



National Action Plan for Earthquake Safety of Health Facilities



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I. Background

The National Action Plan for Earthquake Safety of Health Facilities is the Royal Government of Bhutan's commitment to reduce future losses in health facilities due to earthquakes and other natural hazards. GeoHazards International facilitated the formulation of this action plan, in collaboration with the Department of Disaster Management and the Ministry of Health, with funding from the Global Facility for Disaster Reduction and Recovery.

This document provides guidance to the concerned governmental departments regarding actions to take, policies to put into place and projects to undertake in the short, medium and long-term, to ensure that all health facilities in Bhutan are safe from the impacts of future earthquakes and other natural hazards. The authors recommend that this plan receive regular updates and that progress toward implementing the plan's priority areas be reviewed annually.

Hospitals and health facilities are among the most important resources in any community. Communities rely upon them not only to remain safe during hazardous events such as earthquakes, but also to remain functional and able to provide medical care to the large numbers of people who may seek treatment after a hazardous event. In prior earthquakes, floods and other natural disasters, hospitals and health facilities often have proven to be vulnerable to damage to buildings, critical equipment and contents, and to the loss of staff. The loss of staff further hinders the facility's capacity to provide an effective medical response to the event. In summary, damaged hospitals and health facilities confront real difficulties delivering health care to the communities that they serve; these difficulties, in turn, hamper the recovery process. Both the M6.1 earthquake of 21st September, 2009 in Eastern Bhutan and the M6.8 earthquake of 18th September, 2011 in Sikkim, which principally affected Western Bhutan, damaged hospitals and Basic Health Units(BHU). A total of 54 health buildings suffered damage, and losses exceeded Nu.600 million.

Table 1- Estimates from the Joint Rapid Assessment Report (2009, 2011)

Earthquake Event	Health Buildings Damaged	Estimated Loss (Nu. Million)	Estimated Cost for Recovery and Reconstruction (Nu. Million)
2009	29	123.5	136
2011	22	10.23	17.26
Total	51	133.73	153.26

Keeping hospitals and health units functional and safe is crucial to the ability to provide important emergency and public health services to people, when they need them most. Preserving Bhutan's health system performance during natural hazard events requires near, medium and long-term planning, coupled with sustained action to enhance the seismic safety and preparedness of hospitals

and to build the needed capacities. Developing and implementing the National Action Plan for Earthquake Safety of Health Facilities is an important, time-critical initiative towards this end. This initiative fits into the overall National Disaster Risk Management Framework, which calls for proactive risk reduction and for integration of disaster management concerns into national programs and policies, and supports implementation of key components of the Health Sector Disaster Management Contingency Plan. This Action Plan serves as a tool to incorporate important risk reduction and preparedness initiatives/actions into five year and annual plans of the Ministry of Health.

a. Natural Hazards in Bhutan

Bhutan is vulnerable to earthquakes and several other natural hazards due to its location in the eastern Himalayas, which, in addition to being one of the most seismically active regions of the world, has landslide-prone slopes, potentially dangerous glacial lakes, and a climate conducive to windstorms, floods and wildfires. Among the hazards that Bhutan faces, earthquakes have the potential to cause the most severe and widespread damage, because the entire country lies atop or near the major earthquake fault that divides the Indian tectonic plate from the Eurasian tectonic plate. Though recent earthquakes have been moderate in size, geologic evidence shows that the fault is also capable of breaking under most of the country in a single massive earthquake; scientists postulate that such a massive earthquake may have last occurred circa 1100 A.D.¹ Bhutan's two previous, moderate earthquakes (21st September, 2009 and 18th September, 2011) caused 13 deaths, many injuries and losses of approximately Nu. 3698.63 million.² The much larger earthquakes that the fault is capable of generating would cause unprecedented damage.

Another major natural hazard that Bhutan faces, especially due to the effects of climate change, is the risk of glacial lake outburst floods. Bhutan has 2,674 glacial lakes, 25 of which have been identified as potentially dangerous. Due to climate change and increasing temperatures, the threat of glacial lake outburst floods is increasing, as glaciers melt and retreat at unprecedented rates.³ In October 1994, a massive glacial lake outburst floods from Luggye Tsho in the headwaters of Pho Chhu River damaged the Punakha Dzong, causing numerous casualties. Earthquake shaking can also trigger a glacial lake outburst flood, by causing the natural dam holding back the glacial lake to crack and fail.

In addition to these two major natural hazards, Bhutan is vulnerable to recurring and seasonal hazards that include landslides, flooding, wind and hail storms. These hazards are increasing, with changes in temperature and precipitation levels and patterns. The effects of Cyclone Aila, which hit the Bay of Bengal in May 2009, were felt in all twenty Dzongkhags of Bhutan, disrupting power and water supplies, damaging roads, irrigation channels, bridges and other infrastructure, including health facilities.

¹Kumar, S. Wesnousky, S.G., Jayangondaperumal, R., Nakata, T., Kumahara, Y. and V. Singh (2010). Evidence for surface rupture along the northeastern Himalayan front, India: Timing, size, and spatial extent of great earthquakes. *Journal of Geophysical Research*, 115 (B12422), 1-20.

²Joint Rapid Assessment Report (JRAR), 2009 and 2011

³Second National Communication, NEC, 2011

Bhutan is also susceptible to fire in both settled and forest areas. The country's rugged terrain, highly combustible forests, erratic wind conditions and shortage of trained fire-fighters and equipment increase the risk of forest fire outbreaks, especially during the dry winter months. Fires in the human settlements of Wamrong, Trashigang and Chamkhar, Bumthang in 2011 and 2012 have had devastating effects on those communities.

In addition to shaking damage, earthquakes can also trigger many of these other hazards, including glacial lake outburst floods, landslides and rock falls, and fires. Strong earthquakes in mountain areas invariably cause numerous landslides and rock falls, especially when slopes are saturated by heavy rainfall. Earthquakes trigger fires that can spread between structures and grow into conflagrations. The Ministry of Health should describe these hazards by identifying the areas and structures threatened by floods, landslides, rockfalls, avalanches, Glacial Lake Outburst Floods, and by ensuring measures to reduce the risk from them are incorporated into measures to improve earthquake safety and preparedness of health facilities.

b. Relevant national and health sector policies

The Royal Government of Bhutan places a high priority on equitable and quality access to free health care services, including referral services outside the country, and has made rapid progress in health sector development, with sustained primary health care coverage now being provided to more than 90% of the population. Average life expectancy in Bhutan has increased from 37 years (in 1960) to 66 years (in 2005), while childhood immunization (began in 1991) levels now exceed 90%. Today, Bhutan has 31 hospitals (including 1 national and 2 regional referral hospitals), 181 basic health units and 518 Outreach Clinics.

Several national and health sector policy documents summarized in this section were especially relevant to the development of the National Action Plan for Earthquake Safety of Health Facilities. These are the National Health Policy 2011, National Disaster Risk Management Framework 2006, the National Disaster Management Bill, and the Health Sector Disaster Management and Contingency Plan.

The National Health Policy 2011 of Bhutan aims to "build a healthy and happy nation through a dynamic professional health system, attainment of highest standard of health by the people within the broader framework of overall national development in the spirit of social justice and equity." The policy includes a section on Emergency Health Service and specifies, "All health facilities shall institute appropriate system of care to deal with emergencies, disasters, epidemics and outbreaks" and "shall provide a system of emergency for (a) disasters (b) epidemic outbreaks (c) mass casualty (d) routine emergencies."

The National Disaster Risk Management Framework 2006 incorporates the principles of pro-actively reducing disaster risks through decentralized and empowered disaster management institutions at various levels, and through adopting a multi-sectoral approach to disaster management. The

Framework's Component 4, disaster preparedness, requires concerned Ministries/Sectors to develop disaster preparedness and response plans at various levels. Component 5 specifically mentions "Mitigation and integration of disaster risk reduction in development plans."

Table 2 - Components outlined in National Disaster Risk Management Framework, 2009

NDRMF components	
1	Institutional, legislative and policy framework
2	Hazard, vulnerability and risk assessment
3	Early warning system
4	Disaster preparedness
5	Mitigation and incorporation of DRR in development sectors
6	Public awareness and education
7	Capacity development
8	Communication and transportation

Similarly, the draft National Disaster Management Bill requires various sectors/agencies to develop disaster management and contingency plans. In line with these policies, the Ministry of Health has developed a Health Sector Disaster Management and Contingency Plan that requires facilities of all levels to develop emergency management plans.

c. Impact of previous earthquake events on Bhutan's health sector

The losses attributable to the two moderate earthquakes of 21st September 2009 and 18th September 2011 demonstrate Bhutan's high level of risk in future earthquakes.

1. Impact of September 21, 2009 Earthquake

In this event, 45 Basic Health Units were damaged. The Joint Rapid Assessment Report estimated the total cost of damages to health infrastructure at Nu. 594 million. The report noted that "collapse" and "major damages" to Basic Health Units reflected "poor construction of these buildings," and that although "building materials used in the construction met the specifications, the design of these buildings left a lot to be desired."

In fact, damaged Basic Health Units were unable to provide health care services to communities. The Ministry of Health had to make temporary arrangements for emergency health services.

