



The role of emergency medical teams in disaster response: a summary of the literature

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Abstract

In the aftermath of natural disasters, emergency medical teams (EMTs) are dispatched to help local rescue efforts. While some impact evaluations of EMTs are available, few comprehensive evaluations of the implementation of EMTs in natural disasters, have been published to date. As a result, the evidence base to inform global guidelines and best practices, is remarkably thin. This paper aims to provide a better understanding of the role of EMTs, by summarizing recent reports and case studies. Specifically, this summary aims to identify key improvement areas, as well as obstacles and opportunities for improvement. After a search of the literature, 40 publications met the inclusion criteria, and were included in this summary of the literature. The effective functioning of EMTs is codependent on interactions between different actors, including national governments, international organizations, NGOs, local government agencies, community stakeholders and the private sector. Five key improvement areas were identified: (1) coordination and integration of EMTs and other actors; (2) systematic classification and registration of EMTs; (3) national stewardship; (4) community engagement; (5) research and data collection. As the prevalence of natural disasters rise, effective disaster response will be an increasingly important component of global health in the coming decades. To optimize EMT efficiency, there needs to be increased recognition of the different actors involved, increased cooperation amongst EMTs under the coordination of international rosters, and increased research efforts to evaluate challenges to and opportunities for improved disaster response.

Keywords Emergency medical teams · Foreign medical teams · Natural disasters · Disaster response · Emergency response · Humanitarian crises

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1 Introduction

During the past three decades, natural disasters have resulted in an estimated 800,000 casualties, and affected over a billion people (Peiris et al. 2015). In 2016 alone, 160 million people worldwide, were affected by natural disasters (Puri et al. 2017). With the challenges of rising temperatures and spiraling climate change, the frequency and global impact of natural disasters is expected to continue to increase (Goldschmidt and Kumar 2016; Daftary et al. 2014; Kusumasari and Alam 2012).

Population in low- and middle-income countries (LMICs) are most vulnerable to natural disasters, especially in countries, where emergency response plans and dedicated resources are not in place. In LMICs poor road infrastructure and communication systems may delay response operations, and the availability of medical equipment and personnel is often inadequate to cope with a sudden surge in demand for trauma care (Arziman 2015; Gerdin et al. 2014).

In such contexts, the immediate response after a natural disaster, is primarily provided by residents and local rescue efforts (Gerdin et al. 2014). Subsequently, national emergency services, such as the military or national medical teams, are usually dispatched to affected areas. If local and national responses are insufficient to address the emergency, the international community may offer various forms of assistance, including the deployment of emergency medical teams (EMTs) (Hanfling et al. 2012).

EMTs are defined by the World Health Organization (WHO) as “groups of health professionals and supporting staff outside their country of origin, aiming to provide health care specifically to disaster affected populations” (Foreign Medical Team Working Group 2013). EMTs may include governmental (both civilian and military) and non-governmental teams, providing basic and/or advanced care during a limited period in existing or temporary structures, with or without field hospitals. For example, EMTs have been dispatched after the Indian Ocean tsunami in 2004 (Bridgewater et al. 2006), the Haiti earthquake (Levie et al. 2017) the floods in Pakistan in 2010 (Tordrup et al. 2013), and the typhoon Haiyan in Southeast Asia in 2013 (Peiris et al. 2015; Brolin et al. 2015).

Following these operations, evaluations of the role and impact of EMTs, have been conducted. While EMTs are recognized to be a critical component of the global health workforce, concerns have emerged over their functioning and effectiveness. For example, lack of cooperation and coordination between different EMTs, has been a longstanding issue, resulting in fragmented disaster management, and duplication of relief efforts (Rodriguez-Espindola et al. 2018). In addition, recent case studies illustrate that EMTs are often deployed with little understanding of needs and capacities in affected countries, while skills and professional standards of EMTs were found to be highly variable (Foreign Medical Team Working Group 2013).

