

1 Introduction

1.1 Background

This report presents the methodology and findings of a seismic non-structural vulnerability assessment of 9 major hospitals in Nepal. The study was conducted by National Society for Earthquake Technology-Nepal (NSET) under a contract with WHO- Nepal during March-November 2003.

This study has been carried out considering the high seismic risk of the country and low level of preparedness in critical infrastructures including health facilities. In the past, big earthquakes in Nepal have caused huge numbers of casualties and damage to structures. The Great Nepal - Bihar earthquake in 1934 reportedly killed 8519 persons and damaged 80,000 buildings in Nepalese territory. In recent years, the Kathmandu Valley Earthquake Risk Management Project and other projects (e.g. The Study on Earthquake Disaster Mitigation in Kathmandu Valley) estimated high potential losses and casualties including the potential losses of medical facilities during a large earthquake affecting Kathmandu Valley. Although a seismic country, earthquake-resistant standards have not been effectively applied and guidelines have not been published and practiced for hospital facilities in general, in Nepal. For this reason, there is a higher possibility of hospital buildings not being functional during a large seismic event.

National Society for Earthquake Technology-Nepal (NSET) conducted the project “Structural Assessment of Hospitals and Health Institutions of Kathmandu Valley” with WHO-Nepal and the Ministry of the Health, HMGN in 2001. The assessment estimated that most of the hospitals would withstand the occasional earthquake of MMI VII without collapsing. It was found that 10% of the hospitals might be functional, 30 % partially functional, and 60% out of service. The major cause of possible functional loss was considered to stem from non-structural damage and one of the recommendations of the project was to conduct detailed non-structural assessment of major hospitals.

This project is the recommended follow-up of the aforementioned study. Both studies were envisaged by the *Health Sector Emergency Preparedness & Disaster Response Plan Nepal* prepared by the Health Disaster Working Group, Epidemiology and Disease Control Division (EDCD), Department of Health Services (DHS), the Ministry of Health and WHO-Nepal.

The current project emphasizes the development of appropriate methodology for carrying out such non-structural vulnerability assessment and has conducted an assessment of selected 9 major hospitals located within and outside Kathmandu Valley.

Since structural vulnerability assessment is a pre-requisite for a comprehensive non-structural assessment, a structural assessment was also conducted for those hospitals for which it was not done previously.

1.2 Structure of the Report

Section 1 of this report presents the introduction of the study project and section 2 the objective, scope and approach while section 3 includes the methodology. The result on hospitals performance assessment and recommendations to improve seismic performance has been given in section 4. Section 5 presents examples of mitigating non-structural vulnerability of hospitals. Annex 1 presents the definition of terms, Annex 2 the significance of non-structural damage, Annex 3 the causes of non-structural damage and Annex 5 presents the sample report on individual hospital.

The results and the recommendations drawn are from the reports of individual hospitals. The individual reports are produced as appendices to this main report and are given to the

concerned hospitals. These reports are detailed in such a way to enable the implementation for non-structural mitigation options. The sample report of individual hospital given in this report shows the level of work done in each hospital.

Prioritisation and phasing of recommendations are made considering the cost involvement and the effectiveness of implementing the recommendations.

Some doable and cost effective non-structural vulnerability options are identified considering the availability of materials and technology as well as the feasibility of implementation. The examples given in this report might be useful to other hospitals as well.