2. Impact of September 18, 2011 Earthquake

This earthquake had limited impact on the health sector, though at least one BHU suffered heavy

damage. According to the Ministry of Health's assessment report, nine district hospital buildings (Bumthang, Tsimalakha, Gedu, Dagapela, Paro, Punakha, Sipsu, Gomtu, and Wangdue) developed cracks and required minor repairs. The affected health facilities were able to deliver public health services without disruption. The Joint Rapid Assessment Report estimated the total cost of damages to health infrastructure at Nu. 10.23 million.

II. National Action Plan for Earthquake Safety of Health Facilities

The main focus of the Action Plan is to enhance earthquake safety in health facilities, and to promote their continued functioning. Whenever possible, the plan integrates safety measures for other natural hazards such as fire, windstorms, and floods.

The stated goal of the Action Plan is that:

Health facilities are physically resilient and health services remain accessible and functioning at the maximum capacity possible during and immediately after hazardous events and emergencies.

a. Action planning process

The National Action Plan for Earthquake Safety of Health Facilities represents the combined effort of the Health Facilities Safety Working Group, formed with representation from key Ministries, Departments and relevant Donor Agencies (*Annexure I - Health Facilities Safety Working Group Members*) and facilitated by GeoHazards International.

At a National Stakeholder Workshop on 8th March 2012, working group members and the participants endorsed the Terms of Reference (*Annexure II*) and a Guidance Note on Development of Action Plan (*Annexure III*). The Health Facilities Safety Working Group met on numerous occasions, and GHI facilitated its work using e-mail and other communication tools.

The Working Group presented the action plan development progress, the draft action plan matrix and immediate priorities and recommendations for incorporation in the Ministry of Health's 11th Five Year Plan at the Second National Stakeholder Workshop on 23 May, 2012.

b. Action plan objectives

The National Action Plan for Earthquake Safety in Health Facilities has the following objectives:

1. Make health staff, patients and the general public safer from earthquakes and other hazards;
2. Make health facilities and buildings safer and more earthquake-resistant;
3. Enhance earthquake and emergency preparedness in health facilities; and
4. Build overall capacity and awareness of health personnel about earthquakes and other natural hazards.

c. Health facilities earthquake safety framework

The working group first worked to finalize the Health Facilities Earthquake Safety Matrix or Framework (*Annexure IV*). The framework identifies five priority areas that cover all aspects of improving earthquake safety in the health sector.

Table 3 - Priority Areas

Priority Area I	Strengthening Earthquake Safety and Disaster Management Institutional and Policy Framework in the Health Sector
Priority Area II	Education and Awareness
Priority Area III	Risk Reduction and Mitigation
Priority Area IV	Preparedness, Response and Recovery
Priority Area V	Capacity Building

III. Priority Areas and Outcomes

Priority Area I- Strengthening earthquake safety and disaster management institutional and policy framework in the health sector

The objectives of this priority area are to formulate and implement various policies, guidelines and ministerial directives to improve earthquake safety and disaster preparedness in health facilities and to strengthen disaster management institutions within Bhutan's Health sector.

Table 4- Priority Area I

Priority Area I	Outcomes	Baseline	Recommended Interventions	Timeline*	Performance Indicators	Responsible Agencies
Strengthening earthquake safety and disaster risk management institutional and policy framework in Bhutan's health sector	1.1 Policies, guidelines, ministerial directives supporting earthquake safety and disaster management in Health Facilities are in place	<ul style="list-style-type: none"> - National Health Policy, 2011 - Health Sector Disaster Management and Contingency Plan, 2011 - National Influenza Pandemic Preparedness Plan, 2010 	<ul style="list-style-type: none"> - Review and endorse the Health Sector Disaster Management and Contingency plan - Formulate standard guidelines for emergency planning in all health facilities - Formulate guidelines to identify and abate threats to functionality and hazards caused by damage to building contents, equipment and furnishings in health facilities - Adopt higher safety standards for the design and construction of all health facilities - Issue ministerial directives for implementation of earthquake safety and emergency management-related plans, standards, policies and guidelines, including the incorporation of earthquake safety, emergency management and information on other hazards in the Royal Institute of Health Sciences/ Medical University Curriculum 	<ul style="list-style-type: none"> Short Short Short to Medium Medium Short to Medium 	<ul style="list-style-type: none"> - All health facilities with functional disaster management and contingency/evacuation plans - Guidelines to identify and abate hazards from building contents, equipment and furnishings adopted and implemented in all health facilities - A new engineering standard developed specifically for health facilities that will be mandated over and above other relevant national standards 	<p><u>Lead:</u> Department of Medical Services, Ministry of Health</p> <p><u>Supporting Agencies:</u></p> <ol style="list-style-type: none"> 1. Policy and Planning Division, Ministry of Health 2. Royal Institute of Health Sciences/ Medical University management 3. Department of Disaster Management, Ministry of Home and Cultural Affairs 4. Gross National Happiness Commission 5. Dzongkhag/ Thromde Administration 6. Ministry of Finance
	1.2 Disaster Management institutions within the Health Sector strengthened	<ul style="list-style-type: none"> - Disaster Management focal person identified in Department of Medical Services - Health Help center established in 2010 	<ul style="list-style-type: none"> - Appoint/Identify disaster management focal persons and establish emergency management units in all health facilities - Strengthen Emergency Management Services Division in the Ministry of Health - Strengthen Health Help Centre and emergency response services 	<ul style="list-style-type: none"> Short Short & Medium Medium 	<ul style="list-style-type: none"> - All health facilities with disaster management focal persons and functional disaster management units - Health Help Centre fully functional and equipped to fulfill its mandate 	<p><u>Lead:</u> Department of Medical Services, Ministry of Health</p> <p><u>Supporting Agencies:</u></p> <ol style="list-style-type: none"> 1. Human Resources Division, Ministry of Health 2. Hospital/ Health facility management principals 3. Department of Disaster Management

*Short (1-5 yrs.), Medium (5-10 yrs.), Long (More than 10 yrs.)

The National Disaster Management Framework 2006 and the National Health Policy 2011 required the drafting of the Health Sector Disaster Management and Contingency Plan 2011. The Department of Medical Services, the health sector agency responsible for disaster management, conducted a number of simulation exercises to review and test the 2011 contingency plan.

The action plan framework specifies two outcomes and eight key interventions to build upon these earlier actions and further strengthen disaster management institutions and policy framework in the health sector.

Outcome 1.1 - Policies, guidelines, ministerial directives supporting earthquake safety and disaster management in hospitals and basic health units in place

a. Review and endorse the Health Sector Disaster Management and Contingency Plan

The Ministry of Health drafted the Health Sector Disaster Management and Contingency Plan in 2011; however, the plan has not yet been reviewed or endorsed. Contingency arrangements outlined under the plan should be tested and updated, and the Ministry of Health should formally endorse the plan. That endorsement would authorize the Department of Medical Services to draft various standard procedures and guidelines for emergency management in health facilities.

b. Formulate standard guidelines for emergency planning in all health facilities

Guidelines for emergency planning in health facilities at various levels should be formulated and disseminated based on the sector contingency plans. All health facilities should be required to develop their own emergency plans and to test the plans on a regular basis.

c. Formulate guidelines to identify and abate threats to functionality and hazards caused by damage to building contents, backup utility systems and equipment

In order for a hospital to remain functional, critical utilities, such as electrical power and water, and critical medical equipment must be functional, too. In previous earthquakes, hospitals lost functionality when electrical power went out and backup systems failed to come online, or when critical lifesaving and diagnostic equipment fell or became inoperable, due to earthquake shaking. Another concern is that objects can fall onto staff and patients inside a hospital and can injure them. Structural measures to limit building damage and protection for critical utility systems and medical equipment are equally important. Standard guidelines that specify measures to protect critical utility systems, such as the backup electrical power system, and critical medical equipment from earthquakes, floods and fires should be prepared, formally adopted and implemented in all health facilities.

d. Adopt higher safety standards for the design and construction of health facilities

Health facilities provide critical health care and services during and after emergency events. People congregate in health facilities even under normal operating conditions; after an earthquake or other event that creates mass casualties, large numbers of people will converge on health facilities. Because health facilities must keep all of these occupants safe and also remain functional during earthquakes and other types of emergencies, they should be built to meet higher standards and to provide a greater level of safety. Buildings in health facilities have not performed well in previous earthquakes for a

number of reasons, which include inadequate design, use of sub-standard building materials, and lack of construction inspection and quality control. The Ministry of Health should immediately adopt higher safety standards for health facility construction, along with general safety guidelines for all health facilities to follow.

- e. Issue ministerial directives for implementation of earthquake safety and disaster management plans, standards, policies and guidelines, including incorporation of earthquake safety and emergency management materials in the curricula of the Royal Institute of Health Sciences and the Medical University

All safety and disaster management-related plans, guidelines, standards and policies for the health sector should be formally adopted and circulated to all health facilities as a directive that they should undertake. In addition, the Ministry of Health should issue policy directives that call for including earthquake safety, emergency management and other information on natural hazards in the Royal Institute of Health Sciences' and the Medical University's curricula.

