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Geohealth Frontiers: Linking Geological Substrates to Public Health and Ecosystem Risk Assessment

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Abstract

Geohealth is a new interdiscipline of study that investigates how geological conditions affect public health and ecosystem integrity. This review takes into account the ways in which the fabric and composition of geological substrates—mineralized rocks, volcanic soils, sedimentary basins—can influence environmental quality and, consequently, human health. Natural impurities like arsenic, fluoride, and heavy metals typically have geogenic sources and leach into groundwater or concentrate in agricultural products, thus inflicting long-term health issues like carcinogenesis, fluorosis, and organ damage. In industrial belts and mining regions, anthropogenic activities are likely to initiate geological vulnerabilities, releasing toxicants that enhance environmental and health hazards. By using examples of case studies from Iran, India, and Sub-Saharan Africa, this paper provides regional variation in geological exposure to risk. New advances in geo-mapping, remote sensing, and isotopic fingerprinting now enable accurate spatial correlation of geologic substrates with disease clusters for early intervention. Further, the inclusion of geological data in environmental risk models enhances the accuracy of ecosystem health assessment and land-use planning. This review proposes a geohealth strategy based on cross-sectoral collaboration among geologists, ecologists, and public health experts to predict and mitigate environmental hazards. The novelty of this work lies in its emphasis on proactive integration of geological data into health monitoring systems, policy, and climate adaptation planning.

Keywords: Geohealth, geological substrates, environmental risk, heavy metals, groundwater, disease mapping.