

# EMERGENCY MANAGEMENT IN THE WESTERN PACIFIC REGION: CURRENT STATUS AND CHALLENGES

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**Abstract.** Disasters from natural hazards affect most countries in Asia and the Pacific Region. Nine of the top 10 countries with the highest number of disaster-related deaths were in Asia. Recent events have demonstrated the prevalence of hydro-meteorological, geophysical, climatological, and biological hazards in the region, as well as those generated by humans and technology. The impacts go beyond infrastructure damage and economic loss but include health, loss of lives, and disruption of public and health care systems. Prioritization of preparedness and risk reduction, policy development, comprehensive strategies, climate change implications, and effective management among others are challenges that emergency and response programs must include. Evidence has shown that risk management, preparedness programs and emergency management programs can significantly mitigate the impact of hazards on communities, thereby reducing loss of lives and property. The World Health Organization (WHO) has taken the lead to ensure a comprehensive approach to risk reduction and emergency management. Technical support to countries, organizational strengthening, creation of policies, human resource capacity building, partnerships, and the creation of knowledge bases were among the strategies that the Organization has achieved.

## BACKGROUND

Disasters from natural hazards have claimed 3 million lives worldwide, from 1980 to year 2000, and have adversely affected the lives of 800 million people (Guha-Sapir *et al*, 2004). Between 1994 and 2003, more than 255 million people were affected globally each year by natural disasters. During the same period, these disasters

claimed an average of 58 000 lives annually. In 2003, 1-in-25 people worldwide were affected by natural disasters (Pesigan, 2009). Economic damage brought about by natural disasters has increased 14-fold since the 1950's. In the last decade, disasters have caused damage of an estimated USD 67 billion every year (Guha-Sapir *et al*, 2004).

In 2008 alone, more than 235,000 people were killed by disasters from natural hazards. People affected reached 214 million and economic costs reached over USD 190 billion. That year, although recorded natural disasters (354) were less than the 2000-2007 yearly average (397), the death toll was three times higher than the annual average

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of for 2000-2007. This was mainly caused by two major events: Cyclone Nargis, which killed 138,366 people in Myanmar, and the Wenchuan earthquake in China, which caused the deaths of 87,476 (Rodriguez *et al*, 2009).

Asia, with 160 disasters in 2008, remained the most affected continent as in previous years. Nine of the top 10 countries with the highest number of disaster-related deaths were in Asia. Affected individuals reached 117.8 million and estimated damages exceeded USD 118.2 billion. China (29), the United States (22), and the Philippines (20) were most often affected by natural disasters. These three countries, together with India and Indonesia, have occupied the top ranking of disaster occurrence during the last three years. Four (China, the Philippines, Vietnam, and Australia) of the top ten countries most hit by reported events belong to the Western Pacific Region, while three (Indonesia, India, and Thailand) belong to the South-East Asian Region (Rodriguez *et al*, 2009).

#### TPOLOGY OF HAZARDS IN THE REGION

The Centre for Research on the Epidemiology of Disasters (CRED) (Guha-Sapir *et al*, 2004) defines a disaster as “a situation or event which overwhelms local capacity, necessitating a request to the national or international level for external assistance, or is recognized as such by a multinational agency or by at least two sources, such as national, regional or international assistance groups and the media.”

For a disaster to be entered into the CRED Emergency Events Database (EM-DAT), at least one or a combination of the following criteria must be fulfilled: 1) 10 or more people reported killed, 2) 100 people or more reported affected, 3) a declaration of a state of emergency, and 4) a call for in-

ternational assistance (Guha-Sapir *et al*, 2004).

The United Nations International Strategy for Disaster Reduction (UN/ISDR) on the other hand defines hazard as “a potentially damaging physical event, phenomenon or human activity that may cause the loss of life or injury, property damage, social and economic disruption, or environmental degradation” (UN/ISDR, 2009).

Hazards may have different origins that may be natural (geophysical, hydro-meteorological, climatological, and biological) or induced by human processes (environmental degradation, social hazards, and technological hazards) (Pesigan, 2009; Rodriguez *et al*, 2009).

In the Asia-Pacific region, hydro-meteorological hazards include storms, tropical cyclones, floods, and sea surges. Common geophysical hazards include volcanic eruptions, earthquakes, tsunamis, landslides, avalanche, and seiches, while climatological hazards include drought, El Niño Southern Oscillation (ENSO), La Niña, *dzud*, and wildfires. Biological hazards may be natural such as in outbreaks and epidemics, or human generated, as in the deliberate use of biological agents (Pesigan, 2009).