Outcome 1.2 - Disaster management institutions within the health sector strengthened

- a. Appoint/Identify emergency management focal persons and establish emergency management units in all health facilities

All health facilities should have operative emergency management units and identified emergency management focal persons. This would support planning, providing and sustaining capacity development activities. Formally designating and training emergency management focal persons would also help to facilitate, coordinate and sustain emergency preparedness and response activities in the health facilities.

- b. Strengthen the Emergency Management Services Division in the Ministry of Health

The Emergency Management Services Division under the Department of Medical Services is responsible for coordinating emergency management and disaster preparedness and response in the Ministry of Health. The division now has only one dedicated official working on disaster preparedness and response. Given the number of health facilities in Bhutan and the important role of the Ministry of Health, there is need to strengthen this division. The division should work with a multi-sector disaster management committee and report to the Secretary, Ministry of Health, in order to ensure that the unit is not isolated and to facilitate mainstreaming of risk reduction measures into the Ministry's plans and programs.

- c. Strengthen Health Help Centre and emergency response services

The Ministry of Health instituted the Health Help Centre in 2011 to improve access to health services and to provide round-the-clock healthcare services. The Centre offers a broad range of medical assistive services—ranging from medical emergency services, medical triage, health counseling, and

information on health services and facilities to SMS prescription for over-the-counter drugs—through a toll free number, responding within one hour to calls made at anytime from anywhere, so long as telephone/mobile network coverage is available. The Centre currently manages 101 ambulances and 69 emergency medical teams in twenty Dzongkhags. The Centre's near-term priorities are to increase its number of paramedics and to build their capacities systematically. In the long-term, the Centre needs to be strengthened institutionally and its infrastructure developed, to fulfill its important mandates.

Table 5 -Priority I - Outcomes, Activities and Sub-activities

Outcome	Activity	Sub-Activity
1.1 Policy guidelines and ministerial directives supporting disaster management in hospitals and basic health units in place	a. Review and endorse Health Sector Disaster Management and Contingency Plan	1. Conduct stakeholder meetings and table top exercises to review and test contingency plan
		2. Present reviewed plan for endorsement by the Ministry of Health. Formulate and disseminate standard guidelines to all hospitals/ basic health units
	b. Formulate standard guidelines for emergency planning in all health facilities	1. Draft emergency planning guidelines
		2. Disseminate guidelines to all health facilities and support them in formulating emergency plans
		3. Set up formal monitoring and evaluation mechanisms
	c. Formulate guidelines to identify and abate threats to functionality and hazards caused by damage to building contents, backup utility systems and equipment	1. Conduct assessment of threats to functionality and hazards caused by damage to building contents, backup utility systems and equipment in all hospitals
		2. Formulate standard guidelines for abatement of falling hazards and threats to functionality
		1. Disseminate guidelines to all health facilities and implement mitigation measures
	d. Adopt higher standards for the design and construction of health facilities	1. Review needs, gaps, current standards, etc.
		2. Conduct stakeholder consultations
		3. Formulate and agree on safety standards
		4. Disseminate to all health facilities
	e. Issue ministerial directives for implementation of earthquake safety and disaster management related plans, policies, guidelines and standards	1. Evaluate all activities and identify requirements for formal directives
		2. Disseminate to all health facilities
1.2 Disaster management institutions within the health sector strengthened	a. Appoint/identify disaster focal persons and establish disaster management units in all health facilities	1. Finalize Terms of Reference
		2. Issue ministerial directives for appointment or identification of focal persons and establishment of disaster management units
	b. Strengthen establish emergency management units in the Ministry of Health	1. Assess human resources need, detail out responsibilities etc.
		2. Discuss and submit to the Royal Civil Service Commission
	c. Strengthen Emergency Services Division in the Ministry of Health	1. Develop training curriculum for paramedics and other emergency staff
		2. Recruit and train paramedics and other required staff
		3. Review and formulate institutional and standard procedures for the Centre and its functions
		4. Review resources, budget, equipment and infrastructure requirements and formulate a long-term plan for implementation on prioritized basis

Priority Area II - Education and Awareness

The objective of this priority area is to enhance knowledge and share information related to earthquake safety in health facilities, and to increase awareness among health personnel about risks from natural hazard events. Increased awareness can lead to positive changes in behaviors and attitudes regarding the importance of risk reduction and preparedness.

Table 6 - Priority Area II

Priority Area II	Outcomes	Baseline	Recommended Interventions	Timeline	Performance Indicators	Responsible Agencies
Education and Awareness	2.1 Enhanced knowledge and information sharing management	- Knowledge and information shared through past and ongoing trainings programmes	- Establish earthquake safety and disaster risk reduction knowledge sharing network among health facilities - Share Information with communities	Medium Ongoing	- Mechanism for information sharing developed - No.of knowledge sharing activities - No. of community campaigns, etc.	<u>Lead:</u> Department of Medial Services, Ministry of Health <u>Supporting Agencies:</u> 1. Health Institutes/ Universities 2. Management of hospitals/health facilities 3.Department of Disaster Management, Ministry of Home and Cultural Affairs
	2.2 Increased awareness and education	- Existing information and awareness materials developed by the Ministry of Health and the Department of Disaster Management - Awareness programs through various media	- Conduct awareness activities on a prioritized basis - Observe International Day for Disaster Reduction (or commemoration of past earthquake events) and conduct preparedness drill in all health facilities as a National event - Develop information and education materials (risk communication, dos and don'ts, hazard-specific, family preparedness, etc.) - Incorporate safety information on earthquakes and other hazards and emergency management materials into Royal Institute of Health Sciences and Medical University curricula - Carry out awareness trainings on family preparedness for all health staff	Ongoing Short Ongoing Medium, long Short	- Increased awareness on disaster risks among health staff - Development of a comprehensive awareness strategy for health sector - No. of awareness activities carried out at various levels - Information and education materials formulated and disseminated in all health facilities - Risk reduction materials incorporated into Royal Institute of Health Sciences/University curricula - All health staff have family disaster management plans	<u>Lead:</u> Department of Medial Services, Ministry of Health <u>Supporting Agencies:</u> 1. Health Institutes/ Universities 2. Management of hospitals/health facilities 3.Department of Disaster Management, 4. Dzongkhag/ Thromde Administrations

Outcome 2.1 - Enhanced knowledge and information sharing management

a. Establish knowledge sharing network

Forming a network of disaster management focal persons and units in health facilities would promote sharing of knowledge and experience, as well as joint implementation of activities and programs. A virtual platform could be used to share information on hazards, risks, preparedness and response guidelines, awareness materials, and risk mitigation options. The platform would provide a place to discuss common issues and challenges and would foster solidarity and motivation.

b. Share information with communities

As important community nodes and public service providers, health facilities can share knowledge and raise awareness in their immediate communities about natural hazards and the need for risk reduction and preparedness. The training of village health workers should integrate information on earthquake safety, other hazards, disaster risks, their impact on the health sector, and the preparedness measures that the health sector is putting into place.

Outcome 2.2 - Increased awareness and education

a. Conduct awareness programs and activities

There is a need to conduct awareness activities and programs on a prioritized basis, targeting decision makers, focal persons, disaster management units, emergency health staff and others, at various levels. Content should include various hazards, dos and don'ts, health emergencies, and preparedness measures being put into place.

b. Observe International Day for Disaster Reduction

Bhutan has observed the International Day for Disaster Reduction since 2008. All health facilities should observe this day and also mark past earthquake events that have affected Bhutan. These days present significant opportunities to enhance preparedness and to share the message of earthquake safety and risk reduction. Health facilities across Bhutan could use the International Day for Disaster Reduction as a time to reflect on their role in emergencies and to conduct emergency drills.

c. Develop information and education materials

Easy-to-use and understand educational materials should be developed for disaster management units, emergency medical teams, focal persons and other health staff. These materials should provide basic information on various hazards, dos and don'ts, family preparedness, simple maps identifying hazard zones (glacial lake outburst flood red zone areas, landslide prone areas, flood inundation zones, etc.) and other relevant topics.

d. Incorporate safety information on earthquakes and other hazards and emergency management materials into Royal Institute of Health Sciences and Medical University curricula

Incorporating appropriate materials on emergency management, as well as information on various hazards and disaster risks, into the Royal Institute of Health Sciences and the medical university curricula would help to promote a culture of preparedness and resilience and would represent a long-term investment in risk mitigation.

e. Raise awareness on family preparedness

During earthquakes and other emergencies, the staff at a health facility is responsible for far more than delivering routine health services: staff must also deliver critical emergency health care and ensure the safety of patients. To fulfill this responsibility, both staff and their families need to be prepared for natural hazard events and emergencies. When staff members' families are prepared and able to take care of themselves, staff members feel able to continue their work at the hospital. Health facilities must place a high priority on sensitizing staff on the need for family preparedness. Such sensitization programs can help health personnel and their family members to change attitudes, prepare their own disaster management plans, and assume their respective responsibilities during emergencies.

