Projection of temperature in relation to cardiovascular disease using bias correction method

ABSTRACT

Climate and weather have significant influences on human health. Climate change together with natural phenomena and human activities have the tendency to impact the environment and debilitates human well-being in various ways. Extreme temperature, which is often associated with climate change, has some negative implications on human health, potentially resulting in diseases such as cardiovascular disease. The aim of this study is to analyze the impacts of temperature projection on the mortality rates of cardiovascular disease based on daily average temperature projection using bias correction method. Downscaling approach can be used to downscale the global climate model outputs that are available at coarse resolution. However, to study the impact of climate change need meteorological data or information at finer resolution. In this study, statistical downscaling is used to downscale the GCM's temperature to local scale's temperature. The observed daily mean temperature data in 5 years (1970- 1974), the historical GCM data (1976-1980) and the projection data (2076-2080) under RCP4.5 and RCP8.5 were used. However, the global climate model outputs produce biases when applied due to its coarse estimate, hence lead to erroneous results. Thus, bias correction method was used to correct the biases in global climate model outputs to project the future of extreme temperature, and eventually calculate the mortality rate of the cardiovascular diseases. The mortality rate of the cardiovascular disease is calculated by using attributable daily deaths formula. Results revealed that quantile mapping technique is able to capture the variability in global climate model as well as quantifying the biases. The projected trend of heat-related deaths under RCP4.5 is lower than the deaths under RCP8.5.

Keyword: Global climate model; Bias correction method; Quantile mapping; Temperature; Mortality