Thematic Session 4.2
Vulnerability Reduction of Health Facilities

Vulnerability Reduction and Emergency Preparedness in Health System of Nepal

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Demand for Medical Services

Normal Admittance Levels

Immediate large-scale demand for out-patient, in-patient treatment and surgery

Continued influx of small numbers of severely injured retrieved from building rescues

Long term medical care and re-establishment of normal medical care

(Source: Earthquake Protection, 1992)

Days after Earthquake

0 1 2 3 4 5 6 7
Situation in our context

Time

Service

Normal Service

Disaster

Restoration to Normal Service
Initiatives

• Collaborative efforts by government agencies, WHO and NSET for vulnerability reduction and emergency preparedness

• Main objectives
  – Expediting the process of health sector emergency planning
  – Assessment of vulnerability and strengthening the hospitals
  – Providing training to the health workers in emergency preparedness and disaster response
  – Strengthening a mechanism for multi-sectoral coordination and collaboration in health sector disaster management
  – Information sharing and awareness raising
Emergency Planning in Health Sector

- The Disaster Health Working Group (DHWG) established in 1993 and revitalized by the MOH/DHS/EDCD and WHO from the end of 2000.

- In September 2003, institutionalized as a legal entity for Disaster Management in the health sector by MoH.
  - Secretariat with 16 disaster planners and managers and
  - Large group comprising of around 50 members from collaborative partners, various stakeholders involved in health sector disaster management

- Health Sector Emergency Preparedness and Disaster Response Plan developed in October 2003
Seismic Vulnerability Assessment

• Structural Vulnerability Assessment of 14 hospitals in the Kathmandu Valley in collaboration WHO/PAHO.
• Non-Structural Vulnerability Assessment of 9 hospitals (4 in Kathmandu and 5 outside) in collaboration with NSET
• Outcomes of studies are consolidated as “Guidelines for Seismic Vulnerability of Hospitals”
Required Performance of Hospitals

Expected Performance

<table>
<thead>
<tr>
<th>Design Earthquakes</th>
<th>Fully Operational</th>
<th>Functional</th>
<th>Life Safety</th>
<th>Near Collapse</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Frequent</strong> (50%-50 Years)</td>
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<td>MMI VII</td>
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Reference:
But,

- Due to high seismic hazard
- Due to many structural and non-structural defects
- Due to lack of emergency preparedness

Our hospitals in Kathmandu Valley might be

- Partially or fully not operational after a moderate earthquake
- Most of them are even posses life safety hazard with heavy structural and non-structural damage during a severe earthquake

Medical system of KV may be totally out of order for a long time after a severe earthquake
Situation in our hospitals...

No extra precaution for passing the medical gas pipe from one building to another, no flexible coupling.

ECG monitor just above the bed and on a weak tray.
Other non-structural elements

Window glasses without plastic lamination may cause life safety hazard

Failure of cracked partition wall has potential of life safety hazard to doctor, patient or other people
Structural Defects

- Inadequate/improper structural system
- Low quality materials and workmanship
- Lack of repair and maintenance

Weak links between different buildings

Improper or seismic joints

Seismic joints
Expected Performance

Design Earthquakes

- MMI VII
  - Frequent (50%-50 Years)
  - Occasional (20%-50 Years)
- MMI VIII
  - Rare (10%-50 Years)
- MMI IX
  - Very Rare (5%-50 Years)

Performance Objective for New Construction (80%)
Performance Objective for Standard Occupancy Buildings (20%)
Performance Objective for Emergency Response Facilities
Performance Objective for Safety Critical Facilities

This situation demands

• **Urgent attention !!!**

• **Immediate intervention in all hospitals**

• **But,**
  – We have resource constraints
  – Little experience in implementing structural and non-structural mitigation measures

• **Therefore,**
  – Piloting and phase-wise intervention is proposed
## Required Intervention

