

# Iran's Disaster Risk: Now is the Time for Community-based Public Health Preparedness

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**Conflicts of interest:** The authors have no disclosures or conflicts of interest to report.

**Keywords:** community; disaster; earthquake; iran; public health

**Received:** April 16, 2013

**Accepted:** April 27, 2013

Online publication: August 20, 2013

doi:10.1017/S1049023X13008820

## Abstract

The Bandar Bushehr, Iran earthquake of April 9, 2013 gravely illustrates how disaster-prone areas of the world are compounding their risk of disaster and major public health emergencies when there is a geographical convergence of natural and technological hazards. Scientists must emphasize to policy makers that ever-increasing regional industrialization and the broader introduction of nuclear facilities, especially in the Middle East, must parallel sound prevention and community-level public health preparedness planning.

**Ardalan A, Mowafi H, Burkle FM, Jr. Iran's disaster risk: now is the time for community-based public health preparedness. *Prehosp Disaster Med.* 2013;28(5):421-422.**

On April 9, 2013, Iran experienced one more reminder of its vulnerability to large-scale natural disasters. The magnitude 6.3 earthquake, with an epicenter just 89 km (55 miles) southeast of the rural area of Bandar Bushehr,<sup>1</sup> resulted in at least 35 deaths and 800 injuries (80 people were hospitalized).<sup>2</sup> Bandar Bushehr has approximately 12,000 inhabitants and is the site of the Bushehr nuclear power plant. While early reports indicated no damage to the Bushehr facility itself and no radiation leaks to the surrounding communities, the event highlights the potential public health risk posed by the convergence of natural and technological hazards that makes both Iran and this region so unique.

The Islamic Republic of Iran is among the most natural hazard-prone countries in the world. It ranks eight out of ten on a global assessment of mortality risk from earthquakes.<sup>3</sup> In recent years, Iran's government has decided to pursue nuclear power as part of its national energy portfolio. While nuclear energy potentially can reduce greenhouse emissions and provide more affordable domestic power generation, it also poses new public health risks to nearby communities. Not only do malfunctions at nuclear facilities pose direct radiologic public health risks, but routine natural disasters can increase in complexity quickly due to technological failures of power plants and other facilities in their vicinity.

This risk to public health is not unique to Iran. Worldwide, nearly 100 nuclear reactors in 30 countries operate in earthquake-prone regions.<sup>4</sup> Of these, 34 operate in high-risk seismic areas and 17 are within a mile of coastline,<sup>4</sup> increasing the risk from tsunami and the potential spread of radiation leaks via ocean currents. While the majority of these high-risk reactors are in East Asia (Japan and Taiwan), two exist in North America (USA) and one each in Europe (Slovenia) and the Caucasus (Armenia), in addition to the Iranian reactors.

The 2011 Honsu earthquake (magnitude 9.0)<sup>5</sup> and subsequent tsunami resulted in failure of the Fukushima Daiichi nuclear plant and the release of radiologic contaminants into the surrounding atmosphere and ocean waters. The 2008 Sichuan earthquake (magnitude 7.9)<sup>6</sup> resulted in the death of over 20,000 people and damaged a nearby chemical factory in Shifang, releasing 80 metric tons of ammonia and killing 100 chemical plant workers.<sup>7</sup> In both these instances, the presence of technological facilities greatly complicated the already severe impacts of the natural disaster; the "lack of emergency planning and risk communication for local residents"<sup>5</sup> resulted in the overwhelming of the capacity that had been established to deal with more routine natural disasters.

The added environmental risk posed by chemical or nuclear facilities near earthquake zones hampers rescue and recovery efforts due to risks posed to emergency personnel, expands significantly the disaster zone out of which populations must be evacuated, and

poses dramatic new risks to regions outside the immediate earthquake zone from the spread of contaminants along the paths of wind and ocean currents.

Despite the frequent occurrence of earthquakes and other natural disasters in Iran, overall community awareness and preparedness for even routine disasters is low. A recent population-based study revealed a disaster readiness score for earthquakes of only 8 out of 100.<sup>8</sup> Yet, the potential to reverse this trend remains high. Iran does not have to go far to find a platform from which to develop meaningful mitigation and preparedness plans. Iran has an extensive community-based primary health care network that is well positioned to both raise community awareness of local risk profiles and aid community members in developing household emergency plans.<sup>8</sup> Iran's health system reform now places communities under the care of multidisciplinary teams of physicians, public health specialists and community health workers.<sup>9,10</sup> This integrated approach is

ideal for marrying at the community level disaster risk reduction measures (increasing awareness, risk identification, emergency planning) with the clinical training required to treat patients and protect health infrastructure should such a public health emergency occur.

Policy makers in Iran, and around the region, must strongly advocate for the inclusion of technological emergencies (including radiological and chemical emergencies) as part of public health awareness campaigns and national risk reduction plans. The same would go for other countries in the region where petrochemical production may predominate.

In light of ever-increasing regional industrialization and the broader introduction of nuclear facilities in the Middle East, the public health community across the region should work in partnership with industry, local Red Crescent Societies and national governments to push for community-based preparedness to mitigate the impact of this looming public health emergency.

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