EXPOSURE TO TERRESTRIAL GAMMA RADIATION IN WESTERN SWEDEN

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After excluding contribution from radon 42% of the average effective dose from natural background radiation comes from terrestrial gamma radiation (TGR) in Sweden. In western Sweden, in the county of Vastra Gotaland, the TGR is high and originates mainly from granite, but the county has also areas with low TGR (0-500 nGy/h). This study aims to investigate the distribution of TGR in relation to the population (population-weighted average). Data for the study comes from the database at the Swedish Geological Survey and is based on aerial measurements. The digital database has unique measurements for each 200 x 200 meter grid for uranium, thorium and potassium, respectively. With conversion factors for the three nuclides, the TGR can be calculated in nGy/h. Each individual in Vastra Gotaland (n=1.5 million) was retrieved from the population registry with the dwelling coordinates. Using the Geographical Information System the coordinates of the individual's home was matched with the level of TGR. Then the TGR for each municipality was calculated as 1) an average of the grid cells (surface-weighted average) and 2) the population-weighted average, respectively.
The population-weighted average of TGR for the county of Vastra Gotaland was 56 nGy/h. There was a tendency of higher population-weighted municipality average compared to the surface-weighted average i.e. the population distribution was skewed towards regions with higher TGR. In the 49 municipalities the median populationweighted average was 55 nGy/h, Sotenas had the highest 118 nGy/h and the Trollhattan municipality had the lowest average of 37 nGy/h. In our study we found that the population-weighted average of TGR for the municipalities in Vastra Gotaland was higher than the surface-weighted average. This is probably a random phenomenon, but important to keep in mind when designing and evaluating ecological studies.

Keywords: terrestrial gamma radiation, epidemiology, Geographical Information System