Technical Report

Health systems in urban disasters
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<th>Abbreviation</th>
<th>Full Form</th>
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<tr>
<td>ASEAN</td>
<td>Association of Southeast Asian Nations</td>
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<tr>
<td>DMAT</td>
<td>Disaster Medical Assistance Team</td>
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<td>DRM</td>
<td>Disaster Risk Management</td>
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<td>DRR</td>
<td>Disaster Risk Reduction</td>
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<td>GEJE</td>
<td>Great East Japan Earthquake</td>
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<tr>
<td>IASC</td>
<td>Inter-Agency Standing Committee</td>
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<tr>
<td>MHPSS</td>
<td>Mental Health and Psychosocial Support</td>
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<tr>
<td>NCDs</td>
<td>Non-communicable diseases</td>
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<tr>
<td>PWDs</td>
<td>Persons with disabilities</td>
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<tr>
<td>UHEM</td>
<td>Urban health emergency management</td>
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<tr>
<td>WASH</td>
<td>Water, sanitation and hygiene</td>
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<tr>
<td>WHO</td>
<td>World Health Organization</td>
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<td>WKC</td>
<td>WHO Centre for Health and Development (Kobe Centre)</td>
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EXECUTIVE SUMMARY

Background and objectives
Emergencies and disasters affect localities, cities, countries and regions. In many instances urban areas and megacities are directly affected and are involved in response efforts. Decentralized cities have sufficient resources and have developed strong efforts and are enhancing their capacity in health care including health emergency management even way ahead of national systems. Health emergency management in urban areas is unique because of the complexity of political and socio-economic structures. It is essential that health systems in urban areas have strong capacity to prepare for and respond to emergencies and disasters. This project aims to identify health and health systems impacts of urban disasters, the efforts done and gaps in response, recovery, preparedness and disaster risk reduction (DRR). The results, discussions, generalizations and recommendations will guide health emergency managers in developing actions that are systems-oriented and contributing to sustainable development.

Methodology
Case disasters were identified through the website of the Centre for Research on the Epidemiology of Disasters (CRED), www.emdat.be, and based on the following criteria: magnitude of damages, number of individuals affected, urban economic impact and references to health and health sector concerns. Eight disasters were selected from 2008-2011 namely, Bangkok floods (2011), Haiti Earthquake (January 2010), Great East Japan Earthquake (March 2010), New Zealand Christchurch Earthquakes (2010 and 2011), Philippines Ondoy Pepeng Santi Typhoons (September to October 2009), Myanmar Cyclone Nargis (May 2008) and China Wenchuan earthquake (May 2008). An internet search was done to collect available reports of the case disasters. The search was done using Google.com, news reports, websites of international organizations, Ministries of Health and city government websites. WHO also provided materials and reports e.g. that of health systems review post Philippine floods. A review of literature was done noting of the following: individual health impacts, health system impacts, response efforts and gaps, recovery efforts and gaps, preparedness efforts and gaps and DRR programming. Mapping of response, recovery and preparedness efforts, DRR programming and health systems impacts was done using MS Excel. Based on the information
gathered, main areas in each of the six building blocks were identified. Information in each country and disaster was mapped according to these main areas.

**Results**
A total of 111 sources were used in the review. These reports described the disasters and efforts in Bangkok floods (6 sources), Haiti Earthquake (19), Great East Japan Earthquake (16), New Zealand Christchurch Earthquakes (4), Philippines Ondoy Pepeng Santi Typhoons (22), Myanmar Cyclone Nargis (17) and China Wenchuan earthquake (14). The reports came from government and NGO sources and peer-reviewed journals.

Every disaster is unique. The different hazards, health care systems, socio-political structures and economic levels provided a wide variety of examples where lessons can be derived. Each emergency requires assessment, careful planning and continuous monitoring. The paper discusses the health and health system impacts as a whole. Individual health impacts can be divided into several general categories: communicable diseases, non-communicable diseases (NCDs), mental health and psychosocial (MHPSS) and conditions due to external causes. There were also environmental and population health issues and concerns for vulnerable groups. Social determinants for health have been raised. Health system impacts were categorized using WHO’s six building blocks of the health system. The efforts of the health sector during response, recovery, preparedness and DRR are discussed. Identified challenges and needs are highlighted. The case disasters represented different large scale emergencies, different economic levels, different political systems and different regions. The study gave a general view of how a health system works through different challenges through time using analysis that considers governance, financing, workforce, services (products), logistics and information. Because disasters seldom happen in the same place it is vital to strengthen local capacities for initial response as well as national capacity to provide good technical support. Preparedness is essential and city governments can develop strong capacity for preparedness, response and recovery. This study identified gaps and challenges where action and research should focus. The issues, needs and gaps are too many. Hence, the public health expert and manager mindset would be very useful in prioritizing challenges and creating innovative solutions.
Way forward

Health emergency managers must understand the temporal aspect of emergencies and through a systems lens taking into consideration the wider political and socioeconomic environment where the emergency took place. They must have a strong public health and management capacity. A systems approach is essential in the assessment of vulnerabilities, capacities and needs, rapid assessment during the acute response phase, monitoring, documentation and evaluation. In all phases of the emergency, service delivery should focus on Primary Health Care, safe hospitals (resilient and functional health facilities) and environmental health. The recovery phase serves as an opportunity window for advocacy, planning, policy-making and change. Health information management in emergencies must be strengthened. Its key areas include but are not limited to disease surveillance and early warning system, monitoring of needs, resources and activities, patient records, coordination between entities, research on health emergency management (specific to context) and the application of geographic information systems. Health personnel in charge of health information must be trained.
1. **INTRODUCTION**

1.1 **Background**

Every year, there are events that unite people’s hearts from every walk of life in different cultures, languages and countries. In most scenarios, the immense damages and losses showing people’s helplessness following nature’s havoc result to an outpouring of support from many countries. Emergencies and disasters could be small scale or large scale affecting localities, countries and regions. In many instances urban areas and megacities are directly affected and are involved in response efforts.

The human and economic impacts of natural hazards in 2011 were massive especially where urban areas are affected. A total of 30 773 people were killed and 244.7 million were affected. Economic damage estimated at US$ 366.1 billion was highest compared to previous years.[1]

The effects of emergencies on human health and life are well known so much so that much of health sector response is focused on prevention of mortality and morbidity and health service delivery.

Emergencies heavily disrupt the health sector in terms of infrastructure damages, loss of medical equipment, human resources and increased demand for services. Investment in the health sector is expensive and when losses are great they take years to recover. Understanding the effects of hazards and emergencies on health systems is the first step to strengthen disaster risk reduction in the health sector. It is the basis for preparedness, capacity building and response and recovery measures.

The study and application of health emergency management has moved forward over the past few years. Many countries which are frequently visited by natural hazards have developed policies and infrastructure for preparedness and response. Experience suggests that many systems which have undergone emergencies have potential for sustainable growth and development in terms of governance, partnership between government and non-government entities, efficient use of resources, human resource capacity and community participation. Expertise and knowledge of countries is also growing as there are study programmes geared towards disaster risk reduction (DRR) and emergency management. There are also agencies
that collect information from many countries for monitoring disasters and learning from experiences. [2]

Certain frameworks and concerns are already known. Responders and governments are becoming familiar with the main phases of emergency namely preparedness, response and recovery. [3] DRR initiatives and policies are also being advocated and implemented. The study of and techniques in measuring health systems are also advancing as more health professionals in the field are beginning to appreciate and utilize the health systems framework. [4] The negative impacts of urbanization, its risks to health and human welfare and how it cross-links with emergencies and disasters have been described. It is also well known how social determinants – poverty, education, population growth, gender, equity, power, etc. – affect health and access to health care. [3]

The World Health Organization (WHO) continues its lead role in providing technical support to the health sector and relevant actors to ensure an efficient, effective and evidence-based health emergency management system. This includes not only Ministries of Health but also Health Departments in decentralized systems, universities that produce health workforce, other relevant ministries, international and local health NGOs and health care institutions. Globally, this is achieved through WHO’s role as the global lead in the Inter-Agency Standing Committee (IASC) cluster system in emergency response. Through the International Health Regulations (IHR), WHO specifically targets the need to respond to “public health emergencies of international concern” and calls for the strengthening of health systems by improving national core capacity and mobilizing collective global action. [5]

1.2 Rationale

Many health systems are decentralized and local health departments are enhancing their capacity for effective health governance under the local government either at the provincial or district level. Many decentralized cities have sufficient resources, have developed strong efforts and are enhancing their capacity in health care including health emergency management even way ahead of national systems. Experience has shown that disasters in urban areas have distinct effects because of the complexity of political and socio-economic structures. As a consequence, health emergency management in urban areas is also unique. [3] It is essential
that health systems in urban areas have strong capacity to prepare for and respond to emergencies and disasters. This project aims to identify health and health systems impacts of urban disasters, the efforts done and gaps in response, recovery and preparedness. It aims to show which areas are most affected and needed strengthening. Identifying these gaps will guide local and sub-national health managers in disaster risk reduction and preparedness efforts since it gives them a wide scope of needs and actions needed for health emergency management. It will also guide national level health policy makers and managers in developing policies, organizational structures, capacity building strategies and M&E tools. This will strengthen their capacity to direct resources in order to fill in local gaps.

1.3 Objectives

This literature review aims to meet the following objectives:

1. Identify the health and health system impacts of major urban disasters from 2008 to 2011;
2. Identify response and recovery efforts, gaps and challenges in the health sector;
3. Identify preparedness efforts and gaps and disaster risk reduction (DRR) programming in the health sector; and
4. Make recommendations for urban health emergency management.

