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Source-Specific VOC exposure and health risk assessment in Abidjan (Côte d'Ivoire): A comparaison of traffic and domestic fires emissions

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This study, conducted as part of the DACCIWA-FP7-WP2 project, investigated the health risks associated with urban air pollution and volatile organic compounds (VOCs) in Abidjan, Côte d'Ivoire. Two contrasting environments were monitored: a traffic site in Adjamé and a domestic fires site in Yopougon. Sixteen VOCs, including aromatics, alkanes, alkenes and monoterpenes (C_5–C_{10}), were identified using gas chromatography. Average total VOC concentrations were similar at both sites (85 µg/m³), but their diurnal patterns differed: rush-hour peaks were observed at the traffic site, while a morning peak was observed at the domestic fires site due to cooking and food smoking. BTEX compounds (benzene, toluene, ethylbenzene and xylenes) dominated, representing79.6–86% of total VOCs. Benzene concentrations reached9.8 µg/m³ in Yopougon, surpassing the European safety limit of 5µg/m³ and nearly doubling the level in Adjamé(4.5µg/m³). The estimated lifetime cancer risks(LCRs) for benzene were 6.7×10^{-2} at the domestic fire site and 3.1×10^{-2} at the traffic site, which far exceeds the acceptable threshold of 10^{-6}. While non-carcinogenic risks were moderate, the carcinogenic potential, especially from benzene and ethylbenzene, poses serious public health concerns. These results highlight the need for stringent air quality regulations and targeted interventions to mitigate chronic exposure in Abidjan's urban areas.

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