Chernobyl: A belated Review

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Thanks to the trending miniseries ‘Chernobyl’ on HBO, nuclear power, and its applications have been popular discussion topics among GenY. Although somewhat fictionalized, this series successfully rescinds one of the tragic yet important scientific events of human history.  From an artistic point of view the show has accurately recreated the 80’s Soviet Union culture and the society. It has received substantial appreciation for that. The series is loosely based on the book called ‘Voices from Chernobyl’ written by the 2015 Nobel Laureate writer and oral historian Svetlana Alexievich. This book is a compilation of interviews of people who were affected by the incident or knew someone who did. Naturally, the core of the series is rooted in the emotions and experiences of the people but not on hard facts and numbers.

To recount the event, the disaster happened at a nuclear power plant in Pripyat that used nuclear fission reaction to generate electricity. Fission is when a Uranium nucleus absorbs a neutron and eventually gets fragmented in Barium and Krypton nuclei to release more neutrons and energy. Thus, more neutrons become available to carry on the energy-releasing reaction spontaneously. The heat from the reactions is used to generate steam which in turn gets converted into electricity.

On the fateful night of 26th April 1986, failure of more than one safety protocols (lack of cooling water and reaction rate controlling rods) accelerated the reaction rate up to a point that the roof of the reactor was blown off from steam accumulation. This started an avalanche of explosions and the whole area was exposed to high radiation in addition to fire, heat, and debris.

Although the first responders (firemen, plant operators, pilots) got an acute dose of radiation, the residents of Pripyat got an average radiation dose of 70 milli-gray. An amount of 700 milli-gray is considered to cause fatal effects or acute radiation syndrome (ARS) which is 10 times higher than the dose absorbed by the residents within 30 km radius of the incident. The United Nations Chernobyl Forum report states childhood thyroid cancer by radioactive iodine had been one of the main after-effects of the event but there had been no observable increase in any other form of cancers among the people in the affected area. Rather the fear mongering within the public, due to lack of knowledge on radiation exposure, caused increased psychological problems. This was aggravated by the economical downfall that followed the event.

Also, after revisiting the incident, the question that encompasses my mind is, what could have prevented or at the very least mitigated the devastating effects of this explosion? Could better communication among the scientists, government and public have yielded better results?

As radiation damages cannot be seen immediately, the health hazards related to the explosion were not noticed by the residents immediately. It resulted in higher exposure to a large dosage of radiation which could have been avoided with better science literacy among the general population. People went outside with their kids to check the fire caused by the explosion and suffered prolonged exposure. A basic knowledge of radiation safety would have prevented such consequences. The workers involved in cleaning up the mess by the accident were mostly unaware of the outcomes of such high levels of radiation exposure. Greater involvement of the government and the scientists in teaching the public about the dangers and the emergency actions to be taken in case of radiation hazard could have resulted in a much more efficient and humane post-accident cleanup. The damages caused by this incident could certainly be better controlled had there been clearer and more honest communication among the scientists, engineers, government, and residents in that area.

Yes, the Chernobyl incident had made us question the safety aspect of nuclear energy, but studies have shown that the fatality rate of nuclear power plants is much less than that from coal, natural gas, and wind power plants. Also, the radioactive material produced by the properly shielded nuclear power plants is lower than coal power plants per kilowatt hour energy produced.  Chernobyl has been a lesson learnt hard way, but it has nonetheless inspired scientists to come up with safer technologies for nuclear reactors. As a conclusion, I would say we should know the history of Chernobyl not to fear nuclear energy, but to prepare for a greener future with nuclear energy armed with failproof safety measurements.

References:

1. Nuclear Agency Report on average dosage obtained by people in the Chernobyl incident (<https://www.oecd-nea.org/rp/chernobyl/c04.html>)
2. The United Nations Chernobyl Forum report (<https://www.iaea.org/sites/default/files/chernobyl.pdf>)
3. Fatality rate of different energy sources (<http://www.inference.org.uk/withouthotair/c24/page_168.shtml>)
4. Study of nuclear materials waste generated by nuclear and coal power plants (<https://www.nrc.gov/docs/ML0932/ML093280447.pdf>)