1.4 Use of terms and frameworks

This review uses several frameworks and terms for analysis. First, the WHO building blocks of the health system is used in order to have a comprehensive picture of the impact of emergencies on health as well as a broad picture of emergency management efforts. [6] The building blocks are: governance, health financing, health workforce (or human resource), service delivery, essential medicines and technology and health information. Key components under each building block are identified as a way of determining common themes in terms of impact as well as management. For instance, there are 5 key areas under governance: 1) policy and integration of policies; 2) leadership and organizational structure; 3) planning, implementation and sustainability; 4) coordination, partnership and multi-sectoral approach and 5) monitoring, accountability, assessment and evaluation.
This study also takes a temporal approach in describing efforts and challenges in health emergency management. Although it is based on disaster management cycle, only three phases are used – response, recovery and preparedness. Many reports also refer to rehabilitation and reconstruction phases, which take place after recovery. Some experts argue though that particularly in the health sector, efforts for rehabilitation and reconstruction may be equivalent to preparedness. Some DRR experts have also identified the early recovery phase which links response and recovery. The delineations between these phases are actually not clear-cut, i.e. the phases are more of a theoretical approach to understand the scenario rather than actual time bounded phases. They may overlap each other and the efforts and gaps may be present in more than one phase. The length of each phase also depends on the context. Thus, for the purpose of this review and considering the value of a simplified approach, only response, recovery and preparedness phases are used.

It must also be clear that Disaster Risk Reduction (DRR) is a framework or an approach in understanding emergencies and disasters. Its main premise is that risk can be understood and properly managed, i.e. reduced in order to minimize or avoid the negative consequences. DRR is not a phase although it is best done during preparedness. This report will mention the terms disaster risk management (DRM), disaster mitigation (lessening the impact) and disaster prevention in passing but will not use them. There are other reports dedicated to the analysis of these older terms. The recent framework used is DRR and international and national policies are already based on DRR. [3]
References


2. METHODOLOGY

The methodology was divided into three main parts: 1) identification of case disasters, 2) the literature search and 3) analysis and mapping of results. Case disasters were identified disasters that could provide key information to meet the objectives of the review. Identification of case disaster was done through the website of the EMDAT. [1] Major disasters from 2008 to 2011 were identified based on the following criteria: magnitude of damages, number of individuals affected, urban economic impact and references to health and health sector concerns. The database was broad and included: 1) earthquakes, seismic activity; 2) extreme temperature; 3) flood; 4) mass movements, wet; and 5) storm.

Ten major disasters were identified namely Haiti Earthquake (January 2010), Great East Japan Earthquake (March 2010), China Qinghai Earthquake (February 2010), China floods (May 2010), Pakistan flash flood (July 2010), Philippines Ondoy Pepeng Santi Typhoons (September to October 2009), China floods (July 2009), Typhoon Morakot (China, Taiwan and the Philippines, 2009), Myanmar Cyclone Nargis (May 2008) and China Wenchuan earthquake (May 2008). Consultation with UHEM was conducted to finalize the list of case disasters. The following disasters were dropped: China floods in 2009 and 2010 and Typhoon Morakot in 2009. The case disasters must utilize learning from country health systems and impacts to health care. Typhoons and floods can be covered by the Philippine typhoons in 2009 while China’s health emergency system can be covered by the Wenchuan Earthquake. The impact of the Pakistani flash floods was more economic rather than on health and human welfare. New Zealand Christchurch Earthquakes (2010 and 2011) and Bangkok Floods (2011) were added because of their urban setting. The New Zealand experience can also give another viewpoint of how a high-income country (other than Japan) approached health emergency response.

The final case disasters included eight namely, Bangkok floods (2011), Haiti Earthquake (January 2010), Great East Japan Earthquake (March 2010), New Zealand Christchurch Earthquakes (2010 and 2011), Philippines Ondoy Pepeng Santi Typhoons (September to October 2009), Myanmar Cyclone Nargis (May 2008) and China Wenchuan earthquake (May 2008). These cases covered disasters with huge impact on human life (earthquakes, floods and typhoons). They represented countries from high, middle to low income levels. Countries with
centralized and decentralized governments were also represented. Myanmar and Haiti represented countries which were in difficult political set-ups where international interference was perhaps inevitable. The Great East Japan Earthquake provided cases of tsunami and nuclear radiation exposure. In Haiti, a cholera outbreak occurred months after the emergency while in the Philippines leptospirosis outbreak happened.

An internet search was done to collect available reports of the case disasters. The search was done using Google.com, news reports, websites of international organizations (including the Association of Southeast Asian Nations, ASEAN), Ministries of Health and city government websites. WKC also provided materials and reports e.g. that of health systems review post Philippine floods.

A review of literature was done taking note of the following: 1) individual health effects, 2) health system effects, 3) response efforts and gaps, 4) recovery efforts and gaps, 5) preparedness efforts and gaps and 6) DRR programming. Using the six building blocks of the WHO health systems, highlights and points in the literature were noted using MS Excel. The title, author, date and page numbers were also included. Triangulation of review results was done through MS Excel to come up with all descriptions, concerns and issues in health and the health sector in each disaster event. Highlights and unique experiences in each country were also identified.

The third part of the methodology was mapping of response, recovery and preparedness efforts, DRR programming and health systems effects. Mapping was done using MS Excel. Based on the information gathered, main components in each of the six building blocks were identified. Information in each country and disaster was mapped according to these main areas. The maps showed 1) health system effects, 2) gaps and challenges, 3) efforts done and 4) DRR plans and efforts. The analysis was completed through the preparation of summary points on unique experiences, city and national level governance, communication and interoperability issues, response priority issues, recovery priority issues and preparedness and DRR priority issues.

An overall map was prepared summarizing the eight selected cases. This map used the intensity of colour and number of asterisks to indicate the number of countries where the particular component was identified as an effect, gap or effort.
There are some components in the building blocks that seem to be cross-cutting between two or more blocks. Indeed, the building blocks should not be seen as separate entities but are always interlinked. Changes in one area also produce changes on other area. [2] These cross-cutting components are described below and are placed in specific building blocks to facilitate mapping.

- Logistics management is closely linked with the procurement, supply, storage and distribution of medical products, vaccines and technologies. It is also related to hospital infrastructure and logistics systems under service delivery. In health emergencies, logistics management is done with the objective of supporting services delivered and not on procurement and supply management per se. Hence, logistics management will be classified as a component of service delivery. [3]

- Risk communication is a service delivered to inform the public of health risks, ways of preventing diseases and strategies to maintain and maximize health. It also uses information from research and surveillance. In this review it will be classified under service delivery. [3]

- Disease surveillance and early warning systems (EWS). Health information includes the detection, investigation, communication and containment of events that threaten public health security. Although surveillance and EWS may be considered services that are delivered by the health sector (usually the government), because its goal is to ensure the production, analysis, dissemination and use of reliable and timely information, it will be classified under health information system and research. [3]

- Inter-agency and inter-level communication supports disease surveillance, sharing of information and the distribution of services and resources. It is also closely linked to collaboration and coalition-building for advocacy and policy. In this review, components under governance are reserved for policy and organization issues, thus inter-agency and inter-level communication will be included under health information and research. [3]

The classification of these cross-cutting components in this review is only for ease of mapping and does not intend to categorize for technical purposes, policy development and strategy and implementation.
References


3. **RESULTS AND DISCUSSION**

A total of 111 sources were used in the review. These reports described the disasters and efforts in Bangkok floods (6 sources), Haiti Earthquake (19), Great East Japan Earthquake (16), New Zealand Christchurch Earthquakes (4), Philippines Ondoy, Pepeng, Santi Typhoons (22), Myanmar Cyclone Nargis (17) and China Wenchuan earthquake (14). Most of them came from government and NGO sources. Some also came from peer-reviewed journals. Some emergencies used many sources while some had only a few. This is based on available information. New Zealand in particular only had four sources, but all these were key documents coming from the government and were focused on health sector efforts. The references are listed after every country study in chapter 4.

3.1 **General observations**

Every disaster is unique. The different hazards, health care systems, socio-political structures and economic levels provided a wide variety of examples where lessons can be derived. It implies then that inasmuch as patterns and indicators can be developed for health emergency management, each emergency must be considered a unique case that requires assessment, careful planning and continuous monitoring and evaluation. Some countries have implemented the inter-agency cluster system in response efforts and even these can be very different.

Individual health impacts can be divided into some general categories: communicable diseases, non-communicable diseases (NCDs), mental health and psychosocial (MHPSS) and conditions due to external causes. There were also environmental and population health issues and concerns for vulnerable groups. Social determinants for health have been raised. Communicable diseases were usually easily identified and mentioned in reports, and rightly so considering population movements and overcrowding. NCDs included lifestyle diseases and those needing long-term care. MHPSS concerns may be grouped under NCDs although to give emphasis to these conditions, and considering that the management approaches are different, they were categorized in a separate group. External causes included injuries, exposure to nuclear radiation, electrocution, etc. Environmental health was mainly focused on water and food safety, sanitation and hygiene and vector control.
Health systems in urban disasters

Health system impacts were categorized using WHO’s six building blocks of the health system. [1] These include governance, health financing, health workforce, service delivery, essential medicines and technology and health information system. A seventh category on cross-cutting issue was included. Key components that served as indicators for each building block were identified.

### 3.2 Effects on human health

There were common issues that affected human health. These are enumerated in Table 1.

**Communicable diseases.** Communicable diseases are probably the most commonly reported entity. Almost all documents reported communicable diseases implying that these are among the main concerns in emergencies. The reason could be historical – communicable diseases are the most advocated group of diseases in the past. Four types of communicable disease concerns were mentioned. This classification is not pathologic or biological but reflects how health managers and responders view communicable diseases.

