

ANALYSIS OF HEAVY METAL (Pb, Cr, Zn, Cd) Levels in Indoor Dust at UiTM Shah Alam: Impact on the Health of Students and Staff

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Structured Abstract

Background: Indoor dust in educational institutions can serve as a significant pathway for heavy metal exposure. This study focused on evaluating the concentrations of lead (Pb), cadmium (Cd), chromium (Cr), and zinc (Zn) in indoor dust within the Faculty of Applied Sciences, UiTM Shah Alam, and assessing associated health risks.

Methods: Dust samples were collected from multiple indoor environments, including classrooms, laboratories, lecture halls, and common areas. Samples underwent acid digestion and were analysed using Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES). Health risks were assessed using the Hazard Quotient (HQ) method, while statistical analyses (independent t-test and Spearman correlation) were performed to examine the relationship between exposure levels and self-reported health symptoms obtained from ICOP-based questionnaires.

Results: All four heavy metals were detected across sampling locations. Laboratories recorded the highest chromium level (98.40 mg/L), while classrooms showed the highest lead concentration (18.02 mg/L). HQ values exceeded 1 for Pb in classrooms (HQ = 1.71) and Cr in laboratories (HQ = 32.09), indicating potential non-carcinogenic health risks. However, statistical analysis revealed no significant association between heavy metal concentrations and reported health symptoms ($p > 0.05$).

Conclusion: The findings indicate that certain faculty areas are prone to heavy metal accumulation, presenting localized health risks. Regular environmental monitoring and improved cleaning protocols are essential to mitigate long-term exposure among students and staff.

Keywords: Indoor Dust, Heavy Metals, ICP-OES, Health Risk Assessment, UiTM Shah Alam

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