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Assessing the Severity of Traffic Related Air Pollution in South-East London to School Pupils

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Abstract : Outdoor air pollution presents a significant challenge for public health globally, especially in urban areas, with road traffic acting as the primary contributor to air pollution. Several studies have documented the antagonistic relation between traffic-related air pollution (TRAP) and the impact on health, especially to the vulnerable group of population, particularly young pupils. Generally, TRAP could cause damage to their brain, restricting the ability of children to learn and, more importantly, causing detrimental respiratory issues in later life. Butlittle is known about the specific exposure of children at school during the school day and the impact this may have on their overall exposure to pollution at a crucial time in their development. This project has set out to examine the air quality across primary schools in South-East London and assesses the variability of data found based on their geographic location and surroundings. Nitrogen dioxide, PM contaminants, and carbon dioxide were collected with diffusion tubes and portable monitoring equipment for eight schools across three local areas, that are Greenwich, Lewisham, and Tower Hamlets. This study first examines the geographical features of the schools surrounding (E.g., coverage of urban road structure and green infrastructure), then utilize three different methods to capture pollutants data. Moreover, comparing the obtained results with existing data from monitoring stations to understand the differences in air quality before and during the pandemic. Furthermore, most studies in this field have unfortunately neglected human exposure to pollutants and calculated based on values from fixed monitoring stations. Therefore, this paper introduces an alternative approach by calculating human exposure to air pollution from real-time data obtained when commuting within related areas (Driving routes and field walking). It is found that schools located highly close to motorways are generally not suffering from the most air pollution contaminants. Instead, one with the worst traffic congested routes nearby might also result in poor air quality. Monitored results also indicate that the annual air pollution values have slightly decreased during the pandemic. However, the majority of the data is currently still exceeding the WHO guidelines. Finally, the total human exposures for NO2 during commuting in the two selected routes were calculated. Results illustrated the total exposure for route 1 were 21,730 µm/m3 and 28,378.32 µm/m3, and for route 2 were 30,672 µm/m3 and 16,473 µm/m3. The variance that occurred might be due to the difference in traffic volume that requires further research. Exposure for NO2 during commuting was plotted with detailed timesteps that have shown their peak usually occurred while commuting. These have consolidated the initial assumption to the extremeness of TRAP. To conclude, this paper has yielded significant benefits to understanding air quality across schools in London with the new approach of capturing human exposure (Driving routes). Confirming the severity of air pollution and promoting the necessity of considering environmental sustainability for policymakers during decision making to protect society's future pillars.

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