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PAPER**

**Health Emergency and Disaster Risk  
Management: An emerging framework  
for achieving synergies among the  
Sendai Framework, the 2030 Agenda for  
Sustainable Development, the New Urban  
Agenda and the Paris Agreement**

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# The Health Emergency and Disaster Risk Management: An emerging framework for achieving synergies among the Sendai Framework, the 2030 Agenda for Sustainable Development, the New Urban Agenda and the Paris Agreement

## Abstract

This paper discusses the potential of the Health Emergency and Disaster Risk Management (Health-EDRM) Framework in promoting synergies in pursuing risk-resilient sustainable development pathways via conceptual analysis of the key roles of health and Health-EDRM in the major international risk-resilient and sustainable development agendas of the Sendai Framework, the 2030 Agenda for Sustainable Development, the New Urban Agenda and the Paris Agreement. It first analyses the Health-EDRM Framework, which is a comprehensive, systematic, cross-sectoral, and interdisciplinary endeavour of the World Health Organization and its health and non-health partners. The four key international risk-resilient and sustainable development agendas are then analysed in detail to explore how they can be interlinked and synergised under the Health-EDRM Framework.

Keywords: Health Emergency and Disaster Risk Management (Health-EDRM); Sendai Framework; 2030 Agenda for Sustainable Development; Paris Agreement; New Urban Agenda

## Contents

Introduction: Mainstreaming Health in Key International Risk-Resilient and Sustainable Development Agendas.....	5
WHO Health-EDRM Framework.....	6
Health-EDRM and the Sendai Framework.....	8
Health-EDRM and the 2030 Agenda for Sustainable Development.....	10
Health-EDRM and the New Urban Agenda.....	14
Health-EDRM and the Paris Agreement.....	16
References.....	20

## Introduction: Mainstreaming Health in Key International Risk-Resilient and Sustainable Development Agendas

This paper aims to assess the potential of the Health Emergency and Disaster Risk Management (Health-EDRM) Framework in promoting synergies in pursuing risk-resilient sustainable development pathways via conceptual analysis of the key roles of health and Health-EDRM in the major international risk-resilient and sustainable development agendas of the Sendai Framework, the 2030 Agenda for Sustainable Development, the New Urban Agenda and the Paris Agreement. By mainstreaming health in the key international risk-resilient and sustainable development agendas, Health-EDRM could help promote synergies in pursuing risk-resilient sustainable development pathways.

While human impacts of disasters and emergencies are complex, they usually cause direct and indirect impacts to health (e.g. indirect impacts derived from the disruption of life-line infrastructure like water, power and transportation, as well as health systems and facilities). Both health and non-health adverse outcomes from disasters and emergencies may cause hindrance or even setback to human progress and sustainable development. Moreover, these impacts often disproportionately affect vulnerable populations such as the poor, older people, children, those with disabilities and ethnic minorities (Chan, 2017; WHO, 2019). These vulnerabilities are exacerbated in countries [A5][A6][A7] which have less resilient societal and health systems and lower coping capacity, making the human impact more profound when compared to developed nations. Hence, the development of risk resilience to mitigate impacts of disasters and emergencies is crucial for the pathways to sustainable development.

To protect people from the adverse health impact of disasters and emergencies, proactive disaster health risk management is always one of the main objectives of people working in public health and related fields (Chan and Shi, 2017). With proper preparedness, coordination, resources, and resilience building, health risks associated with disasters and emergencies might be mitigated at all levels. At the macro level, suboptimal disaster risk management systems, lack of resources and knowledge, and ongoing insecurity arising from conflict might affect response capacity (WHO, 2018b). At the micro level, health risks might be conceptualized and mitigated by looking into the vulnerability, exposure to hazards, and how people respond to and manage such risks.

The intersection of health and disaster risk reduction (DRR) has been an emerging interdisciplinary field of study and practice in recent years. In a number of landmark international risk-resilient and sustainable development agendas adopted almost simultaneously in 2015–2016, including the Sendai Framework for Disaster Risk Reduction 2015–2030, the 2030 Agenda for Sustainable Development, the Paris climate agreement, and the New Urban Agenda (Habitat III), health is recognised as an inevitable outcome and a natural goal of disaster risk reduction and sustainable development, and the cross-over of the two fields of health and DRR is no doubt crucial for the successful implementation of these international agendas. As a joint venture sponsored by this cross-over to engage all related stakeholders, practitioners, and researchers, Health Emergency and Disaster Risk Management (Health-EDRM) has emerged as an overarching field of policy and study encompassing emergency and disaster medicine, DRR, humanitarian response, community health resilience, and health system resilience (CCOUC, n.d.; Chan and Murray, 2017; Lo, et al, 2017; WHO, 2019). As an academic paradigm, Health-EDRM has been actively developed since 2009 (WHO, 2018b, 2019). In contrast to more traditional response-based medical

emergency and disaster approaches to disaster health risk, the Health-EDRM paradigm focuses on systematic analysis to examine health and disaster risks and applying public health tools to the management of health and disaster risk. By adopting the preventive public health approach, it emphasises disaster and emergency preparedness and resilience building in disaster risk reduction to reduce potential adverse impact for all hazards throughout the emergency cycle (Aitsi-Selmi and Murray, 2015; Chan and Murray, 2017; WHO, et al, 2017g). Health-EDRM practices employ and implement evidence-based policies and solutions to support preparedness, response, and rehabilitation capacity building to enhance the resilience of health systems and their associated supporting systems and infrastructure.