Human-generated hazards are also present in the Asia-Pacific region, and they include technological and societal hazards. The former include chemical incidents, structure fires, radiological incidents, building collapse, transport crashes, infrastructure failure, and pollution, while societal hazards are exemplified by complex emergencies, armed conflict, acts of ‘terrorism,’ mass gatherings, stampedes, and social unrest (Pesigan, 2009).

#### RECENT EMERGENCIES IN THE REGION

In 2008, 40% of all reported natural

disasters occurred in Asia (143 out of 354 global disasters). This is approximately the same share as seen in the annual average of 2000-2007. More than 80% of the reported victims of natural disasters in 2008 are also from Asia (177.8 million out of 231.2 million) (Rodriguez *et al*, 2009).

More than 62% of economic damage due to disasters was in Asia (USD 118.2 billion out of USD 190.3 billion), and these costs have increased through the years. The impact of natural disasters on middle-income countries, such as China, seems to be increasing. Economic vulnerability tends to increase as countries develop. Thus, these countries must invest more in disaster risk-reduction measures to ensure continuous economic growth (Rodriguez *et al*, 2009).

Countries in the Pacific are usually affected by hydrological and meteorological hazards. Hydrological hazards, such as storms, were responsible for more than 85% of total affected people in these countries and caused the greatest economic loss. In such small island states, emergencies have a relatively large human and economic impact when considering country surface, number of inhabitants, and Gross Domestic Product (GDP) (Rodriguez *et al*, 2009).

It is encouraging however to note that despite a steady increase in the overall disaster occurrence, the number of reported affected individuals has remained relatively stable over the years. The reason for this decreasing trend is still to be determined. Whether it is the result of better preparedness, better response of governments and humanitarian agencies during emergencies, or improvements in the reporting of disaster occurrence and impacts, further research would be needed (Scheuren *et al*, 2007).

Storms, earthquakes, and floods are among the most common natural hazards in the Western Pacific Region. A tropical

cyclone is a non-frontal storm system that has a low-pressure center, spiral rain bands, and strong winds. Depending on their location and strength, tropical cyclones may be referred to as a "hurricane" (western Atlantic/eastern Pacific), "typhoon" (western Pacific), "cyclone" (southern Pacific/Indian Ocean), "tropical storm," or "tropical depression" (defined by wind speed) (CRED, 2008). As they move inland from the sea, cyclones or typhoons may hit a large area. Damage to life and property are usually brought about by secondary events, such as storm surges (tidal waves), flooding, and landslides. Communities in low-lying coastal areas are usually affected most. In addition, inland flooding and landslides can also cause much harm (WHO-UPOU, 2007).

Typhoon Kammuri hit Vietnam in August 2008 causing remarkable numbers of dead (162) and those affected (57,630). Drowning, injuries, and trauma were the main causes of casualty. Economic damage reached USD 120 million (CRED, 2008).

June 2008 also saw Tropical Storm Fengshen that killed 644 and affected 4,785,469 individuals in the Philippines (CRED, 2008). Economic losses reached nearly USD 285 million as many areas in central Philippines were inundated with flood and mud flows. This storm capsized a passenger ferry, which increased the number of dead and missing.

In such scenarios, the indirect effects of typhoons had to be monitored over time. These usually included the destruction of water storage and distribution installations, contamination of water supplies, food insecurity, destruction of livelihood, and short- and long-term mental health problems; while possible outbreaks of communicable diseases are rarely observed (WHO-UPOU, 2007).

Earthquakes are sudden shifts or move-

ment in the tectonic plate in the earth's crust and can be of tectonic or volcanic origin. Strong earthquakes can destroy even the best-built structures and can trigger secondary disasters, such as tsunamis and volcanic eruptions. Earthquakes can cause deaths and injuries, primarily because of collapsing buildings and falling objects. Burns, electrocutions, and respiratory diseases due to exposure to dust and possible asbestos fibers from rubble may also result from earthquakes (WHO-UPOU, 2007).

