

# Ecological and health risk analysis of potentially toxic elements in road dust and topsoil from a medium-sized urban city in southwestern Nigeria.

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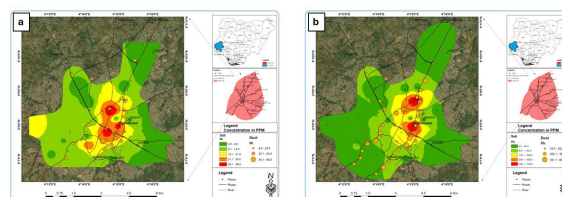


Figure 1: spatial distribution map of (a) Ni and (b) Pb in the study area.

Potentially toxic elements (PTEs) in topsoil and road dust from Ogbomoso, a medium-sized city in Nigeria, were analysed to assess their enrichment factor (EF), pollution load index (PLI), potential ecological risk (PER), and human health risk (HHR). PTEs concentrations (ppm) varied widely in both media: Pb (topsoil and road dust; below detection limit, BDL-779.0 and 25.0-698.0), Zn (16.0-3136.0 and 75.0-1072.0), Ni (3.0-49.0 and 6.0-80.0), Co (6.0-25.0 and 9.0-28.0), Mn (310.0-1502.0 and 385.0-2065.0), Cr (10.0-125.0 and 43.0-260.0), Cd (BDL-3.4 and BDL-2.3), and Ba (48.0-365.0 and 79.0-286.0) respectively (Fig. 1). The mean EF values were greater than 1 for all PTEs except for Cd, with Pb, Zn, and Ni showing the highest accumulation. The average PLI values (5.30 for soil and 2.68 for road dust) indicate high pollution levels. The mean ecological risk index (Eri) ranked Pb > Cd > Ni/Cu > Zn in soil and Cd > Cu > Pb > Ni > Zn in road dust.

The HHR assessment model revealed minimal non-carcinogenic and carcinogenic effects for both adults and children. The mean total hazard index (THI) values of children (soil: 0.523, road dust: 1.11) and adults (0.225, 0.478) indicated low ( $HI \geq 0.1 < 1$ ) and medium risk ( $rHI \geq 1 < 4$ ). The total carcinogenic risk index (TCRI) values of children (1.40E-04, 2.80E-04) and adults (3.87E-04, 7.72E-04) exceeded  $10^{-4}$ . The carcinogenic risk index (CRI) followed the trend Ni > Pb > As > Cd, with children being more susceptible than adults.

These findings provide a scientific basis for environmental and public health protection in the study area. Future work will focus on tracing the sources of PTEs and speciating Cr to better understand its environmental behaviour and health implications.