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Reducing risks to health and wellbeing at mass gatherings: the role of the Sendai Framework for Disaster Risk Reduction

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SUMMARY

Mass gatherings of people at religious pilgrimages and sporting events are linked to numerous health hazards, including the transmission of infectious diseases, physical injuries, and an impact on local and global health systems and services. As with other forms of disaster, mass gathering-related disasters are the product of the management of different hazards, levels of exposure, and vulnerability of the population and environment, and require comprehensive risk management that looks beyond single hazards and response. Incorporating an all-hazard, prevention-driven, evidence-based approach that is multisectoral and multidisciplinary is strongly advocated by the Sendai Framework for Disaster Risk Reduction 2015–2030. This paper reviews some of the broader impacts of mass gatherings, the opportunity for concerted action across policy sectors and scientific disciplines offered by the year 2015 (including through the Sendai Framework), and the elements of a 21st century approach to mass gatherings.
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1. Introduction

Mass gatherings of people at religious pilgrimages and sporting events are linked to numerous health hazards and accidents.[1–4] Traditionally, attention from public health authorities has focused on the transmission of infectious diseases, their impact on local health systems and services, and the threat to global health security of those with epidemic potential.[5–7]

The World Health Organization (WHO) defines a mass gathering as "An organized or unplanned event where the number of people attending is sufficient to strain the planning and response resources of the community, state or nation hosting the event".[8] Events at religious pilgrimage sites, sports facilities, air shows, musical festivals, political rallies, and other events that attract crowds vary in their complexity and demand for medical services and can lead to losses in lives, livelihoods, and health in the event of failure to cope with health hazards in emergency situations.[9]

One of the largest regular mass gatherings in the world is the Hajj.[1] It is the annual mass gathering of over two million Muslims from all over the world and presents challenges to the authorities in Saudi Arabia.[1,10] The inevitable overcrowding in a confined area of such large numbers increases the risk of injuries,[11] heat exposure,[12] and a range of infectious diseases. The risk of infection was evident in the outbreaks of meningococcal W135 strains in 2000 and 2001 with their associated high mortality and potential for international spread.[10] Indeed, the annual Hajj has faced several disasters due to fires at camp sites and in crowded tunnels, falling cranes, and stampedes due to failures in crowd movement control.[13]

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However, as in a number of other health policy areas, reducing the health risks of mass gatherings and seizing the opportunities for health improvement that mass gatherings may offer requires a broader approach to the underlying determinants of risk.[1] A comprehensive risk approach incorporates a wide range of hazards as well as taking into account the role of population vulnerability and exposure levels.[9,14,15] Such an approach is akin to the social determinants of health approach, which looks at the upstream factors behind health outcomes, including socioeconomic inequalities.[16] The positive implication of this more comprehensive approach is that mass gatherings, as with other forms of hazard, can be seen as amenable to prevention, and new avenues of policy and management to reduce the risk to people and their environment open up.

2. Mass gatherings, health, and disaster risk

There is global agreement that disasters are not natural events and that disaster risk arises as the result of the interaction between hazards (natural hazards such as earthquakes or human-made hazards such as anthropogenic climate change) and predisposing vulnerabilities and exposures. Disaster risk reduction (DRR) encompasses the scientific, policy, and practice activities that aim to reduce losses in lives, livelihoods, and health by acting on hazard probability, vulnerability, and exposure levels.[17]

As alluded to above with the Hajj example, the health consequences of mass gathering-related disasters are many and go beyond the transmission of travel-related infectious disease (Middle East respiratory syndrome coronavirus (MERS-CoV), severe acute respiratory syndrome (SARS), etc.). They include injuries resulting from crowd density and inadequate infrastructure (e.g., bridge collapse), exposure to extreme weather events, and escalation of violence as a result of crowd behaviour.[18] Risks can be compounded, for example, when population displacement and overcrowding in evacuation or re-housing facilities leads to a further increase in the risk of infectious disease outbreaks, or overwhelmed medical services are unable to deliver on elective functions such as chronic disease management, putting those who need life-saving medication such as insulin for diabetes in a particularly vulnerable position.[19,20]