Table 7 - Priority II -Outcomes, Activities and Sub-activities

Outcome	Activity	Sub-Activity
2.1 Enhanced knowledge and information sharing management	a. Establish knowledge sharing network among health facilities	1. Develop suitable information technology platform and other coordination mechanism
		2. Conduct knowledge- and experience-sharing activities (quiz, exhibitions, newsletters, etc.)
	b. Share information with communities	1. Carry out community-based awareness activities
		2. Train village health workers
2.2 Increased awareness and education	a. Conduct awareness programs and activities	1. Conduct needs assessment and planning activities per target audience
		2. Implement awareness-raising activities
	b. Observe International Day for Disaster Reduction	1. Participate in National Shakeout
		2. Commemorate past earthquake events, the role of health facilities during emergencies and other awareness activities
	c. Incorporate safety materials on earthquakes and other natural hazards and emergency management materials into RIHS and university curricula	1. Review existing curriculum for emergency management and information on hazards and health emergencies, etc.
		2. Formulate appropriate materials
		3. Carry out capacity building activities
		4. Incorporate into curricula
	d. Raise awareness on family preparedness	1. Formulate materials
		2. Conduct sensitization programs

Priority Area III - Risk Reduction and Mitigation

The objectives of this priority area are to reduce loss of lives and property damage in the event of an earthquake or other natural hazard event, such as a glacial lake outburst flood, fire, or landslide. Specific risk reduction and mitigation measures differ, depending on the hazard. For earthquakes, risk reduction and mitigation involve ensuring that health facilities are structurally sound, located on stable ground and able to withstand the expected level of earthquake shaking with limited damage; that critical utility systems and equipment are protected from damage; and that furnishings, decorative finishes and parts of the building are anchored or braced to prevent them from falling onto patients or staff members. The table below focuses on risk reduction and mitigation measures for earthquakes, but similar measures can and should be delineated for the other hazards that Bhutan's health facilities face.

Table 8 - Priority Area III

Priority Area III	Outcomes	Baseline	Interventions	Timeline	Performance Indicators	Responsible Agencies
Risk Reduction and Mitigation	3.1 Structural measures implemented	<ul style="list-style-type: none"> - Vulnerability assessment training conducted for Health Infrastructure Development Division engineers - Existing designs for hospitals based on standard building codes - Basic health unit construction guidelines - Vulnerability assessment of Jigme Dorji Wangchuck National Referral Hospital conducted in 2012 	<p>New Construction:</p> <ul style="list-style-type: none"> - Prepare standard earthquake-resilient designs for health facilities - Review existing guidelines for health facility construction and incorporate earthquake safety and risk reduction concerns, including identification of sites outside of hazard zones (glacial lake outburst flood red zones, flood and landslide prone areas, windstorms, etc.) - Institute construction quality control and inspection mechanisms for, and adherence to, standards and designs <p>Existing Buildings:</p> <ul style="list-style-type: none"> - Conduct vulnerability/safety assessment of existing health facilities/buildings - Carry out recommended Replace/Repair/Retrofit measures 	<ul style="list-style-type: none"> Short to Medium Short to Medium Short to Medium Short to Medium Short to Medium Medium to Long 	<ul style="list-style-type: none"> - All new health facilities constructed per earthquake resilient design - Health facilities constructed per guidelines outside of hazard zones - Quality and standards of all new construction ensured - All health facilities assessed and strengthened accordingly 	<p><u>Lead:</u> Health Infrastructure Development Division, Ministry of Health</p> <p><u>Supporting agencies:</u></p> <ol style="list-style-type: none"> 1. Department of Medical Services, Ministry of Health 2. Management of hospitals/health facilities 3. Department of Disaster Management, Ministry of Home and Cultural Affairs 4. Dzongkhag/Thromde Administrations 5. Ministry of Works and Human Settlement 6. Dzongkhag/Thromde Engineers

	3.2 Critical utility systems and equipment protected and falling hazards abated		- Carry out fixing, bracing and other non-structural measures in all health facilities (e.g., electric systems, proper use of electrical appliances, etc.)	Medium	- Falling hazards in health facilities identified and abated	<u>Lead:</u> Health Infrastructure Development Division, Ministry of Health <u>Supporting Agencies:</u> 1. Department of Medical Services, Ministry of Health 2. Management of hospitals/ health facilities 3. Department of Disaster Management
	3.3 Risk insurance in place for health facilities		- Explore and institute risk insurance for health facilities/ buildings	Short to Medium	- Health facilities and buildings insured on a prioritized basis	<u>Lead:</u> Department of Medical Services <u>Supporting agencies:</u> 1. Royal Insurance Corporation of Bhutan and other insurance agencies 2. Ministry of Finance 3. Department of Disaster Management

Outcome 3.1 - Structural Measures

For New Construction

a. Prepare standards for earthquake-resilient designs for health facilities

Health facilities must remain functional, in order for health personnel to deliver important emergency medical services and to ensure the safety of patients and the public. Therefore, higher performance standards should be maintained for health facility buildings, especially with regard to earthquakes.

b. Review existing guidelines for health facility construction

Existing health facility construction guidelines and procedures should be reviewed, in order to determine how to incorporate higher design standards so as to limit damage from earthquakes, windstorms and other natural hazard events. Guidelines should also specify how to identify safe sites for construction and should prohibit building in hazardous areas (glacial lake outburst flood red zone areas, flood zones, landslide prone areas, etc.).

c. Institute construction quality control and inspection mechanisms

Past assessments and experiences from previous earthquake events illustrate the importance of ensuring construction quality by testing materials, inspecting workmanship, and confirming that the building is constructed according to the design drawings. The Health Infrastructure Development

Division should institute a special quality control and inspection mechanism independent of the builder for the construction of health facilities.

Existing Construction

- d. Conduct vulnerability/safety assessment of existing health facilities

At present Bhutan has 31 hospitals (including Jigme Dorji Wangchuck National Referral Hospital), 184 Basic Health Units and 517 outreach clinics. Some of these facilities were built before Bhutan adopted requirements for special seismic detailing of reinforced concrete buildings, along with other seismic safety requirements. It is therefore necessary to assess the vulnerability of existing health facilities, to develop a clear understanding of the level of vulnerability and the possibilities for strengthening or replacing structures to reduce and mitigate risk.

- e. Carry out recommended strengthening, replacement or relocation measures

Vulnerability and safety assessment recommendations for strengthening or replacing existing health facilities/buildings should be carried out in a prioritized and phased manner.

Outcome 3.2 - Critical utility systems and equipment protected and falling hazards abated

- a. Carry out fixing, bracing and other non-structural measures in all health facilities

During an earthquake, falling contents, equipment and building elements such as parapets and ceilings cause the most injuries. Damage to critical utility systems, such as electrical power, and to expensive life-saving and diagnostic medical equipment can impede the delivery of medical services. Equipment and utility distribution systems must be braced and anchored, so that they will remain functional following earthquakes and other emergencies. Hospitals have more complex utility systems and equipment than do most other buildings; for that reason, they need special guidelines and standards for protecting those systems and pieces of equipment against natural hazards. The Health Infrastructure Development Division and Biomedical Engineering Division should work with engineers who are experienced in protecting these systems to formulate such guidelines and standards. They should also develop guidelines to abate potential hazards caused by contents or architectural elements that can fall during an earthquake, along with guidelines for electrical safety and fire hazards. Once guidelines are available, the Ministry of Health should train appropriate personnel and implement required measures.

Outcome 3.3 - Explore and institute risk insurance for health facilities

- a. Explore and institute risk insurance for health facilities

Insuring health facilities and buildings (on a prioritized/selective basis) can ensure funding for recovery and re-construction activities, if required. Insurance can also be a way of ensuring and encouraging buildings to be constructed per design.

Table 9 - Priority III - Outcomes, Activities and Sub-activities

Outcome	Activity	Sub-Activity
3.1 Structural measures implemented	a. Prepare standards for earthquake-resilient designs for health facilities	1. Review existing designs and gaps
		2. Include non-structural elements (fixtures, ceilings, partitions, equipment, etc.)
		3. Formulate enhanced standards and designs and disseminate
	b. Review existing guidelines for health facility construction	1. Review existing guidelines
		2. Include seismic considerations, site assessment and other risk reduction concerns (glacial lake outburst flood risk zones, landslide and flood prone areas, recurrent windstorms, etc.)
		3. Update guidelines and disseminate
	c. Institute construction quality control and inspection mechanisms	1. Review existing inspection mechanisms
		2. Formulate and mandate quality control of construction (including construction materials) and inspection mechanisms
	d. Conduct vulnerability and safety assessments of existing health facilities and buildings	1. Formulate vulnerability assessment checklists and guidelines
		2. Train engineers and assessors
3. Consolidate assessment report and present to decision makers		
e. Implement recommended measures	1. Prioritize recommendations and plan implementation	
	2. Implement measures in phased manner	
3.2 Critical utility systems and equipment protected and falling hazards abated	a. Carry out fixing, bracing and other non-structural abatement measures in all health facilities	a. Prepare guidelines for the protection of critical utility systems and guidelines for abating potential falling hazards
		b. Train maintenance staff and engineers in implementing the mitigation measures
		c. Implement the measures in all health facilities
3.3 Risk insurance in place for health facilities	a. Explore and institute insurance against damage to health facilities and buildings	1. Explore risk insurance options
		2. Put mechanisms in place

Priority Area IV - Preparedness, Response and Early Recovery

The objectives of this priority area are to strengthen preparedness planning and to enhance response and immediate recovery capacities.

