

How well prepared are we to deal with any possible fallout of a radioactive disaster

<http://tribune.com.pk/story/1165862/well-prepared-deal-possible-fallout-radioactive-disaster/>

By Zeenia ShaukatPublished: August 19, 2016

August marks the anniversaries of the United States (US) attack on Hiroshima and Nagasaki, Japan. The World War II nuclear bombing killed 90% of Hiroshima's population while tens of thousands died later due to radiation exposure. In Nagasaki, an estimated 40,000 people were killed.

Today, despite consistent rise in nation states' interest in building and expanding their nuclear capability, a combination of stringent safeguards and international diplomacy has largely reduced the threat of a repeat of a Hiroshima/Nagasaki. However, bombing is not the only way for toxic levels of radioactivity to make its way to common people's lives. In the past 70 years, 440 radiation accidents have occurred worldwide, largely linked to nuclear power plants. A critical nuclear plant accident not only demand intensive disaster response in terms of addressing the radiation contamination, but states are required to undertake massive operations for evacuation and resettlement, while also dealing with psycho-social impacts of the disaster, and resurrect of a shattered economy.

As a state that has embarked upon an aggressive drive to expand its civilian nuclear capability, Pakistan is pursuing 8,000MWe of power generation by setting up nuclear power facilities at 10 different sites in Sindh, Punjab and Khyber-Pakhtunkhwa. This is in addition to Karachi Nuclear Power Plant (KANUPP) 1, Chasma 1 and 2, KANUPP 2 and 3 and Chasma 3 and 4, which are under construction.

Being much conscious of their image, the Pakistan Atomic Energy Commission (PAEC), the body responsible for the country's nuclear energy production, has been consistently responding to critics of the nuclear power expansion. The latter maintain that not only are these plants expensive to set up – KANUPP 2 and 3 shall cost US\$9 billion – they pose much risk owing to their proximity to the population. KANUPP is located within 30km radius of Karachi that houses 10% of Pakistan's population. The PAEC on its part maintains that its operations meet the highest safeguard standards and there is no need to worry. They have not yet responded to the demand for sharing of an emergency response and an evacuation plan in case an accident of a serious nature occurs, at any of the nuclear plants, threatening the local population.

This article seeks to review the disaster response exercises undertaken in the aftermath of three major nuclear power plants accidents and draw comparisons with disaster response in Pakistan. This is to understand how well prepared are we to deal with any possible fallout of a radioactive disaster. The focus is on three out of five major nuclear accidents rated as International Nuclear Event Scale level 5. These are Three Mile Island (USA, 1979), Chernobyl (Ukraine [then USSR], 1986) and Fukushima Daiichi (Japan, 2011).

Loss of public faith and voluntary evacuations

Three Mile Island (TMI) was the most serious accident in the US commercial nuclear power plant. Triggered by malfunction of equipment, worker errors and design-related challenges, the plant suffered a partial meltdown on March 28, 1979 beginning at 4am. Within the next five hours, the US's Nuclear Regulatory Commission and the White House were notified. By 11am, all non-essential staff was evacuated from the site. By mid-day the Environmental Protection Agency and the Department of Energy were ready with their response teams. The latter, along with TMI's owner started sampling radioactivity in the atmosphere using helicopters.

Two days later, an operation to maintain continuous flow of coolant to the core resulted in a substantial release of radiation from the plant's auxiliary building. The next day, chemical reactions in the melting fuel created a large hydrogen bubble in the pressure vessel. This triggered fears of explosion and breach of containment. The state government had to pursue emergency consultations to decide if it was wise to order the evacuation of local population. Eventually, pregnant women and preschool-aged children, within a five-mile radius of the plant, were advised to leave the area. It took another day before the size of the bubble was reduced. However, the hours in between were filled with much anxiety.

The aftermath of TMI makes one of the most interesting case studies of evacuation dilemmas. The confusion and contradictory information surrounding the fate of the plant kept the government from making an official order for evacuation. Only three advisories were issued at different points, by different departments. Public stayed unclear about the course of action. Schools were also closed and people were advised to stay indoors, while sounds of air raid fuelled further unease. Yet, 150,000 people left their homes, on voluntary basis, during the peak of the emergency. Those left behind belonged to blue collar professions, uncertain about taking such a big step. Local hospitals became severely understaffed and absenteeism among state officials rose to 250% above normal.

Studies later concluded the decision of the population to evacuate depended much on their trust of public officials. In this case, people chose not to trust the state that was reluctant to issue an evacuation order, yet sent mixed signals by announcing evacuation plans. They undertook voluntary evacuation. Later, a presidential commission's report on the accident observed people's right to know was severely compromised because of the lack of communication at all levels.

Mental health issues and the cost of livelihood

On April 26, 1986, one of the four reactors at the Chernobyl Nuclear Power Plant, located close to Ukrainian- Belarusian border suffered an accidental explosion during a safety test. The ensuing fire lasted for ten days, releasing massive amount of radioactivity into the environment. Research suggests contamination spread across 29,400km² areas, while particles of reactor core spread to Belarus, Russia, and Ukraine, and beyond. The release of radioactive isotope, as found in later years, led to a large-scale increase in the incidence of thyroid cancer in exposed children and adolescents. Over 6,000 cases were reported.

