Forum: Special Conference

Issue: Health Awareness in the Wake of Fukushima

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Introduction

On March 11th 2011 an earthquake took place in Japan, causing an enormous tsunami. During these few hours and days, thousands of civilians were killed, buildings were dilapidated, local infrastructure was destroyed and much more happened, seriously damaging the Japanese economy & disrupting normal life for years to come. To make things worse, the tsunami created the conditions for a nuclear disaster which later took place in the Fukushima power plant. When this happened and was rated as a major accident, (grade 7 according to International Nuclear and Radiological Events Scale-INES), it added more catastrophic consequences, such as deaths, short and long term health effects, contamination of soil and water supply, as well as other risks for the present and future.

Finally, it stirred the long standing debate on the use of nuclear energy and the health risks and implications to which the local populations are exposed.

This study guide analyzes the various implications and parameters of nuclear energy, related to Public Health, in the wake of the Fukushima accident. There are many organizations involved and working on this issue. Organs of the United Nations and other international institutions are striving to cooperate and coordinate efforts, each from their own expertise & perspective, since this issue runs across countries, continents and various sciences simultaneously.

Definition of Key Terms

International Nuclear and Radiological Event Scale – INES

This is a scale developed by the International Atomic Energy Agency –IAEA, in 1990, to rate the severity of accidents caused by nuclear and radiological events. The scale has 7 grades of accidents from 0-7, where each grade represents an accident 10 times more serious than the previous grade. Although it is intended to be a logarithmic scale, the accidents' effects take time to be accurately rated and there is some room for interpretation. Therefore the scale cannot be used for disaster aid deployment. To cite an

example, the Fukushima accident, was rated much lower before it reached grade 7.

See relevant table below (source Wikipedia)

Ratings	Name	Description
0	Deviation	Event of no safety significance
1	Anomaly	Impact on defence in-depth e.g. exposure of a member of the public in excess of annual statutory limits
2	Incident	Impact on people and environment, on radiological barriers and control, on defence in-depth. e.g. significant contamination within the facility in an area not expected by design
3	Serious Incident	Impact on people and environment, on radiological barriers and control, on defense in-depth e.g. exposure in excess of ten times the annual statutory annual limit for workers
4	Accident with local consequences	At least one death from radiation, release of significant quantities of radioactive material within an installation with a high probability of significant public exposure
5	Accident with wider consequences	Several deaths from radiation, significant release of radioactive material likely to require implementation of some planned countermeasures.
6	Serious accident	Significant release of radioactive material likely to require implementation of planned countermeasures.
7	Major Accident	Major release of radioactive material with widespread health and environmental effects requiring implementation of planned and extended countermeasures. There have been two such events: Chernobyl disaster (1986), Fukushima disaster (2011).

Nuclear Leakage

Nuclear leakage is a type of nuclear accident such as the one seen in Fukushima. Nuclear leakage occurs when there is a failure in the nuclear power plant system or in one of its components .As a consequence the reactor core cannot be controlled and cooled. Therefore the nuclear fuel containing uranium or plutonium and other radioactive fission products begins to heat up and leak.

Sieverts - Millisieverts (mSv)

The most common SI multiple of sivevert is the millisievert (1 mSv = 0.001 Sv) which is used to measure the dose of radiation received by people. This unit belongs to the so-called SI (*Système international d'unités*)

Background Information

The main issue we are dealing with is related to how public health is affected by nuclear energy. Exposure to radiation constitutes a health risk, depending on the amount of radiation the human body is exposed to. It ranges from minor health effects to death.

The effect of radioactive materials on humans is that they cause damage to the body's internal chemistry and to the DNA of cells. The body tries to repair the damage, but when the damage is severe it cannot cope, leading to immediate short term health effects (nausea, diarroea, vomiting, headache, fever & fatal damage to internal organs). During the DNA repair process, there is also a possibility of a mistake, which could lead to long-term effects, such as cancer (thyroid cancer) being the biggest and most frequent long-term risk. The extent of the damage caused to the person depends on how long he/she is exposed to radiation and at what level.

