assessment, resuscitation, and stabilization services the most (6 of 9 disasters, 66.7%), followed by services for communicable diseases and MHPSS (5 of 9, 55.6%); and referral and transfer, and health promotion and community engagement (4 out 9, 44.4%). On the other hand, the Philippines received the referral and transfer the most (5 of 5, 100.0%), followed by MHPSS; health promotion and community engagement (4 of 5, 80.0%); and assessment, resuscitation, and stabilization (3 of 5, 60.0%). While some data points were gathered for Laos and Myanmar, there were not enough data to compare and analyze.

Disasters caused by earthquakes received services for assessment, resuscitation, and stabilization; and referral and transfer the most (4 of 6, 66.7%), followed by services for communicable diseases and health promotion and community engagement (3 of 6, 50.0%). Services for assessment, resuscitation, and stabilization were also delivered the most in disasters caused by floods (3 of 3, 100.0%). While data points were gathered for the rest of the hazard types, there were not enough data to compare and analyze. Table 3 lists examples of the services provided for each of the categories scoped. Based on the available data analysis, it is noteworthy to mention that certain emergency medical care categories, such as triage, surgery, and intensive care, have limited representation.

The review showed that humanitarian response efforts usually utilize mobile clinics to deliver services, especially to reach inaccessible areas or areas where health facilities were difficult to reach.^{23,27,29–32,38,42–44,53,54} Response efforts were also usually coordinated with local authorities, with several organizations deploying staff to support service delivery in local hospitals or primary health care centers. Services for MHPSS were delivered for all hazard types. Reports identified trauma from the disaster as the usual cause for the need for MHPSS services,^{23,27,32,42} as well as fear and anxiety,^{27,28,32,42,43} loss of family members,³⁶ and constrained social and living conditions.^{32,42} Anxiety was commonly associated with uncertainty of future stability and conditions, fear of continuing danger (i.e., aftershocks), and misinformation.^{32,42,53} The need for health promotion and community engagement was associated with the affected population's anxieties about the lack of information in terms of future plans,⁴² as well as the importance of providing timely and accurate information about humanitarian assistance to ensure community participation.^{31,38,42} Efforts were made to ensure that channels were 2-way, such that people could express their concerns and feedback,^{32,33} and that the community was engaged in strategies implemented, including the representation and participation of minority and vulnerable groups.^{41,42} There was also an effort to translate health promotion materials and messages into the local language in Indonesia.²⁷

Discussion

This scoping review aimed to identify what types of EMC were provided by humanitarian organizations in response to sudden onset disasters caused by natural hazards in Southeast Asia in the last 10 years. Most of the documents gathered were technical reports, with only 1 journal article included. This may be because the medical response to disasters is not usually analyzed or discussed in peer-reviewed journals, except for disasters that have caused massive damage, such as the 2010 Haiti earthquake in Hawaii and the 2013 Super Typhoon Haiyan in the Philippines. The hazards covered include earthquakes, tsunamis, floods, landslides, cyclones, and volcanic eruptions, the majority of which were in Indonesia and the Philippines. This is consistent with the data from the ASEAN Coordinating Centre for Humanitarian Assistance on Disaster Management (AHA Centre) that showed that most of the disasters recorded in Southeast Asia from 2012 to 2023 were in Indonesia (74.6%) and the Philippines (10.0%).⁵⁶ The findings also have consistent aspects with previous research that indicate the significance of international collaboration and partnership, developing rapid deployment strategies, establishing programs to alleviate the burden, and enhancing professional and organizational capabilities and communication processes.^{57–60}

EMC Provided for Sudden Onset Disasters in Southeast Asia

The top EMC categories delivered are: MHPSS; assessment, resuscitation, and stabilization; referral and transfer; and health promotion and community engagement. The increase in mental health issues caused by psychological distress has been recognized as an emerging concern in recent years.⁶¹ Causes for mental health issues identified included trauma, fear and anxiety, and uncertainty of social and living conditions.^{23,27,28,32,42,43,53} Mental health concerns continue to be observed even months after the event.²⁷ The MHPSS service delivered the most was PFA.^{27,28,30,31,35,37–44,48} Organizations strived to ensure that services were appropriate, targeted, and

