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ANALYSIS OF SHORT-TERM PM2.5 MONITORING DATA FROM LOW-COST SENSOR NETWORKS IN GHANA: A CASE STUDY IN ACCRA-TEMA AND GREATER KUMASI METROPOLITAN AREAS

Air pollution, particularly in metropolitan areas, is gaining significance in Ghana with concomitant burden of diseases and premature mortality. This study aimed to analyze air pollution data in key metropolitan cities in Ghana focusing on PM2.5. Daily PM2.5 samples were collected from 14 low-cost sensor networks deployed at eight residential, one commercial, three roadside, and two industrial locations in Accra-Tema and Greater Kumasi metropolitan areas, from January to June 2022. The datasets were analyzed using descriptive statistics, Box and Whisker plots, temporal variation, and calendar plots. Mean PM2.5 levels measured during the dry season (January-March) were more than twice (53%) higher than those found during the rainy season (April-June). Daily mean PM2.5 concentrations in Accra-Tema ranged from 34.24 ± 27.25 µg/m3 (CPC) to 52.05 ± 44.25 µg/m3 (Chalton), while Kumasi varied from 48.90 ± 34.48 µg/m3 (Suame) to 57.30 ± 40.60 µg/m3 (Asokwa). The variation in PM2.5 values between metropolitan areas revealed a strong influence of different local emission sources on the distribution of PM2.5 concentrations at the various receptor locations. The results showed that PM2.5 concentrations in all study locations exceeded the World Health Organization guideline of 10 µg/m3. However, 86% of the PM2.5 datasets exceeded the Ghana Standard level of 35 µg/m3, with 57% occurring in the Accra-Tema area and 29% occurring in the Greater Kumasi area. The findings of this study will contribute to bridging the data gap and provide a clear understanding of the state of air quality in the country's coastal and middle belt zones.

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