Title: **Assessment of Heavy Metal Accumulation in Commercially Important Spiny Lobster Species from the Bay of Bengal and Implications for Consumer Health Risks**

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Abstract: This study assessed heavy metal contamination and associated health risks in spiny lobsters (*Panulirus polyphagus*, *Panulirus homarus*, *Panulirus ornatus,* and *Panulirus versicolor*) collected from the coastal waters of Bangladesh. Concentrations of As, Cd, Cr, Pb, Hg, Mn, Cu, and Zn were measured across different body parts (Abdomen, appendages, carapace, and cephalothorax), and statistical tools such as Principal Component Analysis (PCA) and Pearson correlation were employed to identify contamination sources. Results indicated strong anthropogenic influences for Cd, Cu, and Zn, while Cr, Mn, and As reflected natural geogenic inputs; Hg was largely atmospheric in origin, and Pb exhibited mixed sources. Health risk assessment revealed severe threats, as Hazard Index (HI) exceeded 1 in all species for both adults and children. Arsenic was the most alarming, with Target Hazard Quotient (THQ) values surpassing 5 in all cases for both adult and children, except one case, followed by elevated Cd and Pb risks. Estimated Daily Intake (EDI) exceeded the Recommended Daily Allowance (RDA) for As in all samples and for Cd and Pb in most body parts. Carcinogenic risk analysis classified As and Cd in Level VII (extremely high risk), Cr between Levels III–VII, and Pb between Levels III–V. Overall, the findings suggest significant ecological and public health hazards, underscoring the need for strict monitoring, pollution control, and sustainable coastal management.

Keywords: **Carcinogenic Risk Hazard Index Health Risk Heavy Metals Spiny Lobster**

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