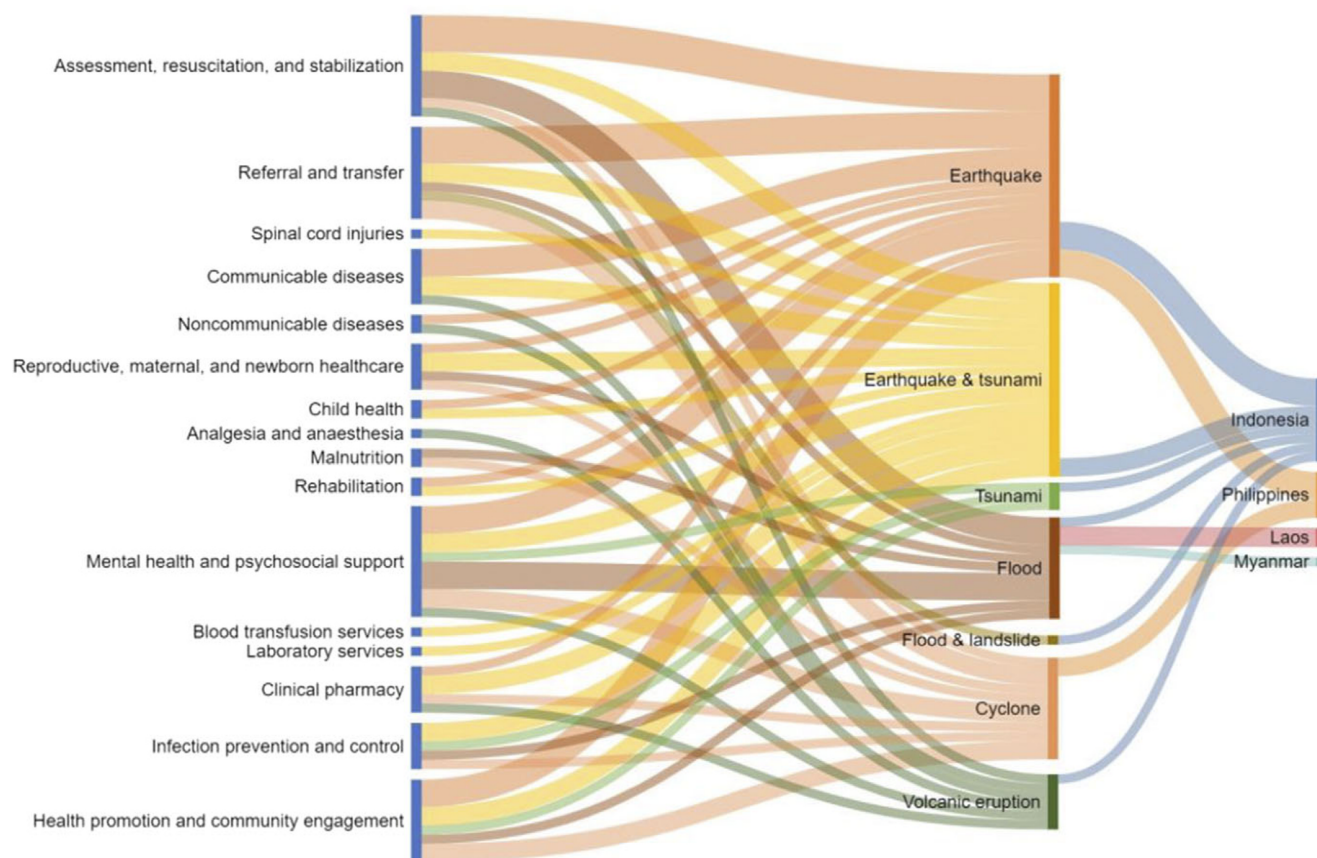


Figure 2. Visualisation of EMS services provided to disasters caused by natural hazards in Southeast Asia from 2014-2023 (figure generated using <https://sankeymatic.com/>) (Note: EMS categories with no data collected were excluded from this figure).

community-based, with specific activities for children, such as play therapy and the establishment of child-friendly spaces.^{23,27–34,38} In Indonesia, psychosocial activities were modified during Ramadan, such as conducting prayers and breaking fast together.⁴⁴ In addition, the need for PSS for health staff and volunteers was also highlighted.^{27,39,40,47} As MHPSS services were usually provided by humanitarian organizations in this review, this highlights the high demand for such services and the need for national governments to scale up local MHPSS preparedness and response efforts to ensure that the demands are met, including after external aid has ended.

Services for assessment, resuscitation, and stabilization included first aid and basic emergency and health services.^{26,27,29,34,47} This reflects the need for immediate international assistance during the first weeks of the disaster.¹⁸ In addition, blood pressure monitoring was delivered specifically to the Philippines,^{25,28,48} which can be seen as a reflection of hypertension being one of the top causes of morbidity in the country.⁶² Services for referral and transfer were usually done for cases that needed advanced comprehensive care,^{25,27,28,30,31,40,42} which reflects the need for active referral systems and pathways. Services for health promotion and community engagement covered not only health and health information but also WASH promotion.^{27,30–32,37,42,43,48} These 3 categories of services are usually basic services expected for disaster response, ensuring that immediate health needs are addressed, external organizations are properly integrated into the local DRRM structure, and essential information is delivered to the affected population in a timely manner. Nevertheless, the high number of disasters

where these services were provided can be a cause for the need for national governments to scale up efforts in these aspects as well.