The 7.9 Magnitude Wenchuan Earthquake struck China on May 2008 and had destructive effects that led to collaborative efforts all over the world. It affected 45.6 million people in 10 provinces, and casualties included 68,858 deaths and 18,618 missing. Economic losses reached USD 85 billion, as 26 million buildings were damaged and around 5 million totally collapsed (CRED, 2008).

Wenchuan Earthquake badly damaged 10,000 school buildings in Sichuan and almost 7,000 schools were completely destroyed. At least 9,000 children died instantaneously in these schools. This tragedy emphasized the need for strong public infrastructures that could withstand such hazards. Both schools and hospitals, if they are properly designed and built, play an important role in saving the lives of society's most vulnerable people during disasters. Poorly constructed buildings are the main cause of death and injury when earthquakes strike. This is why constructing resilient buildings in earthquake-prone zones is vital (Rodriguez *et al*, 2009).

Indirect damage in earthquakes include destruction of water supplies and sewerage systems, contamination of water, exposure of people to the environment, disruption of transportation, poverty, and the possible increase of communicable and non-communi-

cable diseases (WHO-UPOU, 2007).

A general flood is caused when a body of water exceeds its normal level due to increased rainfall or melting of snow. Narrow valleys may be hit by flash floods because of exceptionally heavy rains upstream or dam bursts (CRED, 2008). In November 2008, general floods due to continuous heavy rainfall in Vietnam affected 600,000 individuals and killed 99 persons. In June of the same year, floods in China killed 176 and affected 1,600,000 persons causing economic losses of USD 2.2 billion (CRED, 2008). A tropical depression in January 2009 caused floods in low-lying areas in Fiji that affected 10,556, killed 12, and incurred total damages of USD 43 million (CRED, 2008; WHO/WPRO, 2009).

Coastal areas may be hit by tidal waves or storm surges that are associated with cyclones or typhoons. Tsunamis due to under-sea earthquakes may also occur. A storm surge refers to the rise of the water level in the sea, an estuary or lake as a result of strong wind driving the seawater inland. When this condition is superimposed with the normal astronomical tide, a coastal flood may occur (WHO-UPOU, 2007).

Recent storm surges and coastal floods in December 2008 in Kiribati, Marshall Islands, Federated States of Micronesia, affected several communities and individuals, and destroyed agricultural lands, vegetable gardens, livelihood, and public infrastructure (CRED, 2008). In such events, drowning and injuries are the main causes of casualty. Response strategies must consider indirect impacts, such as contamination of water supplies by floodwater, possible increased transmission of endemic water- and vector-borne diseases after a flood and among people displaced, malnutrition, and poverty (WHO-UPOU, 2007).

## IMPACT OF HAZARDS ON SOCIETY AND THE PUBLIC HEALTH SYSTEM

Hazards have immediate and lingering impacts on societies. Every year, one Member State in five experiences a crisis that endangers the health of its people (Rodriguez *et al*, 2009). Emergencies cause an immediate increase in cases of illness, disability, and death; psychosocial stress; breakdown in security; population displacement; and breakdowns or loss of essential life-support services (water, food, and shelter), communication networks, and information flows. Impacts are magnified when there is damage to and loss of public facilities, services, and staff that ultimately affect economic development (Pesigan, 2009).

One important consideration is the impact of hazards on the public health system. Other than an increase in the number of deaths and injuries, there is an increased demand for mental health and psychosocial care, safe water and food supply, and medical management. Damage to healthcare facilities and effects on the health workforce may disrupt routine health services and disease surveillance. Concerning the affected populations, there may be delays in or lack of access to health services, while concerning healthcare providers, there is increased burden on health personnel and facilities. Occasionally, environmental health hazards cause environmental pollution, exposure of communities to toxic substances, and risk of infection or contamination for response and relief personnel (Pesigan, 2009).

Emergencies place sudden and intense demands on health systems. They can delay economic activity and development. In areas with weak health infrastructures, responding to an emergency without external support can disrupt routine health services and humanitarian programs for many months and the economic impact may ex-

tend for years (Guha-Sapir, 2004). Furthermore, achievement of the Millennium Development Goals (MDGs) may not be attained in areas that are affected by disasters and chronic crises.

