Health Emergency and Disaster Risk Management (Health-EDRM): Developing the Research Field within the Sendai Framework Paradigm

Sharon Tsoon Ting Lo¹ · Emily Ying Yang Chan^{1,2,3} · Gloria Kwong Wai Chan¹ · Virginia Murray^{4,5,6} · Jonathan Abrahams⁷ · Ali Ardalan⁸ · Ryoma Kayano⁹ · Johnny Chung Wai Yau¹⁰

Published online: 9 May 2017

© The Author(s) 2017. This article is an open access publication

Abstract The intersection of health and disaster risk reduction (DRR) has emerged in recent years as a field of critical inquiry. Health is recognized as an outcome and a goal of DRR, and the integration of both fields is essential to ensure the implementation of the Sendai Framework for Disaster Risk Reduction 2015–2030. Health Emergency and Disaster Risk Management (Health-EDRM) has emerged as an umbrella field that encompasses emergency and disaster medicine, DRR, humanitarian response, community health resilience, and health systems resilience. In September 2016, an international group of experts met in Hong Kong to assess the current status and potential of the Health-EDRM research field, a research area that these scholars characterized as underdeveloped and fragmented. Key challenges identified include research overlap, lack of

strategic research agenda, absence of consensus regarding terminology, and limited coordination between stakeholders. The Sendai Framework provides a useful paradigm within which to shape the research field's strategic development. The WHO Thematic Platform for Health-EDRM Research Group was established to coordinate activities, promote information-sharing, develop partnerships, and provide technical advice to strengthen the Health-EDRM research field. This group will promote the generation of robust and scientific health research to support the meaningful implementation of the Sendai Framework.

Keywords Health disaster risk reduction · Health emergency and disaster risk management · Health-EDRM · Sendai Framework

With contributions from: Alistair Humphrey (Canterbury District Health Board, New Zealand), Olivier Hagon (Geneva University Hospitals), Diana Wong (Monash University), and Ada Fong (The Chinese University of Hong Kong).

✉ Sharon Tsoon Ting Lo
sharon.lo@cuhk.edu.hk

¹ Collaborating Centre for Oxford University and CUHK for Disaster and Medical Humanitarian Response (CCOUC), The Jockey Club School of Public Health and Primary Care, The Chinese University of Hong Kong, Hong Kong, China

² Nuffield Department of Medicine, University of Oxford, Oxford OX3 7BN, UK

³ François-Xavier Bagnoud Center for Health & Human Rights, Harvard University, Boston, MA 02115, USA

⁴ Public Health England, London SE1 8UG, UK

⁵ The United Nations International Strategy for Disaster Reduction (UNISDR) Scientific and Technical Advisory Group, CH1202 Geneva, Switzerland

⁶ Integrated Research on Disaster Risk (IRDR) Scientific Committee, Beijing 100094, China

⁷ World Health Organization, 1211 Geneva 27, Switzerland

⁸ Tehran University of Medical Sciences, Tehran 1416753955, Iran

⁹ World Health Organization Kobe Centre for Health Development, Kobe 651-0073, Japan

¹⁰ Faculty of Medicine, The Chinese University of Hong Kong, Hong Kong, China

the Sendai Framework and the achievement of its seven global targets, four of which are directly health-related. The need to “strengthen the evidence-base” and “enhance the scientific and technical work on disaster risk reduction” (UNISDR 2015, Paragraph 25) is highlighted in the Sendai Framework’s text, with the health and DRR nexus identified as a research field that requires further development by actors such as the World Health Organization (WHO). On 23 September 2016, a workshop, entitled Emergency and Disaster Risk Management for Health: New Frontiers for Public Health Science, was held at The Chinese University of Hong Kong. Five presentations from international scholars and practitioners reviewed emerging trends, identified gaps, and provided recommendations for the health and DRR research field. This meeting was followed by closed-door roundtable discussions, which formulated action points to address the challenges raised. Out of these discussions, the WHO Thematic Platform for Health Emergency and Disaster Risk Management Research Group was established to guide future research work. This article presents a summary of the outcomes of these meetings, identifies recommendations for the future development of this research field, and advocates the prioritization of the health and DRR nexus among researchers and practitioners.

