Hot temperatures and morbidity: A systematic review and meta–analysis

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Background

Extreme temperatures have been shown to have a detrimental effect on health. Hot temperatures in particular can increase the risk of mortality, particularly in relation to cardiorespiratory diseases. Given the onset of climate change, it is critical that the impact of temperature on health is understood, so that effective public health strategies can correctly identify vulnerable groups within the population. However, while effects on mortality have been extensively studied, morbidity has received less attention. This study applied a systematic review and meta–analysis to examine the current literature relating to hot temperatures and morbidity.

Methods

We performed an extensive literature review to identify all relevant studies investigating the association between temperature and morbidity. Included studies were required to report a change in daily hospitalisation counts for a change in temperature, reported as either a relative risk or % change. After identifying the final set of studies for inclusion, we extracted the quantitative estimates of the effects of hot temperatures on all–cause and cardiorespiratory morbidity. Pooled effect estimates were calculated using a Bayesian hierarchical approach that allowed for the consideration of multiple study results, particularly latitude and different lag periods. Studies were analysed for both respiratory and cardiovascular morbidity, in total and also according to the temperature relationship considered (linear or non–linear).

Results

Eighteen relevant studies were included in the final meta–analysis, covering both respiratory and cardiorespiratory morbidity. The meta–analysis results showed a non-significant increasing effect on respiratory morbidity due to a 1°C increase on hot days.

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Figure 1: Health effects observed to increase with increasing temperature

Figure 2: Literature search strategy and results

Figure 3: Pooled results for respiratory morbidity

Figure 4: Pooled results for cardiovascular morbidity