In recognition of this, global health agencies have published guidelines to improve the quality of the medical response by EMTs, importantly WHO’s ‘*Classification and minimum standards for foreign medical teams in sudden onset disasters*’ (Norton et al. 2013). Yet, the evidence base for guidelines on the deployment of EMTs, is remarkably limited (Juntunen 2011). Recently, a number of reviews of public health interventions during humanitarian emergencies, have been published, either broad in scope (Blanchet et al. 2017), or focused on specific issues, such as water sanitation (Ramesh et al. 2015), sexual and reproductive health (Singh et al. 2018; Warren et al. 2015), and patient safety (El-Khani et al. 2019). To the best of our knowledge, lessons learned from the specific deployment and implementation of EMTs in disasters, have not yet been reviewed

and summarized in previous contributions. Considering this gap in knowledge, the present paper reports a summary of the literature of EMTs role in the setting of emergent humanitarian aid in natural disasters. Because man-made disasters, such as armed conflict or terrorist attacks, are associated with a different scope of challenges for EMTs, compared to natural disasters, and have therefore been left out of this summary (Severin and Jacobson 2020).

The aim of this summary is to identify areas for improvement in implementation and research by better understanding the obstacles to and opportunities for successful delivery of disaster response by EMTs.

2 Summary of the literature

The literature on the topic of disaster response and EMTs was summarized to gain a better understanding of challenges to the deployment of EMTs, and to develop a set of concepts, which can inform future research and policy recommendations on this topic.

PubMed, ScienceDirect and Web of Science databases, were searched with the search terms, included in Table 1. Grey literature was included from the United Nations and UNISDR databases, using the same search terms (Foreign Medical Team Working Group 2013). Only articles in English, or with published English translations, were included, as this is the one language all the authors have in common. Inclusion criteria were any publication on EMTs and disaster response in the setting of natural disasters, published in the past 20 years; during this timeframe, the demands for outcome measurements in disaster response have been refined, and before this, there were few critical publications on the subject. Exclusion criteria were any publication addressing man-made disasters.

The included articles were analyzed inductively to derive emerging themes and improvement areas in the operation of EMTs, following natural disasters. These themes were used to outline recommendations with the aim of informing future research and policy on international humanitarian disaster response, following natural disasters.

A total of 674 articles were rendered from the PubMed and other online search databases of which, 529 articles were excluded from the literature search, commonly opinion pieces or other publications not directly related to EMTs. This produced a list of 145 articles that were of interest, and out of these, 40 were selected for in depth review, as they fulfilled the inclusion criteria.

Table 1 Key search terms

Area of interest	Search terms
Disaster	Disaster, natural disasters, humanitarian crisis, humanitarian emergency
Disaster response	Disaster response, disaster response teams, foreign medical team, emergency medical team, disaster relief
Disaster response organizations	Cluster management, World Health Organization (WHO), UN Office for disaster risk reduction (UNISDR), UN Disaster Assessment and Coordination (OCHA), UN Relief and Works agency (UNRWA)

3 Results

3.1 Characteristics of EMTs

EMTs were defined as groups of health professionals and supporting staff, operating outside their country of origin to provide care to disaster-affected populations (Peiris et al. 2015; International Federation of the Red Cross World Health Organization 2017). EMTs could include interdisciplinary personnel, and are ideally self-reliant and mobile, although this was not always the case (Brolin et al. 2015). The WHO classifies EMTs based on the type of care they provide, their team size and capabilities; Type 1 provide outpatient emergency care, Type 2 provide inpatient and outpatient surgical emergency care, and Type 3 are inpatient referral teams, delivering complex high-level surgical and medical care (Peiris et al. 2015; Norton et al. 2013; International Federation of the Red Cross World Health Organization 2017). Although teams vary widely in composition, they typically include physicians, nurses, pharmacists and coordinators and other supportive staff based on the care provided (Cranmer and Biddinger 2014).

3.2 Improvement areas

Five themes emerged in this summative review as central to EMT implementation: (1) coordination and integration of EMTs and other actors; (2) systematic classification and registration of EMTs; (3) national stewardship; (4) community engagement; (5) data collection and research.