Table 10 - Priority Area IV

Priority Area IV	Outcomes	Baseline	Recommended Interventions	Timeline	Performance Indicators	Responsible Agencies
Preparedness, Response and Early Recovery	4.1 Preparedness planning strengthened	<ul style="list-style-type: none"> - Health Sector Disaster Management and Contingency Plan formulated in 2011 - National Influenza Pandemic Preparedness Plan, 2010 	<ul style="list-style-type: none"> - Review and adopt Health Sector Disaster Management and Contingency Plan - Formulate and adopt guidelines for emergency management plan for health facilities - Issue ministerial directives for formulation of emergency plans in all health facilities - Carry out table top exercises to test plan, train participants and sensitize participants on plan and their responsibilities - Conduct preparedness and evacuation drills in all health facilities 	<ul style="list-style-type: none"> Short Short Short to Medium Short to Medium Short to Medium 	<ul style="list-style-type: none"> - Functional health sector contingency plan in place - Functional disaster management/ contingency plan for all health facilities in place - All health facilities, Dzongkhags, health sector agencies aware of contingency plan procedures and arrangements 	<p><u>Lead:</u> Department of Medical Services, Ministry of Health</p> <p><u>Supporting Agencies:</u></p> <ol style="list-style-type: none"> 1. Management of Hospitals/ Health Facilities 2. Department of Disaster Management, Ministry of Home and Cultural Affairs
	4.2 Response and immediate recovery capacities strengthened	<ul style="list-style-type: none"> - Health Help Centre established in 2011 - 69 Emergency medical teams across the country - 101 ambulances available 	<ul style="list-style-type: none"> - Establish clear chain of command and communication flow - Maintain stockpile of materials required for emergency response and immediate recovery period - Establish/institute pre-arrangements for emergency requirements, including arrangements for mutual aid and coordination between health facilities - Standardize equipment/materials requirements in health facilities and at local and national levels - Strengthen emergency medical response capacities 	<ul style="list-style-type: none"> Short Medium Short to Medium Short to Medium Medium 	<ul style="list-style-type: none"> - Effective communication and command system in place for emergencies - Stockpile of emergency materials and pre-arrangements in place and pre-positioned for effective response and recovery - Health facilities equipped with basic equipment and materials - Health Help Centre equipped with manpower and capacities to deliver effective emergency medical response 	<p><u>Lead:</u> Department of Medical Services, Ministry of Health</p> <p><u>Supporting Agencies:</u></p> <ol style="list-style-type: none"> 1. Management of Hospitals and Health Facilities 2. Department of Disaster Management 3. Health Help Centre, Ministry of Health

Outcome 4.1 - Preparedness planning strengthened

a. Review and adopt health sector disaster management and contingency plan

Since 2011, the Ministry of Health has formulated a health sector disaster management and contingency plan that details emergency arrangements, communication protocols, etc. At this time, the Ministry of Health should review, update and formally adopt the plan and disseminate it at all levels, in order to familiarize all health personnel with the plan's procedures and provisions. Reviewing the contingency plan could also help to guide health facilities in drafting their own contingency plans.

b. Formulate and adopt emergency management plans in health facilities

All health facilities need their own contingency plans to be able to respond effectively during emergencies. The Ministry of Health should formulate guidelines to assist health facilities in coming up with and adopting their own contingency plans. Ministerial directives mandating that all health facilities formulate their own contingency plans would encourage facilities to create and adopt such plans.

c. Conduct tabletop exercises to test plan and train and sensitize participants on plan and their responsibilities

A number of tabletop exercises should be conducted at various levels, in order to test both the health sector contingency plan and contingency plans made at the health facility level. Tabletop and simulation exercises can also serve as an effective tool to sensitize health personnel and to make them aware of their roles and responsibilities during emergencies.

d. Conduct preparedness and evacuation drills in all health facilities

Once the contingency plan is formulated and has been tested through various tabletop exercises, regular mock drill/ evacuation drills should be conducted to ensure preparedness and to review and update contingency arrangements and procedures.

Outcome 4.2 - Response and immediate recovery capacities strengthened

a. Establish clear chain of command and communication flow

Formulating and instituting a clear chain of command and information flow during emergencies will facilitate effective response. All levels within the health sector should establish a clear communication flow.

b. Maintain stockpile of materials required for emergency response and immediate recovery

Effective emergency preparedness and response require maintaining a stockpile of emergency materials at various levels. As emergency medical services are a vital component of first response, the Ministry of Health should ensure that adequate capacities (trained personnel, equipment, and other

resources) exist at all levels and that arrangements are put into place to support rapid provision of emergency medical services. Facilities at Dzongkhag or regional levels should also maintain emergency recovery materials (CGI sheets, tarpaulin, education materials etc.), to help ensure the swift recovery and functionality of health facilities.

- c. Establish/Institute pre-arrangements for emergency requirements, including arrangements for mutual aid and coordination between health facilities

Effective emergency management means having emergency plans and contingency arrangements in place and practiced, well in advance. Health facilities should put in place on a prioritized basis all pre-arrangements and procedures that the health sector disaster management and contingency plan and emergency plans formulated by individual health facilities (related to manpower, communication, transportation etc. for response and recovery) require. All referral and district hospitals should establish a network and should develop and maintain protocols for mutual aid and coordination in emergencies.

- d. Standardize equipment/materials requirements at all levels

The Ministry of Health should standardize emergency and disaster management equipment and materials requirements at various levels-basic health units, Dzongkhag hospitals, regional referral hospitals/region and at national level-and procure them on a prioritized basis.

- e. Strengthen Emergency Medical Response Capacities

All health facilities should review existing medical response systems and capacities and should develop a plan to adopt and strengthen these systems and capacities, as needed. Facilities should establish emergency medical response and disaster management units and should train staff in mass casualty management, trauma and psychosocial care, triage and other related skills. In the case of the Health Help Centre, more paramedics and emergency medical teams should be added. The Centre should provide continuous skills/refresher trainings to the teams, strengthen its emergency communication facilities, and develop its infrastructure in a phased manner.

Table 11 - Priority IV- Outcomes, Activities and Sub-activities

Outcome	Activity	Sub-Activity
4.1 Preparedness planning strengthened	a. Review and adopt Health Sector Disaster Management and Contingency Plan	1. Review and discuss plan at various levels and with various stakeholders
		2. Update plan and formally disseminate
	a. Formulate and adopt emergency plans in health facilities	1. Formulate emergency planning guidelines and disseminate to all health facilities
		2. Each health facility develops its own plan
	b. Conduct table top exercises to test and sensitize on contingency arrangements	1. Develop/design scenarios
		2. Conduct table top exercises at various levels and draw up standard procedures
		3. Formulate the contingency plan
	c. Conduct preparedness and evacuation drills in all health facilities	1. Disseminate emergency plan and guidelines
		2. Sensitize at all levels
	4.2 Response and immediate recovery capacities strengthened	a. Establish clear chain of command and communication flow
2. Formulate standard communication procedures at various levels		
b. Maintain stockpile of materials required		1. Identify and standardize materials required to be stockpiled for response and immediate recovery
		2. Stockpile materials on prioritized basis
c. Establish and institute pre-arrangements for emergency requirements		1. Identify gaps and requirements
		2. Discuss and formulate pre-arrangements to be put in place
		3. Establish pre-arrangements as required
d. Standardize equipment and material requirements at various levels		1. Assess equipment and materials needs at various levels of hospital administration
		2. Standardize equipment and material requirements
		3. Procure on prioritized basis
e. Strengthen emergency medical response capacities		1. Review requirements, establish system and procedures and provide relevant training in health facilities
		2. Increase manpower, strengthen emergency communication system, provide training and infrastructure requirements, etc. for the Health Help Centre

Priority V - Capacity Building

The health sector must develop human and material capacities at various levels, in order to reduce risk and increase preparedness. Carrying out a capacity needs assessment and implementing capacity building programs to build technical, managerial and emergency skills on a prioritized basis, will help the sector to implement risk reduction and action plan priorities effectively.

