Abstract

In developing countries, air pollution is increasing especially in urban centers. This has led to enhanced cases of cardio-respiratory diseases. According to World Health Organization, air pollution is estimated to cause about two million premature deaths worldwide annually. Additionally an estimated 800,000 premature deaths are caused each year by urban air pollution, a principle component of which is particulate matter. Studies have indicated that the levels and distribution of air pollution are highly dependent on the meteorology. This study was conducted based on this theory.

The study sought to examine the relationship between fine particulate matter (PM2.5) and selected meteorological variables over Kenya during the period 2001 to 2012. The data used included monthly rainfall, relative humidity, temperature and wind speed from synoptic stations and satellite air quality data from the period 2001 to 2012. Monthly Global 1o by 1o level-3 Aerosol Optical Depth data was obtained through Giovanni at 550 nm from MODIS-Terra Version. 5.1 and employed as PM2.5 proxy. Detailed monitoring of temporal and spatial patterns of fine particulate matter (PM2.5) pollution and meteorological parameters was carried out using time series analysis and surfer software. Correlation, simple regression and multiple regression techniques were used to model PM2.5 concentrations and distribution as a function of meteorological conditions.

The results reveal that a correlation between PM2.5 and rainfall, temperature and wind speed yields reasonable negative relationship with the r-value ranging from -0.429 to -0.785. A positive relationship with RH is realized, r-value ranging between 0.081 and 0.269. Student t-test showed that the results were statistically significant at 95% confidence level. The variation of rainfall, relative humidity, wind speed and temperature on the average explains 47% of PM2.5 concentrations.