

Title: Human health risk assessment of heavy metals in vegetables of Bangladesh

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Abstract: This study aims to evaluate the heavy metal concentration in fifteen species of vegetables as well as associated health risk. Atomic absorption spectrometry is used to assess heavy metals. The mean concentrations of Pb, Cd, Cr, Ni and Fe in vegetables were 4.78, 0.713, 9.266, 0.083, 5.06 mg/kg/fw exceeding the reference value of FAO/WHO indicating unsafe to consumption. Based on principal component analysis, the Pb, Cr, Ni and Fe are from same sources. Health risk was estimated in terms of estimated daily intake (EDI), target hazard quotient, hazard index (HI) and cancer risk (CR). The EDI values of metals except Cr were found to be lower than maximum tolerable daily intake (MTDI). The total THQs of metals were > 1 indicating non-carcinogenic health risk. The individual HI values for vegetables except potato (0.831) and total HI values were found to be > 1 (94.747). The TCR of Pb, Cd and Cr were $> 1.0E-04$ which indicating carcinogenic risk. Fruit and pod vegetables contribute much in carcinogenic risk for Pb and Cr whereas fruit, root and stems vegetables for Cd. The study revealed potential human health risk associated with the consumption of different types of vegetables in Bangladeshi adult population that might assist the regulatory bodies to develop new strategies to minimize the risk to human.

Keywords: Heavy metal, Vegetables, Carcinogenic, Non-carcinogenic, Atomic absorption spectrometry

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