Recent evidence indicates that climate change will increase the number of extreme events. The UN International Strategy for Disaster Reduction (UN/ISDR) observed that in 2005, there was an 18% rise in the number of natural disasters. The reported increase of natural disasters from 2000 to 2007 also confirmed this global upward trend that is primarily driven by the increase in the number of reported hydro-meteorological disasters, including floods and storms. For example, hydrological disasters have increased by 7.4% per year on average and continue to increase with an average annual growth rate of 8.4% during the 2000 to 2007 period (Scheuren *et al*, 2007).

The Asia-Pacific region has a large population that relies on agriculture for living. Climate change, because of its slow impact on the environment, will contribute to reinforcing the vulnerability of large segments of the poorest populations. Disaster risk reduction then must consider the issue of climate change and its impact to health aiming to reduce people's vulnerability and increase their resilience to natural disasters (Rodriguez *et al*, 2008).

Furthermore, risk, vulnerability, and impacts of natural hazards do not only depend on exposure to extreme natural phenomena but also depend on anthropogenic factors, such as government policy, population growth, urbanization, community resilience to natural disasters, and the inability of poor populations to escape from the vicious cycle of poverty (Guha-Sapir *et al*, 2004; CRED, 2008). Risk management and preparedness then must be comprehensive and must be suited to the socio-cultural background of societies.

## GAPS IN HEALTH EMERGENCY MANAGEMENT IN THE REGION

Public sector agencies must prioritize preparedness and prevention through policy and accompanying funding support. In reality, risk management and vulnerability assessments have been a lower priority than response has been. The approach to disaster management has remained reactive, focusing on relief, followed by rehabilitation and reconstruction. Prevention planning or community preparedness has limited funds and is not a policy priority in most national governments, funding agencies and other development institutions (Guha-Sapir *et al*, 2004).

Policy development is vital as it precedes human and other resources dedicated to emergency preparedness and response. Most countries in Asia and the Pacific are only starting to create national policies on disaster risk management, and emergency preparedness and response.

Evidence and experience over the years has shown that emergency management must be comprehensive. It includes a vast array of concerns and activities that include mass casualty management, provision of safe water, sanitation and hygiene, nutrition, concerns on both communicable and non-communicable diseases, issues on maternal and newborn health, and mental health and psychosocial support. In addition to the health services mentioned, emergency management also handles pharmaceuticals and health technologies, logistics, health information systems, and the restoration of the health infrastructure (Rodriguez *et al*, 2008).

Emergency response covers an entire spectrum of management activities from needs assessment, surveillance and monitoring, planning, to recovery. It must be connected with wider processes aimed at

social development as steered by national and local governments. Partnerships and collaboration between United Nations agencies, governments, NGOs and the private sector are needed in order to attract a greater and more predictable flow of funds and ensure holistic management (Rodriguez *et al*, 2008).

A comprehensive view of emergency preparedness should also take into account challenges in the 21<sup>st</sup> century. The impact of climate change would call for new strategies for adaptation and the increase in natural hazards. Public health and emergency managers also need to understand the health impact of economic crises, especially when it comes on a time of mega-hazards and epidemics that transcend country borders. Public health security issues should also be dealt with. These scenarios must be properly managed in terms of preparedness, risk communication, vulnerability reduction, and response.

Having shown the complexity of emergency preparedness and management, a dedicated unit in Ministries of Health in Member States is essential. Such units would take charge of the overall strategies and activities surrounding the entire disaster risk management framework and emergency management. The specialized unit would also take charge of policy formulation, coordination, knowledge generation, technical support at the national and local level, communications, comprehensive capability building, and management of resources and logistics (ADPC, 2008).

An effective and efficient emergency preparedness and response program therefore must ensure that health systems should be able to cope with sudden surges in demand, provide temporary services when the system is disrupted and restore normal functions in time (WHO, 2009).

## EHA/WPRO STRATEGIC DIRECTIONS TO ADDRESS THE GAPS/NEEDS

The vision of the World Health Organization's (WHO) emergency preparedness and response program is safer and healthier communities and strong health systems. It aims to reduce excess mortality, morbidity and disability arising from emergencies and disasters. It also aims to ensure that health services, infrastructure and equipment remain intact after emergencies and disasters (WHO, 2009).

In the area of health governance, the WHO emergency preparedness and response program seeks to strengthen the institutional and managerial capacity for emergency management including operational support for response. The program was developed to provide support to governments and the international community during emergency relief and recovery operations (WHO, 2009).