Table 12 - Priority Area V

Priority Area V	Outcomes	Baseline	Recommended Interventions	Timeline	Performance Indicators	Responsible Agencies
Capacity building	5.1 Capacity building for risk reduction	<ul style="list-style-type: none"> - Past and ongoing trainings - Vulnerability assessment forms training, 2012 	<ul style="list-style-type: none"> - Build capacity of engineers and maintenance staff to assess vulnerability and safety of health facilities/buildings and to communicate risk - Build the capacity of engineers and architects in retrofitting and seismic risk reduction techniques for buildings - Carry out comprehensive training on how to abate falling hazards - Raise awareness and capacity of policy and planning personnel and other relevant health personnel on mainstreaming risk reduction concerns 	<ul style="list-style-type: none"> Short to Medium Medium to Long Short Short to Medium 	<ul style="list-style-type: none"> - Engineers and technical personnel are trained in the use of vulnerability assessment tools and procedures and equipped with capacity to retrofit/strengthen existing health facilities/buildings - Technical personnel are able to communicate risk effectively - Health personnel, especially maintenance staff, are trained in carrying out non-structural risk reduction measures 	<p><u>Lead:</u> Health infrastructure development division, Ministry of Health</p> <p><u>Supporting Agencies:</u></p> <ol style="list-style-type: none"> 1. Department of Medical Services, Ministry of Health 2. Hospital/health facility management 3. District/ Thromboc engineers 4. Ministry of Works and Human Settlement 5. Department of Disaster Management
	5.2 Capacity building for preparedness and response	<ul style="list-style-type: none"> - Table top and simulation exercises conducted to test the Health Sector Disaster Management and Contingency Plan - National Influenza Pandemic Preparedness Plan simulation and table top exercises - Emergency management trainings undergone by Ministry of Health personnel 	<ul style="list-style-type: none"> - Evaluate and strengthen emergency communication systems in place - Strengthen emergency transportation arrangements - Provide training to targeted groups: paramedics, Health Help Centre staff, disaster management units, health facility administrators, doctors, nurses, focal persons - Provide standard equipment/materials for response and immediate recovery 	<ul style="list-style-type: none"> Short to Medium Medium Short to Medium Medium 	<ul style="list-style-type: none"> - Health personnel are equipped with knowledge on emergency management - Medical teams, focal persons have enhanced capacity to carry out their responsibilities 	<p><u>Lead:</u> Department of Medical Services, Ministry of Health</p> <p><u>Supporting Agencies:</u></p> <ol style="list-style-type: none"> 1. Hospital/ health facility management 2. Health Help Centre 3. Doctors, nurses other health staff 4. Department of Disaster Management, Ministry of Home and Cultural Affairs

Outcome 5.1 - Capacity building for risk reduction

- a. Build capacity of engineers and maintenance staff to assess building for vulnerability and safety of health facilities/buildings

Bhutan has more than 700 health facilities (including basic health units and outreach clinics), many of which were constructed before building codes required earthquake-resistant features. It is therefore very important to determine the potential earthquake vulnerability of existing health facilities and buildings. To carry out vulnerability and safety assessment of health facilities and buildings, the Ministry of Health needs to formulate tools to carry out the assessments and train engineers to use them.

- b. Build the capacity of engineers and architects for retrofitting and carrying out mitigation measures

Engineers should receive training in mitigation and retrofit techniques so that, after conducting vulnerability and safety assessments, they are able to provide recommendations on how to strengthen or replace health facility buildings.

- c. Carry out comprehensive training on protecting backup utility systems and abating potential falling hazards

Maintenance staff and other relevant personnel should receive training as soon as possible on how to fix and brace potential falling hazards, and on how to address other non-structural hazards such as poor electric wiring etc. that could lead to fires. Maintenance staff and engineers should be trained on how to protect and strengthen critical backup utility systems, to ensure that they are not damaged during earthquakes or other hazardous events.

- d. Raise awareness and capacity on mainstreaming risk reduction concerns

Both the National Disaster Risk Management Framework 2006 and the National Disaster Management Bill require Ministries and Agencies to mainstream disaster management risks and concerns into their plans and programs. The 11th Five Year Planning Guidelines identify "mainstreaming disaster resilience" as one of 16 National Key Result Areas and "disaster risk reduction" as a cross-cutting theme. Raising awareness and building the capacity of policy and planning and other relevant personnel of the Ministry of Health will help to enable them to mainstream disaster management concerns into their plans and programs.

Outcome 5.2 - Capacity building for preparedness and response

- a. Evaluate and strengthen emergency communication systems in place

Bhutan has a networked medical services system that relies on telephone and mobile communication. The Health Help Centre's entire emergency medical response system is based on mobile

communication. This system is not robust enough to function during a widespread earthquake emergency. The Ministry of Health should evaluate its existing communication systems both within and between health facilities and upgrade them as needed for effective and reliable communication during emergencies.

b. Strengthen emergency transportation arrangements

Bhutan depends heavily on its fragile road networks for all transportation. In the past, minor earthquakes or even heavy monsoon rains have produced landslides that blocked roads for days. Major earthquake events could affect the whole of Bhutan and render the road network impassable. For this reason, it is crucial to consider alternative arrangements for transporting critically ill patients from one health facility to another (to district and referral hospitals) within Bhutan, as well as arrangements for transporting people outside Bhutan to receive specialized medical care.

c. Provide training to targeted groups in the health sector

The Ministry of Health should assess the capacity needs for the various health personnel at different levels. These include paramedics, Health Help Centre staff, disaster management units, health facility administrators, doctors, nurses, focal persons, etc. Based on the assessment, a capacity building programme should be developed and implemented. Training topics should include conduct of preparedness and evacuation drills, mass casualty management, search and rescue, first aid, emergency logistics, psychosocial and trauma care, fire safety and other emergency management skills.

d. Provide standard equipment/materials for response and immediate recovery

All health facilities should have the standard equipment and materials that the staff will need to respond to an earthquake or other emergency, and to continue providing medical care in its immediate aftermath. A set of standard, essential equipment and materials for each facility would include items for mass casualty management, fire suppression, basic search and rescue, and emergency communications, as well as emergency food and water and extra medical supplies needed to treat the types of injuries earthquakes and other hazard events will cause. Similarly, emergency medical response teams and ambulances should be equipped with standard emergency medical response equipment and communication facilities.

Table 13 - Priority V - Outcomes, Activities and Sub-activities

Outcome	Activity	Sub-Activity	
5.1 Capacity building for risk reduction	a. Build capacity of engineers and maintenance staff to assess buildings for vulnerability and safety	1. Formulate tools and train engineers and assessors	
		2. Plan and provide resources for actual assessment	
		3. Conduct related skill enhancement and mentoring and training programs and activities	
	b. Build the capacity of engineers and architects in retrofitting and carrying out mitigation measures	1. Assess capacity needs and gaps	
		2. Conduct training and mentoring programs	
		3. Conduct pilot projects for skill development	
	c. Conduct comprehensive training on fixing and abating of falling hazards	1. Develop guidelines, manuals and provide training	
		2. Fix falling hazards in pilot health facilities as a demonstration and skill development project	
	d. Raise awareness and capacity of policy and planning and other relevant personnel regarding mainstreaming disaster risk reduction	1. Carry out awareness and sensitization activities	
		2. Integrate disaster risk reduction policies and practices into Ministry of Health's plans and programs	
	5.2 Capacity building for preparedness and response	a. Evaluate and strengthen emergency communication systems in place	1. Evaluate existing emergency communication systems and facilities
			2. Upgrade and enhance emergency communication systems and facilities
3. Formulate emergency communication procedures and sensitize health personnel			
b. Strengthen emergency transportation arrangements		1. Review needs and explore alternative transportation requirements	
		2. Put alternative transportation systems and arrangements into place	
c. Provide training to targeted groups in the health sector		1. Assess capacity and training needs at various levels	
		2. Prioritize capacity requirements—emergency drills, mass casualty management, search and rescue, first aid, emergency logistics, psychosocial and trauma care, fire safety and other capacity requirements	
		3. Formulate plan and strategy for capacity building	
		4. Implement prioritized plan	
d. Provide standard equipment and materials required for response and immediate recovery		1. Review needs for standard equipment and materials for response and immediate recovery at various levels	
		2. Develop lists of essential standard equipment and materials facilities at each level should have on-site	
		3. Procure and disseminate standard equipment and materials	

IV. Implementation, Review and Monitoring Arrangements

Mainstreaming disaster risk reduction is an important theme in the 11th Five Year Plan. As is true for other cross-cutting themes, the Gross National Happiness Commission and the Ministries and Agencies would be required to monitor their progress and achievements in mainstreaming these concerns.

Through the National Action Planning Process, the working groups have succeeded in incorporating their immediate priorities into the upcoming 11th Five Year Plan. However the plan takes a long-term view (over more than 10 years) and identifies priorities and activities that would extend beyond the 11th Five Year Plan. In addition, as needs and priorities change over time, the plan requires continual review and monitoring.

The Department of Medical Services should ensure, as the key agency, that the national action plan is reviewed in conjunction with the annual and five yearly plan reviews. A Review Committee, which would be co-chaired by the Department of Medical Services and the Department of Disaster Management and would involve the working group members, would carry out annual reviews of the action plan. The annual review meeting would evaluate the progress made in implementing the action plan, gaps, support and resource requirements and also plan for current priorities to be included in upcoming annual and five yearly plans.

