

Title: Spatial-temporal variability and probabilistic health risk assessment of fluoride from lentic ecosystem, Türkiye

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Abstract: Thrace Region is a part of the Marmara Region of Türkiye. There are many natural and artificial stagnant water habitats in the region that are used for irrigation and drinking water supply. This study is intended to determine the spatial-temporal variability and probabilistic health risk of fluoride exposure in the water of stagnant water bodies in the Thrace region. A total of 33 stagnant water bodies were selected, and water samples were collected during the dry and wet seasons of 2021–2022. The fluoride levels were measured using a spectrophotometric method (wavelength is 588 nm). The fluoride accumulations varied from 0.16–0.64 mg/L for the natural lakes, 0.04–0.74 mg/L for the reservoirs, and 0.01–0.53 mg/L for the artificial ponds. The World Health Organization (WHO) suggested a level of fluoride in drinking water of 0.5 to 1.5 mg/L. The study area had a fluoride deficiency of less than 0.5 mg/L in natural water bodies during the wet season (87.87%) and the dry season (93.93%), which might be a potential threat to dental health. Estimation Daily Intake (EDI) and Hazard Quotient (HQ) widely used health risk assessment methods were applied to the data in the current research to describe the non-carcinogenic risk of fluoride. All the calculated hazard quotient (HQ) values, both in the dry and wet seasons and in all age groups, were recorded as below 1. Both teenagers and children living in the central part of the study area are at higher risk than infants and adults. To evaluate model uncertainty, Monte Carlo simulations were employed. The outcome of the sensitivity analysis revealed that the major risks to the health of the inhabitants are the high content of fluoride and their daily intake of water.

Keywords: Thrace region natural artificial lake fluoride health risk assessment

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