- **Diseases that were commonly seen among disaster-affected individuals.** Examples of these are: respiratory problems, skin diseases, hospital acquired infections, diarrhoea, food poisoning, chicken pox and conjunctivitis.
- **Diseases that were likely to occur.** These are identified during risk assessment based on existing health conditions. WHO risk assessment usually classifies diseases into: 1) diseases associated with overcrowding (measles, diphtheria, pertussis, meningitis and acute respiratory infections); 2) vaccine-preventable diseases (DPT, measles, tetanus, polio and hepatitis A); 3) vector borne and zoonotic diseases (dengue, malaria, rabies, leptospirosis, lymphatic filariasis); and food- and water- borne diseases. This classification has practical use in terms of surveillance and prevention efforts.
- **Diseases that are at risk for outbreaks.** The diseases under this category may be similar to the first two. Responders make it a point to prevent outbreaks of diseases such as measles, cholera and leptospirosis because of the huge resource implications and difficulty of containment.
- **Diseases that had caused outbreaks.** Communicable disease control and management in emergencies has already been advocated and capacity has been built that the...
occurrence of outbreaks nowadays is more considered a failure in surveillance, prevention and management. The cost of an uncontrolled outbreak in the health system is great. The additional loss of lives and increase of illness produce a strong emotion in affected societies reflecting on the capacity of their leaders and the health sector. Examples of recent outbreaks are cholera that happened about 9 months after the Haiti earthquake (2010) and leptospirosis in the Philippines (2009).

During the Wenchuan earthquake in China, hospital-acquired infections of admitted patients affected by the earthquake were a concern. The type of communicable disease that occurred during an emergency depended on the type of hazard which was why risk assessment for communicable diseases should be part of preparedness, response and recovery. The potential impact of communicable diseases is presumed to be high following emergencies and disasters. There is a risk for increase in endemic diseases and outbreaks. Risk assessment is a detailed analysis to identify disease risks and priority measures to reduce the impact of communicable diseases. It includes the assessment of the risks of epidemic potential and endemic diseases, waterborne diseases, communicable diseases, vector-borne diseases and disruptions due to emergencies. Commonly adopted measures include safe water, sanitation and site planning, primary health care services, surveillance and early warning system, immunization and prevention of vector borne diseases. [2]

**Non-communicable diseases (NCDs).** All except the Philippines have identified NCDs as an important concern. NCD issues included lifestyle-related diseases (hypertension, DM, obesity and hypercholesterolemia), care for chronic patients (including patients on dialysis and post-transplant), patients needing rehabilitation and asthma. Their approach would be very different in terms of funding, human resource capacity, service delivery and infrastructure/equipment. Information on how NCDs were being managed in emergencies especially in temporary sites was still very limited. More emphasis on NCD prevention, management and control is recommended considering the existing burden of effected populations and the higher rates of elderly groups. Studies focusing on NCDs in emergency management should be done including economic studies on the added value of NCD maintenance medications (e.g. for hypertension and diabetes) as a way to prevent cardiovascular events.
**Mental Health and Psychosocial Support (MHPSS).** All countries have identified MHPSS as a relevant concern. It seems however that no government public health system has developed distinct models on managing MHPSS needs efficiently. The key strategy was to integrate MHPSS services into Primary Health Care and the existing service delivery system. Again, MHPSS required different approaches in terms of funding, human resource capacity, service delivery and infrastructure/equipment. There is paucity of evidence. There were only a few reports focusing on detailed MHPSS services provision, prevention, monitoring and evaluation.

**External causes.** Health conditions due to external causes included physical and chemical injuries. These depended largely on the type of hazard; earthquakes would have a different profile than flooding. Morbidity and mortality due to electrocution were noted during the Bangkok floods. External causes are usually the main cause of death in emergencies and many survivors may be left disabled.

**Environmental health.** Environmental health concerns were related to water and food safety, vector control, sanitation and waste management. Special concerns occurred e.g. in Japan due to risk of radiation exposure. Strengthening of environmental health efforts is crucial during preparedness and response and failure to do so would increase the risk of preventable diseases, especially communicable ones. In fact, almost all countries have identified the need to prioritize these issues.

**Vulnerable groups.** Vulnerable groups were particularly emphasized in urban health emergencies. They include women, pregnant and lactating women, elderly, foreigners/migrants, children, displaced/ moving populations and persons with disabilities (PWDs). The issue of vulnerable groups is related to human rights and development issues, gender, discrimination, security, abuse and human trafficking. Vulnerable groups commonly bring medico-legal issues. The challenge is probably for the health sector to be more conscious of the needs of vulnerable groups and their access to care. Agencies focused on advocacy and the care of vulnerable groups are beneficial and must have strong coordination with the health sector. On the other hand, the health sector must be familiar with these issues and must build a functioning referral system for holistic care. The health sector has a huge role in managing the health and psychosocial needs of these groups including the medical side of their legal concerns.
Social determinants of health. Existing poverty and poor conditions were main concerns especially in low middle- and low- income countries. The risk behaviour of affected individuals to continue living in hazard-prone areas for economic reasons was an important consideration. After all, living in the urban environment is already a high risk because of the social and health risks at hand. Educational attainment and literacy of affected populations were not particularly emphasized in any of the countries. Perhaps they were generally understood as relevant considerations during preparedness and response. Health responders must be more familiar with social determinants for health and the health sector must closely coordinate with related sectors (e.g. social welfare and education) for collaboration and proper referral. Much of health management (e.g. disease prevention and treatment) depend on determinants such as the availability of financial resources for compliance to health care and education.
## Table 1. Individual health needs

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<td>Chile Earthquake</td>
<td>Communicable diseases</td>
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- **Disaster**: Great East Japan Earthquake, Chile Earthquake
- **Communicable diseases**: Health consequences of prolonged evacuation, Respiratory problems, Outbreak risks, Influenza and influenza-like illnesses, Food and water-borne diseases, Tetanus, Legionellosis
- **NCDs and chronic illnesses**: Chronic medical conditions, Health consequences of prolonged evacuation, Dialysis patients, Hypertension, Deep vein thrombosis, Diabetes, Musculoskeletal diseases, Poor diet and lack of exercise, Obesity, Long term care, Post organ transplant, Heart disease, Asthma, Cancer, Chronic lung disease, Hypercholesterolemia
- **MHPSS**: Health and mental health consequences of prolonged evacuation, Stress, Suicide, PTSD, Insomnia, Somatization of mental and psychosocial conditions, MHPSS for children, adults and the elderly
- **External causes**: Crushing deaths, Multi-hazard impacts and approach, Deaths, Drowning and trauma, Tsunami-associated pneumonia (soujou haien), Chemical burns of responders, Short to long term effects of radiation on health, Broken bones
- **Environment al health**: Environmental health monitoring and management, Related to radioactive waste, Lack of understanding of radiation and its effects
- **Vulnerable groups**: Care for vulnerable groups: women, pregnant women, elderly, disabled persons and foreigners
- **Social determinants**: Risk tolerance of the people for the sake of continuing lives may pose risk to health
- **Others**: Mass population movements
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<tr>
<th>Disaster</th>
<th>Communicable diseases</th>
<th>NCDs and chronic illnesses</th>
<th>MHPSS</th>
<th>External causes</th>
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<th>Vulnerable groups</th>
<th>Social determinants</th>
<th>Others</th>
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<tr>
<td>Haiti earthquake</td>
<td>Communicable diseases Cholera outbreak Acute flaccid paralysis Wound infection Low vaccination coverage Tetanus infection Diseases associated with overcrowding: measles, diphtheria, pertussis, meningitis, waterborne and vector-borne diseases and acute respiratory infections Disease risks: pandemic influenza, meningococcal disease, TB, HIV/AIDS, diseases due to overcrowding Vaccine-preventable diseases (DPT, measles, tetanus, polio, hepatitis A) Vector borne and zoonotic diseases (dengue, malaria, rabies, leptospirosis, lymphatic filariasis) Skin infections</td>
<td>Post surgical care Future implications of high amputation rates Rehabilitation needs</td>
<td>Increase in mental health cases</td>
<td>Injuries, amputations Burns Quick treatment during search and rescue Crush syndrome Surgeries and complications Deaths Riots and strikes Chemical risks</td>
<td>Environmental health Sanitation concerns Search and rescue of survivors Food and water safety Waste and health-care waste management</td>
<td>Pregnant and lactating women Newborns Children Displaced populations RH issues People with disabilities</td>
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<td>Philippine typhoons</td>
<td>Leptospirosis Health impacts of prolonged floods Skin diseases Respiratory diseases Watery diarrhoea</td>
<td>Mental health needs</td>
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<td>Wenchuan earthquake</td>
<td>Hospital-acquired infections MRSA infections Fever Diarrhoeas Fever with rash Acute jaundice Encephalitis</td>
<td>Unknown impact of disasters on people with chronic diseases</td>
<td>Kidney complications</td>
<td>Mental effects Depression PTSD</td>
<td>Displaced families going through winter and freezing conditions especially in mountainous and remote areas</td>
<td>Poor existing health conditions Water borne diseases</td>
<td>Care for the elderly and their needs Infant feeding in emergencies and the use of milk formula Health of</td>
<td>Health is a perceived need next to livelihood and housing</td>
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<td>Disaster</td>
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<td>New Zealand Earthquake</td>
<td>Risk of gastroenteritis outbreak chronic patients on dialysis MHPSS impacts and needs for staff and survivors Earthquake anxiety Injuries</td>
<td>Sanitation</td>
<td>Elderly Persons with disabilities Vulnerable groups Wellness prioritized</td>
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<td>Thailand floods</td>
<td>Risk of outbreak Food poisoning Diarrhoea Leptospirosis Chicken pox Conjunctivitis Measles Water-borne diseases Malaria Vector borne diseases Cholera Chronic diseases Nutrition Drowning Electrocaution Chemical intoxication Wounds Sanitation and hygiene Environmental health Waste management Water &amp; food safety Reproductive health services Breastfeeding</td>
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<td>Cyclone Nargis</td>
<td>Common illnesses Communicable disease risks in overcrowded shelters Water-borne diseases Dengue and malaria risks Water-related illness a year after the storm Acute malnutrition Chronic health issues Mental health problems Dead and missing injuries Hygiene and sanitation Safe water Waste management Children Older people PWD Pregnant and lactating women</td>
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3.3 Mapping of health system effects, gaps and efforts

Map 1 summarizes the health system effects, gaps and efforts from the eight country case studies. The darker colours and higher number of asterisks indicate more reports. Some components are well known effects and gaps. Components in dark or medium green are commonly done efforts. Health care financing and medicines and technology were the least known building blocks in terms of the effects and gaps; efforts on these were the least documented or systematized. Items that remained white are probably non-problematic, undocumented or underreported in the references selected.