Health-EDRM adopts a comprehensive, multidisciplinary approach to cover all areas of risk management and determinants that might affect health (WHO, et al, 2017a-h). This is achieved by engaging both health and non-health actors to understand the theories that describe how human health risks and outcomes might be affected by disasters and emergencies. Health-EDRM also advocates for the parallel top-down and bottom-up approaches to maximize risk and impact management. As a scientific discipline, Health-EDRM aims to build relevant inter- sectoral and multidisciplinary frameworks and gather evidence to reduce health risks and impacts in crises and emergencies.

The paper first examines the Health-EDRM Framework formulated by the WHO and then delineates how Health-EDRM might help build linkages and achieve synergies among the key aspects of four major international risk-resilient and sustainable development agendas, namely the Sendai Framework, the 2030 Agenda for Sustainable Development, the New Urban Agenda and the Paris Agreement.

## WHO Health-EDRM Framework

The WHO Health Emergency and Disaster Risk Management (Health-EDRM) Framework [A8] is an academic and practical response to the challenge of the health impact of emergencies and disasters by putting people's health at the centre of emergency and disaster risk management (Chan and Lam, 2020; Chan and Shaw, 2020; WHO, 2019). It echoes the Sendai Framework's strong emphasis on the need to build resilient health systems through integrating disaster risk management into the provision of healthcare an "[A9][A10] to enhance cooperation between health authorities and other relevant stakeholders to strengthen country capacity for disaster risk management for health" (WHO, 2019). It originates from the 2016 International Conference on the Implementation of the Health Aspects of the Sendai Framework, which resulted in the Bangkok Principles calling for engagement of the health sector in disaster risk reduction and greater participation of health sector representatives in disaster risk reduction platforms and committees at all levels. The subsequent Health-EDRM Framework published in 2019 emphasizes the centrality of prevention, preparedness, and readiness (on top of the more traditional focuses on response and recovery) to save lives and protect health, as well as the importance of multi-sectoral collaboration. The WHO Health-EDRM Framework is a significant development from the International Health Regulations (2005) adopted by Ministries of Health by a whole-of-government, whole-of-society, interdisciplinary approach, while highlighting the centrality of health in DRR. [A11][A12]

With the vision of the "highest possible standard of health and well-being for all people who are at risk of emergencies, and stronger community and country resilience, health security, universal health coverage and sustainable development", the expected outcome of Health-

EDRM is that “countries and communities have stronger capacities and systems across health and other sectors resulting in the reduction of the health risks and consequences associated with all types of emergencies and disasters” (WHO, 2019).

Recognising the current fragmented approaches to diverse types of hazards, the over-emphasis on reacting to hazardous events at the expenses of preventing and preparing properly for response, and gaps in coordination across the entire health system and between health and other sectors, the Health-EDRM Framework was compiled to enhance the ability of communities and countries to achieve optimal development as well as health outcomes. First of all, it tries to overcome the problems by putting forward a common language and a comprehensive approach that can be adapted by all health and non-health actors working to reduce health risks and consequences of emergencies and disasters. To aid this endeavour, WHO has also compiled a glossary to accompany and supplement this Framework document (WHO, 2020a). The purpose is to address the need for a standardized terminology in Health EDRM by consolidating existing multidisciplinary glossaries and definitions (including those from various United Nations agencies, WHO, World Meteorological Organization, Intergovernmental Panel on Climate Change (IPCC), International Federation of Red Cross and Red Crescent Societies (IFRC), United States federal government) into a single, comprehensive reference tool for policymakers, practitioners and other stakeholders. This comprehensive approach emphasizes “assessing, communicating and reducing risks across the [whole risk reduction] continuum of prevention, preparedness, readiness, response and recovery, and building the resilience of communities, countries and health systems” (WHO, 2019). Derived inter-disciplinarily from risk management, emergency management, epidemic preparedness and response, and health systems strengthening, Health-EDRM helps align policies and actions for global agendas of disaster risk reduction, sustainable development, urban development, and climate change (Aitsi-Selmi and Murray, 2015; Peters, et al, 2016; WHO, 2019; Wright, et al, 2020). This opens up the possibility to link up relevant global agendas and achieve synergy across them.

As a comprehensive multi-sectoral effort, Health-EDRM requires joint planning and action by health and non-health government ministries, the national disaster management agency, the private sector, communities and community

organizations, supported by the international community. The core outcome [A13][14] of Health-EDRM is a strengthened health system emphasizing community participation and resilience building for effective all-hazard [A15][A16] prevention, preparedness, response, and recovery, including those for climate change-related meteorological and biological hazards (See also UNDRR & ISC, 2020; Annex 1, WHO, 2019). This will ultimately contribute to sustainable development as discussed in sections below. To kick start a global process of health- centred risk resilience building, the WHO Health-EDRM Framework proposes priorities for action in the following three broad areas: surveillance, early warning and alert systems; emergency preparedness for response across all hazards, the health system and all sectors; and resilient, safe, secure and sustainable hospitals and health facilities that can continue to function in emergency or disaster situations (WHO, 2019).

## Health-EDRM and the Sendai Framework<sup>1</sup>

Adopted by 187 Member States on 18 March 2015 at the third World Conference for Disaster Risk Reduction in Sendai, Japan (UNDRR, 2015) and endorsed by the UN General Assembly in June 2015, the Sendai Framework for Disaster Risk Reduction 2015 – 2030 and its significance must be understood not only in its own right as the driving force for global disaster risk reduction efforts, but also as part of the broader international policy on risk-resilient and sustainable development agendas. The symbolic and practical significance of the almost synchronous adoption of the Sendai Framework, the Sustainable Development Goals (SDGs), the Paris Agreement within the United Nations Framework Convention on Climate Change, and the New Urban Agenda together form a far-reaching resilience agenda across the areas of disaster risk reduction, health, sustainable development, climate change, and urban development efforts.

