

Investigating The Impact of Temperature on PM₁₀ Concentration Levels

Husna Aqilah Tuah, Nurul Latiffah Abd Rani

Structured Abstract

Background: Particulate matter with a diameter less than 10 micrometres (PM₁₀) is a harmful air pollutant linked to respiratory and cardiovascular diseases (WHO 2016). Its levels are influenced by emission sources and meteorological factors such as ambient temperature, which affects pollutant dispersion and atmospheric stability (Seinfeld and Pandis 2016). Understanding the interaction between temperature and PM₁₀ is important for effective air quality planning. This study investigates the correlation between ambient temperature and PM₁₀ concentration in Shah Alam and Petaling Jaya, Malaysia, during the years 2022 and 2023.

Methods: Daily air quality data, including PM₁₀ levels and ambient temperature, for a period of two years (2022–2023) were obtained from the Department of Environment Malaysia (DOE Malaysia 2023). Shah Alam and Petaling Jaya were selected as study sites representing urban and suburban environments respectively, each with different levels of development and emission characteristics. Descriptive statistics were used to determine trends and variations in the data. Pearson correlation analysis was conducted to assess the relationship between temperature and PM₁₀ concentrations. Data analysis and visualisation, including time series plots and boxplots, were carried out using Microsoft Excel with the XLSTAT statistical software add-in.

Results: The results revealed notable temporal variations in PM₁₀ concentrations across both locations. Shah Alam, as an urban area with higher industrial and vehicular activity, recorded consistently higher PM₁₀ levels compared to Petaling Jaya, a suburban location. A moderate to strong positive correlation between ambient temperature and PM₁₀ was observed in both areas. The findings also indicated that elevated temperatures, particularly during dry and hot seasons, coincided with increased PM₁₀ concentrations, especially in Shah Alam.

Conclusion: In conclusion ambient temperature significantly affects PM₁₀ levels in both urban and suburban settings. Integrating temperature data into air quality planning could improve pollution forecasting and support better environmental and public health management.

Keywords: PM₁₀, ambient temperature, air quality, XLSTAT, urban pollution.

*Correspondence: nurullatiffah@uitm.edu.my

School of Chemistry & Environment, Faculty of Applied Sciences, Universiti Teknologi MARA, Shah Alam, Malaysia