

## **The association between temperature and cause-specific mortality in the Klang Valley, Malaysia**

### **ABSTRACT**

This study aims to examine the relationship between daily temperature and mortality in the Klang Valley, Malaysia, over the period 2006–2015. A quasi-Poisson generalized linear model combined with a distributed lag non-linear model (DLNM) was used to estimate the association between the mean temperature and mortality categories (natural  $n=69,542$ , cardiovascular  $n=15,581$ , and respiratory disease  $n=10,119$ ). Particulate matter with an aerodynamic diameter below  $10\ \mu\text{m}$  ( $\text{PM}_{10}$ ) and surface ozone ( $\text{O}_3$ ) was adjusted as a potential confounding factor. The relative risk (RR) of natural mortality associated with extreme cold temperature (1st percentile of temperature,  $25.2\ ^\circ\text{C}$ ) over lags 0–28 days was 1.26 (95% confidence interval (CI): 1.00, 1.60), compared with the minimum mortality temperature ( $28.2\ ^\circ\text{C}$ ). The relative risk associated with extremely hot temperature (99th percentile of temperature,  $30.2\ ^\circ\text{C}$ ) over lags 0–3 days was 1.09 (95% CI: 1.02, 1.17). Heat effects were immediate whereas cold effects were delayed and lasted longer. People with respiratory diseases, the elderly, and women were the most vulnerable groups when it came to the effects of extremely high temperatures. Extreme temperatures did not dramatically change the temperature mortality risk estimates made before and after adjustments for air pollutant ( $\text{PM}_{10}$  and  $\text{O}_3$ ) levels.