
Children's Environmental Health Research Findings
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Topic: Risk from living near a coking plant

Title: Health risks from the exposure of children to As, Se, Pb and other heavy metals near the largest coking plant in China

Conclusion: Proximity to a large coking plant is associated with risks to children, primarily from the ingestion of heavy metals in locally produced food.

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Abstract: Coking influences environmental quality and poses high risks to human health as large amounts of heavy metals and metalloids are emitted into the environment from coal during the coking process. Health risks depend heavily on multi-pathway and element-specific exposures, which have, unfortunately, been rarely studied. In this study, children's health risks and exposure levels to As, Se, and heavy metals (Pb, Cd, Cr, Ni, Co, Zn, Cu, Mn, V and Sb) in the water, soil, dust, air and locally produced food were studied based on field sampling and questionnaire-based surveys around the largest coking area in China. Human blood samples were collected and analyzed to indicate the exposure levels. The non-carcinogenic risks to children mainly resulted from Cr, Mn, Pb, As and Sb, the levels of which were 3 to 10 times higher than the acceptable levels (1.0×10^{-6}). The carcinogenic risks to children were 30 to 200 times higher than the safe level (1.0×10^{-6} - 1.0×10^{-4}), which could be attributed to Cr, As and Ni pollution. The estimated risks mainly came from the pathway involving the ingestion of locally produced food, accounting for more than 85% in total for most elements. For As, the food ingestion and air inhalation exposure pathways both contributed approximately 50%, respectively. The high risks in this study highlight the attention paid to the health of children who live in the vicinity of coking activities and the importance of site-specific multi-pathway health risk assessments and food safety to protect potentially exposed children.

Keywords: coking, chromium, lead, nickel, arsenic, selenium, child