The following services were also provided to an adequate number of disasters covered (i.e., 5–6): communicable diseases; reproductive, maternal, and newborn health care; clinical pharmacy; and IPC; while the following services were provided to a small number of disasters covered (i.e., 1–2): spinal cord injuries, NCDs, child health, analgesia and anesthesia, malnutrition, rehabilitation, blood transfusion services, and laboratory services. These services are usually expected to be provided after sudden onset disasters, especially as these are expected indirect health effects. The low coverage may indicate that national capacities were sufficient in addressing these concerns or that these issues usually emerge after external aid has pulled out. However, this may also reflect the limitations of the scoping review methodology used, which are discussed below.

On the other hand, there were several EMC categories that were not scoped. Triage, ward management, and sterilization are usually intrinsically expected of EMTs; thus, organizations may not see the need to routinely report these. However, the demand for services for wounds, burns, and fracture management is usually high for sudden-onset disasters. Similar to the services above, the lack of data on these services may indicate either sufficient national capacities or limitations in the study methodology. Lastly, for intensive care, surgery and perioperative care, palliative care, medical imaging and reporting, CBRN, toxicology, and toxinology, several reasons can be hypothesized. These services may not be considered immediate needs and were therefore not delivered, or these services

Table 3. Scoped EMC services provided during sudden onset disasters in Southeast Asia

Category	Services provided
MHPSS 12 of 17 (70.6%)	Psychological first aid (PFA) ^{27,28,30,31,35,37–43,48} Psychological support for children, including play therapy and establishing child-friendly spaces ^{23,27–34,38} Community-based activities ^{31,32,42,43} Support for health staff and volunteers ^{28,39,40,47} Psychosocial activities for Ramadan in Indonesia ⁴⁴
Assessment, resuscitation, and stabilisation 11 of 17 (64.7%)	First aid and basic emergency care ^{23,26,27,29,31,34,47,49,50} Blood pressure monitoring, especially in the Philippines ^{25,28,48}
Referral and transfer 10 of 17 (58.8%)	Use of ambulances, including helicopter clinics in Indonesia and sea ambulance in the Philippines ^{27–30,45,48,53} Referrals for cases that need advanced comprehensive care or from remote locations ^{25,27,28,30,31,40,42}
Health promotion and community engagement 9 of 17 (52.9%)	Disease prevention ^{27,30–32,42,43,48} Water, sanitation, and hygiene (WASH) promotion ^{27,30–32,37,42,43} Health information dissemination ^{32,42,43}
Communicable diseases 6 of 17 (35.2%)	Respiratory diseases ^{23,24,27,30,31,55} Diarrhoea ^{27,29,30,44,48,55} HIV ^{37–39,41} Common colds ^{23,48} Malaria ³¹
Reproductive, maternal, and newborn healthcare 5 of 17 (29.4%)	Ante- and post-natal care ^{37,38,42,43,51} Basic emergency obstetric and newborn care (BEmONC) ^{31,32,37,40} Basic deliveries ^{32,37} Counselling ^{40,41}
Clinical pharmacy 5 of 17 (29.4%)	Basic medicines ^{23,28,42,43,55} Other health-related consumables, such as hygiene kits, mosquito nets, and maternity or delivery kits ^{23,26,27,31,32,34,37,38}
IPC 5 of 17 (29.4%)	Immunisation for children against measles and rubella ^{37–41} Tetanus prophylaxis and IPC measures against COVID–19 for the deployed teams ^{29,51} Training on epidemic control for volunteers (ECV) ^{31,44,47}
NCDs 2 of 17 (11.8%)	Skin conditions ^{23,24,27} Hypertension ²⁴
Child health 2 of 17 (11.8%)	Support for health nutrition needs for infants, young children, and mothers ^{37,38} Paediatric ward for children ⁴⁸
Malnutrition 2 of 17 (11.8%)	Screening for acute malnutrition ^{35,51} Treatment for wasting, provision of supplements, and refresher training for frontline workers ⁵¹
Rehabilitation 2 of 17 (11.8%)	Support for people with disability (PWD) ^{37,38,40} Provision of mobility aids, such as wheelchairs and crutches ²⁷
Spinal cord injuries 1 of 17 (5.9%)	No specifics provided ³³
Analgesia and anesthesia 1 of 17 (5.9%)	For myalgia, cephalgia, low back pain, and arthralgia ²⁴
Blood transfusion services 1 of 17 (5.9%)	No specifics provided ⁴²
Laboratory services 1 of 17 (5.9%)	No specifics provided ⁴²

are considered specialized and addressed by specific organizations whose reports were not scoped by the study methodology.

