

ABSTRACT BOOK

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Assessment of Pollutants in the Gaseous and Particulate Phase According to Vehicular Flow and their Impact on Health in Córdoba (Argentina)

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Abstract

In recent times, rapid urban and industrial development has caused significant environmental deterioration, especially in developing countries. The exposure of urban populations to high levels of atmospheric pollutants are responsible for increasing health risks. On the other hand, numerous studies have identified vehicular traffic as the main source of air pollution in Cordoba city, but this hypothesis has not been properly tested. In this study, PM_{2.5} samples were collected at 10 sampling sites in Córdoba city, Argentina. These sites were classified in 3 categories according to their vehicular flow (Slow, Medium and Fluid), and the concentration of Polycyclic Aromatic Hydrocarbons (PAHs) was determined. In addition, values of O₃, NO₂, SO₂, HCHO and CO, were obtained from the Copernicus Sentinel-5P satellite and atmospheric variables from NASA's MERRA-2 service. The results indicate that the highest levels of PAHs and NO₂ were found in the Slow traffic category. In contrast, PM_{2.5} concentration showed the highest values in Fluid traffic category, emphasizing the importance of determining the composition of particles to understand their hazardousness. A similar behavior was observed between PAHs and NO₂, identifying traffic as the primary source of these pollutants. Furthermore, the study estimated additional cases of lung cancer associated with population exposure using the Toxic Equivalent Concentration for Benzo[a]Pyrene (TECB(a)P) index employing AirQ+ software (WHO). According to Cordoba's regulations, the allowed value of B[a]P in the air was exceeded several times and the highest risk values of TECB(a)P were found in the Slow traffic category. Moreover, outliers' values were observed for NO₂ and PM_{2.5} coinciding with a nearby forest fire event, highlighting the fact that these pollutants are reliable biomass burning markers. In conclusion, different levels of vehicular flow would have a different impact on PM_{2.5}, PAHs, and gaseous pollutants concentrations, where Slow flow category would be the most dangerous. This emphasizes the need for thorough traffic regulation, not only because of the levels of emitted pollutants, but also due to their influence on human health.