



Exposure to Radiation in Ireland

On average, a person in Ireland receives an annual dose of 3950 μSv from all sources of radiation. By far the largest contribution of approximately 86 per cent (3400 μSv) comes from natural sources (Figure 1). Man-made radiation contributes approximately 14 per cent (550 μSv): dominated by the beneficial use of radiation in medicine (540 μSv). Doses from other man-made sources account for less than 1 per cent (15 μSv). The contribution from all sources of radiation, to the average annual dose to a person in Ireland, is shown in Figure 2.

Figure 1 Contribution from natural and man-made sources of radiation

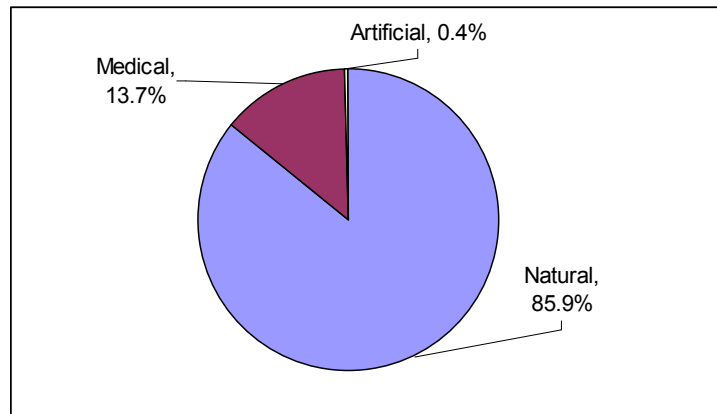
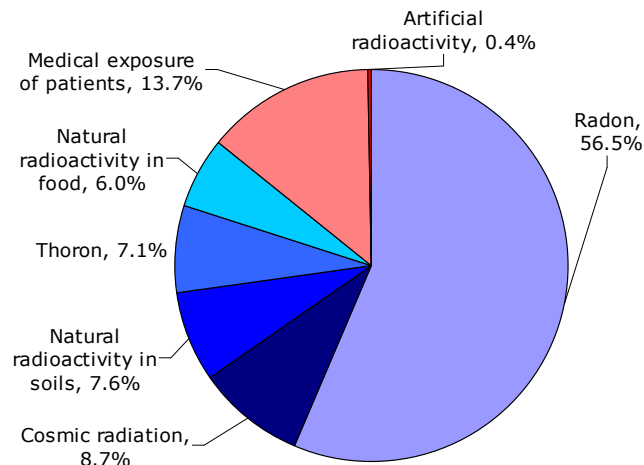


Figure 2 Contribution from all sources of radiation



The principal sources of radiation in Ireland are as follows

Radon

Radon is a radioactive gas that occurs naturally in the ground and when it enters a building it can build up to unacceptable levels. For most people, radon is the major contributor to their total dose. On average, a person receives 2050 μSv per year from radon in the home and an additional 180 μSv from radon in the workplace. For the individual, there is very large variability in the dose received from radon. This source of radiation exposure, among all others, is probably the easiest to reduce.

Cosmic radiation

On average, a person living at sea level receives 300 μSv from cosmic radiation – high-energy radiation from outer space reaching the earth's surface. The dose varies with latitude and altitude but the variability across Ireland is extremely small. Air crew and airline passengers receive an additional dose from cosmic radiation. The dose received depends on the frequency of flights and the routes flown.

Natural radioactivity in soils

Radioactive elements occur naturally in all rocks and soils and have been there since the creation of the Earth. On average, a person receives 300 μSv every year from the radiation emitted from this source.

Thoron

On average, a person receives 280 μSv per year from exposure to thoron. Thoron, like radon, is a naturally occurring radioactive gas. Unlike radon, its principal source is building materials.

Natural radioactivity in food

The natural radioactivity present in soil is transferred to crops and grazing animals, thereby resulting in a radiation dose when these are eaten. Similarly, natural radionuclides are present in the sea and these are transferred to fish and shellfish. On average, a person receives 235 μSv every year from natural radioactivity in food. Approximately 75 percent of this is due to potassium-40. Potassium is an essential element and its concentration in the body is controlled by metabolic processes.

Medical exposure of patients

Many procedures carried out routinely in medical diagnosis involve exposure to radiation. On average, a person receives 540 μSv per year from medical procedures. This average value does not include doses from medical treatment such as radiotherapy, which will normally be several hundred times higher.

Some people receive no dose from medical procedures while others receive much higher doses. The total dose received depends on the number and type of procedures. Some well-known procedures and the typical doses received are: dental

X-ray (10 μSv); chest X-ray (20 μSv); mammography to identify breast cancer (500 μSv); CT scan (5400 μSv); angiogram to determine heart function (6000 μSv).

All medical exposures to radiation must be clinically justified and should only be carried out if recommended by a GP or medical consultant. Exposure to radiation as part of a routine medical check-up is rarely if ever justified.

Working with radiation

If you work with radiation in the medical, industrial or education/research fields, on average you receive a dose of 20 μSv per year. Air crew who fly above 8000 m receive an average dose each year of 2000 μSv . As mentioned above, the average contribution from radon in indoor workplaces is 180 μSv . If you work with radiation or are air crew, your employer is required by law to keep a record of your doses.

Artificial radioactivity

On average, a person receives 15 μSv every year from artificial radioactivity in the Irish environment. We receive approximately 10 μSv from artificial radioactivity in soils and a further 5 μSv from artificial radioactivity in food. The origin of this radioactivity is nuclear weapons testing in the 1950s and 1960s, the Chernobyl accident in 1986 and discharges from the Sellafield reprocessing plant in the UK.

Further Reading

Colgan, P.A., Organo, C., Hone, C. and Fenton, D. (2008) **Radiation Doses Received by the Irish Population** RPII 08/01. Dublin: Radiological Protection Institute of Ireland.