3.4 Health system effects

Most reports and analysis on health emergencies focused on effects on individual health, service delivery, human resource and logistics. Concerns on governance and health information system (except disease surveillance) were only briefly mentioned. This section discusses the effects of emergencies on the health system. Analysis using the health system framework is based on the viewpoint that health emergency management must meet the goals of the health system which are efficiency, quality and safety, financial risk protection, equity and universal coverage.

Experience suggests that settings with weak governance have weak service delivery systems during health emergencies. Careful health systems evaluations are needed to support this and provide recommendations on systems strengthening even when a city or locality has already suffered an emergency. The best approach to evaluate the efforts of these systems is to identify the objectives for health emergency response (inputs, outputs, outcomes and impacts) and determine whether these have been met. Negative effects of the disaster on health governance have strong implications on service delivery especially in terms of efficiency, effectiveness, quality and safety. The cases of Haiti and Myanmar were examples of scenarios where international intervention was needed. The Philippines was unique in its decentralized governance system where local government units were very powerful. In health governance, policy, leadership, organizational structure and system, planning and implementation and coordination were key components that were affected by the disaster.

Health care financing systems were disrupted by disasters although further analysis will need more comprehensive data. In Haiti, free services and medicines/supplies had a significant impact on the largely privatized health care. [3] Most health financing concerns mentioned
budgetary support for emergency management and financial risk protection for populations affected. There was no mention of the efficiency of health financing and paying (purchasing) providers although these were most likely affected due to disrupted administrative structures and mechanisms.
Map 1. Health systems challenges and efforts in recent disasters

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<th>Meds &amp; technology</th>
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**System effects**

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**Health service delivery**

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<td>Health system effects</td>
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<td>Gaps in response recovery and preparedness</td>
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<td>Response, recovery and preparedness efforts</td>
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<td>DRR plans and efforts</td>
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Emergencies affected health human resources through risks on their health and lives. Their families and properties were affected as well as their transportation to posts and work environments. Increasing service demands adding to reduction in the number of workforce led to multi-tasking or simply just inadequacy of human resource. In summary, the effects of emergencies on the health workforce were on their quantity, allocation/distribution, capacity and welfare/safety.

Service delivery did not just refer to services provided to patients but included services provided by the entire health sector to individuals as well as to the population as a whole. It did not only include medical/clinical services but included assessment, monitoring and management. The concern on strong and resilient health infrastructure with capable staff (safe hospitals) was included in service delivery. Almost all emergencies indicated damages and destruction of health, water, sanitation and waste facilities. The impact on primary care and the possible surge of patients was also a concern in service delivery. Concerns on equity, availability, access, quality and safety to health services have been put forward.

In essential medicines and health technology, logistics management system, essential medicines and medical supplies were key areas of concern. Preparedness and logistics mechanisms adapted to emergencies were important areas that should be strengthened. On the other hand, there was no mention of the impact of disasters on laboratories and blood banks although these were also important areas essential to service delivery.

Concerns on the effects of emergencies on health information were always mentioned. These included health information systems, disease surveillance, coordination between government levels and patient records. One challenge of health information systems is that it is technology dependent and takes time to develop. Situations where the information system was disrupted and where external agencies came in with their information systems have been very challenging.

Considering most health system components affected, the best preparedness measures should include the following:

- Budgetary support for health emergency response taking into consideration provider-payments, essential medicines and logistics;
- Financial safety-nets for the poor and vulnerable built at the city and national levels;
- Reserve human resource with training for response and capacity for multi-tasking;
- Efficient management system for human resource and service delivery;
• Resilient health infrastructure with logistics and functional staff;
• Health services at the primary care level to enhance prevention, triage and referral;
• Surge capacity of health facilities;
• Essential medicines supply;
• Logistics management system;
• Disease surveillance and early warning system;
• Patient records and health information system; and
• Coordination among responding agencies.

3.5 Health sector response efforts and gaps

The response phase begins in the aftermath of the disaster. The first responders are usually the people in the local vicinity many of whom were affected. Activities are centred on assessment, life-saving and provision of basic needs. Major societal changes can also occur such as when population movements or when major structural damages occur. The response phase can last up to a few months.

Leadership, organizational system and coordination were among the main efforts in health emergency governance. Experience suggests that countries with strong governance for health emergencies have relatively more efficient response efforts. The link between governance and efficiency in service delivery needs to be analyzed extensively. Leadership, organizational system, coordination, planning and implementation of plans required more strengthening. Policy development and monitoring of governance were also needed. Governance appeared to be more extensive in Japan, the Philippines and New Zealand. More effort is needed to enhance monitoring of governance, policy and implementation.

Health financing is the probably the least analyzed building block in health emergency management. It can be assumed that resource mobilization was always done in any setting even though this is not necessarily mentioned in documents. There was limited information on the mechanism of how governments and international organizations mobilize resources for health emergencies, except for the fact that international organizations also prepared project proposals and made emergency appeals. A few countries were concerned with financial risk protection through health insurance mechanisms or by waiving of out-of-pocket payments. None of the reports mentioned the use of emergency (pre-allocated) budgets although this was probably understood. There were no reports that included costing of damages and economic evaluation of response efforts. Reports on the Haiti earthquake and the Philippine floods
explicitly mentioned the need for such assessments. Other financing efforts and concerns were related to purchasing of providers and efficiency.

Many sources provided information on the type of health workforce deployed and that they were allocated/ distributed according to needs. Enhancing the capacity of the health workforce even during the response phase has also been done. Most capacity building activities were trainings and orientations specific to certain areas e.g. WASH, nutrition and certain diseases. Deployment of reserve workforce has been noted in Japan, the Philippines and Thailand although it can be assumed that there were also existing mechanisms in other countries. Japan, in particular has a strong system of training reserve Disaster Management Assistance Teams (DMATs). [4, 5] A few of the health systems have identified the need to ensure the welfare, safety and security of the workforce. Type and distribution, capacity building and welfare and security were the same components in human resources that required strengthening.

Service delivery during health emergency response had the most extensive information and also had the most component areas of concern. Many of the services delivered targeted populations affected as a whole (e.g. health promotion, risk communication, environmental sanitation, etc.) while some services are directly for individual patients (e.g. primary care, acute care, secondary level care). Cross-cutting issues such as equity, access, privacy, human rights and participation were identified as main concerns in most emergencies. Assessment of health needs and resources has been done in most settings; it is one of the main services that should be done in the acute response phase. Most rapid assessments identified health and service delivery needs however systemic issues such as health governance (e.g. coordination) and health information system assessment were not covered. As a way forward, assessment and monitoring must also take a health systems approach. Many countries have identified the need to strengthen mass casualty management (MCM), surge capacity, monitoring and management and quality of care. Cross-cutting issues e.g. access, equity, participation, human rights, safety and privacy were also increasingly becoming important. There seems to be a huge gap in management, monitoring and evaluating service delivery including insurance of quality and safety. Only the Philippines identified the need for development of clinical guidelines and procedural protocols.

Provision essential medicines and medical supplies were done in most scenarios. Japan, Haiti, the Philippines and Myanmar have identified the need for donation protocols. Functioning pharmacies and laboratories, logistics management and rational drug use were not well emphasized.
Most countries have done efforts on disease surveillance, information management and communication between agencies and levels. Secure and back up records were identified as a gaps. There was also a need to strengthen information systems especially in terms of monitoring needs, resources and activities and a systematic way of disseminating/ sharing them. The application of geographic information systems for assessment and monitoring of health and health system concerns have not been described in these case disasters. These are areas that can further be explored.

3.6 Health sector recovery efforts and gaps

The recovery phase may begin weeks after the event. People are already starting to go back to their pre-emergency way of life while the memory of the event is still too near. Many systems are still returning to normal operations. Humanitarian work is still present although becoming less highlighted, while local government and institutions are regaining their roles. The recovery phase can last for more than a year and should proceed towards development.

Information on health sector recovery efforts and gaps was less compared to that of response. In fact, there was more information on preparedness than recovery. This is probably because most of the efforts in the health sector were concentrated on the response phase while preparedness efforts are regularly advocated for and are being enhanced. This leaves health sector recovery as a gap or a phase that is not understood completely.

Most recovery efforts and concerns were focused on governance particularly policy, long term planning, implementation and coordination. Most identified needs included long-term planning, implementation, sustainability and coordination. There must also be a careful look at policy, leadership and organizational structure. The recovery phase should serve as a window for planning and policy-making. This is because the experience is still fresh and the motivation to enhance preparedness is strong.

