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Improving the health forecasting alert system for cold weather and heat-waves in England: a case-study approach using temperature-mortality relationships

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The health forecasting alert system for cold weather and heatwaves currently in use in the Cold Weather and Heatwave plans for England is based on 5 alert levels, with levels 2 and 3 dependent on a forecast or actual single temperature action trigger. Epidemiological evidence indicates that for both heat and cold, the impact on human health is gradual, with worsening impact for more extreme temperatures. The 60% risk of heat and cold forecasts used by the alerts is a rather crude probabilistic measure, which could be substantially improved thanks to the state-of-the-art forecast techniques.

In this study a prototype of a new health forecasting alert system is developed, which is aligned to the approach used in the Met Office's (MO) National Severe Weather Warning Service (NSWWS). This is in order to improve information available to responders in the health and social care system by linking temperatures more directly to risks of mortality, and developing a system more coherent with other weather alerts. The prototype is compared to the current system in the Cold Weather and Heatwave plans via a case-study approach to verify its potential advantages and shortcomings.

The prototype health forecasting alert system introduces an "impact vs likelihood matrix" for the health impacts of hot and cold temperatures which is similar to those used operationally for other weather hazards as part of the NSWWS. The impact axis of this matrix is based on existing epidemiological evidence, which shows an increasing relative risk of death at extremes of outdoor temperature beyond a threshold which can be identified epidemiologically. The likelihood axis is based on a probability measure associated with the temperature forecast. The new method is tested for two case studies (one during summer 2013, one during winter 2013), and compared to the performance of the current alert system.

The prototype shows some clear improvements over the current alert system. It allows for a much greater degree of flexibility, provides more detailed regional information about the health risks associated with periods of extreme temperatures, and is more coherent with other weather alerts which may make it easier for front line responders to use. It will require validation and engagement with stakeholders before it can be considered for use.