Chernobyl's casualties included firefighters, who suffered radiation doses of 20,000mSv. Firefighting and radioactive containment also included dropping of 5,000 tonnes of boron, dolomite, sand, clay and lead on the burning core by helicopters for nine days of the fire. Twenty eight people died within three

months because of excessive radiation exposure. The recovery and clean up took a year, involving participation of 200,000 people from all over Soviet Union. Around 116,000 people within 30km radius of the plant were evacuated and relocated. Rural areas based on forests and wetlands surrounding Chernobyl experienced loss of livelihoods as radioactive particles were deposited on soil and vegetation. In later years, studies were conducted on over one million people to diagnose possible effects of radiation. A report by the Chernobyl Forum pointed severe mental health problems among people in the area coupled with “paralysing fatalism due to myths and misperceptions about the threat of radiation.”

The looming cost of evacuation

The third major accident, most recent, in Fukushima Daiichi Nuclear Power Plant, Japan was triggered by a 15metre Tsunami on March 11, 2011. A disabled power supply caused loss in the cooling capacity of the reactors, leading to melting of the cores. Subsequent four to six days saw high level of radioactive release into the environment. Apart from responding to the disaster, the Japanese state ordered and arranged evacuation of the locals. Majority had left within the first three days of the accident, escaping the strongest radioactive plume on March 15.

By May 2011, 170,000 people were evacuated from Fukushima. This came with various negative effects. The evacuation led to absence of medical support from hospitals, as a result of which even injured emergency workers, fighting hydrogen explosion in the plant, were unable to find help. More than 50 hospital inpatients and elderly people also died because of the deterioration of underlying medical problems. A report observes that relocation raised the mortality among evacuated elderly people needing nursing care by about three times, with women accounting 70% of these deaths. The evacuees also suffered higher prevalence of hypertension, diabetes and dyslipidaemia.

Reports also state young women in Fukushima feel stigmatised worrying about assumptions regarding their reproductive health. Among the evacuee community, distress concerning displacement, fear of radioactive exposure and settlement, livelihoods and relations with residents of new location have been a constant source of anxiety. In fact, fear of conflict with communities hosting the evacuees loom large as the latter stay disgruntled because of a sudden increase in population and resultant economic dynamics. Japanese regulatory authorities had to impose regulation limits for food and are still monitoring fish caught in the area surrounding the damaged nuclear power plant.

Compromising the right to protection and safety in Pakistan

Compare all of this to major disasters in Pakistan. In recent memory, 2005 earthquake, floods of 2010 and 2011, military operations in Swat (2009) and North Waziristan (2014), Balia factory fire in 2012, and 2015 Karachi’s heatwave stand out. The floods and military operations triggered mass migration. The evacuation process was observed to be most unorganised with a crippled early warning system and extremely poor arrangements for the transportation of the affectees. Not to talk of the absence of an evacuation plan. At the displaced persons camps, provision of basic facilities, including food, sanitation, healthcare and education remained in disarray. Several non-governmental agencies and international donors had to step in to fill in for the service delivery deficit. Cash compensation for displaced persons, in these cases, further added to the distress due to insufficient amount and irregularity of payment.

The failure of emergency response is most evident in the Baldia Factory Fire tragedy in 2012. As 260 people burnt to death, the fire brigades ran out of water and discontinued operations till supplies were replenished. The water supply of the largest industrial estate of the country, where the factory was located, was discontinued because of non-payment of bills. Similarly, last year's heatwave in Karachi that killed over 1,000 people exposed the limitations of the healthcare infrastructure to address a crisis impacting a population of 20 million. Hospitals were packed to capacity while mortuaries ran out of space to accommodate the dead. Once again there was neither any emergency response plan nor an effective early warning system.

Though there are no reports of mishaps at Pakistan's nuclear power plants in the public knowledge, accidents at these plants, whether due to human error, equipment failure or natural disasters, are not an impossible phenomenon. The question that arises is how well-equipped is our state to respond to a major radiation crisis? Are our disaster management institutions capable of evacuating all or a portion of Karachi's population in case of a serious accident at KANUPP? Have the citizens of Karachi or Chashma, and other cities where nuclear power plants are being established received any evacuation or emergency response plan to respond to a disaster at nuclear power plants? What are the state's plans for a scenario where Karachi's economic activity – trade, commerce, industry – may come to a halt as a result of such a threat? Are there any plans for a rehabilitation fund in case of mass displacement triggered by radioactive fallout? Does the state have the data of people in Karachi to monitor any possible impact of a crisis? The way people have struggled with emergencies and disasters of various scales in the past, it is only fair that their right to protection and safety be respected by the PAEC and other relevant state bodies. After all, right to life is more important than "the right to nuclear-generated electricity".