The human health impact is precisely what makes disasters so devastating. In addition to causing personal tragedy and suffering, high levels of mortality and morbidity have an important indirect impact on political, social, and economic progress. In addition to causing disease and infirmity, the shock and experience of hazards and their consequences have a complex impact on physical, mental, and social well-being (Marx et al. 2012). Good health and wellbeing is therefore an outcome of all disaster risk reduction activities. Despite notable developments in countries around the world, the centrality of health to mainstream DRR policies and practices has often not been recognized. Efforts to integrate health into such programs are notably scarce and frequently hidden within social, economic, and environmental outcomes or limited to references to “saving lives” (Murray 2014). Meanwhile, the health sector has tended to retain a narrower focus on infectious diseases (Waring and Brown 2005) and emergency preparedness and response.

Health researchers over the past half century have addressed various aspects of the intersection of health and disasters. This literature highlights the diverse clinical and public health impacts of disasters (Lechat 1979; Korteweg et al. 2010), the application of disaster epidemiology (Malilay et al. 2014), the synergies between emergency management and public health (Clements and Casani 2016), and the role of public health in mitigating disaster risks (Shoaf and Rottman 2000). However, this body of literature has some limitations: a scoping review of the

evidence for emergency planning identified the tendency of most articles to focus on preparedness and response, while only a few texts relate to hazard analysis, mitigation, and capability assessment. Moreover, a substantial proportion of the literature reviewed consisted of anecdotal event reports that omitted intervention evaluation or follow up (Challen et al. 2012). Other concerns have highlighted a “fragmented and response-oriented approach,” with related literature dispersed across various scientific disciplines in a somewhat piecemeal manner (Tekeli-Yeşil 2006, p. 317). Overall, the systematic integration of disaster risk reduction into the health sector and the health sciences research fields requires acceleration and further development (Aitsi-Selmi and Murray 2015).

Health Emergency and Disaster Risk Management (Health-EDRM) is an umbrella term described by the WHO that captures the broad intersection of health and disaster risk management (DRM). Encompassing areas such as emergency and disaster medicine, health systems strengthening and resilience, disaster risk reduction, humanitarian response, and community health resilience, Health-EDRM refers to the “systematic analysis and management of health risks, posed by 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” (WHO 2011). Health-EDRM provides an effective policy framework to unite diverse stakeholders to comprehensively and effectively address this complex field, from strengthening health and DRR efforts to building health resilience across populations. Health-EDRM is therefore multidisciplinary, multisectoral, and collaborative in nature (WHO 2011), and recognizes the holistic approach required to reduce the negative health outcomes from all hazards.

Recent years have seen health issues gain increasing recognition and advocacy within international policy circles (Aitsi-Selmi, Murray, et al. 2016). As a result, health is a clear cross-cutting theme in the 2030 Agenda for Sustainable Development, particularly within the Sendai Framework for Disaster Risk Reduction 2015–2030 (UNISDR 2015), Sustainable Development Goals (United Nations 2015a), Paris Agreement on Climate Change (United Nations 2015b), and New Urban Agenda (United Nations 2016).

The difference is particularly striking in the Sendai Framework, which contains over 30 explicit references to health, compared to 3 references in its predecessor, the Hyogo Framework for Action 2005–2015 (UNISDR 2005). Throughout the Sendai Framework, health is highlighted as both an outcome and a goal, with health-focused measures cited as a means to reduce disaster losses. Four out of the seven global targets are directly related to health; the other three are indirectly linked. The critical need to “enhance

resilience of national health systems by integrating disaster risk management into primary, secondary and tertiary care, developing the capacity of health workers to understand disaster risk and applying DRR approaches in health work” has been highlighted (UNISDR 2015, Paragraph 30). Health sector authorities and workers are identified as contributing stakeholders to managing disaster risk and to building community resilience.