Learnings and challenges

Coordination with national governments is key. The results of the scoping review showed that humanitarian response efforts are usually coordinated with national and local authorities. Organizations usually either utilize mobile clinics to deliver services, especially to reach inaccessible areas where health facilities are difficult to reach,^{23,27,29–32,39,42–44,53,54} or deploy staff to local health facilities to support service delivery. The need to deploy mobile clinics emphasize how sudden onset disasters have the capacity to cause danger to essential infrastructure, such as health facilities or roads, which can hinder accessibility of health services and can also be a challenge for both national and humanitarian response efforts. This was evident in some disasters scoped in this review.^{26,27,30,36} In addition, affected areas are sometimes already impoverished or hard to reach in the first place, with already low levels of health service accessibility.

Coordination of external aid is essential to ensure that these areas are reached and their health needs are immediately addressed, while efforts to increase baseline delivery of health services should be prioritized. On the other hand, it is also important that national governments establish robust systems and frameworks in the coordination and management of external aid to ensure that efforts are aligned and appropriate, and to prevent duplication. This also includes ensuring that external aid is sent to areas with needs that align with their capacities, as well as ensuring that responding organizations have mechanisms to communicate and coordinate, not only with national authorities but also among each other and the affected communities.^{18,63,64}

Ensuring appropriateness of response activities and services. With the diversity of cultures, languages, religions, and even geographical compositions of different countries in Southeast Asia, there is a need to ensure that response activities and services are appropriate for the context and people they are given to. This was applied, for example, in response efforts in Indonesia where health promotion materials were translated to the local language³⁶ and MHPSS activities were modified during Ramadan.⁴⁴ In this sense, ensuring the representation and participation of communities, especially of minorities, vulnerable groups, and displaced populations, is crucial and should be prioritized.^{42,65,66} In addition, different countries have different health profiles and thus require different types of health services. Health promotion efforts should focus on endemic diseases, and historical disease burdens can also be referred to as disasters usually exacerbate already existing diseases in the country. For example, mosquito-borne diseases, like dengue and malaria, are endemic in Indonesia and the Philippines, which is why these were included in health promotion efforts.^{27,31,32,42,43} Attention should also be given to the health needs that arise from displacement, especially when it becomes long-term.⁶⁶

Fostering national resilience. National governments are expected to strengthen their intrinsic capacities to be prepared for and respond to emergencies.^{18,66–68} Requests for external aid can reflect gaps in national resources and skills, and can thus be used to assess which aspects of national and local health and DRRM systems need improvement. In the Philippines, despite having one of the most robust legal DRRM frameworks in the world, experiences from previous disasters show that implementation at the local level remains challenged by a lack of resources and capacity.⁶⁹ Improving national DRRM systems and capacities should be a priority, as this can result in a timelier, cost-effective, and appropriate

response.¹⁸ Humanitarian organizations can also contribute to increasing national and local resilience by providing training opportunities for health staff and community volunteers, as well as ensuring that mechanisms for the continuity of service delivery are set up before their response activities end.¹⁸ Ethical issues should be taken in consideration together with local social approaches to improve resilience.⁷⁰ This has been observed during COVID time in prehospital settings^{71,72} and family caregivers.⁷³ A holistic approach from different fields of knowledge should be encouraged.⁷⁴

Limitations

This scoping review was only able to include documents that are accessible online. In addition, search engines may not have scoped documents from other national and private organizations. Thus, the data gathered and presented should only be taken as a snapshot of the actual response. Further systematic reviews can be conducted from the results of this review. Publication bias may also be present because some disasters were covered by multiple references. Due to these, the results should not be taken as a generalization for the different countries in the region but can still serve as a starting point for discussion or further research.

Conclusion

Southeast Asia is one of the most disaster-prone regions in the world, being constantly at risk of multiple hazards, such as earthquakes, typhoons, flash floods, and volcanic eruptions, resulting in various direct and indirect health effects. With national governments primarily responding to deliver timely and appropriate immediate response, large-scale emergencies may necessitate the need for external aid, especially since sudden onset disasters can occur quickly or unexpectedly. In such cases, national governments usually request aid from humanitarian organizations to fill gaps in their disaster response.

This scoping review showed that in response to recent sudden-onset disasters in Southeast Asia, particularly in Indonesia and the Philippines, the following types of EMC were provided the most: MHPSS; assessment, resuscitation, and stabilization; referral and transfer; and health promotion and community engagement. This can provide insights for national governments on which aspects of their DRRM systems can be improved on to increase national resilience for a timelier, and more cost-effective and appropriate response and recovery. Systems and frameworks for the coordination and management of external aid should also be robust to ensure that appropriate aid is sent to areas with needs that align with their capacities. Therefore, it is suggested that the local systems should be aligned with international disaster response processes during which certain disaster preparation certifications should be mandated while the frequency and complexity of training simulations are enhanced.

Further research is recommended in terms of analyzing the effectiveness and efficiency of systems and capacities that each country have established to coordinate and manage humanitarian aid during disasters to provide insights on how to improve collaboration.