Information on health care financing during recovery was very limited. It suggests that financing is a crucial gap during the recovery phase, i.e. the donation drive of the response phase is over while most governments/ agencies would focus on funding preparedness. The recovery phase is perhaps the best phase to conduct studies/ evaluations on health care financing for emergencies. This is because the impact of economic risks due to the emergency is still clear among affected individuals and organizations. Studies may include health care-induced poverty, out-of-pocket payments, willingness to pay, health financing mechanisms and flows, efficiency
of health insurance mechanisms, institutional mobilization of funds and economic evaluation of health emergency efforts.

Capacity building, types and management for the health workforce were priorities during recovery. Welfare of workers was also an identified need. As in financing, recovery could also be a less resourced phase in terms of human resource because the initial responders and volunteers have already left. The recovery phase seems to be the best phase to ensure that capacity building of the local workforce is done. During this phase, non-government agencies may still be present and have the capacity to conduct trainings while local health workers are still at a “higher energy level”, i.e. they have not necessarily gone back to their routine.

Service delivery efforts and concerns were focused on health facility reconstruction, public health and disease prevention, health promotion and education, MHPSS services, WASH (water, sanitation and hygiene) infrastructure, primary care and community services, maternal care and environmental health. As recommended in several countries, strengthening of Primary Health Care is one key strategy for recovery and preparedness. Cross-cutting issues particularly sustainability and participation are also relevant.

Logistics management remains an important action during recovery. It should be explored further why there was less information on medicines and supplies and why there were no mentioned needs/gaps identified during the recovery phase. One possible explanation is that budgeted/donated resources were already being used and there was less donation drive.

Disease surveillance and health information system were commonly done and advocated during recovery perhaps as a part of systems being improved. Conduct of research on health emergency management and the impact of emergencies on human health and welfare are recommended during the recovery phase.

3.7 Health sector preparedness and DRR programming

During preparedness, the city does all measures to assess and reduce risk (DRR) and enhances its capacity for response. In the case studies, many reports described the preparedness measures done in Japan, Chile, the Philippines, New Zealand and Thailand. New Zealand’s experience was unique because it had two earthquakes (2010 and 2011); thus the benefits of preparedness and DRR measures done after the first quake was immediately realized.
Preparedness and DRR efforts and challenges emphasized governance particularly policy development, leadership and organizational structure, long-term planning, implementation and partnership and multi-sectoral approaches. It appears that what the health system can achieve in health emergency management depended on planning and policy during the preparedness phase. The theoretical difference between preparedness efforts and DRR programming must be clear to decision makers and health emergency managers. Preparedness efforts refer to plans made, policies developed and activities done to prepare for health emergencies. They may include mitigation and disaster prevention measures. DRR programming is based on the framework that disaster risks (in terms of hazard, vulnerability and capacity) can be reduced. Thus it requires assessment of hazards, vulnerabilities, capacities and resources, planning and implementation of strategies. DRR efforts are best done during the preparedness phase.

There was still a huge gap in health financing efforts and mechanisms to achieve financial risk reduction have been identified as a need. Each country has its distinct health care financing system and thus development of financing strategies for preparedness needs to be context specific. The Philippines has budget for emergencies (calamity fund). [6] This resource may also be available in other countries especially middle- and high- income ones. It is recommended that budget should be allocated for each of the phases from preparedness to response to recovery.

Capacity building and management of human resource were key actions during preparedness. Training of reserve workforce was also being done. Capacity building was identified as a need and was recommended as part of DRR. Training was usually based on the roles of training participants. Most health responders are service delivery providers and thus must be familiar with principles related to rapid assessment, clinical services, population-based services and cross-cutting issues. There is however a smaller subgroup of health workforce that should receive specialized training on logistics management, rational drug use, risk communication, monitoring of services, health information systems (disease surveillance, monitoring of needs and activities and communication between entities) and like areas. Health emergency decision makers and managers must be familiar with systems issues particularly governance, financing, health human resource and certain areas in service delivery (safe hospitals, monitoring, quality, etc.) and health information systems.

Preparedness efforts in service delivery were focused on vulnerability and capacity assessments, health facilities, emergency and acute care, primary care and community strengthening, disease surveillance, health promotion and education, community participation
Health systems in urban disasters

and advocacy. The conduct of vulnerability and capacity assessments means that the DRR framework was used. DRR efforts and recommendations have focused on assessments, health facilities, primary care, strengthening of WASH facilities, community participation and advocacy. Identified challenges in preparedness were focused on primary health care, community level services, health education, advocacy, community participation and cross cutting issues and strengthening of WASH systems.

In general, experience has shown that preparedness and DRR have focused on the following: vulnerability and capacity assessment, health facilities, emergency and acute care, primary health care, community level services, disease surveillance, WASH, health education and promotion, advocacy for emergency management and cross-cutting issues (including community participation). Management and monitoring of services, communicable disease control, environmental health, child health, referral system, secondary care and disease prevention have also been done. In the area of essential medicines and health technology, preparedness efforts emphasised logistics management and stockpiling, including that of essential medicines and medical supplies. These are basic packages that should be included in preparedness and DRR.

Japan and the Philippines have reference to health information systems as key preparedness efforts. [5, 7] What was unclear in the literature is what health information system in emergencies comprised since its mention is usually brief. This review has outlined the critical components in health information management in emergencies. These include but are not limited to disease surveillance and early warning system; monitoring of needs, resources and activities; patient records, coordination between entities and levels; research on health emergency management (specific to context); and the application of geographic information systems. The main question is whether or not health information systems being prepared for emergencies include these components.
References


4. COUNTRY STUDIES

4.1 Cyclone Nargis (2008)

General information
Cyclone Nargis was the worst natural disaster in the history of Myanmar. The cyclone made landfall on 2 May 2008 and inundated huge areas killing 138,336 people. Affected individuals reached 2,420,000. Total damages were estimated at US$ 40 billion. [1] Relief efforts were slowed due to political reasons. There was extensive information available although these were mostly from international NGOs and UN agencies including the Association of Southeast Asian Nations (ASEAN). [2, 3]

Unique experiences
For the affected population, access to care was a challenge because of out-of-pocket payments. The need to enhance care for the chronically ill and the elderly was also raised.

Governance and their impact on health service delivery
Coordination for emergency response was led by the ASEAN in close coordination with the government. There was no clear information on governance and coordination between the city and the national level. On the other hand, reports indicate close coordination between UN agencies and NGOs with the government. Coordination concentrated at the national level while field level coordination remained weak. There was no information on coordination and interoperability between the national government and the city of Yangon. Since most reports came from non-government sources, inter-agency coordination was adequately described. [4, 5, 6]

Priority issues
Response priorities were focused on: health information system, building of local capacity in health emergency management and strengthening of field level coordination. A recovery and preparedness plan was prepared and the main concern was effective implementation. The country needed to develop an Action Plan on DRR and to mainstream DRR on all sectors. Preparedness priorities included: preparedness plans and activities at the national level, building of human resource capacity at the national level and disaster-resilient infrastructure (safe health facilities). [2, 3, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18]
References


## Map 2. Health systems challenges and efforts in Cyclone Nargis, Myanmar

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### System effects

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### Response

- * Documented systems effects
- Documented efforts
- * Documented challenges and gaps
- D Disaster risk reduction recommendations

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### Preparedness and DRR

- D Disaster risk reduction recommendations

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**Legend**

- D Disaster risk reduction recommendations
4.2 Wenchuan Earthquake (2008)

General information
On 12 May 2008, a magnitude 7.9 earthquake hit Wenchuan County in Sichuan Province, China. It affected 45,976,596 people killing 87,476 with damages estimated at US$ 85 billion. [1] There was extensive information available on the Wenchuan earthquake although most were from non-government sources.

Unique experiences
One area of concern after the quake was that of displaced families going through winter and freezing conditions especially in mountainous and remote areas. Responding agencies also raised the concern on the care for chronic illnesses and the elderly. [2]

Governance and their impact on health service delivery
The Chinese health system was decentralized and the Emergency Management Office (EMO) was organized at the provincial and city levels. There was a national policy on emergency response but local units also needed to develop their own policies. Information on coordination and interoperability between levels and entities was very limited. [3, 4]

Priority issues
Response priorities included strengthening of coordination in a decentralized system, development of health emergency financing system, quality in service delivery and monitoring of health-related media communications. In particular, rational drug use and prevention of hospital-acquired infections were raised as important needs. [5, 6, 7] There were several effects on the health system and gaps in the response phase where no documented efforts were done were identified (see Map 3). As part of recovery, construction standards for health facilities should be developed. [8] A call for more research on health and emergencies (particularly earthquakes) was raised. [9] Mechanisms to ensure preparedness planning must be enhanced. There were recommendations to establish disaster preparedness centres. [10] Capacity building was essential at the government level and in communities and should be integrated in continuing education of the health workforce. [11] DRR must be mainstreamed into national and local health policy. [12, 13, 14, 15]
References


## Map 3. Health systems challenges and efforts in the Wenchuan Earthquake

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### System effects
- **Documented systems effects**
- **Documented efforts**
- **Documented challenges and gaps**
- **Disaster risk reduction recommendations**

### Response

### Recovery

### Preparedness and DRR

### Health service delivery

### Legend

- Documented systems effects
- Documented efforts
- Documented challenges and gaps
- Disaster risk reduction recommendations
4.3 The Philippines Typhoons (2009)

General information
Three typhoons ravaged Luzon island, northern part of the Philippines, in September and October 2009. Typhoon Ketsana (local name Ondoy) hit Metropolitan Manila, the nation’s capital, on 27 September 2009 causing floods and landslides. The storm and succeeding floods affected 4,901,763 individuals killing 501. Damages were estimated at US$ 237.5 million. Within one month, Typhoons Parma (local name Pepeng, 10 October) and Mirinae (local name Santi, 28 October), made their landfall in nearby regions worsening the devastation already caused by the first storm. The succeeding storms affected an additional 5,280,666 individuals killing 551 more people with additional damages estimated at US$ 600.6 million. [1] Extensive information was available mainly from non-government sources. WHO provided studies that gave more information on the health care system in emergencies. Documentation of efforts of local (city) health offices were available but these came from different NGO/WHO sources.