As discussions have shifted to the implementation of the Sendai Framework, health has continued to be advocated at various meetings. At the UNISDR Science and Technology Conference (Geneva, January 2016), health as a scientific discipline was highlighted with regard to the need to build the scientific evidence-base for DRR, in addition to including public health emergencies into discussions surrounding disasters (UNISDR 2016a; Aitsi-Selmi, Murray, et al. 2016). The International Conference on the Implementation of the Health Aspects of the Sendai Framework (Bangkok, March 2016) promoted the Bangkok Principles, identifying seven areas for mainstreaming of DRR within health systems and the health sector, from the systematic integration of health into DRR programs, building resilient health systems, and stimulating public and private investment to building the DRR capacity of health workers, incorporating disaster-related health data into early warning systems and indicators, fostering transboundary information-sharing for all hazards, and promoting policy coherence at all levels (UNISDR 2016b).

Thematic gaps of Health-EDRM research identified included inquiry into invisible health needs (mental health, psychosocial support and well-being, and sexual and reproductive health), in addition to the risks faced by subpopulations (children, people with disabilities, and the elderly) and their respective needs and capacities to manage risks to themselves and their communities before, during, and after disasters (Khan et al. 2015). Practical challenges identified included overlap in research activities, lack of strategic research agenda, absence of consensus about terminology, limited ability to develop multisectoral and interdisciplinary approaches, challenges in bridging the science-policy-practice nexus, limited platforms to enable effective knowledge-transfer and experience-sharing across transnational boundaries (requiring translation of research into English), limited coordination mechanisms between stakeholders, and lack of funding (Aitsi-Selmi, Blanchard, et al. 2016). Overall, the Health-EDRM research field remains underdeveloped and fragmented, and requires strategic direction to maximize its contributions to reduce disaster losses meaningfully in terms of health, lives, and livelihoods.

The Sendai Framework can provide a powerful tool to develop and strengthen the Health-EDRM research paradigm. As the primary document shaping the DRR policy and

practice of Member States and other stakeholders over the next 15 years, it can provide suggestions for the strategic development of this research field, and add impetus for funding and other resources that need to be directed to these areas.

All four priorities for action in the Sendai Framework are relevant to the Health-EDRM field. Scientific risk assessments should be facilitated to understand the complex nature of direct and indirect health risks from a diversity of hazards that impact individuals and populations. Systems science may shed light on the best way to strengthen health and DRR governance to manage disaster risk. Improved management can be attained through proactive measures for prevention and preparedness, as well as timely, effective, and efficient response, recovery, rehabilitation, and reconstruction. Public and private resources should be invested to support Health-EDRM initiatives, with a view to translate that research into pragmatic and scalable disaster risk reduction activities. The research field should be action oriented, and enhance all aspects of Health-EDRM.

Other guiding principles of the Sendai Framework (UNISDR 2015, Paragraph 19) may be applied to the Health-EDRM initiative:

- DRR is a “shared responsibility by central Governments and relevant national authorities, sectors and stakeholders”; Health-EDRM research should similarly be multisectoral in nature;
- DRR requires an “all-of-society engagement and partnership”; Health-EDRM research should empower populations to identify their disaster risks and take action to mitigate these risks and build resilience;
- DRR and DRM depend on “coordination mechanisms within and across sectors and with relevant stakeholders at all levels”; one outcome of the Health-EDRM meetings is recognition of the need for cross-sector stakeholder coordination mechanisms to strengthen the evidence-based approach to health-DRR;
- DRR needs a “multi-hazard approach” and “easily accessible, up-to-date, comprehensible, science-based and non-sensitive risk information”; obtaining key information related to direct and indirect health risks should be prioritized in the Health-EDRM research agenda; and
- DRR works best when “an effective and meaningful global partnership and the further strengthening of international cooperation [...] are essential for effective disaster risk management”; the Health-EDRM research field can only be fully developed through international partnerships and cooperation, and should be prioritized as such.

Overall, the Sendai Framework highlights the critical role of “academia, scientific and research entities and

networks” to identify disaster risk factors and emerging disaster risks; “increase research for regional, national and local application; support action by local communities and authorities; and support the interface between policy and science for decision-making” (UNISDR 2015, Paragraph 36). Research—when done well and focused in the right areas—has the potential to empower stakeholders to provide the evidence-based practices to implement the Sendai Framework and meet the global targets relating to reductions in disaster-related mortality and morbidity.

