Mega-earthquakes in BD: Before they strike

Monday, May 30, 2016

By *Professor MG Quibria*

Bangladesh is the most densely populated country on earth. The country is perched at the juncture of several active tectonic plate boundaries, atop the world's largest river delta, barely above sea level. This uncanny combination of geology and demography makes the country potentially the most vulnerable to the risks of an earthquake-and the tsunamis and flooding that follow in its wake.

In recent years, although Bangladesh experienced some minor tremors, it did not suffer any major earthquakes-those exceeding seven and above on the Richter scale. Despite its location, it experienced two such major earthquakes in the last 150 years. An important fact about major earthquakes is that they are few and far between, and the amount of time between these mega-earthquakes is very long. This is both good news and bad news. Since the country has not had this type of quake in many years, it seems to be a disaster waiting to happen.

According to a recent seismic zoning map prepared by the Bangladesh University of Engineering and Technology (BUET), 43 per cent of the areas in Bangladesh are rated high risk, 41 per cent moderate, and 16 per cent low. As a city, Dhaka is considered by the seismic experts to be one of the most earthquake-vulnerable metropolises in the world for its unplanned urbanisation, high population density, and lack of monitoring and enforcement of building codes. The death and destruction that may follow from a major earthquake can be massive.

It is not possible to prevent natural disasters such as earthquakes, nor is it possible to predict their precise timing. However, there are precautions that the country can take to reduce disaster risks. The first is a detailed, coordinated action plan to meet the challenges of the

disaster. An effective plan needs to be decentralised and requires full community participation; it needs to be tested and perfected through mock exercises on a regular basis. The government, however, has a plan which remains largely untried and untested. It has created, with assistance from the United Nations, an urban community volunteer programme, comprised of 64 thousand volunteers from the fire service and civil defence, to serve as the "frontline" in case of a disaster. However, the public needs to be educated, as they have very little information about the programme and the way to access assistance when necessary.

The second area of preparation relates to building codes. In an earthquake, the greatest danger stems from collapsing buildings. Most buildings and civil construction in the country are low quality; they do not conform to building codes. The building codes in the country have been revised in recent years to enhance building integrity against earthquakes. However, the vast majority of the buildings in the country are not "earthquake-proof."

It may be noted that modern seismic codes (i.e., adequate detailing and reinforcement of seismic protection) are a relatively new innovation. They were introduced in developed countries (e.g., the US, Japan, etc.) in the late 1960s and in other parts of the world (e.g., Turkey and China) in the late 1970s. Today, China's code is comparable with similar codes in seismically active areas of the world. China has become one of the most active users of modern approaches in structural control and health monitoring of civil infrastructure. All new major civil structures, such as long bridges and sports stadiums, are heavily instrumented with sensors. In this regard, developing countries like Bangladesh have many lessons to learn from China, which has made a dramatic overhaul in seismic codes.

The government needs to make sufficient public investments to improve the quality of buildings. Incorporating the safety codes in new buildings is easier than designing, enacting, and implementing requirements for retrofitting old buildings. Households and businesses should also be encouraged to invest in retrofitting their buildings through tax credits or subsidised bank loans. It may be mentioned that there is some moral hazard related to such precautionary investments-people have a hard time investing in things that are not imminent. However, an ounce of prevention is often worth a pound of investment in mitigation.

The above ex ante risk-reduction efforts need to be complemented by ex post risk mitigation

measures. Recent years have seen the emergence of innovative financial risk-mitigation measures-capital-market based risk financing mechanisms such as sovereign insurance (macro-insurance), catastrophe bonds, contingent credit, and regional catastrophic insurance pools. Bangladesh should take advantage of these instruments to transfer some of the risk internationally; however, this would require both technical and financial assistance from financial institutions involved in international development.

How does a macro-insurance system work? The world-leading reinsurers, such as Swiss Re, Munich Re, and others, can provide this macro-insurance. The governments would pay an annual premium, based on actuarial assessments of risks; international donor agencies like the World Bank and the Asian Development Bank (ADB) can help to share the costs. These macro-insurance instruments can be contingent upon observable variables that are independent of the country's actions-they could be parametric (e.g., earthquake magnitude), which would help circumvent the moral hazard problems. For some large and unpredictable risks, where the private sector alone won't provide cover, additional official financing could be blended with private funds.

Regional cooperation can be used to design similar insurance mechanisms for various types of natural disasters, including earthquakes. Recent years have seen the development of a number of regional risk insurance pools. Such initiatives include the Caribbean Catastrophe Risk Insurance Facility and the Pacific Disaster Financing and Insurance Programme. In addition to risk financing, regional cooperation can be a mechanism for knowledge and technology sharing for disaster management.

Although it is only at the initial stage of development, the global system of risk financing has shown tremendous potential for growth. International risk financing can be an important instrument of risk mitigation for vulnerable countries like Bangladesh, which are trying to map out a route to sustainable development.