



## Air Quality Index for Makkah City, Saudi Arabia: Recommended Breakpoints and Bands

Abdel Hameed A. Awad\*, Alia A. Shakour, Yasser H. Ibraheim,  
Nasser Abdel-Latif

Department of Air Pollution, National Research Centre, Dokki, Giza, Egypt

**Abstract:** The purpose of this paper is to suggest an air quality index (AQI) for Makkah city, Saudi Arabia. AQI provides public with timely and easily understandable information on how clean or polluted the air is? AQI is divided into ranges; each range is assigned a descriptor and a color code. The breakpoints and bands (sub-indices) were selected basing on actual trends of ambient air pollutant concentrations, the national standard, WHO-guidelines and our scientific judgment. The index value of 50 was based on the annual air pollutant of the Saudi Arabia standards. The index value of 100 was based on the numerical value of the short-term standard (1 h- 24 hrs) for each pollutant. AQI is developed for criteria air pollutants (health related pollutants) including: particulate matter less than 10  $\mu\text{m}$  in size ( $\text{PM}_{10}$ ), ozone ( $\text{O}_3$ ), sulphur dioxide ( $\text{SO}_2$ ), carbon monoxide ( $\text{CO}$ ), and nitrogen dioxide ( $\text{NO}_2$ ). The suggested AQI was divided into 6 bands indicating different level of health concerns: 1) 0-50 (good), 2) 51-100 (moderate), 3) 101-150 (unhealthy for sensitive groups), 4) 151-200 (unhealthy), 5) 201-300 (very unhealthy), and 6) 301-500 (hazardous). The selection of breakpoints not dependend on epidemiological or meta-analysis studies, as no data are available on the relationships between air pollution and health effects in Saudi Arabia. The paper provides a proposal to develop an AQI for Makkah city and its importance for air quality management and protection of human health.

**Keywords:** Makkah city, AQI, proposal, breakpoints, bands.