The Sendai Framework sets out one expected outcome, one goal, seven global targets, 38 indicators, and four priority areas. The expected outcome of the Sendai Framework is “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” (United Nations Office for Disaster Risk Reduction [UNDRR], 2015, Paragraph 16). The Sendai Framework thus calls for the strengthening of resilience by prevention and reduction of hazard exposure and vulnerability, increased preparedness for response and recovery and a stronger role of national governments and non-state stakeholders in reducing and managing disaster risks.

In the Foreword to the Sendai Framework, Margareta Wahlström, the UN Special Representative of the Secretary-General for Disaster Risk Reduction, pointed out that “health resilience is strongly promoted throughout” the Framework (UNDRR 2015, Foreword)”. One year after the publication of the Sendai Framework, the International Conference on the Implementation of the Health Aspects of the Sendai Framework for Disaster Risk Reduction 2015-2030 called for a central place of health resilience in disaster management and adopted the Bangkok Principles to guide the implementation of the health aspects of the Sendai Framework (UNDRR, 2016). The interplay between health and disaster risk reduction is analyzed below in the four priority areas of the Sendai Framework under the Health-EDRM Framework (UNDRR, n.d.).

Priority 1 emphasizes that an understanding of disaster risk is the foundation for developing disaster risk management policies and practices. A specific reference to health under this priority area is “[t]o systematically evaluate, record, share and publicly account for disaster losses and understand the economic, social, health, education, environmental and cultural heritage impacts, as appropriate, in the context of event-specific hazard-exposure and vulnerability information” (paragraph 24(b)). It suggests that disaster risk management should concern not only with post- event on-the-ground rescue of victims, but also risk assessment to address vulnerabilities, in parallel with an emphasis on prevention in public health and the Health-EDRM Framework. There has also been call for disaster risk management to address more the underlying vulnerability from social, economic and environmental factors, including poverty, land use, and inequity (Aitsi-Selmi and Murray, 2015), which indicates a recognition of the role of underlying factors in both disaster risk reduction and health in terms of social, economic, political and environmental determinants of disaster vulnerabilities and health

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<sup>1</sup> This section develops from an earlier analysis in Chan, Hung, Murray, et al (2020)

outcomes. Disaster risks and poor health outcomes were also found to be socially patterned and affect the disadvantaged disproportionately (Phibbs, et al, 2016). Availability, accessibility, quality, and applicability of reliable data are essential for understanding disaster risks. Data availability has been one of the themes recurring in the global discussion of implementing the Sendai Framework. In addition to the high cost of building historic datasets, concerns over the inadequacy of existing health data in disaster setting have been raised, including non-standardized record of health data owing to the absence of common definition and classification of disasters, as well as temporality and attribution issues in linking mortality and morbidity to disasters (Maini, et al., 2017). The Sendai Framework Data Readiness Review has been conducted to ascertain how ready countries were to report against the global targets under the Sendai Framework, which found that data on economic loss and damage to critical infrastructure was very limited while mortality and morbidity data are slightly more available. In terms of data quality, the Review found that data quality varied significantly between countries, with different measurement, data hosting systems and aggregate data used. These findings provide useful insights on the availability of health- and non-health-related disaster data globally and their importance in understanding disaster risk (See also WHO, 2020b). [A17][A18]

Priority 2 concerns the centrality of strengthening disaster risk governance in disaster risk management. Governance within and across related sectors at local, national, regional and global levels requires leadership, collaboration and participation of stakeholders during all phases of a disaster. The specific reference to health under this priority is “[t]o promote transboundary cooperation to enable policy and planning ... to build resilience and reduce disaster risk, including epidemic and displacement risk” (paragraph 28(d)). While this reference to health in terms of disaster risk governance is limited to epidemic risk, a much wider health perspective in disaster risk governance is recommended in the Health-EDRM Framework integrating health perspective in national disaster risk reduction strategies and plans, relevant laws, regulations and policies. This involves defining structures, roles and responsibilities within the governments in relation to Health-EDRM, planning finances and manpower requirements, and the coordination mechanism for the Health-EDRM operation (WHO, et al, 2017g). One of the global targets under the Sendai Framework is to increase the number of countries that have national and local disaster risk reduction strategies. This target provides an opportunity to mainstream health when the disaster risk reduction strategy is being developed or revised in increasing number of countries.

Priority 3 involves building disaster resilience by funding cost-effective structural and non-structural measures to mitigate disaster risk. The Sendai Framework covers economic, social, health and cultural resilience at individual, community, country, and environmental levels, where resilience is defined as “the ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions” (UNDRR, 2009). This is the priority area where health is featured most prominently in the themes on safe hospitals (paragraph 30(c)), health system resilience (paragraph 30(i)), access to basic services (paragraph 30(j)), and chronic diseases (paragraph 30(k)). These references to health in the Sendai Framework point to the significant role played by resilient health systems in reducing disaster risk, including safe hospitals, clinics and related structures and facilitates, and access to health care services, which coincide with the Health-EDRM Framework.

