

UNIVERSITI TEKNOLOGI MARA

**HEAVY METALS CONCENTRATION IN
STREET DUST FROM RESIDENTIAL
AND INDUSTRIAL AREAS AT MUKIM
HULU KINTA PERAK**

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ABSTRACT

Street dust forms due to the interaction of the atmosphere, lithosphere (pedosphere), and anthroposphere and can be regarded as an index of the environmental condition in urban areas because it may affect ecosystems and human health. Therefore, this research aims to determine the amount of heavy metal content and its subsequent risks to human health in 72 street dust samples collected from two locations, i.e., industrial and residential areas in Mukim Hulu Kinta, Perak. The heavy metal concentrations were obtained by wet acid digestion and Atomic Absorption Spectroscopy (AAS) for the assessment of copper (Cu), cadmium (Cd), zinc (Zn), and lead (Pb) concentrations. The results showed a high concentration of Zn and the lowest concentration of Cd. The decreasing trend of metal levels of street dust average from the residential and industrial areas is as follows: $Zn > Cu > Pb > Cd$. Statistical analysis using an independent t-test indicated a significant difference in Pb levels between the residential and industrial areas ($p = 0.004$, $t = -1.562$, $df = 70$). However, no significant differences are noted in the results for Cu, Cd, and Zn levels between the areas. In addition, the geo-accumulation index (Igeo) value has been calculated to assess the contamination of heavy metals, and the result is in the following order: $Cd > Zn > Cu > Pb$. As the hazard quotients (HQ), indicated that the HQ of Cu, Cd, Zn, and Pb was less than one which is an acceptable limit for humans. Thus, the residential and industrial areas exhibit a safe level of heavy metals in street dust for the population.

Keywords: Heavy Metals, Street Dust, Geo-accumulation index, Health Risk Assessment

CHAPTER 1

INTRODUCTION

1.1 Background of study

Cities has evolved into the hub of human activity as a result of the fast industrialization and urbanization processes. Nevertheless, there have a significant impact on the urban environment with a variety of elements, including industrial effluent, transportation, housing, and daily lives of residents (Chen et al., 2022).

Street dust forms due to the interaction of the atmosphere, lithosphere (pedosphere), and anthroposphere and can be regarded as an index of the environmental condition in urban areas. The dust accumulating on the surface of roads and streets mostly consists of quartz and feldspar arouses great interest in researchers owing to the pollutants it contains, mainly heavy metals (Zgłobicki & Telecka, 2021). Heavy metals are either essential (i.e., Copper and Zinc) or non-essential metals (i.e., Cadmium and Lead). For example, Cu is essential for haemoglobin formation, carbohydrate metabolism but if metals present in in excess, it causes cellular damage. World Health Organization (WHO) recommended safe limits of Cd and Pb on humans with maximum acceptable concentration of Cd is 0.003 parts per million (ppm) while Pb is 0.01 ppm (Kinuthia et al., 2020).

Heavy metals in street dust are considered air pollutants harmful to humans, plants, and animals (Aguilera et al., 2021). A study by (Nawrot et al., 2020) stated that heavy metal contaminants are potentially toxic when absorbed into the human body at high concentrations that can lead to chronic effects depending on the routes of exposure