

The Impact of Air Pollution on Public Health in Some Regions of Kosovo

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Abstract

Background: Air pollution is a major environmental and public health concern in Kosovo, particularly in urban areas during the winter season. Fine particulate matter (PM₁₀ and PM_{2.5}) poses significant health risks due to its ability to penetrate deeply into the respiratory system.

Aims: This study aimed to assess the levels, seasonal variation of PM₁₀ and PM_{2.5} concentrations in selected urban areas of Kosovo, and to compare them with international air-quality standards.

Study Design: Three urban regions Prishtina, Peja, and Gjilan were selected based on demographic significance, degree of urbanization, and availability of continuous

monitoring data.

Methods: Daily PM₁₀ and PM_{2.5} measurements for the year 2024 were analysed data from the Kosovo Hydro-Meteorological Institute. Annual and seasonal averages were calculated and compared with World Health Organization (WHO) and European Union (EU) air-quality standards. Pearson correlation analysis was applied to evaluate the relationship between PM₁₀ and PM_{2.5} concentrations.

Results: All studied regions exceeded WHO annual guideline limits for PM₁₀ (15 µg/m³) and PM_{2.5} (5 µg/m³), while remaining within EU permissible limits. Prishtina recorded the highest annual mean concentrations (PM₁₀: 28.3 µg/m³; PM_{2.5}: 18.21 µg/m³). Seasonal analysis showed

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that winter pollution levels were more than twice as high as summer values, with particularly elevated levels observed in Gjilan. A very strong positive correlation between PM_{10} and $PM_{2.5}$ and higher level of significance of $p < 0.01$, which suggests common emission sources, including traffic, construction activities, and solid-fuel combustion for heating.

Conclusion: Urban areas in Kosovo experience persistent air pollution that exceeds WHO recommendations, especially during winter. These findings highlight the need for enhanced air-quality monitoring, stricter emission control policies, and targeted public health interventions.

Keywords: Air pollution; Public health; Exposure assessment; Urban environment.