3.2.1 Coordination and integration

Poor coordination was identified as a major challenge to the effective EMTs implementation. Inefficient use of the EMTs and supporting resources during operations on the ground, poor communication with government actors and regional headquarters, insufficient independence with regards to transport and utilities and little to no interaction between the different EMTs involved, were all factors identified as obstructive to efficient implementation (Goldschmidt and Kumar 2016; Gerdin et al. 2014; Rodriguez-Espindola et al. 2018; Juntunen 2011; Blanchet et al. 2017). The 2010 earthquake in Haiti served as a prime example of these issues; despite the involvement of many EMTs, Haitian relief efforts were plagued by lost opportunities, due to poor coordination of EMTs, fragmentation, and a lack of cohesive relief strategies (Hanfling et al. 2012; Levie et al. 2017; Schreeb et al. 2008).

3.2.2 The need for systematic classification and registration of EMTs

The WHO's publication, "*Classification and minimum standards for Foreign Medical Teams in sudden onset of disasters*", outlines guiding principles and minimum technical requirements for all EMTs in disaster response (Norton et al. 2013). Following the typhoon Haiyan in the Philippines, the WHO initiated a system for on-site registration categorizing EMTs, based on these principles (Brolin et al. 2015; Norton et al. 2013). For the EMTs registered, efficiency and allocation of resources, were significantly improved through a distribution system overseen by the local government (Peiris et al. 2015). However, only half of the available EMTs agreed to register, demonstrating low interest for any coordination initiatives (Brolin et al. 2015). Initial reports demonstrated increased efficacy for the

EMTs that did register, suggesting that registration systems may play an important role in coordinating international emergency response efforts, but that there is a need for a consensus on the method of implementation and adherence (Peiris et al. 2015; Norton et al. 2013; Radestad et al. 2013). New efforts were made at EMT registration after the Nepal earthquake in 2015, employing coordination cells and Geographic Information Systems with positive results (Takada et al. 2021). Other conceptual health systems frameworks based on time intervals and levels of care, have been proposed, but have yet to be tried in practice (Lind et al. 2012).

3.2.3 National stewardship

The first 72 h following a natural disaster serves as a crucial window for emergency response and the way this time is managed may dictate later outcomes (Arziman 2015). Many reports identify national and local government agencies as vital in coordinating emergency efforts during the early relief efforts. However, after typhoon Haiyan in the Philippines, 108 EMT teams arrived, but none were operational within the first 72 h; the average time from arrival to operational status was 82 h (Brolin et al. 2015). Major obstacles to reaching operational capacity were identified as lack of internet availability, no debriefing for new arrivals, lack of self-sufficiency amongst EMTs, and lack of appropriate technical equipment (Peiris et al. 2015). Furthermore, a lack of appropriate needs assessment, poor transportation, difficult geographical access, and limited communication capabilities were factors that delayed EMTs in reaching full operational status, in a timely manner (Brolin et al. 2015).

These obstacles illustrate the need for national and local government agencies coordinate and facilitate relief efforts on the ground. A strategy to overcome such obstacles, was demonstrated after the 2010 earthquake in Japan, when Japan's government efficiently activated a national emergency plan, requested international assistance, facilitated ground communications, and lifted custom barriers for arriving EMTs in the immediate post-disaster window (Nagata et al. 2016). Other examples of successful national stewardship include Haiyan, where local government structures were more efficient in mobilizing and integrating collaborative efforts between government agencies, EMTs and international organizations (Santiago et al. 2016). Local and national government agencies may improve coordination and accountability of effective EMT relief efforts, by conducting early needs assessments (Schreeb et al. 2008). After the earthquake in Japan 2011, for example, the Japanese government set a precedent to regulate international aid, by creating a framework of criteria for foreign EMTs (Nagata et al. 2016), including operational guidelines and the requirement of interpreters and close cooperation with Japanese physicians. Only 4 out of 30 nations, offering medical assistance after the earthquake, were accepted according to these set criteria, further emphasizing the complexity of maintaining effective quality control, and delegating responsibility in disaster responses, involving international relief efforts (Nagata et al. 2016).