Priority 4 calls for integrating disaster risk reduction into development measures to enhance disaster preparedness for response, as well as to “Build Back Better” in recovery, rehabilitation, and reconstruction. The direct references to health under this priority include “[t]o promote the resilience of new and existing critical infrastructure, including ... hospitals and other health facilities... in order to provide life-saving and essential services” (paragraph 33(c)), “[t]o establish a mechanism of case registry and a database of mortality caused by disaster in order to improve the prevention or morbidity and mortality” (paragraph 33(n)), and “[t]o enhance recovery schemes to provide psychosocial support and mental health services for all people in need” (paragraph 33(o)). This priority reinforces the emphasis on resilient health facilities, which are crucial for both preparedness for the impact phase and building back better in the post-impact phase. The establishment of case registry and database of disaster mortality echoes the discussion on disaster data under Priority 1 (See also Green, et al, 2019). [A19][A20].

There is clear synergy between health concepts and the Sendai Framework, and the Health-EDRM Framework can serve as a conceptual pivot and guidance for the implementation of the relevant policies of the Sendai Framework.

## Health-EDRM and the 2030 Agenda for Sustainable Development<sup>2</sup>

The 2030 Agenda for Sustainable Development and the related sustainable development goals (SDGs) adopted in September 2015 at the United Nations Sustainable Development Summit expanded beyond the eight original goals of its predecessor the Millennium Development Goals (MDGs). The 17 SDGs with 169 targets seek to address and balance the three dimensions of sustainable development: economic growth, social inclusion and environmental protection. They are “integrated and indivisible”, aiming to enable risk-resilient and sustainable development for all countries. In view of the specific obstacles to sustainable development encountered by different countries, the 2030 Agenda for Sustainable Development provides that the primary responsibility for achieving the SDGs in national development lies within each country, while their implementation will be ensured by global partnership (United Nations General Assembly, 2015).

With an aim to empower the vulnerable, the SDGs are well aligned with the prevention-focused and people-centred Health-EDRM Framework. Disasters inevitably hinder sustainable development, intermittently and increasingly causing damage and setbacks in communities, which lead not only to economic, productivity and infrastructural losses, but also mortality, adverse health and human capital depletion. Conversely, “better development can reduce the need for emergency relief” (Buchanan-Smith and Maxwell, 1994). To achieve risk-resilient and sustainable development, there is a need to increase health resilience and reduce vulnerability to health risks posed by disasters, a key to the prevention and health-focused approach of Health-EDRM. This need is particularly urgent among the vulnerable populations more susceptible to the negative impact of disasters such as the poor, the older people, children, persons with disabilities, and ethnic minorities. The root of human health vulnerability in disasters and emergencies consists of a complex group of “social, economic, health and cultural factors” (WHO, et al, 2017g). By meeting the SDGs addressing this multi-faceted group of vulnerability factors, the health vulnerability of at-risk populations in disasters could be reduced at the same time. The following paragraphs will outline how selected SDGs can be examined under the Health-EDRM Framework to reduce disaster health vulnerability

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<sup>2</sup> This section develops from an earlier analysis in Chan, Ho, et al (2020).

and build resilience (See also Figure 1, WHO, 2020b). [A21][A22] SDG 1 aims to end poverty in all its forms everywhere. Poverty is known to be a key disaster vulnerability factor and often linked with poor health outcomes. Poor people are more likely to live under vulnerable conditions, with higher risks of pre-existing health conditions and mental health problems due to long-term coping with chronic life stressors and limited access to medical services (Nicogossian, et al, 2012; Goldmann and Galea, 2014; Elliott, 2016). Poverty also reduces people's choice and thus their ability to avoid future health risks (DFID, 2006; WHO, et al, 2017g). Those in lower socio-economic status may be forced to live in more hazard-prone areas, have poorer shelters, have less access to resources and comprehensive disaster warning systems, and focus more on basic survival priorities instead of long-term planning or preparedness for disaster (DFID, 2006; UNDRR, 2008).

Poorer people may even experience a downward spiral of poverty as a result of recurrent disasters [A23][A24]. With higher disaster vulnerability, they are disproportionately affected by the damaging effect when disasters strike and may lose a large proportion of assets or even potential income sources in every disaster (Rentschler, 2013). For example, small business farmers can have their yearly income source curtailed in a single disaster event such as a flood (CARE, 2011).

These may further limit their accessibility to resources and health services for health maintenance post-disaster. Target 1.5 of SDG 1 can help address this linkage between poverty and disaster risk by building the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and disasters. Reducing poverty and building disaster resilience among the poor would prevent adverse health outcomes post disaster. This linkage also justifies incorporating social hazards in the UNDRR and ISC (2020) hazard report.

SDG 2 calls for ending hunger, achieving food security and improved nutrition, and promoting sustainable agriculture, which are linked to health. It was reported that undernutrition was the top cause of global under-five mortality in 2013, accounting for 45% of deaths (Food and Agriculture Organization of the United Nations, 2016). Those suffering from malnutrition are also more vulnerable in disasters, which add further pressure to the four pillars of food security, namely food availability, access, utilisation and stability (EC - FAO Food Security Programme, 2008; Garschagen, et al, 2015). SDG 3 involves ensuring healthy lives and promoting well-being for all.

Together with other SDGs, it is founded on the principles of equity and "leaving no one behind" (WHO, 2016b), which require minimising the discrepancy between the most and the least vulnerable to disasters since an overall healthy population would enable everyone to be more disaster resilient. For example, the provision of robust universal health services can help improve the health status of communities and reduce disaster vulnerabilities. Vaccination can also reduce the health risk of post-disaster communicable disease outbreaks.

