

# D3: Ambient Air Pollution with Daily Cardiovascular and Respiratory Admissions in Klang Valley

**Wan Rozita WM<sup>1</sup>, Mazrura S<sup>2</sup>, Ahmad Faudzi Y<sup>1</sup>, Nor Aini A<sup>1</sup>, Zamtira S<sup>1</sup>, Nurul I<sup>1</sup>, Sohaya K<sup>3</sup>, Md Khadzir SA<sup>3</sup>, Mohd TL<sup>4</sup>**

<sup>1</sup>Institute for Medical Research, Jalan Pahang, 50588 Kuala Lumpur, Malaysia, <sup>2</sup>Faculty of Health Sciences, Universiti Kebangsaan Malaysia, Kuala Lumpur, Malaysia, <sup>3</sup>Health Informatics Center, Ministry of Health, Putrajaya, <sup>4</sup>School of Environmental and Natural Resource Sciences, Faculty of Science Technology, Universiti Kebangsaan Malaysia, Selangor, Malaysia

## ABSTRACT

**Introduction:** The link between daily variations of air pollution level and hospital admissions due to respiratory and cardiovascular diseases is well established in temperate countries. However, more studies are essential to explore the effects of pollutants on population health in tropical climate. **Objective:** The objectives of the study were to determine the associations and risk estimates of daily variations of air pollutants in the Klang Valley, Malaysia with cardiovascular and respiratory admissions. **Methodology:** Data on daily hospital admissions for Klang Valley (2008-2010), were obtained from Health Informatics Center, MOH. Daily mean concentrations of air pollutants of particulate matter less than 10ug/m<sup>3</sup> (PM10), sulfur dioxide (SO<sub>2</sub>), carbon monoxide (CO), nitrogen dioxide (NO<sub>2</sub>), ozone (O<sub>3</sub>), were obtained from Malaysian Department of Environment while the daily observations of meteorological conditions were from Malaysian Meteorological Department. We examined the associations between daily level pollutants and daily hospital admissions of cardiovascular and respiratory using time series analysis of Poisson regression while controlling for time trends, meteorological factors and holiday indicator. Effects for every 10ug/m<sup>3</sup> increase in pollutants were reported as Relative Risk (RR) on current-day (lag 0) admissions to five previous days (lag 5). **Results:** The highest association with immediate effects at lag0 for all admissions of cardiovascular was found with SO<sub>2</sub> (RR=1.049; 95%CI 1.007-1.091), followed by NO<sub>2</sub> (RR=1.021; 95%CI 1.009-1.033). Higher risk were observed among elderly more than 60 years old for SO<sub>2</sub> (RR=1.065; 95%CI 1.012-1.120) and NO<sub>2</sub> (RR=1.031; 95%CI 1.016-1.046). Immediate effects were also found in both males and females with higher risks were observed in males. NO<sub>2</sub>(RR=1.021; 95%CI 1.006-1.035), still remain to be significantly associated with all respiratory admissions and higher risk were found for children less than 9 years old at various lag time with the highest shown at lag0 (RR=1.031; 95%CI 1.014-1.048). PM10 also showed risk to children less than 9 years old at various lag times with the highest risk was found at lag0 (RR=1.013; 95%CI 1.003-1.023). Gender specific analysis showed an incremental risk of respiratory admissions for males exposed to NO<sub>2</sub> (RR=1.026; 95%CI 1.012-1.041) compared to females (RR=1.019; 95%CI 1.001-1.037). PM10 showed delayed effects with female respiratory admissions ranging from 1 to 5 days and the highest effect observed at lag3 (RR=1.013; 95%CI 1.003-1.023). **Conclusion:** We found significant associations with all and age-specific cardiovascular and respiratory admissions in the single-pollutant model for all the pollutants. Gaseous pollutants showed higher risk in both admissions compared to PM10. We found immediate and delay effects in hospital admissions for cardiovascular and respiratory diseases associated with all pollutants.

## KEY WORDS:

*Air pollution, hospital admissions, respiratory, cardiovascular, relative risk, Klang Valley*