3.2.4 Community engagement

Community engagement and anchoring local government institutions in large international relief operations, are important factors for sustainable and effective relief operations (Binder and Baker 2017). By identifying needs specific to the local population, and incorporating cultural and religious norms specific to the area, relief operations can be tailored

to fit both short and long-term needs, and improve the value of the relief operations (Tiberi 2016; Ataya et al. 2010).

As a part of a national preparedness strategy, governments may choose to implement community emergency response teams (CERTs)—teams led by government lay people to integrate key stakeholders and community members in local and regional groups ready to respond immediately to emergencies in their area of responsibility. When allowed proper resources, CERTs may provide efficient immediate relief on the ground bridging the often-unmet needs during the first 72 h and may be implemented as an early sustainable community integration measure (Carr and Jensen 2015).

3.2.5 Data collection and research

Registration and outcomes data collection was fundamental for increased transparency and accountability in humanitarian aid after the typhoon Haiyan in the Philippines (Brolin et al. 2015). Record keeping, data collection and outcomes evaluation was complicated by the number of different actors involved and record systems used, which further underscored the need for collective standards of care and transparency in the aid provided (Peiris et al. 2015; Brolin et al. 2015). Several studies have identified the need for a common reporting system and data sharing for EMTs, in order to facilitate needs assessments, impact and outcome evaluations in the immediate response phase, and as a follow up tool for sustainable quality improvement (Goldschmidt and Kumar 2016; Gerdin et al. 2014).

Long-term humanitarian assistance and rehabilitation requirements that follow natural disasters, has been consistently overlooked in research on disaster response in the past two decades (Goldschmidt and Kumar 2016). The lack of reproducible research is an often-cited obstacle to impact evaluation, outcome measurement and quality improvement (Hanfling et al. 2012; Brolin et al. 2015; Tan and Schreeb 2015; Nickerson et al. 2015). However, an adoption of transparent methods for data collection and data sharing would facilitate needs assessment in real time, while also supporting outcomes evaluations and assessment measures later on (Puri et al. 2017). Without the implementation of a standardized, systematic needs-assessment, funding and other resources may be ineffectively allocated, and the speed to recovery delayed (Schreeb et al. 2008).

4 Discussion

This summary of the literature on the role of EMTs aims to fill some of the void in the literature on humanitarian aid and disaster response following natural disasters. During the last few decades, EMTs have been increasingly utilized to support disaster response efforts in affected countries. Their effective operation remains a complex task, depending on the interactions of multiple factors within and outside affected countries. In this summary of the literature, five main themes emerge as particularly important improvement areas: the need for international coordination of EMTs and other actors; the need for systematic classification and registration of EMTs; the importance of active cooperation between EMTs and national government agencies, as well as EMT's community engagement, and, finally, the need for more research and data collection in the field of disaster response.

Coordination, or the lack thereof, is the most commonly reported obstacle to efficient humanitarian relief interventions. The national government is the primary coordinator for any relief operation, hence functional government infrastructure capable of handling

a national emergency, and managing the many different actors involved, is detrimental to effective disaster response coordination. Japan demonstrated in 2010, how a country with sufficient resources can set requirements and conditions for EMTs and other volunteers to meet the specific needs at hand, and thereby reduce intervention redundancy (Nagata et al. 2016). On the other hand, the detrimental results of weak government structures rapidly collapsing under pressure, were demonstrated in Haiti just a year earlier (Schreeb et al. 2008). The different experiences between Haiti and Japan illustrate a glaring disparity between high- and low-income countries in their ability, to effectively handle natural disasters, a gap that can only be expected to widen with the increasing burden of climate change (Sakai et al. 2017).