SDG 4 establishes the importance of inclusive and equitable quality education and promote lifelong learning opportunities for all, which are crucial under the Health-EDRM Framework since Health-EDRM education can increase disaster health risk literacy and resilience to enhance survival and maintain health in a disaster setting (Shaw, et al, 2011). Target 4.a aiming to "[b]uild and upgrade educational facilities that are child, disability and gender sensitive and provide safe, non-violent, inclusive and effective environment for all" is closely linked to the emphasis on safe facilities and the preventive imperative of the Health-EDRM

## Framework.

SDG 5 strives for gender equality and empowerment of women and girls, which is recognised in the Health-EDRM as health vulnerability can be gender-biased. Moreover, prevailing gender inequalities are usually amplified in disaster settings. For example, there is a higher disaster risk and disaster mortality among women in general (Ferris, et al, 2013). During a prolonged disaster or shortly after a disaster has ended, women can continue facing discrimination, which can hinder them from accessing needed health services and can also lead to increased risk of gender-based violence. For instance, menstrual hygiene management and reproductive health interventions are often overlooked in recovery plans (Bradshaw and Fordham, 2013; Krishnan and Twigg, 2016). Targets 5.1 and 5.2 of ending discrimination and violence against women and girls are particularly relevant for gender equality in both pre- and post-disaster contexts. Target 5.6 of “[e]nsur[ing] universal access to sexual and reproductive health and reproductive rights” is also made achievable in emergency disaster responses planning informed by the Health-EDRM Framework.

SDG 6 focuses on management of water and sanitation, which are key determinants of health and also essential in disaster settings (notably in biological hazards like the Coronavirus Disease 2019 (COVID-19) pandemic). Inadequate access to safe water supply can heighten a population’s health risk and their vulnerability in disasters. Four types of water-related diseases include waterborne communicable diseases caused by ingestion of faecally contaminated water, water-washed diseases due to inadequate water supply and the resulting poor hygiene, water-based diseases from contact with water-dwelling parasitic organisms, and vector-borne diseases arising from water-bred insects, such as mosquito-transmitted malaria (United Nations Economic and Social Council, 2010). It was estimated that 842,000 people die annually in the globe from diarrhoea resulting from unsafe water sanitation and hygiene, which is largely preventable (WHO, 2018a). Taking preventive actions to design water supply and sanitation systems under the Health-EDRM Framework can have a huge impact on the health of populations in the event of a disaster in terms of not only preventing water-related disease outbreaks, but also cascading impacts on water use for healthcare services, food preparation and rescue services. Effective water management should thus pay attention to the risk resilience of the various water systems and ensure that these systems would not be physically damaged by earthquakes or other local disaster risks (WHO, 2011).

SDG 9 involves building resilient infrastructure, promoting inclusive and sustainable industrialization and fostering innovation. Ensuring the continued operation or quick recovery of critical infrastructure (i.e. infrastructure resilience (Panda and Ramos, 2020), such as electricity supplies, information and communications technology (ICT) systems, roads and transport systems) in a disaster can be critical in maintaining the health of those affected. Specifically, a resilient health system that can withstand hazards and remain operational (WHO, et al, 2017g) is essential for reducing the disaster health risk. The Comprehensive Safe Hospital Framework under the Sendai Framework is an example of a global synergic intervention aiming to attain this SDG.

SDG 11 calls for making cities and human settlements inclusive, safe, resilient and sustainable, which echoes with the New Urban Agenda to be discussed later in this paper. While over 55% of the world population were urban dwellers in 2018, the urban population is further projected to rise to 68% of the world’s population by 2050. Moreover, there were 33 megacities holding 10 million people or more and the number is expected to be growing

(UNDESA, 2018). As a result, disasters that strike these urban areas could affect large populations. Those dwelling in informal settlements and slum areas of the city with inadequate basic services are at a higher risk of adverse health outcomes in disasters. Hazards like small fire or heavy rainfall not normally causing a huge impact on residents of urban formal settlements could develop into a disaster in these overcrowded urban living conditions (Baker, 2011). This goal calls for better urban planning and management to reduce health and disaster risks in urban settings, particularly among the urban poor, which suggests the potential synergy with the New Urban Agenda to be discussed later. Target 11.1 of ensuring access for all to adequate, safe and affordable housing and basic services and upgrading slums and Target 11.5 regarding the reducing the number of deaths and the number of people affected by disasters particularly among the poor and people in vulnerable situations both highlight the potential synergy between SDGs and the Sendai Framework under Health-EDRM. Target 11.b additionally seeks to adopt and implement integrated policies and plans in more urban and human settlements for climate change mitigation and adaptation, resilience to disasters, and holistic disaster risk management, as a prime illustration of the synergy among SDGs, the Sendai Framework, the New Urban Agenda, and the Paris Agreement.

SDG 13 advocates taking urgent action to combat climate change and its impacts, which acknowledges climate change as an essential factor affecting sustainable development. Target 13.1 under this SDG and its indicators are particularly linked to the principles of the Health-EDRM Framework. This further suggests the possibility of synergy between the 2030 Agenda for Sustainable Development and the Paris Agreement under the Health-EDRM Framework. As a major driver behind the increasing frequency and intensity of natural hazards and climate-sensitive diseases like dengue fever, malaria, and respiratory diseases (potentially also the COVID-19 pandemic), climate change poses direct adverse impacts on health by ways of mortality, morbidities, injuries, mental health problems and other adverse health effects (Kelman, 2017; Banwell, Rutherford, Mackey, Street, et al., 2018). This demonstrates the importance of considering and assessing health risks and interventional strategies in the overlapping spheres of sustainable development, climate change and disaster risk reduction in a holistic and synergic way by employing the comprehensive, cross-sectoral and multi-disciplinary Health-EDRM Framework. This synergy would maximise the use of resources, as well as prevent redundant or conflicting efforts (Kelman, 2017; Banwell, Rutherford, Mackey, and Chu, 2018).