Furthermore, the mental health consequences of traumatic incidents such as disasters, in general, can be prolonged, with stress to people, families, and communities resulting in short-term fear of death,[21] as well as general distress, anxiety, excessive alcohol consumption, and other psychiatric disorders.[22] In other words, mass gatherings, if improperly managed, can result in what has been defined by the United Nations International Strategy for Disaster Reduction (UNISDR) as "A serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources" – the UNISDR's definition of a disaster.[17]

3. The Sendai Framework for Disaster Risk Reduction

The Sendai Framework for Disaster Risk Reduction 2015–2030 is the first of three United Nations landmark agreements agreed in 2015 (the other two being the Sustainable Development Goals (https://sustainabledevelopment.un.org/) agreed in September 2015, and the UN Framework Convention on Climate Change adopted in December 2015 (http://unfccc.int/2860.php)).[23] The Sendai Framework is a voluntary agreement adopted on March 18, 2015 by 187 United Nations member states after extensive negotiations at the World Conference on Disaster Risk Reduction, the successor to the Hyogo Framework for Action 2005. It has a greater emphasis on health and gives a clearer mandate emphasizing the need for more integrated DRR that incorporates bottom-up as well as top-down approaches, local scientific and technical knowledge, and draws attention to synergies with other critical policy arenas, including health, climate change, and sustainable development.[24]

The Sendai Framework captures the developments in science and policy thinking of the last 10–20 years in moving beyond a single hazard and a response-focused approach to disasters, to an all-hazard, preventive, multisector and multidisciplinary approach that links with sustainable economic development and climate change.[25] The Sendai Framework outcome for the next 15 years is to achieve "The substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries". The following actions with a public health focus are agreed in the Sendai Framework with local, national, regional, and global partners as relevant: "Enhancing the resilience of national health systems through training and capacity development; strengthening the design and implementation of inclusive policies and social safety-net mechanisms, including access to basic health care services towards the eradication of poverty; finding durable solutions in the post-disaster phase to empower and assist people disproportionately affected by disasters, including those with life-threatening and chronic disease; enhancing cooperation between health authorities and other relevant stakeholders to strengthen country capacity for disaster risk management for health; the implementation of the International Health Regulations (2005) and the building of resilient health systems; improving the resilience of new and existing critical infrastructure, including hospitals, to ensure that they remain safe, effective and operational during and after disasters, to provide live-saving and essential services; establishing a mechanism of case registry and a database of mortality caused by disaster to improve the prevention of morbidity and mortality and enhancing recovery schemes to provide psychosocial support and mental health services for all people in need".[23]

The Sendai Framework also recognizes the challenges and gaps: "Enhanced work to reduce exposure and vulnerability, thus preventing the creation of new disaster risks, and accountability for disaster risk creation are needed at all levels. More dedicated action needs to be focused on tackling underlying disaster risk drivers, such as the consequences of poverty and inequality, climate change and variability, unplanned and rapid urbanization, poor land management and compounding factors such as demographic change".[23]

The Sendai Framework has a strong emphasis on the importance of science as a robust foundation for informing decision-making and underpinning DRR. Specific recommendations for the scientific community to improve the understanding of risk and how to achieve its expected outcome of reducing disaster losses in lives, livelihoods, and health include: "Enhanced scientific and technical work on disaster risk reduction and its mobilization through the coordination of existing networks and scientific research institutions at all levels and all regions, with the support of the United Nations International Strategy for Disaster Reduction's Scientific and Technical Advisory Group, in order to strengthen the evidence base in support of the implementation of this framework; promote scientific research of disaster risk patterns, causes and effects; disseminate risk information with the best use of geospatial information technology; provide guidance on methodologies and standards for risk assessments, disaster risk modelling and the use of data; identify research and technology gaps and set recommendations for research priority areas in disaster risk reduction; promote and support the availability and

application of science and technology to decision-making; contribute to the update of the terminology on disaster risk reduction; use post-disaster reviews as opportunities to enhance learning and public policy and disseminate studies".[23]

