Statistical Modeling of Air Quality Determinants in Urban Dhaka

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Abstract

Urbanization and industrialization have markedly affected air quality, notably in Dhaka City, which has become a focal point for heightened air pollution. This study utilizes advanced statistical modeling techniques to uncover the multifaceted determinants impacting air quality in Dhaka's urban landscape. The primary objective is to systematically analyze and comprehensively understand the various factors influencing air quality in the urban context of Dhaka. Data encompassing air quality, meteorological parameters, traffic emissions, industrial emissions, and residential emissions were collected for urban Dhaka. A regression model was constructed to predict air quality levels based on this data, revealing significant impacts of temperature, humidity, wind speed, traffic volume, vehicle type, fuel consumption, and emissions from industrial facilities and households ($p < 0.01$). The statistical model demonstrated a robust predictive capability with an R-squared of 0.86. In conclusion, our study identifies major pollution contributors, outlines seasonal patterns, and locates pollution hotspots. The validated statistical models underscore the reliability of our findings, providing critical insights for policymakers and recommending targeted interventions to mitigate air pollution and improve overall urban air quality in Dhaka.

Keywords:
VOC, SDG, CO2 emissions, regression, BBS.

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