SDG 16 endeavours to promote peaceful and inclusive societies for sustainable development, provide access to justice for all, and build effective, accountable and inclusive institutions at all levels. While emergencies like wars, conflicts, terrorism, and violence are direct threats to life, health and human security decline in conflict-plagued communities and fragile states due to reduction in basic services and provisions for basic needs such as food and water (WHO, 2000).

Complex emergencies and conflicts also have broader and lingering effects on communicable diseases, treatments for non-communicable disease, malnourishment, and mental health. For example, a lingering heightened level of mortality one year after the conflict was found in the Darfur conflict as a result of diarrhoea-related mortality, particularly among the displaced populations (Degomme and Guha-Sapir, 2010). The provision of basic standards of care also becomes increasingly hindered in protracted conflicts due to insecurity, destruction of healthcare facilities, and disruption of medical supply, medication, and vaccine delivery (Checchi, 2010). Subsequently, as access to healthcare and routine

management is inhibited, pre-existing chronic conditions such as tuberculosis, HIV/AIDS, and diabetes may be exacerbated. Conflicts also weaken the healthcare system by displacing or injuring healthcare workers. Immunisation coverage deterioration as a result of prolonged conflicts also puts the entire population at risk of communicable disease outbreaks (Quinn, et al, 2017).

By being put under the Health-EDRM Framework, it will facilitate the achievement of the selected SDGs analysed above and the synergy with related international risk-resilient and sustainable development agendas. This also applies to other SDGs not discussed here, yet still linked with the Health-EDRM Framework, including economic growth-related goals (SDGs 7, 8, and 10), environmental protection-related goals (SDGs 12, 14, and 15) and the goal to enhancing global partnerships (SDG 17). The above-mentioned SDGs as well as their Health-EDRM linkages are also directly intertwined with each other. For example, poverty conditions, which SDG 1 aims to eradicate, further exacerbate the access and availability problem of resources mentioned in other goals. It is connected to SDG 2 of ending hunger since poor households are more vulnerable to malnutrition in disasters. Poorer communities are also more likely to have their education infrastructure destroyed by disasters, affecting the educational achievements aspired by SDG 4. These interlinkages highlight the synergies available among attaining SDGs and Health-EDRM goals holistically, and they should be considered and utilised in the development of SDG policies and implementation plans.

### Health-EDRM and the New Urban Agenda<sup>3</sup>

The New Urban Agenda (NUA) adopted in October 2016 at the United Nations Conference on Housing and Sustainable Urban Development (Habitat III) in Ecuador, set the global agenda for sustainable and inclusive urbanisation for the next 20 years. The New Urban Agenda document incorporating both the Quito Declaration on Sustainable Cities and Human Settlements for All and the Quito Implementation Plan for the New Urban Agenda rests on five pillars of implementation: national urban policies, urban legislation and regulations, urban planning and design, local economy and municipal finance, and local implementation. Health-EDRM presents prominently in the New Urban Agenda, where “health” and its varieties are referred to 29 times while “disaster” 22 times (United Nations General Assembly, 2017).

Among the shared vision of the NUA, Articles 13 (a) and 13 (g) are particularly amenable to the Health-EDRM Framework. The two articles envisage cities and human settlements that “[f]ulfil their social function, including the social and ecological function of land, with a view to progressively achieving the full realization of the right to adequate housing as a component of the right to an adequate standard of living, without discrimination, universal access to safe and affordable drinking water and sanitation, as well as equal access for all to public goods and quality services in areas such as food security and nutrition, health, education, infrastructure, mobility and transportation, energy, air quality and livelihoods”, and “[a]dopt and implement disaster risk reduction and management, reduce vulnerability, build resilience and responsiveness to natural and human-made hazards, and foster mitigation of and adaptation to climate change”. In parallel and potentially synergising with the SDGs, the shared vision of NUA is guided by three principles on social inclusion, economic opportunity and environmental protection. The latter principle addresses disaster risks to “[e]nsure environmental sustainability by promoting clean energy and sustainable use of land and

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<sup>3</sup> This section develops from an earlier analysis in Chan, Ho, et al (2020).

resources in urban development, by protecting ecosystems and biodiversity, including adopting healthy lifestyles in harmony with nature, by promoting sustainable consumption and production patterns, by building urban resilience, by reducing disaster risks and by mitigating and adapting to climate change” (Article 14c).

The Quito Implementation Plan for the New Urban Agenda comprises of transformative commitments for sustainable urban development, including an extensive list of commitments revolving around the three guiding principles of sustainable urban development for social inclusion and ending poverty (Articles 25- 42), sustainable and inclusive urban prosperity and opportunities for all (Articles 43- 62), and environmentally sustainable and resilient urban development (Articles 63- 80). The last principle has the greatest of potential of achieving synergy with the Sendai Framework, SDGs and the Paris Agreement section on the last principle of environmentally sustainable and resilient urban development. Articles 63 and 64 recognize the unprecedented threats from natural and human-made hazards and climate change urban settlements are facing and their vulnerabilities toward these hazards, which in turn undermine the efforts to end poverty and achieve sustainable development. Article 65 illustrates how the Health-EDRM Framework can be central to the synergic efforts of the four international risk-resilient and sustainable development agenda by integrating health and well-being with disaster risk reduction: “We commit ourselves to facilitating the sustainable management of natural resources in cities and human settlements in a manner that protects and improves the urban ecosystem and environmental services, reduces greenhouse gas emissions and air pollution and promotes disaster risk reduction and management, by supporting the development of disaster risk reduction strategies and periodical assessments of disaster risk caused by natural and human-made hazards, including standards for risk levels, while fostering sustainable economic development and protecting the well-being and quality of life of all persons through environmentally sound urban and territorial planning, infrastructure and basic services.”

