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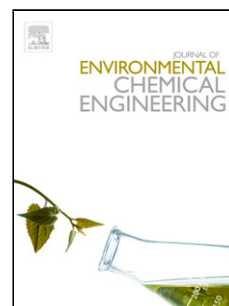
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Levels, Distribution, Characterization and Ecological Risk Assessment of Heavy Metals in Road Side Soils and Earthworms from Urban High Traffic Areas in Benin Metropolis, Southern Nigeria.

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## ABSTRACT

Soil and earthworm (*Aporrectodea longa*) samples were collected from roadsides along urban high traffic areas (HTAs) in Benin Metropolis, Nigeria. Physiochemical parameters of soils were analysed using standard laboratory techniques. Concentrations of heavy metals in samples collected were determined using Atomic Absorption Spectrophotometer. Ecological Risk Assessment was carried out using standard indices. Heavy metal levels in soils of HTAs followed the order Fe > Zn > Mn > Cu > Pb > Cd. Principal Component Analysis (PCA) of heavy metal distribution showed a distinct separation of soils of the pristine area from the HTAs. Contamination Factor (CF) showed very high contamination for Pb and Cd in all HTAs and Enrichment Factor (EF) indicated significant enrichment for Pb. Pollution Load Index (PLI) showed that all HTAs were polluted (PLI > 1) by heavy metals. Geoaccumulation index (Igeo) showed that the soils of HTAs were heavily and extremely polluted with Pb and Cd. Potential ecological risk index (PERI) showed extremely strong pollution for Cd. Bioaccumulation factor (BAF) for earthworms were less than 1 except for Zn at New Benin high traffic area. These indices indicated anthropogenic sources of pollution and portend potential ecological risk. A regular monitoring of the Benin Metropolis for heavy metal contamination and policies that encourage reduction of traffic related contamination should be vigorously pursued.

Keywords: Heavy metal; High traffic; Soil; Contamination; Earthworm; Pollution.

## 1. Introduction

The daunting problem of environmental pollution in this era of accelerated industrial and technological advancement calls for continuous assessment of all environmental matrices including soil in order to evaluate the potential risks to people and the environment [1-3]. Heavy metals constitute one of the most dangerous groups of environmental contaminants because of their persistent nature, toxicity, tendency to accumulate in organisms and ability to

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