Unique experience
The three typhoons were most remembered for their magnitude in affecting several cities and provinces including the National Capital Region where most national offices were located. The risk of duplication of efforts and parallel governing systems was high considering that both national offices and decentralized city governments implemented their respective response efforts. The scope of each level and offices had to be well defined. Another memorable event in this disaster was the leptospirosis outbreak that killed more than a hundred individuals and was considered one of the largest in the world. [2, 3]

Governance and their impact on health service delivery
The metropolitan area that was affected was composed of more than 10 decentralized cities. During the emergency, national and local governments and hospitals activated their emergency response plans and organized their incident command systems. There was strong national and local government lead response although most information available was from the national government perspective. The delineation of national and local government roles was well documented. The Philippines implemented a national version of the global cluster system where different sectors/needs were divided into focus areas (clusters) led by the government. [2] Strong coordination was achieved between national and local governments (different levels), different sectors and government and non-government through the clusters. On the other hand, there were challenges in integrating national and international response coordinating mechanisms. Clusters were also organized at the local level. Some local governments had
strong capacity in preparedness and response because of strong political will and prior planning. The local health sector is a member of the local disaster coordinating body (now disaster risk reduction and management body). Emergency response has been rolled down to the community level through the barangay (village) health emergency response teams. Hospitals had their own network and referral systems. [4, 5, 6] The Philippine experience can give good lessons on how decentralized systems can work.

**Response priorities**

Coordination was challenging within a complex system that was decentralized and with a strong private health sector. Coordination had to be built in different levels and lines – between national and local, between national and international, inter-sectoral and between public and non-government agencies. Coordination at the field level was also a different challenge that should be strengthened. The purpose of the clusters must be clear to partners and its efficiency must be enhanced. Perhaps as a result of decentralization with strong local government units, response efforts have been politicized with possible risks to inefficiency and inadequate access to essential health care and medicines. Some cities had local level contingency and response plans; development and review of these plans must be prioritized. Plans must clearly define the policy shift to emergency mode. [5] The health information system must be strengthened and this includes disease surveillance, assessment and monitoring of needs, sharing of information and documentation. Other response priorities included strengthening of response capacity of the health workforce and regulation of donation practices. Economic evaluation of health service delivery strategies was also needed. Among case countries studied, the Philippines has not yet strongly included financial risk protection in health emergencies in its agenda. [3, 7, 8] Challenges in equity and access to care were among the identified systemic and response gaps; they have not been responded to due to lack of disaggregated information. [9] In general, documentation shows that most identified gaps and challenges have been responded to (see Map 4). [6, 10, 11, 12, 13, 14]

**Recovery, preparedness and DRR priorities**

There was a gap in health recovery planning in the health sector. Map 4 shows the paucity of data in the recovery phase compared to response and preparedness. Identified gaps in the recovery phase included: resource mobilization, guidelines and protocols, provision of water sanitation and hygiene (WASH) and environmental health. Capacity building for health emergency management of the health workforce is needed up to grassroots level. Capacity building should have funding support. [15] There are existing mechanisms to ensure preparedness planning and DRR in the health sector at the local level. These include disaster
risk reduction councils and hospital licensing and accreditation protocols. Hazard mapping of 
vulnerable areas is essential. Preparedness is also needed at the grassroots level and 
budgetary allocation is required. Preparedness must also include mechanisms to ensure 
financial risk protection at the national and local levels. Risk communication also needs 
strengthening. [12, 16, 17, 18, 19, 20]
References


### Map 4. Health systems challenges and efforts in the Philippine Floods

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**Legend**
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- Documented efforts
- Documented challenges and gaps
- Disaster risk reduction
- Disaster risk reduction recommendations

**World Health Organization**

**Documented systems effects**

**Documented efforts**

**Documented challenges and gaps**

**Disaster risk reduction recommendations**
4.4 Haiti Earthquake (2010)

General information
A magnitude-7.0 earthquake hit Haiti on 12 January 2010. Its epicentre was near the town of Leogane, west of Port-au-Prince. The quake affected 3 700 000 people killing 222 570 and rendered 1 million homeless. Estimated damage reached US$ 8 billion. [1] Notable government buildings were damaged or destroyed including the Presidential Palace and the Ministre de Sante Publique et Population (MSPP). Extensive information was available although almost all came from international NGOs and UN agencies.

Unique experiences
The Haiti earthquake was a case of a disaster occurring in a less-resourced society, difficult recent history and weak government. The disaster brought overwhelming international response which, although inevitable because local capacity was lacking, brought even more challenges. The magnitude of the quake was huge while local infrastructure was weak causing damages and destruction that killed people and left many injured. There were high numbers of surgeries and amputations with implications for long-term care and rehabilitation. [2, 3] About 9 months after the earthquake, a cholera outbreak occurred showing that despite international aid, systems in disease surveillance and prevention were still inadequate. [4, 5, 6] The reports mentioned several health information systems that were used by international agencies in partnership with the government. There was an early warning system and surveillance through SMS. The health cluster used the Displacement Tracking Matrix (DTM) to monitor trends and gaps with regard to health and nutrition coverage in settlement sites. There was also a Health Capacity Inventory and Health Facility Master List to monitor needs and assist deployment; it includes a database of all health facilities. [7, 8] Another was the MSPP-PAHO/WHO Alert and Response system that gathered information from NGOs in the field and can monitor diseases and health needs. [5] How these information systems were integrated with each other and with government existing systems and how they were implemented will require further study.

Governance and their impact on health service delivery
The disaster overwhelmed the national healthcare system. Health facilities were damaged and destroyed including part of the Ministry of Health and Population (MSPP). UN and other international agencies had a huge role in response and recovery and there were efforts to coordinate with the government although it is unclear if this coordination proved successful and whether or not it strengthened governance. [2, 9] Most information provided is at the national level and no city level information is available. All references only mentioned the national
government. Haiti is a small country in terms of geographic area, thus administration must be centralized and/or the city government must have been severely weakened by the disaster.

**Response priorities**

In terms of governance, the country had weak preparedness measures. There were no response plans and protocols. The disaster brought a massive influx of NGOs making coordination more challenging especially with local health providers. [10] Voluntarism was challenging because most volunteers cannot speak French and Creole and did not understand the system. [11, 12] This necessitated capacity building of the local health workforce. International aid brought in free services and medicines which had economic and system implications in a highly privatized low-income economy. This was a main issue and WHO had to prepare a position paper regarding private services. [2] On the demand side, people have limited access to health care due to lack of finances. In terms of services delivery, essential water, sanitation and hygiene systems were inadequate contributing to the cholera outbreak. [13] Disease prevention and surveillance were key areas that required strengthening. [14] There was also a need to enhance access, equity and coverage of health services. In terms of health technology, inappropriate donations of medicines were problematic but regulation was probably difficult because of inadequate government capacity. The system to manage the dead and missing (MDM) was also inadequate. [3] Logistics management needed further strengthening although integrating logistics systems of international agencies and the government was possibly challenging. There was a need to strengthen and harmonize health information system and disease surveillance; different existing systems were used. Map 5 on health systems challenges and efforts in the Haiti earthquake points out some identified needs that were not responded to by response and recovery efforts. These however were limited to documented efforts. [2, 15, 16]

**Recovery, preparedness and DRR priorities**

The following areas were identified as the way forward in recovery: 1) strengthening of health system and the government-led coordination system, 2) standardization and enhancement of the quality of health service delivery, 3) integration of recovery in the National Strategic Health Plan, 4) local health HR capacity building, 5) support and services to persons with disabilities (PWDs), 6) reduction of financial barriers to care, 7) revision of cholera guidelines and 8) sustainability of MHPSS and other health services. Ensuring financial risk protection by reducing financial barriers was an identified preparedness measure and is a need for sustainable development. DRR should be mainstreamed in health sector policies and efforts. [11, 17, 18, 19, 20, 21]
References


headquarters and Communicable Diseases Surveillance and Response, Pan American Health Organization.


### Map 5. Health systems challenges and efforts in the Haiti Earthquake

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<th>Logistics management</th>
<th>Prevention of disease and mortality</th>
<th>Emergency response, search and rescue</th>
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### Legend
- **Documented systems effects**
- **Documented efforts**
- * Documented challenges and gaps
- **D** Disaster risk reduction recommendations

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World Health Organization
4.5 Chile Earthquake (2010)

**General information**
An earthquake hit Chile on 27 February 2010. This 8.8-magnitude quake had its epicentre off the coast of central Chile. It was the sixth largest earthquake ever to be recorded by a seismograph. The quake affected 2,671,556 killing 562 with an estimated damage of US$ 30 billion. [1] It also triggered a tsunami which devastated several coastal towns in south-central Chile. Most information came from government sources, i.e. the Ministry of Health. [2, 3, 4, 5, 6, 7]

**Unique experiences**
Latin American countries have a strong advocacy for safe hospitals initiative since the 1990s. Chilean hospitals had vulnerability assessment and preparedness plans which are integrated with other plans. [6] They also conduct emergency drills regularly. This must have an effect on how they responded to the emergency. Like most other countries in this review, Chile also emphasized the need to strengthen care for the chronically ill and the elderly. [8]

**Governance and its impact on health service delivery**
Chile had a national plan for emergencies and disasters although information on how it was implemented is limited. [8] There was coordination between government and non-government entities and network and cooperation between hospitals. Santiago Metropolitan Region also had an emergency and disaster plan although the details on the operation and effectiveness of implementation at the city level were unavailable. [9] There was no information on the relationship of the city with the national level. There was also no information on coordination and interoperability between government levels and entities. [10, 11, 12]

**Priority issues**
Key response issues were the need for back up information systems and re-establishment of primary care. For recovery, there was a need to strengthen coordination mechanisms between government and non-government entities. [13] Some sources documented the need for field hospitals in some areas although its cost-effectiveness should be considered. [14] There were existing mechanisms in preparedness planning. Community level preparedness must be enhanced. There was a need to strengthen DRR policy and analysis from national to local levels. [8, 10, 11, 12] There seems to be a number of health system effects that were not responded to in response and recovery. However, this paucity could be due to the limitation of documentation and dissemination of information on gaps, efforts and activities (see Map 6 –
Health systems challenges and efforts in the Chile Earthquake). Health managers and decision makers need to have a strong health systems perspective in order to identify these needs and challenges and implement systemic actions.