It is therefore up to the international humanitarian community to find a way to bridge this gap, and provide adequate support, when natural disasters affect countries and communities with weak government institutions and limited surge capacity. When government institutions falter, international organizations, such as United Nations (UN) agencies may provide vital support and infrastructure, by employing their large managerial resources to support EMTs on the ground (Rodriguez-Espindola et al. 2018). However, this managerial role is highly dependent on the adherence and acceptance on behalf of the actors involved. Unless a consensus is reached within the international humanitarian community, this responsibility will remain unfilled. In the case of typhoon Haiyan only half of the EMTs chose to participate in government led coalitions with the WHO, further illuminating a resistance in the humanitarian community to collaborate with one another (Brolin et al. 2015).

To a certain extent, EMTs reflect some positive aspects of globalization, integrating a vast number of actors involved in international humanitarian aid, to jointly provide care and disaster relief. EMTs that avoid integration on the ground, are less successful at reaching target populations, and tend to provide short-term solutions with limited sustainable community impact (Binder and Baker 2017; Shultz et al. 2011). Registration systems enable communication, reporting and data sharing between these different actors, and are necessary to improve the efficiency and transparency of EMTs and humanitarian operations in general (Peiris et al. 2015; Brolin et al. 2015; Jahre et al. 2010). A global registry of available resources and qualifications would encourage quality control measures, and allow countries in need of assistance to request EMTs suitable to their specific conditions, improving resource allocation and efficiency of future relief efforts (Peiris et al. 2015).

For the humanitarian community to fortify its role in the setting of climate change and geopolitical instability, it needs to make the necessary collective efforts toward accountability, transparency and sustainability. A part of this process is to support additional research in the field (Goldschmidt and Kumar 2016). There are, however, unique methodological challenges as experimental methods are inapplicable for obvious ethical reasons. Thus, most available literature to date consists of team reports and case studies (Aitken et al. 2009); a recent review of the quality of such evaluations, revealed a strikingly weak evidence base, comprised primarily of observational data with narrow outcomes that offer limited generalizability and causality (Blanchet et al. 2017). Observational data may, however, offer insight and understanding to individual scenarios, as well as a more nuanced picture of the issues, and needs associated with emergency response, when analyzed together. The field of disaster response has evolved over the past few decades, and EMTs are today expected to conduct impact evaluation and outcome assessments, indicating a global trend towards a more transparent international humanitarian community that still has a lot of work left to do.

As with all literature reviews, this summary also has limitations. In our design, we followed the steps of a scoping literature review (Arksey 2005) to conduct this summary, however, we cannot rule out that we may have left out articles relevant to our aim. The studied research field is not mature, and many a conducted study in the area might have been published by non-researchers, and hence as other types of articles than usually found in the databases we have used. We may as a result have missed important articles, although we do believe this risk to be slim as the reference lists of the articles found does not imply references not found in our literature search. We included articles in English only, as this is the one language the authors have in common, but this may have reduced the number of publications included in our search. Finally, as established here and elsewhere, the literature available on EMT implementation following disaster response is limited, and thus, any conclusions drawn from the available literature should be considered in the light of these limitations.

In conclusion, this summary of the literature suggests that EMTs function most efficiently, when well-integrated with other key actors involved, including the national and local government agencies, international organizations and the NGOs, community stakeholders and private actors. The lack of coordination is a major obstacle to effective provision of care, and may be addressed by implementing registration systems to allocate and match the resources to areas of greatest need. Global registration systems would allow for an international credentialing of EMTs, increasing the transparency and accountability of the actors participating in the relief efforts. This would create a common platform for data reporting and sharing, facilitating much needed research and quality control. These actions taken together, could potentially have a significant impact on the rising need for global disaster response going forward.

