

# Strengthening Building Code Implementation and Compliance in Developing Countries: A Case Study of Nepal

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## Abstract

The April 2015 Nepal Gorkha earthquake and subsequent aftershocks devastated much of the building stock of Nepal, especially in rural areas. The prevalence of owner-built structures in the country meant that few residential structures, especially outside Kathmandu Valley, had been constructed with any formal professional engineering design or supervision. Studies have shown that in rural areas, 90% of all structures are built in this way. This situation underlines the need for a suitable mechanism to direct and govern standards of good practice for building new structures.

The recent earthquakes in Nepal have shone a light on the Nepal National Building Code (NBC). Developed following the magnitude 6.9 event in 1988 and published in 1994, the NBC covers the most common building types in Nepal. This tiered code structure requires stringent engineering supervision for international state-of-the-art buildings and very large buildings. For smaller buildings and those in rural areas, the NBC only requires Mandatory Rules of Thumb or Guidelines to be followed by local masons and craftsmen.

Here, we describe observations on the Nepal NBC made during the recent reconnaissance mission to Nepal by the Learning from Earthquakes (LFE) Program of the Earthquake Engineering Research Institute (EERI). This program is a long-standing effort to investigate and learn from damaging earthquakes. In addition, we describe the ongoing project of the EERI Housner Fellows Program – a leadership and advocacy training program, which is at the midpoint of a two-year group project studying methods for strengthening building code implementation, compliance, and enforcement in Nepal.

The EERI LFE reconnaissance mission took place in June 2015 and was a multi-disciplinary data capture exercise, allowing a broad overview of issues, including buildings, hospitals, social impacts, geotechnical, resilience and heritage structures. The subject of the NBC, its implementation and compliance was also addressed. General observations on technical deficiencies to the NBC were presented by the LFE team and are available from EERI in a video [webcast](#), with a report currently being prepared. Additionally, lessons learned on building code implementation and compliance were also presented. Briefly, there is not widespread adoption of the NBC, especially in rural areas, and legislation enforcing the adoption has been insufficient to date. Several initiatives, particularly those through the Nepal National Society of Earthquake Technology (NSET), have made a positive contribution to code compliance, including training of local masons, and development of locally-focused mechanisms to promote code adoption. Technically, several recommendations for improving the NBC were presented by the LFE team, including the incorporation of earthquake resilient design, provision of shelter in place by including occupancy-specific rules and additional guidance on retrofitting and repair.

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The ongoing project by the EERI Housner Fellows seeks to investigate issues around implementation and compliance of the NBC. A review of global best practises in literature, as well as a forthcoming international survey will provide the foundation for a series of workshops with several municipalities in Nepal. These workshops will allow a variety of stakeholders – from the ministerial level to local masons – to share their experience of designing and implementing initiatives at the local level to increase code awareness and compliance. The project aims to produce a series of case studies from these municipalities – chosen from around Nepal, and representing a variety of levels of code implementation. Lessons learnt and recommendations will be presented to each of the participating municipalities through NSET. A cross-cutting report on general observations and lessons from Nepal will also be developed in summer 2016.