The Sendai Framework, when implemented, has the potential to be a truly relevant framework for health, advocating for an all-hazards approach. It makes more than 30 explicit references to health, highlighting the importance of outbreaks and epidemics, chronic disease management, psychosocial interventions, rehabilitation as part of disaster recovery, and makes several references to the International Health Regulations.

4. Reducing losses in lives, livelihoods, and health: building on synergies between disaster risk reduction and health to reduce risks from mass gatherings

The battle against the spread of travel-related infections and other risks facilitated by globalization that arise from mass gatherings is a shared responsibility between different countries, sectors, and disciplines that can help to reduce risk. The coordination of preventive measures by health services, emergency services, engineers, scientists, the private sector, governments, and civil society requires the adoption of an all-hazard approach that is multidisciplinary and multisectoral. The benefits from such measures go beyond those directly involved in any particular mass gathering to protect health and reduce vulnerability globally.

The expansion of DRR from a (single) hazard response-focused approach to a risk-based approach addressing vulnerability and exposure alongside hazard probability has been compared to the widening of the scope of health activities beyond clinical interventions on diseases to health system strengthening and prevention. Public health is increasingly concerned with the latter and works across policy sectors that have an impact on health and wellbeing, such as economic, agricultural, and educational policy. An important driver is the realization that the costs of reactive health interventions dealing with illness in hospitals are exceeding societal resources, alongside concerns for fairness and equity.[16]

Given the health imperative for DRR over the 2015–2030 period, as promoted in the Sendai Framework, a much stronger focus on improving the health outcomes for people at risk of emergencies is needed. Through participation in the Sendai Framework policy process, health actors and their partners such as the UNISDR have worked to ensure that people's health is considered as an explicit outcome of the Sendai Framework and that health outcomes are seen as a shared responsibility among all actors in DRR and emergency risk management.[26,27] Member States of the WHO made high-level policy commitments to DRR and adopted a resolution at the 2011 World Health Assembly to strengthen national health emergency and disaster management capacities and the resilience of health systems.[28]

Looking to the future, Member States and the WHO Secretariat have set a course that brings together DRR and emergency response. Commitments include the provision of greater input and participation by the health sector in DRR national, regional, and global fora. The WHO promotes an all-hazard approach[29] and an integrated multisectoral response to emergencies.[26] The WHO global Pandemic Influenza Preparedness Framework (http://www.who.int/influenza/resources/pip_framework/en/) has already embraced the principles of this integrated all-hazard approach. A conceptual diagram for the integration of the WHO Emergency and Disaster Risk Management for Health (EDRM-H) framework into broader national DRR strategies has been proposed (see Figure 1),[30,31] and could potentially be used to guide the risk management of large mass gathering events. Following the adoption of the Sendai Framework, the WHO has committed to building on previous efforts and is currently developing guidance ("Reducing health consequences of emergencies and disasters: a