<table>
<thead>
<tr>
<th>Hospital</th>
<th>Necessary Improvements and Expected Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Phase I</strong></td>
</tr>
<tr>
<td>Bir Hospital</td>
<td>Improvements in non-structural elements</td>
</tr>
<tr>
<td>Patan Hospital</td>
<td>Improvements in non-structural elements</td>
</tr>
<tr>
<td>Teaching Hospital</td>
<td>Improvements in non-structural elements</td>
</tr>
<tr>
<td>Bhaktapur Hospital</td>
<td>Improvements in non-structural elements</td>
</tr>
</tbody>
</table>
Simple improvement can enhance a lot
# Outcome of Intervention

<table>
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<tr>
<th>Description</th>
<th>Phase I</th>
<th>Phase II</th>
<th>Phase III</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Expected Performance at Present</strong></td>
<td>Hospitals partially operational after a moderate earthquake</td>
<td>Hospitals near to collapse during severe earthquake</td>
<td>Hospitals partially operational after a severe earthquake</td>
</tr>
<tr>
<td><strong>Input</strong></td>
<td>150 - 200 k $ 8-12 months time</td>
<td>2,150 - 3,400 k $ 12-24 months time</td>
<td>375 - 500 k $ 6-8 months time</td>
</tr>
<tr>
<td><strong>Intervention Activity</strong></td>
<td>Improvements in non-structural elements</td>
<td>Detail assessment, design and retrofit of hospital buildings</td>
<td>Additional Improvement of Non-structural elements</td>
</tr>
<tr>
<td><strong>Expected Performance after Intervention</strong></td>
<td>Hospitals fully operational after a moderate earthquake</td>
<td>Hospitals do not collapse during a severe earthquake and partially operational</td>
<td>Hospitals fully to partially operational even after a severe earthquake</td>
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*Expected Performance after Intervention*
Benefit of Intervention

• **Performance of Hospitals enhanced**
  – Medical persons and hospitals staff will not die or become injured during earthquakes
  – Patients will also be safe
  – Can provide service smoothly even after a severe earthquake

• **Repair and maintenance staff will be trained in implementing the mitigation measures**
  – they will continue to maintain the hospitals
Expected Performance after Intervention

- **Fully Operational**
- **Functional**
- **Life Safety**
- **Near Collapse**

**Design Earthquakes**

- **MMI VII** (Occasional, 20%-50 Years)
- **MMI VIII** (Rare, 10%-50 Years)
- **MMI IX** (Very Rare, 5%-50 Years)

- **Frequent** (50%-50 Years)

- **90%**
- **10%**

- **90%**
- **10%**
Needs to bring experience from other countries

- **This type of job is new in the region**
  - Therefore, requires lots of innovative solutions to the problems to suit the local condition
  - Needs training to all involved from designers, builders to the hospital maintenance staff

- **Hence, it may be difficult to implement in conventional way of construction procedures**

- **Therefore, we seek sharing of experiences from other countries of the world**
Training and Capacity Building

- **Interactive computer-based mass casualty management training and simulation exercises**
  - more than 500 participants (medical doctors, nurses, medical students, paramedics and volunteers)

- **Field and hospital based mass casualty management training and mock drill exercises**
  - About 1500 volunteers from Royal Nepalese Army, Nepal Police, Nepal Red Cross, Nepal Scouts and various Communities
Institutionalization

• Hospital Preparedness for Emergencies (HOPE) course
  – As part of Program for Enhancement of Emergency Response (PEER)

• Now this course has been institutionalized at the University
  – The university will run this regional course with required adaptation to suit local needs
• Assess physical facilities and strengthen them – structural and non-structural

• Design Effective Disaster Plans for Hospitals
  – Prepare Operational Teams for on-site management
  – Preparedness for external (mass casualty) and internal (evacuation) incident
Publication and Information Dissemination

- Guidelines on Emergency Preparedness & Disaster Management for Hospitals
- Guidelines on the Best Public Health Practices in Emergencies for District Health Workers
- National template (i.e. Triage Tag) for emergency response
- Rapid Health Assessment Format and Guidelines for using the formats
- Guidelines On Non-Structural Safety in Health Facilities
- Poster on myths and realities of natural disaster based concept from the WHO/PAHO.
- Guidelines for Seismic Vulnerability Assessment of Hospitals
Challenges

• Implement risk mitigation measures (strengthening of hospitals - both structural and non-structural)
• Extension of program from central level to regions and districts
• Effective coordination
• Institutionalization at government level
Thank You!