Subsequent articles go further to commit to solutions that can address disaster risk, sustainable development hurdles, climate change threats, and urbanization problems within a Health-EDRM Framework: “well-connected and well- distributed networks of open, multipurpose, safe, inclusive, accessible, green and quality public spaces” that “improv[e] the resilience of cities to disasters and climate change, including floods, drought risks and heat waves”, and improve “physical and mental health” (Article 67) and “adequate investments in protective, accessible and sustainable infrastructure and service provision systems for water, sanitation and hygiene, sewage, solid waste management, urban drainage, reduction of air pollution and storm water management, in order to improve safety in the event of water-related disasters, improve health, ensure universal and equitable access to safe and affordable drinking water for all, as well as access to adequate and equitable sanitation and hygiene for all...” (Article 119).

Aligned and potentially synergising with the Sendai Framework, NUA commits to strengthening the resilience of cities and their infrastructure, and to “adopting and implementing integrated, age- and gender-responsive policies and plans and ecosystem-based approaches in line with the Sendai Framework for Disaster Risk Reduction 2015-2030”, “holistic and data-informed DRR and management at all levels to reduce vulnerabilities and risk, especially in risk-prone areas of formal and informal settlements, including slums” (Article 77), “more proactive risk-based, all-hazards and all-of-society approaches such as raising

public awareness of risks and promoting ex-ante investments to prevent risks and build resilience”, “ensuring timely and effective local responses to address the immediate needs of inhabitants affected by natural and human-made disasters and conflicts”, and “integration of the “build back better” principles into the post-disaster recovery process to integrate resilience-building, environmental and spatial measures and lessons from past disasters, as well as awareness of new risks, into future planning” (Article 78).

The New Urban Agenda also specifically addresses conflict settings and the health and well-being of those who may be displaced due to conflicts or disasters: “Special attention should also be given to countries in situations of conflict, as well as countries and territories under foreign occupation, post-conflict countries and countries affected by natural and human-made disasters [for the implementation of the New Urban Agenda]” [A25][A26] (Article 19). It commits in Articles 28-29 to “respect[ing] for the human rights of refugees, internally displaced persons and migrants” and strengthening the coordination and collaboration “in the provision of social and basic services for all, including generating investments in communities that are most vulnerable to disasters and those affected by recurrent and protracted humanitarian crises,... to promoting adequate services, accommodation and opportunities for decent and productive work for crisis-affected persons in urban settings and to working with local communities and local governments to identify opportunities for engaging and developing local, durable and dignified solutions while ensuring that aid also flows to affected persons and host communities to prevent regression of their development.” Furthermore, it commits to “support[ing] resilient urban services during armed conflicts... [and] reaffirm[ing] full respect for international humanitarian law” in Article 30.

It is worth noting that while the Sendai Framework does not cover societal hazards, the New Urban Agenda expands on additional societal hazards acknowledged as hazards of importance in the WHO (2020) technical guidance notes on Sendai Framework.

Furthermore, the New Urban Agenda commits to climate action and adaptation planning, integrating these with disaster risk reduction into “age- and gender-responsive urban and territorial development and planning processes” (Article 101). Recognising the interconnectedness and multi-sectoral nature of disaster risks and urban development, Article 101 continues, “...We will promote cooperation and coordination across sectors and build the capacities of local authorities to develop and implement disaster risk reduction and response plans, such as risk assessments concerning the location of current and future public facilities, and to formulate adequate contingency and evacuation procedures”. By acknowledging the interlinkages of urban development, disaster risks, climate change-related disasters, and sustainable development under the Health-EDRM Framework, the New Urban Agenda can synergise with the Sendai Framework and the Paris Agreement to envision cities and urban populations that are inclusive, healthy and resilient in disasters.

## Health-EDRM and the Paris Agreement<sup>4</sup>

Built upon the United Nations Framework Convention on Climate Change (UNFCCC) adopted by almost all UN members in 1992 and as successor to the Kyoto Protocol adopted in 1997, the Paris Agreement on climate change endorsed in 2015 aims to hold the increase in global average temperature to well below 2 °C above pre-industrial levels, and to pursue efforts to limit the temperature increase to 1.5 °C (Article 2(a)). It emphasizes the building up of relevant parties’ capacities to adapt to the impacts of climate change and the fostering of climate

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<sup>4</sup> This section develops from an earlier analysis in Chan, Hung, et al (2020).

resilience (Article 2(b)). While the Agreement focuses primarily on the responsibility of the developed nations to stabilize greenhouse gas concentration, Article 1 points out that “adverse effects of climate change” include significant adverse effects on human health and Article 7 commits all parties to employ appropriate methods to minimize effects of climate change on public health.

Moreover, adaptation efforts, which are highly relevant for reducing climate change health impact, were featured prominently in the Paris Agreement. The Second Global Conference on Health and Climate jointly hosted by France (presidency of the 21<sup>st</sup> annual Conference of the Parties (COP 21) under UNFCCC) and the WHO in July 2016 proposed key adaptation actions to reduce climate change-related health risks, including investment in protecting health from risks linked to extreme weather events [A27][A28], more sustainable food production and healthier diets, more sustainable transport systems and urban planning that reduce major health risks (WHO, 2016a; See also IPCC, 2012). This formed part of the efforts of WHO to mainstream health into global discussions over both climate change and related disaster risk reduction over the years, epitomised in the formulation of the Health-EDRM Framework. In 2009, WHO developed a global Work Plan to support member states in health protection under climate change. The four objectives of the latest Work Plan on Climate Change and Health 2014-2019 updated in 2014 are advocating and raising awareness, strengthening partnerships, enhancing scientific evidence, and strengthening health system (WHO, 2015). The WHO has also strengthened its collaboration with the World Meteorological Organization (WMO) through conducting joint assessments and establishing a joint office to improve the use of climate information to protect public health (WHO, n.d.).