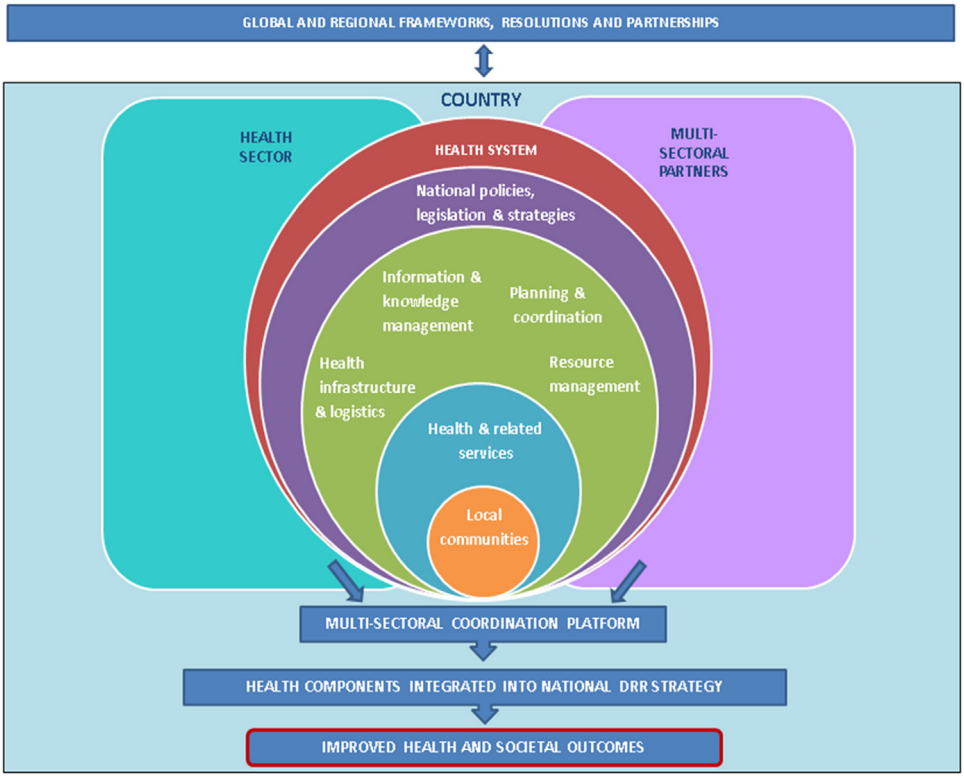

Figure 1. A framework for integrating health into disaster risk reduction strategies—a concept diagram for managing risk at mass gatherings (adapted from Dar O, Buckley EJ, Rokadiya S, Huda Q, Abrahams J. Integrating health into disaster risk reduction strategies: key considerations for success. Am J Public Health 2014;104:1811–6).

risk management policy guide") to help countries to effectively manage emergency risks and reduce their health consequences.[27]

Mass gatherings can introduce new and challenging risks that need to be managed and need to be understood better.[32] Priority 4 of the Sendai Framework calls for the DRR community and its partners: "[t]o develop and strengthen, as appropriate, coordinated regional approaches and operational mechanisms to prepare for and ensure rapid and effective disaster response in situations that exceed national coping capacities". The health sector has clearly recognized the link between mass gatherings and preparedness to reduce disaster risk, but the translation of global policy into local and national capacity remains to be achieved. The Sendai Framework offers an opportunity to galvanize member states and local authorities to achieve common goals by offering a clearer vision and narrative for concerted action and funding reform.

The Sendai Framework offers a unique opportunity to move beyond simply responding to emergencies to a more comprehensive, prevention-based approach to mass gathering management through the use of science and technical capabilities. It puts the protection of people's health, lives, and livelihoods at its centre. Of note, the Sendai Framework promotes the strengthening of the science–policy interface and the development of links to other large global instruments (Sustainable Development Goals, climate change, and the International Health Regulations).

In summary, globalization has created interdependencies that render local disaster impacts in distant locations relevant to communities everywhere, such that risk is shared across national and institutional boundaries. Therefore, reducing risk is a shared responsibility particularly where events or mass gatherings are enhanced by the advantages of globalization in terms of travel, interconnectivity of services, and supply chains.[33] For an evidence-based approach to the health impacts (including infectious disease control) of mass gatherings to be effective, it will be important to blend all-hazard risk management strategies across current global initiatives. In practice, for countries, this will mean harmonizing national strategies across intergovernmental agreements, including the Sendai Framework, the International Health Regulations, the Sustainable Development Goals, and the UN Framework Convention on Climate Change, to optimize resource investment.

Conflict of interest: The authors declare that they have no conflicts of interest.

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