Data availability statement. Data will be made available on request.

Author contribution. Jemar Anne Sigua: Writing – original draft, Writing – review and editing, Conceptualization, Data curation, Formal analysis,

Methodology, Validation, Visualization. **Ebru Caymaz:** Writing – review and editing, Conceptualization, Methodology, Resources, Supervision, Validation. **Rafael Castro-Delgado:** Writing – review and editing, Conceptualization, Methodology, Resources, Supervision, Validation.

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References

1. Sawada Y, Oum S. Economic and welfare impacts of disasters in East Asia and policy responses. *ERIA Research Project Report*. Jakarta: ERIA; 2012: 2011–2018.
2. ASEAN Secretariat (2016) ASEAN Vision 2025 on Disaster Management. Accessed October 10, 2024. Published <http://www.asean.org/storage/2016/02/ASEAN-Vision-2025-on-Disaster-ManagementAdopted.pdf>.
3. UNESCAP (2020) The Disaster Riskscape across South-East Asia: Key Takeaways for Stakeholders. <https://www.unescap.org/sites/default/files/IDD-APDR-Subreport-SEA.pdf>.
4. Whelley PL, Newhall CG, Bradley KE. The frequency of explosive volcanic eruptions in Southeast Asia. *Bull Volcanol*. 2015;77(1):1. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4470363/>.
5. Overland I. (2017) Impact of Climate Change on ASEAN International Affairs: Risk and Opportunity Multiplier. Norwegian Institute of International Affairs. https://www.researchgate.net/publication/320622312_Impact_of_Climate_Change_on_ASEAN_International_Affairs_Risk_and_Opportunity_Multiplier.
6. Pradeep M, Kamarajugedda SA, Lo EYM. Urban growth patterns in major Southeast Asian cities: toward exposure mapping and vulnerability assessment. *19th EGU General Assembly, EGU2017, proceedings from the conference held 23-28 April, 2017 in Vienna, Austria*. 2017:16778. <https://ui.adsabs.harvard.edu/abs/2017EGUGA..1916778M/abstract#:~:text=The%20region%20has%20more%20than,highly%20vulnerable%20to%20natural%20hazards>.
7. UNDRR and World Bank 2010 Synthesis Report on Ten ASEAN Countries Disaster Risks Assessment. https://www.unisdr.org/files/18872_asean.pdf.
8. Shoaf KI, Rottman SJ. (2000) Public Health Impact of Disasters. Australian Journal of Emergency Management. https://www.preventionweb.net/files/2026_VL206801.pdf.
9. Giorgadze T, Maisuradze I, Japaridze A, et al. Disasters and their consequences for public health. *Georgian Med News*. 2011;(194):59–63. <https://pubmed.ncbi.nlm.nih.gov/21685525/#:~:text=Disasters%20directly%20impact%20the%20health,on%20the%20health%20care%20system>.
10. Internal Displacement Monitoring Centre. Global Report on Internal Displacement 2019. <https://www.internal-displacement.org/global-report/grid2019/>.
11. WHO. Classification and Minimum Standards for Emergency Medical Teams. 2021. <https://iris.who.int/bitstream/handle/10665/341857/9789240029330-eng.pdf?sequence=1>.
12. UNDRR (n.d.) Disaster. <https://www.preventionweb.net/terminology/disaster>.
13. UNHCR (n.d.) UNHCR Master Glossary of Terms. <https://www.unhcr.org/glossary>.
14. Hanfling D, Altevogt BM, Gostin LO. A framework for catastrophic disaster response. *JAMA*. 2012;308(7):675–676.
15. Carballo M, Daita S, Hernandez M. Impact of the Tsunami on healthcare systems. *J R Soc Med*. 2005;98(9):390–395. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1199632/>.
16. Telford J, Cosgrove J. The international humanitarian system and the 2004 Indian Ocean earthquake and tsunamis. *Disasters*. 2007;31(1). <https://online.library.wiley.com/doi/abs/10.1111/j.1467-7717.2007.00337.x>.
17. Brolin K, Hawajri O, von Schreeb J. Foreign medical teams in the Philippines after Typhoon Haiyan 2013 - who were they, when did they arrive and what did they do?'. *PLoS Curr*. 2015;5:7. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4447417/>.
18. UN OCHA. Disaster Response in Asia and the Pacific: A Guide to International Tools and Services. 2018. https://asiadisasterguide.unocha.org/images/download/ROAP_DisasterGuide.pdf.
