

Abstract

Asthma is a major cause of chronic morbidity and mortality throughout the world. There is evidence that its prevalence has increased considerably over the past 20 years. It is estimated that 300 million individuals are affected worldwide. Outdoor particle pollution and weather are the most commonly and individually linked with triggering symptoms of asthma in patients. However studies have indicated that the levels and distribution of air pollution are highly dependent on the meteorology. This study was conducted based on this confounding-effect theory. The study sought to examine the combined effect of fine particulate matter (PM_{2.5}) and selected meteorological variables on asthma occurrence over Kenya. Monthly counts of asthma from four provincial and 1 district hospitals in Kenya were obtained from the hospital records during a twelve-year period (2001-2012). Monthly rainfall, temperature and wind speed from synoptic stations and satellite air quality data for the same period were also used. Monthly Global 1° by 1° level-3 Aerosol Optical Depth data was obtained through Giovanni at 550 nm from MODIS-Terra Version. 5.1 and employed as PM_{2.5} proxy. The confounding effect of PM_{2.5} pollution and meteorological parameters on asthma incidence was investigated using the Generalized Linear Models with Poisson distribution and logistic analyses executed in an R programming environment. Asthma incidence had a seasonal pattern. The weather-modified effect of PM_{2.5} on asthma hospital visits was such that for moderate PM_{2.5} concentrations, over 5.8% increase in asthma incidence was reported during the hot and wet season (March-April-May) over Nyeri, 3.5% during the generally hot and humid weather over Mombasa, 3.4% during the generally dry and windy weather over Garissa and 4.6% during the cold and dry weather (June-July-August) over Nairobi. There were few statistically significant associations (95% CL) between asthma cases and PM_{2.5} in any season. These results suggest that weather variables may be statistically associated more strongly with asthma hospital visits than PM_{2.5} and may act as confounding factor in epidemiologic studies. Their interaction with air pollution and associated effect on occurrence of respiratory-related diseases should therefore be considered in such studies.