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## Heavy metal accumulation and health risk assessment in soil-wheat system under different nitrogen levels

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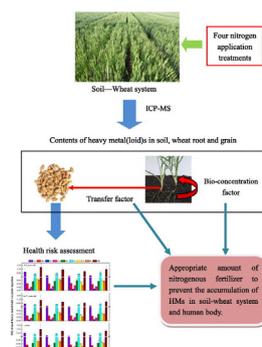
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### HIGHLIGHTS

- The contents of eight HMs in soil-wheat root-grain system were analyzed.
- Health risks of HMs via wheat (*Triticum aestivum*) grain exposure were assessed.
- The bio-concentration factor and transfer factor were respectively lowest between the N-fertilization level of N8–N15.
- The local population who ingested the grain from the culture condition of N15, experienced lowest health risks.

### GRAPHICAL ABSTRACT



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### ABSTRACT

Heavy metal(loid)s (HMs) in organic fertilizer have become a primary source of HMs pollution of farmlands, which could cause deleterious health effects in people exposed through soil-plant systems via multi-pathways. This study investigated China's main grain production area (Henan Province) to evaluate the accumulation and transport characteristics of HMs (Cr, Mn, Ni, Cu, Zn, As, Cd and Pb) in a soil-wheat system and conduct a health risk assessment for wheat (*Triticum aestivum*) grain under different nitrogenous fertilizer treatments. The results indicated that the Cr, Cu, As and Cd contents in soil were 56.21–113.66, 13.97–58.72, 5.79–22.62 and 0.04–0.23 mg·kg<sup>-1</sup>, and the mean contents of Cr and As contents in wheat grains were 0.78 ± 0.31 and 0.49 ± 0.18 mg·kg<sup>-1</sup>, respectively, which exceeded the corresponding standards. The bio-concentration factor and transfer factor were lowest in response to N-fertilization with N8–N15. Health risk assessment showed that the local population who ingested grain from culture condition of N15 experienced the lowest non-cancer and cancer risks. Among different population groups, HMs posed relatively higher non-cancer and cancer risks to children aged 0–5 years. Furthermore, Cr and As exposure was the greatest contributor to Hazard Index (HI), accounting for 74.72–83.11%, while Cr exposure accounted for >90% of the total potential cancer risk. Concluding, this study indicated that, to protect human health, the current application of nitrogenous fertilizer should be controlled to an appropriate level.

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