In the table below, one can see the immediate and long term effects of radiation, as documented by the World Nuclear Association.

Danger Radiation Doses Source: World Nuclear Association

2 millisieverts per year (mSv/yr)	Typical background radiation experienced by everyone (average 1.5 mSv in Australiam 3mSv in North America)
9mSv/yr	Exposure by airline crew flying New York-Tokyo polar route
20 mSv/yr	Current limit averaged for nuclear industry employees
50 mSv/yr	Former routine limit for nuclear industry employees. It is also the dose rate, which arise from natural background levels in several places in Iran, India and Europe.
100 mSv/yr	Lowest level at which any long term increase in cancer risk is clearly evident
350 mSv/yr per lifetime	Criterion for relocating people after Chernobyl accident
400 mSv/hr	The level recorded at the Japanese nuclear site, 15th March
1000 mSv single dose	Causes (temporary) radiation sickness such as nausea and decreased white blood cell count, but not death. Above this, severity of illness increases with dose.
5000 mSv single dose	Would kill about half of those receiving it within a month

Major Countries & Organizations Involved

Japan

Japan is the most important country in this issue along with all the countries who possess nuclear power plants. Japan is the country where the Fukushima disaster took place and the country which responded to it with a high level of resilience and endurance. When the Fukushima disaster occurred the Japanese government took all the appropriate measures to cope with the disaster including shutting down all operating nuclear reactors to lighten the situation. However on 1st of July 2012 the Japanese authorities decided to restart the first nuclear reactor since the accident. This action caused a lot of unrest within the Japanese community but the lack of energy from other resources made the restarting an inevitable activity.

International Atomic Energy Agency-IAEA

The IAEA was founded in 1977 and is the principal UN organ responsible for nuclear safety. As a consequence, it plays a key role in preventing as well as dealing with nuclear accidents, being the prime coordinating agency for an international response to nuclear radiation accidents. In May 2011 an IAEA International Fact Finding mission began producing a preliminary assessment on the Fukushima Daichi, Fukushima Daini and Tokai Daini Nuclear Power Plants .The assessments were presented to the Ministerial Conference on Nuclear Safety. The IAEA Director General presented an action plan aiming to increase nuclear safety. The Action plan was by the IAEA governing bodies. The Action plan constitutes of 12 main actions as follows:

- Assess the safety vulnerabilities of nuclear power plants in the light of lessons learned from the Fukushima accident;
- Strengthen IAEA peer reviews in order to maximize the benefits to Member States;
- Strengthen emergency preparedness and response;
- Strengthen the effectiveness of national regulatory bodies;
- Strengthen the effectiveness of operating organizations with respect to nuclear safety;
- Review and strengthen IAEA Safety Standards and improve their implementation;
- Improve the effectiveness of the international legal framework;
- Facilitate the development of the infrastructure necessary for Member States embarking on a nuclear power programme;
- Strengthen and maintain capacity building - including education, training and exercises at the national, regional and international levels;
- Ensure the on-going protection of people and the environment from ionizing radiation following a nuclear emergency;

- Enhance transparency and effectiveness of communication and improve dissemination of information;
- Effectively utilize research and development.

The aforementioned actions could be easily integrated within a delegate's resolution.

Nuclear Energy Agency – NEA

The Nuclear Energy Agency is a specialized agency and part of the OECD (Organization for Economic Cooperation and Development). Its membership constitutes of 30 countries, mainly European ones. The mission of the NEA is "to assist its member countries in maintaining and further developing, through international co-operation, the scientific, technological and legal bases required for a safe, environmentally friendly and economical use of nuclear energy for peaceful purposes. To provide authoritative assessments and to forge common understandings on key issues as input to government decisions on nuclear energy policy and to broader OECD policy analyses in areas such as energy and sustainable development."

United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR)

Established by the G.A. of the UN in 1955. The mission of the organ is to assess and report levels and effects of exposure to ionizing radiation.

WHO – World Health Organization

WHO is the directing and coordinating health authority within the UN system, formed in 1948. It deals with global health issues, providing leadership, setting the health agenda for research, providing consultation to countries etc. Regarding nuclear accidents, it cooperates closely with the IAEA and provides medical assistance to victims, advises and helps national governments in dealing with such disasters, among others how to prepare, how to respond, and what health actions are needed for the population.