19. Arksey H, O'Malley L. Scoping studies: towards a methodological framework'. *Int J Soc Res Methodol*. 2005;8(1):19–32.
20. Peters MDJ, Godfrey C, McInerney P, et al. Chapter 11: Scoping Reviews (2020 version). In: Aromataris E, Munn Z (eds). *JBIM Manual for Evidence Synthesis*. Joanna Briggs Institute; 2020. <https://doi.org/10.46658/JBIMES-20-12>.
21. CRED (n.d.) General Classification. <http://www.emdat.be/classification>.
22. Page MJ, McKenzie JE, Bossuyt PM, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ*. 2021;372:n71. <https://doi.org/10.1136/bmj.n71>.
23. IFRC. Indonesia: Volcanic Eruption – Mt Kelud DREF Operation n° MDRID009 - Final report. 2014. <https://reliefweb.int/report/indonesia/indonesia-volcanic-eruption-mt-kelud-dref-operation-n-mdrid009-final-report>.
24. YEU. Sitrep #3: Mount Kelud Eruption Emergency Assistance. 2015. Accessed November 28, 2023. <https://reliefweb.int/report/indonesia/sitrep-3-mount-kelud-eruption-emergency-assistance>.
25. IFRC. Philippines: Typhoon Rammasun - Information Bulletin n° 3. 2014. <https://reliefweb.int/report/philippines/philippines-typhoon-rammasun-information-bulletin-n-3>.
26. IFRC. Indonesia: Floods - Information Bulletin n° 1. 2016. <https://reliefweb.int/report/indonesia/indonesia-floods-information-bulletin-n-1-1>.
27. IFRC. Indonesia: Aceh Earthquake DREF Operation n° MDRID011 Final Report. 2017. <https://reliefweb.int/report/indonesia/indonesia-aceh-earthquake-dref-operation-n-mdrid011-final-report>.
28. IFRC. Philippines: Surigao earthquake – DREF Final Report (MDRPH024). 2017. <https://reliefweb.int/report/philippines/philippines-surigao-earthquake-dref-final-report-mdrph024>.
29. IFRC. Indonesia: Earthquakes and Tsunami - Emergency Plan of Action Operation MDRID013 Update n°3. 2018. <https://reliefweb.int/report/indonesia/indonesia-earthquakes-and-tsunami-emergency-plan-action-operation-mdrid013-update-n>.
30. IFRC. Indonesia: Earthquakes and Tsunami – Emergency Plan of Action Operation MDRID013 Update n°4. 2018. <https://reliefweb.int/report/indonesia/indonesia-earthquakes-and-tsunami-emergency-plan-action-operation-mdrid013-update-0>.
31. IFRC. Indonesia: Earthquakes and Tsunami - Emergency Plan of Action Operation MDRID013 Update n°6. Published 2018. <https://reliefweb.int/report/indonesia/indonesia-earthquakes-and-tsunami-emergency-plan-action-operation-mdrid013-update-2>.
32. IFRC. Indonesia: Earthquakes and Tsunami - Emergency Plan of Action Operation MDRID013 Update n°8. Published 2018. <https://reliefweb.int/report/indonesia/indonesia-earthquakes-and-tsunami-emergency-plan-action-operation-mdrid013-update-4>.
33. Sakti YM, Batong GJS, Rukmoyo T, et al. Pre-coordinated deployment of Emergency Medical Team (EMT) orthopaedic spine specialist-cell: Experience in an acute-phase of the 2018 Lombok earthquake by Yogyakarta team'. *J Glob Pharma Technol*. 2020;12(1). <http://download.garuda.kemdikbud.go.id/article.php?article=3331804&val=29253&title=Pre-coordinated%20Deployment%20of%20Emergency%20Medical%20Team%20Emt%20Orthopaedic%20Spine%20Specialist-Cell%20Experience%20in%20An%20Acute-Phase%20of%20the%202018%20Lombok%20Earthquake%20by%20Yogyakarta%20Team>.
34. IFRC. Lao People's Democratic Republic: Flash Floods Emergency Appeal n° MDRLA005; Emergency Plan of Action Operation Update n° 2, 31 October 2018. Published October 31, 2018. <https://reliefweb.int/report/lao-peoples-democratic-republic/lao-peoples-democratic-republic-flash-floods-emergency-0>.
35. UN OCHA and UNCT Laos PDR. Lao PDR: Flash Floods - Office of the Resident Coordinator Situation Report No. 8 (as of 16 August 2018). 2018. <https://reliefweb.int/report/lao-peoples-democratic-republic/lao-pdr-flash-floods-office-resident-coordinator-situation-1>.
36. UN OCHA and UNCT Laos PDR. Lao PDR: Flash Floods in Attapeu - Office of the Resident Coordinator Situation Report No. 9 (as of 23 August 2018). Published August 23, 2018. <https://reliefweb.int/report/lao-peoples-democratic-republic/lao-pdr-flash-floods-attapeu-office-resident-coordinator>.

