

Abstract

BACKGROUND: Air temperature has been shown to be associated with mortality; however, only very few studies have been conducted in Germany. This study examined the association between daily air temperature and cause-specific mortality in **Bavaria**, Southern Germany. Moreover, we investigated effect modification by age and ambient air pollution.

METHODS: We obtained data from Munich, Nuremberg as well as Augsburg, Germany, for the period 1990 to 2006. Data included daily cause-specific death counts, mean daily meteorology and air pollution concentrations (particulate matter with a diameter $<10\text{ }\mu\text{m}$ [PM10] and maximum 8-h ozone). We used Poisson regression models combined with distributed lag non-linear models adjusting for long-term trend, calendar effects, and meteorological factors. Air pollutant concentrations were categorized into **three** levels, and an interaction term was included to quantify potential effect modification of the air temperature effects.

RESULTS: The temperature-mortality relationships were non-linear for all cause-specific mortality categories showing U- or J-shaped curves. An increase from the 90th (20.0 °C) to the 99th percentile (24.8 °C) of 2-day average temperature led to an increase in non-accidental mortality by 11.4% (95% CI: 7.6%-15.3%), whereas a decrease from the 10th (-1.0 °C) to the 1st percentile (-7.5 °C) in the 15-day average temperature resulted in an increase of 6.2% (95% CI: 1.8%-10.8%). The very old were found to be most susceptible to heat effects. Results also suggested some effect modification by ozone, but not for PM10.

CONCLUSIONS: Results indicate that both very low and very high air temperature increase cause-specific mortality in **Bavaria**. Results also pointed to the importance of considering effect modification by age and ozone in assessing temperature effects on mortality.