

# **Earthquake Disaster Vulnerability Assessment and Management in Urban Areas**

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by

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## SYNOPSIS

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Urban earthquake risk is the greatest and most rapidly growing hazard in developing countries. In India, highest seismic risk is concentrated in the north and northeast parts, which is home to approximately 60 percent of the population of the country. This region houses several big urban centers, including Delhi.

Based upon the performance of urban built environment during the past earthquakes of Jabalpur and Bhuj, it is felt that there is tremendous scope for improvement in the Indian construction practices with respect to existing seismic safety provisions in the buildings. Proper understanding and effective planning can reduce the seismic vulnerability of the built environment, considerably, which would ultimately reduce the resultant losses. Considering the need to study the seismic risk management in the urban areas of the country, the present study is carried out. It proposes a simplified methodology to effectively assess the vulnerability in the urban areas. This methodology will form a basis for the administration and development planners to evolve a suitable strategy for seismic risk mitigation at the local level, which can be extended to broader areas. The research has been carried out with following objectives:

1. To study the urban development with specific reference to construction practices followed at national level.
2. To study the performance of the urban built environment during past earthquakes.
3. To study the seismic hazard status with current disaster management mechanism in the case-study area.
4. To assess the risk, using available standard tools.
5. To develop a suitable methodology, which can be effectively used for assessing vulnerability in the case-study area of Delhi (Shahjahanabad).
6. To propose urban seismic risk mitigation measures to reduce seismic risk in urban areas, with special reference to Delhi.

Urban India is facing a daunting task of housing shortage, which has resulted in the growth of urban slums and haphazard unplanned development. A similar situation exists in Delhi also, where large population lives in slums and unauthorized colonies. These types of habitat constitute most vulnerable housing stock from the earthquake risk point of view.

The present study has targeted a similar area of Delhi (Shahjahanabad), wherein the proposed methodology was used, and its effectiveness demonstrated. The level of seismic risk is quite high in this part of city, as indicated by the application of RADIUS tool. However, the RADIUS methodology has its own limitations. To overcome such limitations, a detailed methodology has been proposed to assess the vulnerability of built form of a city like Delhi (Shahjahanabad).

The proposed methodology takes advantage of a systematic approach based on a series of steps to assess the vulnerability of a given area, which has been applied to assess the vulnerability of Turkman Gate locality of Shahjahanabad. A questionnaire was developed and rigorous survey conducted to collect the samples of building types, as existing in the study area. Finally, a pocket with the maximum vulnerability, which is the one that is most prone to damage during a future earthquake, has been identified.

Absence of any reliable mechanism to predict earthquakes, makes it the most disastrous of all natural calamities and its management most difficult. An integrated earthquake risk reduction approach, which starts putting emphasis on pre-earthquake risk mitigation, prevention, preparedness and capacity building, has been proposed to reduce the impact of impending earthquakes in Delhi.