37. **HCT Indonesia.** Central Sulawesi Earthquake & Tsunami: Humanitarian Country Team Situation Report #3 (as of 16 October 2018). Published October 16, 2018. <https://reliefweb.int/report/indonesia/central-sulawesi-earthquake-tsunami-humanitarian-country-team-situation-report-3-16>.
38. **HCT Indonesia.** Central Sulawesi Earthquake & Tsunami: Humanitarian Country Team Situation Report #4 (as of 19 October 2018). Published October 19, 2018. <https://reliefweb.int/report/indonesia/central-sulawesi-earthquake-tsunami-humanitarian-country-team-situation-report-4-19>.
39. **HCT Indonesia.** Central Sulawesi Earthquake & Tsunami: Humanitarian Country Team Situation Report #5 (as of 23 October 2018). Published October 23, 2018. <https://reliefweb.int/report/indonesia/central-sulawesi-earthquake-tsunami-humanitarian-country-team-situation-report-5-23>.
40. **HCT Indonesia.** Central Sulawesi Earthquake & Tsunami: Humanitarian Country Team Situation Report #6 (as of 30 October 2018). Published October 30, 2018. <https://reliefweb.int/report/indonesia/central-sulawesi-earthquake-tsunami-humanitarian-country-team-situation-report-6-30>.
41. **HCT Indonesia.** Central Sulawesi Earthquake & Tsunami: Humanitarian Country Team Situation Report #7 (as of 6 November 2018). Published November 6, 2018. <https://reliefweb.int/report/indonesia/central-sulawesi-earthquake-tsunami-humanitarian-country-team-situation-report-7-6>.
42. **IFRC.** Indonesia: Earthquakes and Tsunami - Sulawesi - Emergency Plan of Action MDRID013 6-month update. 2019. <https://reliefweb.int/report/indonesia/indonesia-earthquakes-and-tsunami-sulawesi-emergency-plan-action-mdrid013-6-month>.
43. **IFRC.** Indonesia: Earthquakes and Tsunami - Sulawesi Emergency Plan of Action Operation 12-month update appeal n° MDRID013. 2019. <https://reliefweb.int/report/indonesia/indonesia-earthquakes-and-tsunami-sulawesi-emergency-plan-action-operation-12-month>.
44. **IFRC.** Indonesia: Earthquakes and Tsunami - Sunda Straits Tsunami - Emergency Plan of Action 6-month Update, Emergency appeal n° MDRID013. 2019. <https://reliefweb.int/report/indonesia/indonesia-earthquakes-and-tsunami-sunda-straits-tsunami-emergency-plan-action-6>.
45. **IFRC.** Indonesia: Flash Floods and Landslides in South Sulawesi Province Information Bulletin. 2019. <https://reliefweb.int/report/indonesia/indonesia-flash-floods-and-landslides-south-sulawesi-province-information-bulletin>.
46. **UN OCHA.** Philippines: Northern Philippines earthquake - Flash Update No. 1 (23 April 2019). Published April 23, 2019. <https://reliefweb.int/report/philippines/philippines-northern-philippines-earthquake-flash-update-no-1-23-april-2019>.
47. **IFRC.** Myanmar: Monsoon Floods Emergency Plan of Action Operation Update n° 1 DREF n° MDRMM012. Published 2019. <https://reliefweb.int/report/myanmar/myanmar-monsoon-floods-emergency-plan-action-operation-update-n-1-dref-n-mdrmm012>.
48. **IFRC.** Philippines: Mindanao Earthquake Final Report n° MDRPH036. 2021. <https://reliefweb.int/report/philippines/philippines-mindanao-earthquake-final-report-n-mdrph036>.
49. **UN OCHA.** Indonesia: West Sulawesi Earthquake Flash Update No. 1 (As of 15 January 2021). Published January 15, 2021. <https://reliefweb.int/report/indonesia/indonesia-west-sulawesi-earthquake-flash-update-no-1-15-january-2021>.
50. **UN OCHA Affairs.** Indonesia: West Sulawesi Earthquake Flash Update No. 2 (As of 16 January 2021). Published January 16, 2021. <https://reliefweb.int/report/indonesia/indonesia-west-sulawesi-earthquake-flash-update-no-2-16-january-2021>.
51. **UN OCHA.** Philippines: Super Typhoon Rai (Odette) - Situation Report No. 10 - Final Report (As of 8 July 2022). Published July 8, 2022. <https://reliefweb.int/report/philippines/philippines-super-typhoon-rai-odette-situation-report-no-10-final-report-8-july-2022>.
52. **UNFPA.** Super Typhoon Rai (Odette) Situation Report 6 & 7, 30 April 2022. Published April 30, 2022. <https://reliefweb.int/report/philippines/super-typhoon-rai-odette-situation-report-6-7-30-april-2022>.
53. **UNFPA.** Typhoon Odette Response - Six Months On - Situation Report #9. 2022. <https://reliefweb.int/report/philippines/typhoon-odette-response-six-months-situation-report-9>.