Strong scientific efforts have underpinned the development of the global climate change agenda. Created by the WMO and United Nations Environment Programme in 1988, the Intergovernmental Panel on Climate Change (IPCC) published an assessment report every five to six years after reviewing and assessing the most recent scientific, technical and socio-economic information relevant to the understanding of climate change and related disasters. Health impacts of climate disasters have been gaining coverage in the assessment reports since mid-1990s.

IPCC predicted that climate change would exacerbate existing health problems and increase the number of ill-health people in many countries, especially in developing countries, as well as limiting growing of food and working outdoors, all of which threaten sustainable development (Pachauri and Meyer, 2014).

In addition to the Paris Agreement, climate change is also the focus of other three international risk-resilient and sustainable development agendas: the Sendai Framework, the Agenda for Sustainable Development, and the New Urban Agenda. This indicates the intertwining effect of climate change in sustainable human development. The linkage between climate change and disaster risk is the most apparent through natural hazards exacerbated by climate change. As it is inducing and exacerbating related natural hazards, e.g. flooding, storm, and drought, climate change is mentioned 15 times and considered a major driver of disaster risk in the Sendai Framework, where countries are urged to incorporate climate change scenarios in their disaster risk assessments (Kelman, 2015, 2017).

As to the 2030 Agenda for Sustainable Development, Goal 13 commits all countries to take urgent action to combat climate change and its impacts while Goal 3 calls for the strengthening of national capacity for early warning, risk reduction and management of national and global health risks, which are closely linked to climate change-related disasters. The relevance of

climate change and health also underpins many other goals, such as Goal 2 on improving food security and nutrition (given that extreme temperatures and rainfall resulting from climate change could lead to crop failure and food shortage) and Goal 6 on water and sanitation (given that climate change-enhanced disasters like flooding and sea-level rise could result in water contamination and salination). Recognizing that unplanned urbanization could create human settlements vulnerable to the impacts of climate change and related disasters, the New Urban Agenda called for the integration of disaster risk reduction and climate change mitigation and adaptation efforts into urban development and planning process (International Organization for Migration, 2018).

Climate change is a cross-cutting global issue with significant impact on disaster risk management and wider sustainable development, which explains its prominence in the related international risk-resilient and sustainable development agendas. Since health is an essential component of climate-related disasters management, the Health-EDRM Framework provides a comprehensive tool to synergize these global efforts by means of improving health outcomes in disasters in particular. With the far-reaching impact of climate change over different aspects of human living and development, climate change adaptation now goes hand in hand with mitigation, which was traditionally the major focus of climate change policy.

Flood, storm, drought and extreme temperatures are the most significant climate-related disasters that affect the greatest number of people, cause preventable deaths and set back sustainable development. Employing the Health-EDRM Framework in the climate-disaster context is to call for a wide range of action to improve the health outcomes, in particular the building of health system and community resilience and the development of effective early warning system, which are all enshrined not only in Paris Agreement, but also the Sendai Framework, the SDGs and the New Urban Agenda in various ways.

## Conclusion

This paper has outlined the Health-EDRM Framework, which helps delineate the various aspects of Health-EDRM in an all-hazard manner. It illustrates how health is interwoven with DRR under the Sendai Framework, SDGs, NUA and Paris Agreement, which is the conceptual pillar and key contribution of the Health-EDRM Framework.

Health issues highlighted in the four key international risk-resilient and sustainable development agendas include health system resilience, safe hospitals/ health facilities, access to basic health care services, epidemics and pandemics, needs of chronic disease patients, and health data management. The analyses in this paper shown that health is a cross-cutting theme across various parts of these agendas, with resilience of health system forming the core.

The underlying elements of the Health-EDRM Framework in these agendas also laid a strong foundation for the Framework's further development. While many of the existing health frameworks and guidelines developed by the WHO could facilitate the implementation of health-related recommendations under the international risk- resilient and sustainable development agendas, the strength of the Health-EDRM Framework lies in its twin emphases on interdisciplinary, cross-sectoral, comprehensive and systematic management of health-related disaster risks and the central role of health in every stage of a disaster, from prevention, response to recovery. The systematic and comprehensive nature of this Framework has a strong potential for generating evidence to inform disaster resilience, sustainable development and urban development policies at national and global levels, taking climate change impact into account. There is a clear synergy between health concepts and the Sendai Framework, the Agenda for Sustainable Development, the New Urban Agenda, and the Paris Agreement, with health serving as a pivotal base and Health-EDRM as a conceptual framework for the implementation of the relevant sections of the agendas. In view of the leadership of WHO in the development of the WHO Guidance on Research Methods for Health and Disaster Risk Management (Kayano, et al, 2020) by the WHO Thematic Platform for Health-EDRM Research Network (Health EDRMRN) (WHO Centre for Health Development, 2018) and the knowledge hub it established in 2020, the further development of Health-EDRM Framework via research and practice should aim to facilitate the synergic implementation of the health-related parts of these international risk-resilient and sustainable development agenda and solidify the centrality of health in disaster risk reduction, sustainable development, climate actions, and urban development. [A29][A30]

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