V. Annexure

Annexure I - Health Earthquake Safety Working Group Members

Annexure II - Terms of Reference for the Working Group

Annexure III - Guidance Note on Development of Action Plan

Annexure IV - Health Facilities Earthquake Safety Action Plan Matrix

Annexure I

Hospital Earthquake Safety Working Group Members

	Name	Designation	Organisation
1	Dr. Druptop Sonam	Medical Superintendent	Jigme Dorji Wangchuck National Referral Hospital
2	Wangdi Gyeltshen	Project Director	Health Infrastructure Development Division
3	Pelden Zangmo	Chief Program Officer	Department of Disaster Management
4	Lhachey Dema	Program Officer	Department of Disaster Management
5	Yangchen Wangmo	Civil Engineer	Health Infrastructure Development Division
6	Sonam Letho	Architect	Health Infrastructure Development Division
7	Pema Tshewang	Administrative Officer	Bumthang District Hospital
8	Pema Dorji	Administrative Officer	Gelephu Regional Referral Hospital
9	Tashi Duba (Coordinator)	Program Officer	Ministry of Health
10	Phuntsho Norbu	Administrative Officer	Mongar Regional Referral Hospital
11	Tek Nath Kararai	Engineer	Thimphu Thromdey
12	Kinley Dorji	National Program Officer	World Health Organization, Bhutan
13	Anne Erica Larsen	Program Analyst	United Nations Development Program, Bhutan
14	Karma Doma Tshering	National Coordinator	GeoHazards International, Bhutan
15	Sonam Tenzin	Project Officer	GeoHazards International, Bhutan

Annexure II

Terms of Reference for School and Hospital Earthquake Safety Working Groups

The Department of Disaster Management (DDM) and GeoHazards International (GHI) will be collaborating in the area of disaster risk reduction and preparedness capacity in the country. Towards this end, the development of National Action Plans for School and Hospital Earthquake Safety in Bhutan is an important activity. The goal of the action planning process is to support the key Ministries - the Ministry of Health and the Ministry of Education to develop a comprehensive consensus plan on how to do away with the current situation of seismically unsafe schools and hospitals, to acceptable levels of seismic safety and preparedness.

Hospital and School Earthquake Safety Working Groups have been formed respectively, with representation from relevant Agencies and Departments, to come out with the draft National Action Plans for school and earthquake safety. This document describes the roles and activities of the Working Group and outlines the support and assistance to be provided by the DDM and the GHI in facilitating the planning process.

A. Working Group Members

Representative from key Ministries, Departments, the DDM and relevant UN and other Donor Agencies have been identified as members of the two Working Groups. The same Working Group members are expected to participate through out the action planning process for continuity and coordinated outcome of the process. In the absence of a designated Working Group member, a replacement from the same Agency/Department should represent with prior information to the DDM focal person.

B. Working Group Activities

The Working Group will conduct the following activities:

- Hold in-person meetings as per agreed schedule to carry out the action plan development process;
- Participate in a National Consultation Workshop to help advance the plan development process;
- Review and provide advice on the draft Action Plan Document, as needed;
- Provide information and data needed for the description of current conditions and gap analysis;
- Produce the draft National Action Plan as a consensus document, with support from DDM and GHI.

C. Expected Outcomes

Expected Outcomes of the Working Group meetings are:

- The development of a draft National Action Plan for Hospital Earthquake Safety and School Earthquake Safety;

- Increased awareness, understanding and urgency among members and stakeholders on the need for seismic safety and to reduce risks and enhance preparedness levels;
- The use of the Action Plan as a mainstreaming and prioritization tool for the Ministry of Health and the Ministry of Education in the 11th FYP.

D. Responsibilities of the Department of Disaster Management

As the National Coordinating Agency for disaster management, the DDM will be responsible for:

- Assigning a National focal person
- Providing the space for meetings
- Identifying and facilitating the participation of relevant stakeholders
- Facilitating technical experts/consultants, as required, during the process
- Ensuring awareness and advocacy on the formulation and implementation of the Plan
- Supporting the Ministry of Education and the Ministry of Health in taking ownership and in mainstreaming the Plan during the 11th FYP and consecutive FYP periods, as required.

E. Responsibilities of GeoHazards International

Support from GeoHazards International will consist of the following:

- GHI's Local Project Officer will organize and facilitate meetings of the Working Group, assist the Working Group members in obtaining background information and data and document for the Working Group meetings and decisions made;
- Develop drafts of the Plan document and compile and edit the draft Plan as per the comments and advice of the Working Group members.
- GHI will provide Mr. Thomas Tobin, who has many years of experience in mitigation planning, as a resource for the Working Groups. Mr. Tobin will co-chair the National Consultative Workshop for the Working Groups and other stakeholders.

Annexure III

Developing a National Action Plan (School Earthquake Safety and Hospital Earthquake Safety) - A Guidance for the Bhutan Working Groups

A. Background

In any earthquake disaster event, hospitals and schools have proven most vulnerable, be it in terms of loss of lives or damage to infrastructure. Bhutan lies in one of the most seismically active regions and even in the most recent earthquake events in Bhutan (21st September, 2009 Earthquake that impacted Eastern Bhutan and 18th September, 2010 that affected mostly Western Bhutan), both health and education sectors suffered heavy losses. More than 250 numbers of school infrastructure and over 100 hospital infrastructures were recorded as damaged in the two earthquake events. These figures alone call for schools and hospitals to enhance their seismic safety and preparedness.

In any community hospitals and schools are critical public service nodes and have a key role to play during all phases of disaster management. Above all, hospital and school management have the responsibility of ensuring a safe environment for children and the public.

Therefore, developing and implementing National Action Plans for Earthquake Safety for Schools and Hospitals is an initiative that needs to be urgently realized. This initiative also fits very well into the overall National Disaster Risk Management Framework, which calls for proactive risk reduction and mainstreaming of disaster concerns into national programs and policies and upcoming National Disaster Management Act, which requires each notified department/agency to prepare contingency/action plans for disaster management. The formulation of such actions plans could also be used as a disaster mainstreaming tool and help the concerned sectors in prioritizing and incorporating important risk reduction and preparedness initiatives/actions into their own five year and annual plans.

B. What is an Action Plan?

An Action Plan is a written document that describes the tasks or actions to be performed to achieve a strategy or certain objectives/goals successfully. The purpose is to organize and develop solutions to address specific issues and challenge.

An action plan usually outlines - strategy/objectives (what is the strategy and what needs to be achieved), issues (challenges, problems, needs), specific tasks (what will be done and by whom), a time line (when will it be done), resources (available and required), likely constraints (existing or expected) and outcomes (expected changes that need to happen to move closer to the goal).

C. Likely Components of an Action Plan for School and Hospital Earthquake Safety

An action plan can be presented in many different ways - it can be a 50-page report, a five page list of key plan elements, or a simple one-page table. The working group should determine how best to present

the plan and the level of detail the plan should try to achieve. Too much detail may obscure the major elements of the plan.

Some of the main elements of an Action Plan would be:

1. Background - A brief description of current conditions physically (hazards, risks, vulnerabilities) and policy-wise (the NDRMF, Bill, relevant policies/guidelines). The plan document might also include a summary of the planning process and the work that was put in to come up with the Plan.
2. Goals - What are the objectives of the Action plan? - What does the Action Plan seek to achieve over a period of time? Goals and Objectives can be divided into short term, long term and intermediate or medium term goals. Clear and measurable Objectives would lead to identifying proper needs and interventions.
3. Identified Gaps - What are the issues to be tackled? A description of the shortcomings, gaps and needs which should be filled before the fundamental objectives can be met.
4. Strategic Areas of Intervention - What are the strategies that need to be adopted to overcome the identified gaps and meet the set goals and objectives? Areas of intervention may be identified in terms of - Awareness Raising, Mitigation/Risk Reduction, Response/Preparedness, Mainstreaming etc.
5. Specific Activities - The Plan then needs to specify priorities and actions under each identified strategy to fill the gaps and reach the objectives.
6. Expected Outcomes - What are the expected results/changes due to implementation of the strategy/ activities? - In quantitative as well as qualitative terms.
7. Time Frame - Timeline for actions should be realistic and could be aligned with the annual and five year planning process.
8. Lead Agencies - A listing of the organizations (and possibly individuals / positions) and agencies that would take the lead or be responsible for each action.
9. Resources - A summary of required and available resources, both fiscal (funding to implement elements of the action plan, cost estimates, sources of funding) and technical (technical documents, standards, training materials, manuals, etc.).
10. Mechanisms/Additional Notes - Implementation/ Coordination/ Reporting mechanisms and arrangements for carrying out activities and other requirements to be noted could also be included in the Plan.

An Action Plan Matrix to summarize all the key elements and for easy reference would be an important annexure to the Plan document.

D. Action Plan Development Process

For the development of an Action Plan, the working groups would adopt the following steps/process:

1. Set the Goals (Clarify objectives, scope, priority areas, etc.);
2. Based on the objectives, analyze needs and gaps;
3. Discuss steps or actions to be taken;
4. Identify - responsibilities and resources (both available and required), opportunities for cooperative implementation, barriers to implementation;
5. Discuss and estimate duration/ time required to carry out actions;
6. Establish priorities and a sequence or schedule for implementation.

Working group members shall meet once a month to review the plan drafting process until its finalization and adoption. An Action Plan is a work in progress. With time, as organizations grow and new developments take place, the Plan should be reviewed on a timely basis to reflect current realities and changing needs and priorities.

