

Purpose

- To provide knowledge on the levels of radiation exposure due to the nuclear accident, and the associated effects and risks to human health and the effects on non-human biota
- To present estimates of radiation doses and discuss implications for health for different population groups inside Japan, as well as in some neighboring countries, in light of the UNSCEAR's previous scientific assessments
- To identify gaps in knowledge for possible future follow-up and research

The UNSCEAR 2013 Report “Volume I, Scientific Annex A: Levels and Effects of Radiation Exposure due to the Nuclear Accident after the 2011 Great East-Japan Earthquake and Tsunami” was prepared for the following three purposes as shown above.

As stated in the Introduction of the Report, at its fifty-eighth meeting (in May 2011), the UNSCEAR decided to carry out, once sufficient information was available, an assessment of the levels of exposure and radiation risks attributable to the nuclear power plant accident following the great east-Japan earthquake and tsunami, and published the Report in April 2014.

The Report is based on prefectural data and government organizations’ data released in Japan up to September 2012, and other data and documents provided by UN member countries other than Japan and by international organizations such as the International Atomic Energy Agency (IAEA) and the WHO. Additionally, new important information obtained by the end of 2013 was also taken into consideration to the extent possible.

The outline of the assessment of exposure doses in the UNSCEAR 2013 Report is as follows.

- The assessment was based on measurement data as far as possible.
- Doses that the public received for the first one year after the accident were assessed.
- The assessment targeted 20-year-old adults, 10-year-old children and 1-year-old infants
- Projections were also made of doses to be received over the first 10 years and up to age 80 years.
- Models were used, with realistic assumptions, to provide an objective evaluation of the situation.
- Protective actions taken during the first year were considered and the doses averted by them were estimated.

[Relevant parts in the Report]

- UNSCEAR 2013 Report (prepared based on paragraph 8 on page 27, paragraphs 3 to 4 on pages 25 to 26, and paragraph 12 on page 27, Scientific Annex A)

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Updated on March 31, 2024

Used measurement values, etc.

1. Internal exposure through inhalation and external exposure
 - (i) Deposition densities of radioactive materials on the ground surface measured on earth and from aircraft
 - (ii) Radioactivity concentrations in the air and on the ground surface estimated based on types and estimated amount of radioactive materials released from the reactor and through diffusion simulation
2. Internal exposure through ingestion
 - Radioactivity concentrations in foods and drinking water
 - (i) First year: Measurement data for concentrations of radionuclides in distributing foods and drinking water
 - (ii) Second year onward: Radioactivity concentrations in foods estimated through simulation based on soil contamination data; For marine products, radioactivity concentrations in seawater estimated based on measurement data in the sea area off Fukushima Prefecture and through diffusion simulation of radionuclides
 - Japanese people's food intake (based on the National Health and Nutrition Survey)

Out of the radioactive materials released due to the accident at Tokyo Electric Power Company (TEPCO)'s Fukushima Daiichi NPS, Iodine-131, Cesium-134, and Cesium-137 are considered to have mainly contributed to people's exposure.

Doses can be assessed most reliably through the measurement using personal dosimeters in the case of external exposure and the measurement using whole-body counters in the case of internal exposure. Such data was partially available regarding the accident at the NPS but was not sufficient for calculating internal exposure doses for all people in Fukushima Prefecture as a whole and in other prefectures.

Therefore, the UNSCEAR conducted dose estimation based on the data indicated above and used other measurement data for verifying the calculation results.

[Relevant parts in the reports]

- UNSCEAR 2013 Report (prepared based on paragraphs 67 to 78 on pages 48 to 50, Scientific Annex A, Appendix A, and "IV. TRANSPORT AND DISPERSION IN THE OCEAN" of Appendix B)

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- It is not likely that any significant changes attributable to radiation exposure due to the accident would arise in future cancer statistics.
- There is the possibility that thyroid cancer risks may theoretically increase among the group of children whose estimated exposure doses were at the highest level. Therefore, their situations need to be closely followed up and assessed.
- Congenital abnormalities and heritable effects are not detected.

Source: Prepared based on the UNSCEAR's "Fact sheet on UNSCEAR 2013 Report: Japanese (Evaluating Radiation Science for Informed Decision-Making)"
(https://www.unscear.org/docs/publications/2016/factsheet_jp_2016_web.pdf)

The UNSCEAR assessed public health effects as indicated above based on its exposure dose assessment.

Assessment concerning risks of specific types of cancer and other diseases is as follows.

- **Thyroid cancer:** Most of the doses were in a range for which an excess incidence of thyroid cancer due to radiation exposure has not been confirmed. However, absorbed doses to the thyroid towards the upper bounds could lead to a discernible increase in the incidence of thyroid cancer among sufficiently large population groups. Nevertheless, the occurrence of a large number of radiation induced thyroid cancers in Fukushima Prefecture—such as occurred after the Chornobyl NPS Accident—can be discounted, because absorbed doses to the thyroid after the accident at Tokyo Electric Power Company (TEPCO)'s Fukushima Daiichi NPS were substantially lower than those after the Chornobyl NPS Accident.
- **Leukemia:** The UNSCEAR considered the risk to those exposed as fetus embryo during pregnancy, and during infancy and childhood, and concluded that no discernible increases in the incidence of leukemia among those groups are expected.
- **Breast cancer:** The UNSCEAR considered the risk to those exposed at the stage of youth, and concluded that no discernible increases in the incidence of breast cancer among those groups are expected.
- **Exposure during pregnancy:** The UNSCEAR does not expect any increases in spontaneous abortion, miscarriages, perinatal mortality, congenital effects or cognitive impairment resulting from exposure during pregnancy, nor does it expect any discernible increases in heritable diseases among the descendants of those exposed from the accident at TEPCO's Fukushima Daiichi NPS.

The UNSCEAR states that their assessment of public exposure doses due to radioactive materials from the accident at Tokyo Electric Power Company (TEPCO)'s Fukushima Daiichi NPS contains uncertainties because the assessment was premised on certain assumptions based on insufficient knowledge and information.

[Relevant parts in the Report]

- UNSCEAR 2013 Report (prepared based on paragraphs 220 and 222 to 224 on page 89, Scientific Annex A)

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