

**ANALYSIS OF AMBIENT AIR POLLUTION LEVELS AND TRENDS IN
SELECTED URBAN AREAS IN SRI LANKA, FROM 2020 JANUARY TO
2023 JUNE**

D.T.A.S.P. Dissanayake*

Institute of Human Resource Advancement, University of Colombo, Colombo, Sri Lanka.

*sdissanayake008@gmail.com

Ambient air pollution has become a global issue due to its negative effect on human health and environmental sustainability. This study analyses ambient air pollution levels and trends in Colombo (Battaramulla) and Kandy, Sri Lanka, from January 2020 to June 2023, focusing on major pollutants: particulate matter (PM_{2.5}, PM₁₀), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), carbon monoxide (CO), and ozone (O₃). The main objectives were to study temporal trends in air pollutants, conduct a comparative analysis of ambient air pollutants and meteorological factors in both cities, and study the relationship between selected meteorological factors and ambient air pollutants. Hence, secondary data (hourly) on ambient air pollutants and meteorological data (temperature, relative humidity, solar radiation, and barometric pressure) were obtained from air quality monitoring stations (AQMS) over 30 months and analysed using SPSS software package. Results showed significant monthly, yearly, and seasonal variations in ambient air pollutant concentrations. Considering the years of study, the highest levels of ambient air pollution in Colombo were observed from November to February, while Kandy experienced its peak pollution from May to November. The highest monthly averages of CO (657.5 µg L⁻¹), O₃ (22.3 µg L⁻¹), SO₂ (8.6 µg L⁻¹), PM_{2.5} (28.9 µg m⁻³), PM₁₀ (45.3 µg m⁻³), and NO₂ (20.4 µg L⁻¹) concentrations in Colombo were recorded during northeast monsoon, and contrasting patterns were observed in Kandy. The lowest monthly averages for ambient pollutant levels in Colombo; CO (566.8 µg L⁻¹), SO₂ (6.0 µg L⁻¹), PM_{2.5} (23.9 µg m⁻³), and NO₂ (15.6 µg L⁻¹) were recorded in southwest monsoon period. Results from 2020 – 2023 indicated PM_{2.5}, PM₁₀, NO₂, SO₂, and O₃ levels were steadily increasing while the CO levels were decreasing in Colombo. These pollutants are below their air quality standards except for fine particles (PM_{2.5}), which are above the WHO guidelines (15 µg m⁻³). Statistical analysis showed that in Colombo, ambient temperature and relative humidity ($p = 0.004$) turn out to be the most important meteorological parameters affecting air pollutants, while in Kandy, ambient temperature ($p = 0.004$) and barometric pressure ($p = 0.002$) have a high effect on ambient air pollutants. The results highlight the importance of meteorological factors in shaping ambient air quality and provide evidence to develop location-specific ambient air pollution control strategies.

Keywords: Air pollution, Meteorological factors, Seasonal trends, Sri Lanka, Urban areas