

Nepal

Preparing for the Big One in Kathmandu Valley, Nepal

In the past, large earthquakes in Nepal have caused huge numbers of casualties and extensive damage to structures. The Great Nepal-Bihar earthquake in 1934 reportedly killed 8,519 people and damaged over 80,000 buildings in Nepal. Later, the 1988 Udayapur Earthquake also resulted in heavy loss of life in the eastern region and also in the Kathmandu valley. Sadly the earthquake risk in Nepalese cities, and especially in the Kathmandu Valley, is still increasing owing to rapid urbanization with uncontrolled development and poor construction practices. Despite the knowledge of historical seismicity, and continued geological research in the Nepal Himalayas, public awareness of earthquake hazard and risk was minimal until a few decades ago, and implementation of earthquake risk management efforts was almost nonexistent.

The 1988 Udayapur Earthquake was a major turning point. Following the massive destruction and the death toll of 721 lives the need for an organized approach was felt in all quarters. Since then, several initiatives were conceptualized and implemented by governmental as well as non-governmental sectors to minimize the risk of earthquakes. The initiatives implemented by the National Society for Earthquake Technology – Nepal (NSET) have been very effective, particularly due to their contribution toward raising the earthquake awareness of the general population as well as the awareness of the authorities. The following text aims to highlight some of the effective programs and activities of NSET.

School Earthquake Safety Program (SESP)

Public schools in Nepal, both the buildings and their occupants, face extreme risk from earthquakes. While they face this risk schools also play a crucial role after an earthquake in helping a community to get back on its feet. So by raising awareness in schools, the entire community is reached because the lessons trickle down to parents, relatives, and friends of pupils and teachers. Realizing this fact, NSET has been implementing community based School Earthquake Safety Program (SESP) since 1999.

As a first step toward working in schools, NSET carried out a Kathmandu Valley-wide vulnerability assessment survey of about 1100 buildings in 643 public schools. The findings were alarming; more than 60% of the buildings were found to be highly vulnerable even in normal conditions. This alarming finding urged NSET to implement vulnerability reduction programs in schools, which led to a pilot program for retrofitting one of the public schools in a rural area of Kathmandu Valley in 1999. Since then SESP has been implemented in more than 20 schools in different parts of the country. Primary objectives of the program are to identify measures to reduce earthquake risk, to raise awareness of risk while implementing the program and to train local masons in earthquake-resistant construction. Accordingly, SESP consists of the following components:

- (a) seismic retrofitting or earthquake-resistant reconstruction of schools buildings;
- (b) training of teachers, students and parents in earthquake risk mitigation and preparedness;
- (c) training of local masons in earthquake-resistant building construction technology.

The program has been found to be successful in instigating community participation in all components of program activities and in the ability to raise the earthquake awareness of communities significantly. The masons trained during the program are now acting as ambassadors to spread the technology of earthquake-resistant construction in their communities and replicating the technology in the construction of new buildings; they are also training other masons. The program has also clearly demonstrated that community-based activities for disaster risk reduction are effective and sustainable. Once the process is started it will continue to be effective in ever-increasing areas. The rich experience gained during the implementation of this program has been translated into a technical manual for designers and builders to assist them in designing and implementing earthquake-resistant school-building construction. Further, the approach and methodology of this program is in the process of adoption by the Ministry of Education and other educational institutions in their regular plans and programs.

Seismic Vulnerability Assessment of Nepalese Hospitals

As a joint effort with the Ministry of Health of His Majesty’s Government of Nepal and WHO Nepal, NSET conducted two studies: “Structural Assessment of Hospitals and Health Institutions of Kathmandu Valley” and “Non-Structural Vulnerability Assessment of Hospitals in Nepal” in 2001 and 2003. A systematic approach to the seismic assessment of hospitals in Nepal was developed while carrying out those assessments on major Nepalese hospitals. The necessity of developing such a methodology arose because methodologies from developed countries could not be applied to Nepal.

The results of the studies show that about 80% of the hospitals assessed in the study fall in the unacceptable performance category for new construction and the remaining 20% of hospitals are at high risk of life-threatening collapse.. Recommendations were made to improve the seismic performance of different hospitals on a priority basis (Figure 1). The securing of all equipment and contents, strengthening of critical systems, training for hospital personnel and provision of some backup for critical systems were proposed for implementation in the first phase. Seismic retrofitting of hospital buildings, further strengthening of critical systems and provision of extra backup systems were the proposed activities for second-phase implementation.

Considering the opportunity of immediate implementation of non-structural risk mitigation, some examples of mitigation options to solve the problems were developed during the study.