References


### Map 6. Health systems challenges and efforts in the Chile Earthquake

#### Governance
- Policy and integration of policies
- Leadership and organization
- Planning, implementation, sustainability
- Coordination, partnership, multi-sector
- Management of accountability, transparency
- Corruption
- Conflict of interest
- Competing funds
- Cost assessment, economic evaluation
- Efficiency
- Paleo-investigation
- Resistance
- Risk
- Benefit
- Social acceptability
- Evaluation of impact
- Research
- Management, allocation, detection
- Research and evaluation of conclusion
- Safety, security, welfare
- Medical readiness
- Churches and local/foreign countries
- Natural disasters
- Science
- Emergency fund
- Cost assessment and economic evaluation
- Efficiency
- Purchasing providers
- Resource mobilization, foreign funding
- Economic impacts of aid
- Financial risk protection
- Management, allocation, deployment
- Capacity
- Reserve and voluntary force
- Safety, security, welfare
- Essential medicines
- Medical supplies including antivirals
- Donations and related policies
- Pharmacies
- Laboratories and blood bank facilities
- Rational drug use
- Surveillance and epidemiologic data
- Information systems to monitor capacities and gaps
- Patient records
- Geographic information systems
- Communication between agencies and levels
- Research

#### Health care financing

#### Workforce

#### Meds and technology

#### Health information

<table>
<thead>
<tr>
<th>System effects</th>
<th>Preparedness and DRR</th>
<th>Response</th>
<th>Recovery</th>
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<td>Disaster risk reduction</td>
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</table>

#### Health service delivery

- Assessment of risk, vulnerability, capacity
- Logistics management
- Prevention of diseases and mortality
- Acute and emergency care
- Primary care, clinics, community and home-based care
- Secondary care
- Specialized care
- Field hospitals, hospital ships
- Rehabilitation care including chronic
- Guidelines and protocols
- Triage, referral, and transportation
- Health in evacuation camps
- Water, sanitation, and hygiene (WASH)
- Nutrition and food
- Management of the dead and missing (MDM)
- Risk communication, health education, promotion, and advocacy
- Mental health, psychosocial support (MHPSS)
- Child health
- Maternal health
- Reproductive health
- Care for the elderly
- Care for persons with disabilities (PWD)
- Mobile populations, foreigners, minorities
- Environmental health and other external causes of disease
- Communicable diseases
- Non-communicable diseases and lifestyle-related risks
- Mass casualty, surge capacity
- Management, planning, implementation, monitoring, and evaluation
- Quality of services
- Equity, access, safety, privacy, human rights, sustainability, cross-cutting

#### Legend
- Documented systems effects
- Documented efforts
- Documented challenges and gaps
- Disaster risk reduction recommendations
4.6 New Zealand Earthquake (2010 and 2011)

General information
Two earthquakes hit Christchurch, New Zealand’s second largest city, occurred in 2010 and 2011. The first quake, measuring 7.1 magnitude, occurred on 4 September 2010. It affected 300,002 people. Damages were estimated at US$ 6.500 billion. The second quake of magnitude 6.3, hit on 22 February 2011 with its epicentre at Lyttelton 10km south-east of Christchurch. Having affected 301,500 individuals and killed 181, it was the 2nd deadliest natural disaster recorded in New Zealand. Damages were estimated at US$ 15 billion. [1] Extensive information was available and mainly from government sources particularly the City of Christchurch and Canterbury District.

Unique experiences
New Zealand health offices had very comprehensive plans for emergencies. The earthquake in 2010 improved response in 2011 earthquakes. They have developed comprehensive information and surveillance systems. Surveillance had several sources including telephone surveys, pharmacies and laboratories. Availability of services for chronic patients (e.g. patients on dialysis) and the elderly was raised. The health system was also concerned with equity and cultural diversity of affected individuals. [2, 3]

Governance and its impact on health service delivery
The district health board, the main organization that manages health emergency, was under the national government and only coordinated with the local government. The health sector emergency operations centre (EOC) at the district level coordinated with EOCs in other sectors. The district-level EOC had sub-committees, one of which was officers/ staff in charge of coordination with other agencies and information monitoring of updates and needs. [4]

Priority issues
Strengthening of primary care (community level) service delivery and enhancement of patient registration, records and tracking system were identified during response. Recovery plans must be mainstreamed into existing plans. Strengthening of primary care (community level) service delivery was also important for recovery. Strong preparedness and disaster mitigation efforts were needed even at the local level. [2, 3, 4, 5]
References


Map 7. Health systems challenges and efforts in the New Zealand Earthquakes

<table>
<thead>
<tr>
<th>Governance</th>
<th>Health care financing</th>
<th>Workforce</th>
<th>Meds &amp; technology</th>
<th>Health information</th>
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**System effects**

**Response**

**Recovery**

**Preparedness and DRR**

**Health service delivery**

**Legend**

- Documented systems effects
- Documented efforts
- Documented challenges and gaps

D Disaster risk reduction recommendations
4.7 The Great East Japan Earthquake (2011)

General information
On 11 March 2011, a 9.0 magnitude quake hit Japan off the Pacific coast of Tohoku. It triggered
a tsunami up to 40.5 metres high that hit Miyako and Iwate Prefecture. The earthquake also
caused level 7 meltdown of three nuclear reactors in the Fukushima Daiichi Nuclear Power
Plant. [1] The multiple disasters affected 368 820 people killing 19 846. Estimated damage was
US$ 210 billion. [2] It was the most powerful earthquake ever to have it Japan and one of the 5
most powerful in the world. It was declared the toughest and the most difficult crisis for Japan
since the end of World War II. There was extensive information available both from government
and nongovernment sources. Most reports described efforts and plans at the national level; city-
level information also existed. In general, evidence shows that the identified challenges and
gaps have been well responded to (see Map 8 – Health systems challenges and efforts in the
Great East Japan Earthquake).

Unique experiences
The magnitude of the GEJE was much more than the government had anticipated. Furthermore,
it was a multiple disaster – an earthquake triggering a tsunami and a nuclear emergency.
Japan’s system has established complex information systems and when the disaster disrupted
this system, the situation became very challenging. On the other hand, there were existing
disease surveillance systems that were utilized during the emergency. The affected areas also
had high proportion of elderly citizens; emphasis was given on chronic medical conditions and
elderly care. Social and private health insurance had a huge role in financing Japan’s health
care system. One of the key efforts achieved was to tap health insurance plans to ensure
access to health care. [1, 3]

Governance and its impact on health service delivery
In general, Japanese cities have disaster response plans however the magnitude of the disaster
was bigger than expected. Local government and prefectures were lead response agencies and
government leadership was strong. There was strong inter-governmental coordination, i.e.
coordination between neighbouring prefectures and cities. Less affected local governments
provided support to affected areas. The national government provided technical advice to local
governments. Coordination between government and non-government entities (e.g. the private
sector, professional associations and NGOs) was good although this was an identified area that
needs further strengthening. The government was also the lead for planning for recovery and reconstruction. [1, 4]

Response priority issues
Different reports have identified response priority issues. The policy for preparedness and response must take a multi-hazard approach. There was a need to enhance overall coordination and partnership between government and non-government agencies. Because the political and administrative system is decentralized, coordination between different government levels and entities also needed to be strengthened. Financial risk protection can be further enhanced through government and private health insurance strategies. Training of Disaster Management Assistance Teams (DMAT) may be enhanced not just to focus on trauma but also on emergency management system. In the area of service delivery, care for chronic illnesses, the elderly and persons with disabilities, quality of health care (e.g. standard treatment protocols) and multidisciplinary MHPSS services must be strengthened. Back up systems for health information and health facility lifelines (water, electricity and communication) are needed. The health information system for tracking patients and monitoring needs and damages also need to be strengthened. More research should be done to study short- to long-term health impacts of radiation exposure. [5, 6, 7, 8, 9, 10, 11, 12]

Recovery priority issues
The country has identified recovery and reconstruction priorities. [13, 14, 15] Japan’s recovery plan includes strengthening of the following: mental health services; restoration of public facilities; medical treatment and supply system; health care for elderly and children; environmental & radioactivity monitoring; restoration of health and medical institutions; collaboration among regional communities; promoting disaster risk reduction; strengthening of human resource; mental health care and disaster education for children; DRR policies; and support of children survivors. The country aims to prevent the outflow of medical and welfare workers to ensure sustainability. National reconstruction strategy aims to strengthen the following: comprehensive community-based health care; public health sentinel and surveillance system; engagement of the private sector; health emergency information system; documentation and sharing of lessons learnt; research on long-term impact of radiation; care for chronic and elderly patients; and mental health and psychosocial support (MHPSS).