54. **UNFPA.** Typhoon Odette (Rai) Emergency Response Snapshot (February 25, 2022). Published February 25, 2022. <https://reliefweb.int/report/philippines/typhoon-odette-rai-emergency-response-snapshot-february-25-2022>.
55. **AMDA.** AMDA Emergency Relief #2: Earthquake in Java, Indonesia (12 December 2022). Published December 12, 2022. <https://reliefweb.int/report/indonesia/amda-emergency-relief-2-earthquake-java-indonesia-12-december-2022>.
56. **AHA Centre** (n.d.) ASEAN Disaster Information Network. <https://adine.tahacentre.org/>.
57. **Heidari M, Aliakbari F, Heydarpoor S, et al.** Pre-hospital emergency service challenges in the face of the COVID-19 pandemic in Iran. *Disaster Med Public Health Prep.* 2022.
58. **Cvetković VM, Tanasić J, Ocal A, et al.** Capacity development of local self-governments for disaster risk management. *Int J Environ Res Public Health.* 2021;18(19):10406.
59. **Cvetković VM, Tanasić J, Renner R, et al.** Comprehensive risk analysis of emergency medical response systems in Serbian healthcare: assessing systemic vulnerabilities in disaster preparedness and response. *Healthcare.* 2024;12(19).
60. **WHO** (n.d.) Ensuring a Coordinated and Effective Mental Health Response in Emergencies. <https://www.who.int/activities/ensuring-a-coordinated-and-effective-mental-health-response-in-emergencies>.
61. **Philippine DOH.** Field Health Services Information System Annual Report 2022. Published 2022. https://doh.gov.ph/sites/default/files/publications/FHSIS_2022_Aug.pdf.
62. **IFRC, UN OCHA, and the Inter Parliamentary Union.** Model Act for the Facilitation and Regulation of International Disaster Relief and Initial Recovery Assistance (with commentary). 2013. <http://archive.ipu.org/PDF/publications/act-en.pdf>.
63. **Hamilton ABL, Sodergard B, Liverani M.** The role of emergency medical teams in disaster response: a summary of the literature. *Nat Hazards.* 2021; 110:1417–1426. <https://link.springer.com/article/10.1007/s11069-021-05031-x#ref-CR16>.
64. **Government of the Philippines.** Tropical Storm Sendong - Post Disaster Needs Assessment. 2012. <https://reliefweb.int/report/philippines/tropical-storm-sendong-post-disaster-needs-assessment>.
65. **Jang S, Ekyalongo Y, Kim H.** Systematic review of displacement and health impact from natural disasters in Southeast Asia. *Disaster Med Public Health Prep.* 2021;15(1):105–114. doi: 10.1017/dmp.2019.125.
66. **WHO.** International Health Regulations (2005) – Third edition. 2016. <https://www.who.int/publications/i/item/9789241580496>.
67. **ASEAN.** ASEAN Leaders' Declaration on Disaster Health Management. 2017. https://asean.org/wp-content/uploads/2017/11/4-ADOPTION_2017_ALD-on-DHM_Endorsed-13th-AHMM.pdf.
68. **UN** (n.d.) Health – United Nations Sustainable Development. <https://www.un.org/sustainabledevelopment/health/>.
69. **UN OCHA.** Report: The After Action Review/Lessons Learned Workshops Typhoon Bopha Response. 2013. <https://www.unocha.org/publications/report/philippines/report-after-action-review-lessons-learned-workshops-typhoon-bopha-response>.
70. **Mohammadi MMD, Sheikhhasadi H, Mahani SA, et al.** The effect of bio ethical principles education on ethical attitude of prehospital paramedic personnel. *J Educ Health Promot.* 2021;10:289. doi: 10.4103/jehp.jehp_708_20. PMID: 34667789; PMCID: PMC8459844.
71. **Castro Delgado R, Cernuda Martínez JA, Romero Pareja JA, et al.** Management of the COVID-19 pandemic: analysis of the perception of professionals of emergency medical systems in Spain after the first wave. *Prehosp Disaster Med.* 2022;37(3):314–320.
72. **Mahmoud Amro T, Arcos González P, Montero Viñuales E, et al.** Impact of COVID-19 pandemic on stress and burnout levels amongst emergency medical technicians: a cross-sectional study in Spain. *Ann Med.* 2022;54(1): 3007–3016.
73. **Sheikhbardsiri H, Tavan A, Afshar PJ, et al.** Investigating the burden of disease dimensions (time-dependent, developmental, physical, social and emotional) among family caregivers with COVID-19 patients in Iran. *BMC Prim Care.* 2022;23(1):165.
74. **Kamrujjaman M, Demetriou C, Cuartas Álvarez T, et al.** The role of social work for Emergency Medical Services (EMS): a systematic review. *Prehosp Disaster Med.* 2023;38(5):628–635.