



## ABSTRACT

Food security is a big problem throughout the world especially due to heavy metal contamination. Heavy metals concentrations and their related health risk were determined in vegetables and fruits. Inductively coupled plasma optical emission spectrometer (ICP-OES) was used to determine the concentration of toxic heavy metals such as cadmium, manganese, arsenic, zinc, nickel, lead, chromium and copper in vegetables and fruits consumed by Pakistani population. Maximum permissible concentration (MPC) for the given heavy metals exceeded the standards set by WHO/FAO for Cd in round melon and turnip in vegetables and apple, cantaloupe muskmelon, strawberry, grapes, and mango in fruits, Ni in guava, cantaloupe muskmelon and pomegranate in fruits, Pb in all vegetables and mango in fruits, Cr and Cu in cantaloupe muskmelon in fruits. From ingestion point of view, the value of estimated daily intakes (EDIs) were found less than the maximum tolerable daily intake (MTDI) level by consumption of all these metals from vegetables and fruits. The Total target hazard quotient (TTHQ) values of the given metals such as As (1.194), Ni (1.996), Pb (7.825), Cu (5.52) and Mn (1.619), As (1.319), Ni (1.665), Pb (1.17), Cu (2.568) were found to be greater than 1 in both vegetables and fruits respectively. These findings show that consumption of these metals from vegetables and fruits would put the population of Pakistani to potentially high health risks. The health index (HI) value of different heavy metals element expresses the mutual non-carcinogenic effects. The health index (HI) values show that consumers have chances to face adverse potential health effects because HI was greater than 1 for selected vegetables (18.163) and selected fruits (9.119), both. The total cancer risks value of arsenic As were found to be less than  $10^{-4}$  indicating no potential cancer risk (CRs) to humans from As consumption, whereas total CRs from Pb was found  $2.678 \times 10^{-4}$  suggesting that significant high potential for cancer risk to the population from studied samples of vegetables and fruits.