Preparedness and DRR priorities
Japan aims to integrate DRR to health and building policy and strengthen long-term planning. Authorities in charge for disaster prevention and DRR need to be established. Health effects of
radiation and their management need to be strengthened. Back up health information system must be in place. [16]

References


Map 8. Health systems challenges and efforts in the Great East Japan Earthquake

<table>
<thead>
<tr>
<th>Governance</th>
<th>Health care financing</th>
<th>Workforce</th>
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<th>Health information</th>
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<td>Resource mobilization</td>
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<td>M&amp;E, accountability, assessment of governance</td>
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Legend
- Documented systems effects
- Documented efforts
- Documented challenges and gaps
- Disaster risk reduction recommendations

Legend
- Documented systems effects
- Documented efforts
- Documented challenges and gaps
- Disaster risk reduction recommendations
4.8 Bangkok floods (2011)

**General information**
The Bangkok floods of 2011 were a result of the annual monsoon season. The floods started towards the end of July by landfall of Tropical Storm Nock-ten and ended in January 2011. Flooding started to spread through the provinces of northern, northeastern and central Thailand along the Mekong and Cho Praya River basins. By October, floodwaters reached Chao Praya and inundated parts of Bangkok. Sixty-five of Thailand’s 77 provinces were declared flood disaster zones and 813 people were killed. World Bank estimated damages reached US$ 45.7 billion, making it one of the world’s costliest disasters as of 2011. [1] Information sources in general were limited both from government and non-government sources. This was probably because the disaster was very recent.

**Unique experiences**
Thailand tapped government health insurance fund to ensure financial risk protection in emergencies. The country also emphasized the care of chronic illnesses and the elderly. Notable external causes of morbidity/mortality during the Bangkok floods were electrocution and chemical intoxication. [2, 3]

**Governance and their impact on health service delivery**
There was very little information on national and local level governance including coordination and interoperability between levels and entities.

**Priorities**
Coordination between government levels and between government and non-government agencies should be strengthened during response phase. Equity in access to health services must also be improved. Bangkok had migrant populations from neighbouring countries. A centralized system of risk communication will also enhance public information. As a way forward, there was a need for multi-sectoral approach for recovery planning and DRR. [2, 3, 4, 5, 6, 7]
References


Map 9. Health systems challenges and efforts in the Bangkok Floods

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<tr>
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**Legend**
- Documented systems effects
- Documented efforts
- Documented challenges and gaps
- Disaster risk reduction recommendations

**System effects**
- Response
- Recovery
- Preparations and DRR

**Health service delivery**
- Assessment of risk, vulnerability, capacity, gaps
- Health facilities and lifelines
- Logistics management
- Prevention of diseases and mortality
- Acute and emergency care
- Search and rescue
- Primary care, mobile clinics, community and home-based care
- Secondary care
- Specialized care
- Field hospitals, mobile clinics, emergency departments
- Rehabilitation, care including physical, occupational, and speech therapy
- Mental health, neuropsychiatric, and substance abuse
- HEP/AIDS
- Nutrition and food
- Water, sanitation, and hygiene (WASH)
- Immunization
- Health education and promotion
- Management of the dead and missing
- Health in evacuation camps
- Environmental health and other external causes of disease
- Communicable diseases
- Non-communicable diseases and lifestyle related risks
- Mass casualty, surge capacity
- Management, planning, monitoring, and quality of service
- Equity, access, safety, privacy, human rights, sustainability, cross-cutting

**Preparedness and DRR**
- D

**Response**
- *

**Recovery**
- *

**Legend**
- Documented systems effects
- Documented efforts
- Documented challenges and gaps
- Disaster risk reduction recommendations

**System effects**
- Response
- Recovery
- Preparations and DRR

**Health service delivery**
- Assessment of risk, vulnerability, capacity, gaps
- Health facilities and lifelines
- Logistics management
- Prevention of diseases and mortality
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5. CONCLUSIONS AND WAY FORWARD

5.1 Link between response, recovery, preparedness and development

Cities and economies are growing and more people are living in urban areas. This growth however is hampered by natural hazards that happen every year. Indeed, emergencies are part of the risk of human civilization especially in urban areas where vulnerabilities become more evident. Poor infrastructure, inadequate planning and poverty worsen the effects of emergencies. Mass events commonly take place in urban areas. These realities bring a huge burden on urban health systems. Good governance should be able to transcend above the tragedies that hazards may bring. Emergencies are windows of opportunity for systems strengthening and sustainable development. Leaders should understand that these are opportune times to cause change. Overall planning and systems development must extend beyond response and recovery phases. Response, recovery and preparedness efforts must be crafted and implemented with a longer-term timeframe towards development. Health sector managers must see their roles within the wider framework of sustainable social development.

This general analysis of major disasters from 2008-2011 has identified individual health impacts, health system impacts and efforts and challenges in response, recovery, preparedness and DRR. The case disasters represented different large scale emergencies, different economic levels, different political systems and different regions. It gave a general view of how a health system works through different challenges through time using analysis that considers governance, financing, workforce, services (products), logistics and information. Each disaster is unique. It therefore requires careful assessment, planning and management. Because disasters seldom happen in the same place it might be useful to strengthen national capacity to provide good technical support. Nevertheless, preparedness is essential and city governments can develop strong capacity for preparedness, response and recovery. Gaps and challenges were identified in this study and this is where action and research should focus. It is understood however that these needs and gaps are too many and trying to successfully solve everything might not be helpful. Here, the public health expert and manager mindset would be very useful in prioritizing challenges and creating innovative solutions.
5.2 Way forward

Health emergency management

Health emergency managers must understand emergencies through time with a systems approach taking into consideration the wider political and socioeconomic context where the emergency took place. This is a high standard. They must have strong public health and management capacity. Efficient and evidence-based governance are vital to health emergency management and in this the manager has a huge role. A few specific recommendations are also identified:

- A systems approach is essential in assessment of vulnerabilities, capacities and needs, rapid assessment during the acute response phase, monitoring, documentation and evaluation.
- In all phases of the emergency, service delivery should focus on Primary Health Care, safe hospitals (resilient and functional health facilities) and environmental health.
- The recovery phase serves as a window for advocacy, planning and policy-making.
- Health information management in emergencies must be strengthened. Situations where the information system was disrupted and where external agencies came in with their information systems have been very challenging. The key areas of health information in emergencies include but are not limited to disease surveillance and early warning system, monitoring of needs, resources and activities, patient records, coordination between entities, research on health emergency management (specific to context) and the application of geographic information systems. Health personnel in charge of health information must be trained.
- Comprehensive health systems evaluations are needed to provide recommendations on systems strengthening even when a city or locality has already suffered an emergency. An emergency can be a policy window for health systems development.

Health emergency management in urban areas

The following are recommendations for health emergency areas in cities:

- Urban areas must have strong preparedness plans, policies and organizational structure.
- Planning must use a systems approach and must take into account all key areas of the health systems building blocks.
- Budget must be allocated for preparedness, response and recovery and there should be mechanisms to ensure financial risk protection.
The role of advocates and health providers for vulnerable groups is crucial.

An emergency is a policy window for urban areas to enhance governance and services.

Documentation of efforts and challenges must be done using a systems approach. The government has a key role in documenting and disseminating lessons learnt.

**Role of the Ministries of Health**

Even in decentralized systems, Ministries of Health still have a huge role in terms of policy and capacity building. Here are ministry recommendations:

- Ministries of Health must strengthen their roles as technical support even as cities develop their own capacities for health emergency management.
- Ministries of Health have a huge role in developing health information systems for emergencies.
- Ministries of Health must ensure financial risk protection at the national level.
- There are policies that the Ministries of Health should develop at the national level. These include but are not limited to: general direction for DRR, ensuring financial risk protection, ensuring efficiency of the use of resources, ensuring health workforce capacity including reserve workforce, ensuring safe and functional health facilities, management of the dead and missing, rational drug use, logistics management, donation policies and health information systems.
- Ministries of Health must build a pool of public health systems and management experts who can serve as technical experts for health emergency management with a strong health systems perspective.
- Ministries of Health must initiate a systems-oriented documentation of health emergencies.

**Research**

The recovery phase is perhaps the best time to conduct research. The UHEM research agenda has been developed. This report notes the following points for further study:

- Linking governance and efficiency in health service delivery;
- Government and non-government mechanisms in resource mobilization;
- Analysis on the disruption of health care financing systems and how they can be improved;
- Management of efficient and effective Mental Health and Psychosocial Services;
• Studies focusing on NCDs in emergencies including economic studies on the added value of NCD maintenance medications (e.g. for hypertension and diabetes) as a way to prevent cardiovascular events;
• Essential medicines, health technology and logistics management needs during recovery phase;
• The application of geographic information systems for assessment and monitoring of health and health system concerns; and
• Monitoring and measuring health systems performance in preparedness, response and recovery.

5.3 Limitations of this study

This study is largely based on available literature online and other reports from WHO, backed by the consultant’s personal field experience. No actual interviews, field discussions and surveys were done. In every emergency, reports would generally come from government and non-government agencies. These however do not represent the private sector which is another major group that provides health services. There are also many ad hoc groups that provide response efforts in cities and they can have wide although temporary coverage. It is therefore likely that a lot of experience has not been documented. These different sectors have different viewpoints, mandates and interests that affect the way they work and document their efforts. Detailed systems analysis of these case disasters will probably be a big task, which is why tools for systems analysis and measurement in health emergencies are important. Once documentation takes a systems approach, this work would be easier. The scope of the review is also broad – trying to cover all building blocks of the health systems. Review of information specific to each building block is recommended for a more comprehensive analysis.
6. REFERENCES

General references


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