CLIMATE CHANGE AND RADON EXPOSURE AS A HEALTH RISK

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Introduction. Radon exposure is expected to increase due to the direct and indirect effects of climate change. According to climate projections, changes in air temperature and humidity could modify the health impacts of radon. The melting permafrost caused by global warming releases more radon into the atmosphere and homes, leading to increased exposure and a higher risk of lung cancer.
The aim is to argue the health risks associated with radon exposure in a changing climate to include it in public health activities.
Material and methods. The world's experience with climate change and its impact on health risks associated with radon was examined, utilizing approximately 30 scientific publications from platforms such as ResearchGate, PubMed, BioMedCentral, WHO, IAEA, and others. A comprehensive analysis was conducted, synthesizing current knowledge and regional estimates of the projected interaction between climate change and radon concerning the onset of lung cancer.
Results. The expanding list of health risks associated with climate change includes the release of substantial amounts of radon due to melting permafrost. This could represent a major risk for the occurrence of lung cancer, as radon exposure ranks as the primary cause among non-smokers and the second leading cause among smokers. Permafrost acts as a natural radon barrier, reducing radiation to one-tenth of the background level and increasing it behind the barrier. With global warming, permafrost melts, allowing radon to seep out of the ground and penetrate buildings, resulting in long-term exposure unless radon remediation is employed. Instantaneous thawing can yield radon levels exceeding 200 Bq/m3 for over five years in buildings with basements. According to the World Health Organization (WHO), the risk of lung cancer increases by approximately 16% for every 100 Bq/m3 of long-term radon exposure. In the Republic of Moldova, the reference level is 300 Bq/m3. Since radon is an odorless, colorless, and tasteless gas, its risk remains unknown without radon testing, particularly in areas with geological indications of its presence. Weather parameters affect radon concentrations both indoors and outdoors. Outdoor wind speed and relative humidity show a negative correlation with radon concentrations. The risk of radon exposure during climate change is further exacerbated by increased use of air conditioners, prompted by high air temperatures (heat waves). This results in lower air exchange rates in well-sealed homes, raising radon concentrations and exposure on upper floors where residents spend more time. Some regional assessments support this relationship, demonstrating a statistically significant direct link between radon concentration in buildings and air temperature. However, a stronger dependence on radon concentration is evident when air temperature and humidity are combined, enabling the quantification of radon concentration fluctuations along with their variability.
Conclusions. The melting of permafrost due to climate change will elevate radon levels in the atmosphere, and projected changes in air temperature and humidity could alter the health risk associated with radon exposure. The amount of inhaled radon is crucial for human health, and testing is the only way to determine the risk of radon exposure in buildings in the new climate change reality.