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Declarations

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References

- Aitken P, Leggat P, Robertson A, Harley H, Speare R, Leclercq M (2009) Health and safety aspects of deployment of Australian disaster medical assistance team members: results of a national survey. *Travel Med Infect Dis* 7(5):284–290
- Arksey H (2005) Scoping studies: towards a methodological framework. *Int J Soc Res Methodol* 8(1):19–32
- Arziman I (2015) Field organization and disaster medical assistance teams. *Turk J Emerg Med* 15(Suppl 1):11–19
- Ataya MD, Duigan P, Louis D, Schinina G (2010) Assessment on the psychosocial needs of Haitians affected by the January 2010 earthquake. Port au Prince: International Organization for Migration
- Binder SB, Baker CK (2017) Culture, local capacity, and outside aid: a community perspective on disaster response after the 2009 tsunami in American Samoa. *Disasters* 41(2):282–305
- Blanchet K, Ramesh A, Frison S, Warren E, Hossain M, Smith J et al (2017) Evidence on public health interventions in humanitarian crises. *Lancet* 390(10109):2287–2296
- Bridgewater FH, Aspinall ET, Booth JP, Capps RA, Grantham HJ, Pearce AP et al (2006) Team echo: observations and lessons learned in the recovery phase of the 2004 Asian Tsunami. *Prehosp Disaster Med* 21(Suppl 1):S20–S25
- Brolin K, Hawajri O, von Schreeb J (2015) foreign medical teams in the Philippines after Typhoon Haiyan 2013 - who were they, when did they arrive and what did they do? *PLoS Curr* 7
- Carr JJ, Jensen J (2015) Explaining the pre-disaster integration of community emergency response teams (CERTs). *Nat Hazards* 77(3):1551–1571
- Cranmer HH, Biddinger PD (2014) Typhoon Haiyan and the professionalization of disaster response. *N Engl J Med* 370(13):1185–1187
- Daftary RK, Cruz AT, Reaves EJ, Burkle FM, Christian MD, Fagbuyi DB et al (2014) Making disaster care count: consensus formulation of measures of effectiveness for natural disaster acute phase medical response. *Prehosp Disaster Med* 29(5):461–467
- El-Khani U, Ashrafiyan H, Rasheed S, Veen H, Darwish A, Nott D et al (2019) The patient safety practices of emergency medical teams in disaster zones: a systematic analysis. *BMJ Glob Health* 4(6):e001889
- Foreign Medical Team Working Group (2013) Registration and coordination of foreign medical teams responding to sudden onset disasters: the way forward. World Health Organization & Health Clusters, Geneva
- Gerdin M, Chataigner P, Tax L, Kubai A, von Schreeb J (2014) Does need matter? Needs assessments and decision-making among major humanitarian health agencies. *Disasters* 38(3):451–464
- Gerdin M, Roy N, Khajanchi M, Kumar V, Dharap S, Fellander-Tsai L et al (2014) Predicting early mortality in adult trauma patients admitted to three public university hospitals in urban India: a prospective multicentre cohort study. *PLoS ONE* 9(9):e105606
- Goldschmidt KH, Kumar S (2016) Humanitarian operations and crisis/disaster management: a retrospective review of the literature and framework for development. *Int J Disaster Risk Reduct* 20:1–13
- Hanfling D, Altevogt BM, Gostin LO (2012) A framework for catastrophic disaster response. *JAMA* 308(7):675–676
- International Federation of the Red Cross World Health Organization (2017) The regulation and management of international emergency medical teams. IFRC-WHO, Geneva
- Jahre M, Jahre L-M, Tatham P, Pettit S (2010) Coordination in humanitarian logistics through clusters. *Int J Phys Distrib Logist Manag* 40(8/9):657–674
- Juntunen C (2011) Reflections on the opportunities and challenges of disaster response. *Couns Psychol* 39(8):1182–1192
- Kusumasari B, Alam Q (2012) Bridging the gaps: the role of local government capability and the management of a natural disaster in Bantul, Indonesia. *Nat Hazards* 60(2):761–779
- Levie F, Burke CM, Lannon J (2017) Filling the gaps: an investigation of project governance in a non-governmental organisation's response to the Haiti earthquake disaster. *Int J Proj Manag* 35(5):875–888
- Lind K, Gerdin M, Wladis A, Westman L, von Schreeb J (2012) Time for order in chaos! A health system framework for foreign medical teams in earthquakes. *Prehosp Disaster Med* 27(1):90–93
- Nagata T, Yoshida S, Hasegawa M, Ojino M, Murata S, Ishii M (2016) International medical teams of the Japan medical association: a framework for foreign medical teams. *Disaster Med Public Health Prep* 10(1):4–5
- Nickerson JW, Hatcher-Roberts J, Adams O, Attaran A, Tugwell P (2015) Assessments of health services availability in humanitarian emergencies: a review of assessments in Haiti and Sudan using a health systems approach. *Confl Health* 9:20