Recommendations for the Health-EDRM research field include:

- (1) The focus of Health-EDRM research should expand its scope to encompass:
 - (a) an all-hazards approach that incorporates the full spectrum of hazards;
 - (b) a holistic all-needs approach, including physical, mental, and psycho-social health and wellbeing;
 - (c) research and interventions facilitated during all phases of a disaster (not purely in the acute phase);
 - (d) disaster risk identification for populations with specific health needs such as children, people with disabilities, and the elderly; and
 - (e) research on and the building of health resilience in all communities;
- (2) Health-EDRM research should develop a multidisciplinary and multisectoral approach to ensure a truly holistic perspective that addresses health needs in disasters;
- (3) Health-EDRM terminology should be developed and agreed upon by key stakeholders;
- (4) Needs assessments, evaluation methodologies, and reporting systems for cases should be developed and standardized at an international level, particularly to measure all dimensions of health before, during, and after disaster settings;
- (5) Evidence-based guidelines should be developed to build population preparedness and community health resilience;
- (6) Health-EDRM research should be facilitated with a view to impacting DRR policy and practice;
- (7) Past research in this field should be reviewed and assessed for better policy suggestion;
- (8) Funding mechanisms should allocate more funding to prioritize the Health-EDRM research agenda; and
- (9) Multistakeholder partnerships should be developed to spearhead research in this field, in accordance with the Sendai Framework.

The Health-EDRM research field has the potential to build the scientific evidence base and meaningfully guide

the implementation of the health aspects of the Sendai Framework (Pearson and Pelling 2015). The Health-EDRM field requires strengthening and support to unite diverse stakeholders (Murray 2014). This would enable and enhance rigorous research of previously understudied issues that relate to health, disaster risk, and resilience-building provided that research uses a holistic and truly multidisciplinary approach.

Consisting of scholars and practitioners from the Health-EDRM field, the WHO Thematic Platform for Health-EDRM Research Group will provide an international multistakeholder and interdisciplinary platform to coordinate activities, promote information-sharing, develop partnerships, and provide technical advice to United Nations agencies and other stakeholders to strengthen and develop the field of Health-EDRM research. Overall, it is hoped that this group—through continued advocacy for greater prioritization and focus on Health-EDRM—will accelerate the development of this critical research field. The knowledge developed by such research can provide the evidence-base that will enable effective implementation of the Sendai Framework.

For those who would like to engage in the development of this WHO Thematic Platform for Health-EDRM Research Group, please contact the current co-chairs Emily Ying Yang Chan at emily.chan@cuhk.edu.hk and Virginia Murray at Virginia.Murray@phe.gov.uk.

Open Access This article is distributed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made.

References

- Aitsi-Selmi, A., and V. Murray. 2015. The Sendai framework: Disaster risk reduction through a health lens. *Bulletin of the World Health Organization* 93(6): 362.
- Aitsi-Selmi, A., K. Blanchard, and V. Murray. 2016. Ensuring science is useful, usable and used in global disaster risk reduction and sustainable development: A view through the Sendai framework lens. *Palgrave Communications* 2: Article 16016.
- Aitsi-Selmi, A., S. Egawa, H. Sasaki, C. Wannous, and V. Murray. 2015. The Sendai framework for disaster risk reduction: Renewing the global commitment to people’s resilience, health, and well-being. *International Journal of Disaster Risk Science* 6(2): 164–176.
- Aitsi-Selmi, A., V. Murray, C. Wannous, C. Dickinson, D. Johnston, A. Kawasaki, A.-S. Stevance, and T. Yeung. 2016. Reflections on a science and technology agenda for 21st century disaster risk reduction. *International Journal of Disaster Risk Science* 7(1): 1–29.
- Challen K., A.C.K. Lee, A. Booth, P. Gardois, H.B. Woods, and S.W. Goodacre. 2012. Where is the evidence for emergency planning: A scoping review. *BMC Public Health* 12: Article 542.

