Street dust and green barrier deposited PM particles chemical characterization and associated health risk assessment in an urban kindergarten

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PM size and chemical composition is a key to their harmfulness. Therefore, different approaches were developed worldwide to deal with this issue. Among them are nature-based solutions (NBSs) which are considered to be a novel and innovative option for air pollution mitigation. This study provides the first results of the investigation of green barrier established between a kindergarten and street. In 2018 and 2019 PM deposited on green barrier and tree leaves were investigated for particle size distribution and chemical composition. In addition, outdoor and street dust potentially toxic elements (PTEs) contents were determined to assess PTE induced health risk. The results showed despite the fact that street dust Cu contents increased during the study period, its contents in outdoor dust display decreasing trend. This suggests the potential efficiency of a green barrier in Cu level reduction. Leaves deposited PM investigation showed that among the studied 1915 particles 16.6% was fine fraction whereas 76.6% - coarse (2.5-10 μm). Based on the chemical compositional features the studied PM were grouped into two clusters of major elements representing carbonates, aluminosilicates and Fe oxides/hydroxides. The non-carcinogenic risk assessment suggested that the multi-elemental risk level is above the allowable limit. Moreover, it was identified that the highest share in risk level belongs to Cr. The results of this study can serve as a basis for the initiation of green barrier PM capturing efficiency monitoring and securing a healthy environment for kindergarten children.