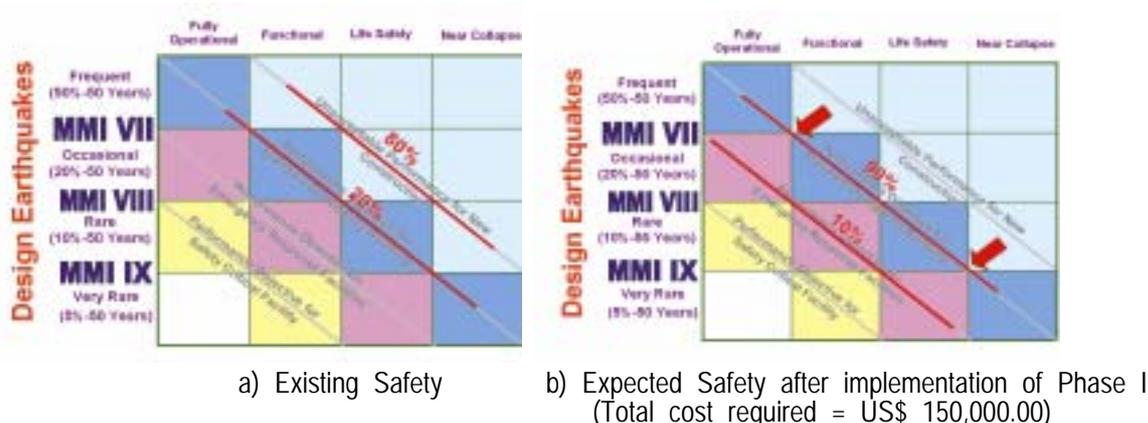


Figure 1: Existing and expected improved situation of hospitals

As a follow-up action, NSET and WHO Nepal conducted a series of meetings with government authorities and donor agencies to identify possible courses of action and the possible resources involved. There are many positive signs for implementing non-structural mitigation measures in selected hospitals within the Kathmandu Valley.

Seismic Vulnerability Assessment of the Drinking Water Supply System in Kathmandu Valley

NSET undertook a study to assess the seismic vulnerability of the drinking water supply system of Kathmandu City with support from UNICEF Nepal in 2002 in view of the high level of earthquake risk. A practical methodology for assessing the seismic vulnerability of the water supply network, its components and institutional capacity was developed. Assessment results in the form of network system damage scenarios for earthquakes were presented using a Geographical Information System (GIS). Based on possible maximum enhancement of present institutional capacity and spatial distribution of the possible extent of damage, optimum routes for the most expedient restoration of the water supply services to meet a minimum level are identified under two different scenarios, as is and an improved system. Spatial distribution of emergency water demand in case of an earthquake was also offered as one of the recommendations of the study (Figure 2).



Possible Evacuation Points and Plan of Immediate Establishment of Pipe System

Figure 2: Water During Emergency

Initiative to set up Pre-Positioned Emergency Rescue Stores (PPERS)

This initiative was jointly carried out by NSET and different ward disaster-management committees of Kathmandu Valley and was supported by the Civil Affairs Group of the British Army. The purpose of PPERS is to provide a reserve of essential tools and equipment to assist in the immediate response to a major disaster, such as an earthquake, in the Kathmandu Valley. PPERS are intended to help those ‘first responders’ on the ground at the local level to enable neighbors to rescue neighbors. Organizational structures such as local-level disaster-management committees and community emergency-response teams are constituted as required to assist in setting up the stores and their effective operation. Seventy-three items helpful during emergencies are included in the stores and 223 volunteers can work together at one time using this equipment for emergency rescue work. Such stores are pre-positioned in eight locations within Kathmandu Valley.

Kathmandu Valley Earthquake Preparedness Initiative (KVEPI)

According to a study carried out during the Kathmandu Valley Earthquake Risk Management Project (KVERMP) by NSET, a major earthquake in Kathmandu Valley today would cause over 40,000 deaths, over 95,000 injuries, leave over 700,000 homeless, damage 60% of the building stock beyond repair, and severely damage the road network including countless bridges as well as the public water-supply system. To combat such events, a program called Kathmandu Valley Earthquake Preparedness Initiative (KVEPI) is being implemented in ten locations in the Kathmandu Valley as a joint program of NSET, the Nepal Red Cross Society (NRCS) and the American Red Cross. This program uses a combined approach of building the capacity and volunteer base of the NRCS, pre-positioning critical relief supplies and rescue equipment, drilling water points, training people in basic first aid and rescue techniques and helping the general public to identify and advocate for safer building practices. Thus the primary goal of the initiative is to improve the resilience of communities and to reduce suffering from earthquake disasters.

- Term/Time Frame

2001 and 2003.

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