- Clements, B., and J. Casani. 2016. *Disasters and public health: Planning and response*, 2nd. Oxford: Butterworth-Heinemann.
- Khan Y., G. Fazli, B. Henry, E. de Villa, C. Tsamis, M. Grant, and B. Schwartz. 2015. The evidence base of primary research in public health emergency preparedness: A scoping review and stakeholder consultation. *BMC Public Health* 15: Article 432.
- Korteweg, H., I. Bokhoven, C. Yzermans, and L. Grievink. 2010. Rapid health and needs assessments after disasters: A systematic review. *BMC Public Health* 10: Article 295.
- Lechat, M. 1979. Disasters and public health. *Bulletin of the World Health Organization* 57(1): 11–17.
- Malilay, J., M. Heumann, D. Perrotta, A. Wolkin, A. Schnall, M. Podgornik, M. Cruz, J. Horney, D. Zane, R. Roisman, J. Greenspan, D. Thoroughman, H. Anderson, E. Wells, and E. Simms. 2014. The role of applied epidemiology methods in the disaster management cycle. *American Journal of Public Health* 104(11): 2092–2102.
- Marx, M., R. Phalkey, and D. Guha-Sapir. 2012. Integrated health, social and economic impacts of extreme events: Evidence, methods, and tools. *Global Health Action* 5(1). doi:[10.3402/gha.v5i0.19837](https://doi.org/10.3402/gha.v5i0.19837).
- Murray, V. 2014. Disaster risk reduction, health, and the post-2015 United Nations landmark agreements. *Disaster Medicine and Public Health Preparedness* 8(4): 283–287.
- Pearson, L., and M. Pelling. 2015. The UN Sendai framework for disaster risk reduction 2015–2030: Negotiation process and prospects for science and practice. *Journal of Extreme Events* 2(1). doi:[10.1142/S2345737615710013](https://doi.org/10.1142/S2345737615710013).
- Shoaf, K., and S. Rottman. 2000. The Role of Public Health in Disaster Preparedness, Mitigation, Response and Recovery. *Prehospital and Disaster Medicine* 15(4): 18–20.
- Tekeli-Yeşil, S. 2006. Public health and natural disasters: Disaster preparedness and response in health systems. *Journal of Public Health* 14(5): 317–324.
- United Nations. 2015a. Transforming our world: The 2030 agenda for sustainable development. <http://www.preventionweb.net/publications/view/45418>. Accessed 4 Feb 2017.
- United Nations. 2015b. Paris agreement. <http://www.preventionweb.net/publications/view/49265>. Accessed 4 Feb 2017.
- United Nations. 2016. Habitat III: New urban agenda. <http://www.preventionweb.net/publications/view/50788>. Accessed 4 Feb 2017.
- UNISDR (United Nations International Strategy for Disaster Reduction). 2005. Hyogo framework for action 2005–2015: Building the resilience of nations and communities to disasters. http://www.preventionweb.net/files/1037_hyogoframeworkforactionenglish.pdf. Accessed 4 Feb 2017.
- UNISDR (United Nations International Strategy for Disaster Reduction). 2015. Sendai framework for disaster risk reduction 2015–2030. http://www.preventionweb.net/files/43291_sendaiframeworkfordrren.pdf. Accessed 4 Feb 2017.
- UNISDR (United Nations International Strategy for Disaster Reduction). 2016a. UNISDR science and technology conference on the implementation of the Sendai framework for disaster risk reduction. [http://www.preventionweb.net/files/45270_unisdrscienceandtechnologyconferenc\[2\].pdf](http://www.preventionweb.net/files/45270_unisdrscienceandtechnologyconferenc[2].pdf). Accessed 4 Feb 2017.
- UNISDR (United Nations International Strategy for Disaster Reduction). 2016b. Bangkok principles for the implementation of the health aspects of the Sendai framework for disaster risk reduction 2015–2030. <http://preventionweb.net/go/48396>. Accessed 4 Feb 2017.
- Waring, S.C., and B.J. Brown. 2005. The threat of communicable diseases following natural disasters: A public health response. *Disaster Management and Response* 3(2): 41–47.
- WHO (World Health Organization). 2011. Emergency risk management for health: Overview. http://www.who.int/hac/events/drm_fact_sheet_overview.pdf. Accessed 4 Feb 2017.