A comprehensive emergency preparedness and response program must develop a strong human resource for emergency management. Risk communication, public awareness, public knowledge, and public information on health emergencies must be enhanced. As experience increases, WHO develops and maintains a body of evidence and knowledge base in support of health emergency management (WHO, 2009).

These objectives are framed in support of the global objective of the Organization and are known as Strategic Objective 5 of the Medium Term Strategic Plan (MTSP) (WHO, 2009). It aims to "reduce the health consequences of emergencies, disasters, crises, and conflicts and minimize their social and economic impact." The goal is to minimize the negative effect on health of emergencies, disasters, conflicts and other humanitarian crises and by responding to the health and

nutrition needs of vulnerable populations affected by such events. The eight regional expected results under this global objective are listed below. The regional expected results:

- Norms and standards developed, capacity built and technical support provided to Member States for the development and strengthening of national emergency preparedness plans and programs;
- Norms and standards developed, capacity built and technical support provided to Member States for a timely response to disasters associated with natural disasters and to conflict-related crises;
- Norms and standards developed, capacity built and technical support provided to Member States for assessing needs along with planning and implementing transition and recovery actions in post conflict and post disaster situations;
- Coordinated technical support on communicable disease control in disasters resulting from natural and human-generated hazards provided to Member States;
- Coordinated technical support provided to Member States on environmental health and food safety in disasters resulting from natural and human-generated hazards;
- Support provided to Member States for strengthening national preparedness, alert and response to food safety and environmental health emergencies;
- Effective communications issued, partnerships formed and coordination developed with other UN agencies, governments, local and international NGOs, academic institutions and professional associations at the country, regional and global levels; and,
- Effective communications in emergency and outbreak situations.

## WHAT HAS EHA DONE TO ADDRESS THE ISSUES?

The Emergency and Humanitarian Action (EHA) unit of the Regional Office for the Western Pacific (WHO/WPRO) has responded to the challenges and gaps through different activities. Among these are providing countries the necessary technical support in managing crises, capacity building, development and dissemination of health knowledge, and health emergency and humanitarian action projects. Along with these activities, EHA strengthens collaboration with national and international partner agencies thereby strengthening the institutional capacity of WHO.

The unit has provided immediate, appropriate, and efficient support to Member States. Recently, EHA took part in response activities in Mindanao (Philippines) complex emergency, Wenchuan earthquake in China, the tsunami in Solomon Islands, and floods in Lao PDR and Fiji.

EHA fostered the development of scientific knowledge on health in emergencies through research activities in Vietnam and the Philippines that has not only studied hazards and their impact on health, but also policies that govern risk management and emergency response. The unit has produced technical resources that guide health emergency managers in preparedness and response strategies. These included the Pocket Emergency Tool, indicators for the assessment of health facilities, and national courses on Public Health and Emergency Management in Asia and the Pacific (PHEMAP). These resources have been translated in several national languages in the region.

Beyond the development of knowledge, EHA with the support of health partners has developed training courses to build the capacity of health managers at the national level. These training activities included

PHEMAP; Chemical, Biological, Radio-Nuclear Emergencies (CBRNE); and Risk Communication. Training activities have been offered as national workshops in China, Malaysia, Papua New Guinea, the Philippines, Vanuatu, Cambodia, and Samoa, and has been developed into a distance education course.

Health emergency and humanitarian action projects have been aimed to support risk reduction, mass casualty management program, district risk mapping, and healthy cities. Most of the activities of EHA have been achieved with the help of different health partners thereby strengthening collaboration with national and international partner agencies. The campaign on Hospitals Should be Safe from Disasters was organized with the UN International Strategy for Disaster Reduction (UN/ISDR) with the support of the European Commission Humanitarian Aid department (ECHO).

Training modules were developed in partnership with Asian Disaster Preparedness Centre (ADPC) and Southeast Asian Ministries of Education Organization Tropical Medicine and Public Health (SEAMEO-TROPMED) Network. These training activities were organized in partnership with Japan International Cooperation Agency (JICA), Kobe University, International Federation of Red Cross and Red Crescent Societies (IFRC), SEAMEO-TROPMED Network, University of the Philippines, and Hanoi School of Public Health. Other activities were done through the support of the Association of Southeast Asian Nations (ASEAN), US Centers for Disease Control (CDC), Save the Children, USAID, and the European Commission Humanitarian Aid department (ECHO).