Food and Agriculture Organization of the United Nations – FAO

This organization's goal is achieving food security for all: making sure that people have regular access to enough high-quality food to lead active, healthy lives, as mentioned in the FAO website. FAO's mandate is to raise levels of nutrition, improve agricultural productivity, better the lives of rural populations and contribute to the growth of the world economy. The FAO is indirectly connected to the issue of nuclear radiation accidents, through the contamination of water and soil, which usually accompanies these events.

International Commission on Radiological Protection (ICRP)

The International Commission on Radiological Protection (ICRP) was founded in 1928 by the International Society of Radiology (ISR) and currently operates as an advisory board helping to prevent cancer and other diseases and effects associated with exposure to ionizing radiation. It also plays a significant role in protecting the environment.

European Atomic Energy Community (EURATOM)

The European Atomic Energy Community (EAEC or Euratom) is an international organisation having as its members all 27 EU countries*." The Euratom Treaty today helps to pool knowledge, infrastructure, and funding of nuclear energy. It ensures the security of atomic energy supply within the framework of a centralised monitoring system." (EURATOM's official website)*

Timeline of Events

29th July 1957, Vienna	Formation of IAEA
28th March 1979, USA	Three Mile Island Nuclear Meltdown
26th April 1986, USSR	Chernobyl Nuclear Disaster
11th March 2011, Japan	Fukushima Nuclear Disaster
1st July 2012, Japan	The Japanese authorities restarted the first nuclear reactor at the Ohi nuclear power plant since the Fukushima crisis. (The nation closed all its reactors in the wake of the Fukushima crisis over a year ago)

Relevant UN Treaties, Resolutions and Events

There are two main conventions concerning response to and prevention of nuclear disasters. These conventions include the Early Notification convention and the Assistance convention. The above mentioned conventions are the prime legal instrument for the establishment of an international framework, coping with radiation accidents and aiming to minimize health effects to relevant populations.

Convention on Early Notification of a Nuclear Accident (Early Notification convention)

http://www.iaea.org/Publications/Documents/Infcircs/Others/infcirc335.pdf

Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (Assistance convention)

http://www.iaea.org/Publications/Documents/Infcircs/Others/infcirc336.pdf

Previous Attempts to Solve the Issue

The issue of nuclear disaster prevention has been a longstanding issue for years after the Chernobyl accident and the debate was reheated after the leakage in Fukushima. In the past, several efforts were made aiming to find a solution to such a demanding issue. They include conventions such as The Convention on Early Notification of a Nuclear Accident (Early Notification convention) and the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (Assistance convention) mentioned in the previous section

There are also various other legal bases and multinational cooperation aims at achieving the best possible nuclear safety

However, despite efforts of the International community to find a viable solution, many obstacles remain making the situation highly complex and difficult to solve.

Possible Solutions

Various solutions could be applied to such a complex and wide range issue. Solutions could be divided into two main categories: measures aiming to prevent a nuclear disaster and measures aiming to minimize health effects in the case of a disaster, which has already occurred.

Preventive measures

There is a very serious and heated debate on how to create and manage nuclear reactors. Solutions could include setting up stricter regulations for the creation and management of nuclear power reactors by, for example, limiting the life of nuclear reactors (considering that most nuclear disasters have been caused by “old” reactors). Another solution could be the serious examination of the location where a nuclear reactor is built, thus examining and avoiding areas prone to earthquakes, such as in Fukushima.

Measures to minimize health effects

Apart from the preventive measures the delegates could also consider to include in their resolutions measures which aim to minimize health effects when a nuclear disaster has already occurred and radiation has leaked. Such measures could include the creation of emergency governmental bodies which quickly respond to any kind of disaster, as well as, measures relating to Public Health such as giving the population non radioactive iodine (I-127) as protection from radioiodine 131 uptake by the thyroid which would lead to severe health effects such as cancer.

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Useful Links

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http://www.who.int/en/