Annexure IV

National Action Plan for Earthquake Safety of Health Facilities						
Priority Area	Outcomes	Baseline	Interventions	Timeline* Short (1-5 yrs.) Medium (5-10 yrs.) Long (More than 10 yrs.)	Performance Indicators	Responsible Agencies
1. Strengthening earthquake safety and disaster management institutional and policy framework in the Health Sector	1.1 Policies, guidelines, Ministerial Directives supporting disaster management in hospitals/ basic health units in place		<ul style="list-style-type: none"> - Review and endorse health sector disaster management and contingency plan - Formulate standard guidelines for emergency planning in all health facilities - Formulate guidelines to identify and abate threats to functionality and hazards caused by damage to building contents, backup utilities and equipment - Adopt higher safety standards for the design and construction of health facilities - Issue ministerial directives for implementation of earthquake safety and disaster management plans, policies guidelines, including incorporation into curricula of RIHS and medical university 	<p>Short</p> <p>Short, Medium</p> <p>Medium</p> <p>Medium</p> <p>Medium, Long</p>	<ul style="list-style-type: none"> - All health facilities with functional disaster management and contingency/evacuation plans - Guidelines to identify and abate hazards from building contents, equipments and furnishings adopted and implemented in all health facilities 	<p><u>Lead:</u> Department of Medical Services, MoH</p> <p><u>Supporting Agencies:</u></p> <ul style="list-style-type: none"> - Policy and Planning Division, MoH - Royal Institute of Health Sciences /Medical University management - Department of Disaster Management , MoHCA
	1.2 Disaster Management institutions within the health sector strengthened	<ul style="list-style-type: none"> - Disaster management focal person identified in the Department of Medical Services - Health help Centre established in 2010 	<ul style="list-style-type: none"> - Appoint/ identify emergency management focal persons and establish emergency management units in all health facilities - Strengthen emergency management services division in the Ministry of Health - Strengthen Health Help Center and emergency health response services 	<p>Short</p> <p>Short & Medium</p> <p>Medium</p>	<ul style="list-style-type: none"> - All health facilities with disaster management focal persons and functional disaster management units - Health Help Centre fully functional and equipped to fulfill its mandates 	<p><u>Lead:</u> Department of Medical Services, MoH</p> <p><u>Supporting Agencies:</u></p> <ul style="list-style-type: none"> - Human Resources Division , MoH - Hospital/ Health Facility Mgtm. - Department of Disaster Management, MoHCA

National Action Plan for Earthquake Safety of Health Facilities

2. Education and Awareness	2.1 Enhanced knowledge and information sharing management		<ul style="list-style-type: none"> - Establish knowledge sharing network - Share information with communities 	<p>Medium</p> <p>Ongoing</p>	<ul style="list-style-type: none"> - Mechanism for information sharing developed - No. of knowledge sharing activities - No. of community campaigns etc. 	<p><u>Lead:</u> Department of Medical Services, MoH</p> <p><u>Supporting Agencies:</u></p> <ul style="list-style-type: none"> - Health Institutes/ Universities - Management of Hospitals/ Health Facilities - Department of Disaster Management
	2.2 Awareness and Education	<ul style="list-style-type: none"> - International Day for Disaster Reduction observed since 2008 - Existing IEC materials related to disaster management and health emergency services 	<ul style="list-style-type: none"> - Conduct awareness activities and programs - Observe International Day for Disaster Reduction (or commemoration of past earthquake events) and conduct preparedness drills in all health facilities as a National event - Develop information and education materials - Incorporate safety information on earthquakes and other hazards and emergency management materials into Royal Institute of Health Sciences and Medical University curriculum - Raise awareness on family preparedness 	<p>Ongoing</p> <p>Ongoing</p> <p>Ongoing</p> <p>Medium, Long</p> <p>Short</p>	<ul style="list-style-type: none"> - Increased awareness on disaster management among health staff - Development of a comprehensive awareness strategy for health sector - No. of awareness activities carried out - Information and education materials formulated and disseminated in all Health facilities - Disaster risk reduction and emergency management materials incorporated in royal Institute of Health Sciences/ Medical University curriculum - All health staff with family disaster management plans 	<p><u>Lead:</u> Department of Medical Services, MoH</p> <p><u>Supporting Agencies:</u></p> <ul style="list-style-type: none"> - Health Institutes/ Universities - Management of Hospitals/ Health Facilities - Department of Disaster Management

3. Risk Reduction and Mitigation	3.1 Structural measures		<p>New Constructions:</p> <ul style="list-style-type: none"> - Prepare standard earthquake-resilient designs for health facilities - Review existing guidelines for health facility construction - Institute construction quality control and inspection mechanism <p>Existing Buildings:</p> <ul style="list-style-type: none"> - Conduct vulnerability / safety assessment of existing health facilities/ buildings - Carry out recommended strengthening, replacement and relocation measures 	<p>Short Medium</p> <p>Short Medium</p> <p>Short Medium</p> <p>Medium</p> <p>Long</p>	<ul style="list-style-type: none"> - All new health facilities constructed as per earthquake resilient design - Health facilities constructed as per guidelines outside of hazard zones - Quality and standards of all new constructions ensured - All health facilities assessed and strengthened accordingly 	<p><u>Lead:</u>Health Infrastructure Development Division, MoH</p> <p><u>Supporting Agencies:</u></p> <ul style="list-style-type: none"> - Department of Medical Services, MoH - Management of Hospitals/ Health Facilities - Department of Disaster Management
	3.2 Falling hazards are abated and insurance coverage in place		<ul style="list-style-type: none"> - Carry out fixing, bracing and other non-structural measures in all health facilities - Explore and institute risk insurance for health facilities 	<p>Medium</p> <p>Short , Medium</p>	<ul style="list-style-type: none"> - Insurance scheme for health facilities/buildings developed - Falling hazards in health facilities identified and abated 	<p><u>Lead:</u>Health Infrastructure Development Division, MoH</p> <p><u>Supporting Agencies:</u></p> <ul style="list-style-type: none"> - Department of Medical Services, MoH - Management of Hospitals/ Health Facilities - Department of Disaster Management - RICB and other insurance agencies
4. Preparedness and Response	4.1 Preparedness planning strengthened	<p>-Health Sector Disaster Management and contingency Plan formulated in 2011</p> <p>- Number of simulation/ table top exercises conducted at various levels</p>	<ul style="list-style-type: none"> - Review and adopt health sector disaster management and contingency plan - Formulate and adopt emergency management plans in health facilities - Conduct evacuation drills in all health facilities - Conduct table top exercises to test plan and sensitize participants on plan and their responsibilities <p>Conduct preparedness and evacuation drills in all health facilities</p>	<p>Short</p> <p>Short, Medium</p> <p>Short</p> <p>Short, Medium</p> <p>Short Medium</p>	<ul style="list-style-type: none"> - Functional health sector contingency plan in place - Functional DM/Contingency plan for all health facilities in place - All health facilities, dzongkhags, health sector agencies aware of the contingency plan 	<p><u>Lead:</u>Department of Medical Services, MoH</p> <p><u>Supporting Agencies:</u></p> <ul style="list-style-type: none"> - Management of Hospitals/ Health Facilities - Department of Disaster Management, MoHCA

	4.2 Response capacities strengthened		<ul style="list-style-type: none"> - Establish clear chain of command and communication flow - Maintain stockpile of materials required for emergency response and immediate recovery - Establish/institute pre-arrangements for emergency requirements - Standardize equipment/materials requirements at all levels - Strengthen emergency medical response capacities 	Short Medium Short, Medium Short, Medium Medium	<ul style="list-style-type: none"> - An effective communication and command system in place for emergencies - Stockpile of emergency materials and pre-arrangements in place and pre-positioned for effective response and recovery - Health facilities equipped with basic DM equipment and materials - Health Help Centre equipped with manpower and capacities to deliver effective emergency medical response 	
5. Capacity Building	5.1 Capacity building for Risk Reduction		<ul style="list-style-type: none"> - Build capacity of engineers and maintenance staff to assess buildings for vulnerability and safety - Build capacity for engineers and architects for retrofitting and carrying out mitigation measures - Carry out comprehensive training on protecting backup utilities and abating potential falling hazards - Raise awareness and capacity on mainstreaming risk reduction concerns 	Short, Medium Medium, Long Short	<ul style="list-style-type: none"> - Engineers/ technical personnel trained in the use of vulnerability assessment tools and procedures and equipped with capacity to retrofit/strengthen existing health facilities/ buildings - Health personnel, especially maintenance staff trained in carrying out fixing of falling hazards etc. 	<u>Lead:</u> Health Infrastructure Development Division, MoH <u>Supporting Agencies:</u> <ul style="list-style-type: none"> - Department of Medical Services, MoH - Management of Hospitals/ Health Facilities - Department of Disaster Management
	5.2 Capacity building for preparedness and Response		<ul style="list-style-type: none"> - Evaluate and strengthen emergency communication systems in place - Strengthen emergency transportation arrangements - Provide training to targeted groups in the health sector - Provide standard equipment/materials for response and immediate recovery 	Short, Medium Ongoing Short Short, Medium	<ul style="list-style-type: none"> - Health personnel equipped with knowledge on emergency management - Health personnel with enhanced capacity in carrying out their responsibilities 	<u>Lead:</u> Department of Medical Services, MoH <u>Supporting Agencies:</u> <ul style="list-style-type: none"> - Management of Hospitals/ Health Facilities - Department of Disaster Management, MoHCA

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