## CONCLUSIONS

Natural hazards affect people and bring

significant economic losses. Asia particularly the Western Pacific Region is most affected by natural hazards, with the most people affected, the highest number of mortality and the greatest amount of economic impacts. Public health emergencies can disrupt the economic development of countries in the region. As countries grow, their economic vulnerability also increases (Guha-Sapir, 2004). Thus, it is necessary for these countries to invest more in disaster risk reduction measures if they want to ensure continuing growth.

Evidence has shown that risk management, preparedness programs and emergency management programs can significantly mitigate the impact of hazards on communities thereby reducing loss of lives and property. Appropriate response strategies have been seen to prevent further mortality and ensure effective recovery and reconstruction.

Preparedness is necessary to ensure effective emergency response. Manage risk and reducing vulnerability at the national level requires policy, appropriate infrastructure, information systems, planning, operation systems, resources, and network. The health sector must collaborate with other government agencies, the armed forces, the private sector, and civil society.

Prioritization of preparedness and risk reduction, policy development, comprehensive strategies, climate change implications, and effective management among others are challenges that emergency and response programs must include.

The World Health Organization (WHO) has taken the lead to ensure a comprehensive approach to risk reduction and emergency management. Technical support to countries, organizational strengthening, creation of policies, human resource capacity building, partnerships, and creation of

knowledge base were among the strategies that the Organization has achieved.

## REFERENCES

- Asia-Pacific Disaster Preparedness Centre (ADPC). PHEMAP 8: inter-regional training course on public health and emergency management in Asia and the Pacific [DVD]. Bangkok: Asia-Pacific Disaster Preparedness Centre (ADPC), 2008.
- CRED. Emergency events database [Webpage]. Brussels: Centre for Research on the Epidemiology of Disasters (CRED) and Université Catholique de Louvain. 2008. [Cited 2009 Sep 5]. Available from: URL: <http://www.emdat.be/>
- Guha-Sapir D, Hargitt D, Hoyois P. Thirty years of natural disasters 1974-2003: The Numbers [Webpage]. Brussels: Centre for Research on the Epidemiology of Disasters (CRED), the World Health Organization (WHO) and Université Catholique de Louvain, 2004. [Cited 2009 Sep 5]. Available from: URL: <http://www.unisdr.org/eng/library/Literature/8761.pdf>
- Peisigan A. Health emergency management [Presentation]. Manila: World Health Organization Regional Office for the Western Pacific (WHO/WPRO), 2009.
- Rodriguez J, Vos F, Below R, Guha-Sapir D. Annual disaster statistical review 2008: The number and trends [Webpage]. Brussels: Centre for Research on the Epidemiology of Disasters (CRED); World Health Organization (WHO); Université Catholique de Louvain. 2008. [Cited 2009 Sep 5]. Available from: URL: [http://www.emdat.be/Documents/Publications/ADSR\\_2008.pdf](http://www.emdat.be/Documents/Publications/ADSR_2008.pdf)
- Scheuren J-M, le Polain de Waroux, Below R, Guha-Sapir D, Ponsérre S. Annual disaster statistical review 2007: The number and trends. Brussels: Centre for Research on the Epidemiology of Disasters (CRED); World Health Organization (WHO); Université Catholique de Louvain, 2007. [Cited 2009 Sep 5]. Available from: URL: <http://www.unisdr.org/eng/library/Literature/8761.pdf>

- [www.emdat.be/Documents/Publications/Annual%20Disaster%20Statistical%20Review%202007.pdf](http://www.emdat.be/Documents/Publications/Annual%20Disaster%20Statistical%20Review%202007.pdf)
- United Nations International Strategy for Disaster Reduction (UN/ISDR). Terminology on disaster risk reduction (2009). Geneva: UN/ISDR, 2009. [Cited 2009 Sep 5]. Available from: URL: <http://www.unisdr.org/eng/library/UNISDR-terminology-2009-eng.pdf>
- WHO-UPOU. Health emergency management: Overview of disaster preparedness and emergency management. Manila: WHO Regional Office for the Western Pacific (WHO/WPRO) and University of the Philippines Open University, 2007.
- WHO. Medium-term strategic plan 2008-2013 and proposed programme budget 2008-2009. Geneva: World Health Organization, 2007.
- WHO. Strategic Directions for strengthening health emergency management 2008-2009. Manila: Emergency and Humanitarian Action, World Health Organization, 2009.