- Norton I, von Schreeb J, Aitken P, Herard P, Lajolo C (2013) Classification and minimum standards for foreign medical teams in sudden onset disasters. World Health Organization, Geneva
- Peiris S, Buenaventura J, Zagaria N (2015) Is registration of foreign medical teams needed for disaster response? Findings from the response to Typhoon Haiyan. *Western Pac Surveill Response J* 6(Suppl 1):29–33
- Puri J, Aladysheva A, Iversen V, Ghorpade Y, Brück T (2017) Can rigorous impact evaluations improve humanitarian assistance? *J Dev Effect* 9(4):519–542
- Radestad M, Jirwe M, Castren M, Svensson L, Gryth D, Ruter A (2013) Essential key indicators for disaster medical response suggested to be included in a national uniform protocol for documentation of major incidents: a Delphi study. *Scand J Trauma Resusc Emerg Med* 21:68
- Ramesh A, Blanchet K, Ensink JH, Roberts B (2015) Evidence on the effectiveness of water, sanitation, and hygiene (WASH) interventions on health outcomes in humanitarian crises: a systematic review. *PLoS ONE* 10(9):e0124688
- Rodriguez-Espindola O, Albores P, Brewster C (2018) Disaster preparedness in humanitarian logistics: a collaborative approach for resource management in floods. *Eur J Oper Res* 264(3):978–993
- Sakai YE, Estudillo JP, Fuwa N, Higuchi Y, Sawada Y (2017) Do natural disasters affect the poor disproportionately? Price change and welfare impact in the aftermath of typhoon Milenyo in the rural Philippines. *World Dev* 94:16–26
- Santiago JS, Manuela WS Jr, Tan ML, Sanez SK, Tong AZ (2016) Of timelines and timeliness: lessons from Typhoon Haiyan in early disaster response. *Disasters* 40(4):644–667
- Severin PN, Jacobson PA (2020) Types of disasters. *Nursing Management of Pediatric Disaster*. 85–197
- Shultz JM, Marcelin LH, Madanes SB, Espinel Z, Neria Y (2011) The, “Trauma Signature:” understanding the psychological consequences of the 2010 Haiti earthquake. *Prehosp Disaster Med* 26(5):353–366
- Singh NS, Aryasinghe S, Smith J, Khosla R, Say L, Blanchet K (2018) A long way to go: a systematic review to assess the utilisation of sexual and reproductive health services during humanitarian crises. *BMJ Glob Health* 3(2):e000682
- Takada Y, Otomo Y, Karki KB (2021) Evaluation of emergency medical team coordination following the 2015 Nepal earthquake. *Disaster Med Public Health Prep* 15(3):308–315
- Tan YS, von Schreeb J (2015) Humanitarian assistance and accountability: what are we really talking about? *Prehosp Disaster Med* 30(3):264–270
- Tiberi O (2016) Mental health in Haiti: beyond disaster relief. *CU JGH* 6(1):14–20
- Tordrup D, Ahmed W, Bukhari KS, Kanavos P (2013) Availability of medical supplies during the 2010 Pakistan floods. *Lancet Glob Health* 1(1):e13–e14
- von Schreeb J, Unge C, Brittain-Long R, Rosling H (2008) Are donor allocations for humanitarian health assistance based on needs assessment data? *Glob Public Health* 3(4):440–447
- Warren E, Post N, Hossain M, Blanchet K, Roberts B (2015) Systematic review of the evidence on the effectiveness of sexual and reproductive health interventions in humanitarian crises. *BMJ Open* 5(12):e008226

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