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## Future Projections of Heat Mortality Risk for Major European Cities due to Heat Waves

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Over the last few decades heat waves have intensified, become more common, pose severe health risks, especially in densely populated cities, and have led to excess mortality. While the probability of being adversely affected by heat stress has significantly increased over the last few decades, the risk of heat mortality is rarely quantified. This quantification of heat mortality risk is necessary for systematic adaptation measures. Furthermore, heat mortality records are sparse and short, which presents a challenge for assessing heat mortality risk for future climate projections. It is therefore crucial to derive indicators for a systematic heat mortality risk assessment. Here, risk indicators based on temperature and mortality data are developed and applied to major cities in Germany, France and Spain, using regional climate model simulations. These simulations have biases of up to 3°C with respect to observations and, thus, need to be bias-corrected. Bias-corrected daily maximum, minimum and wet-bulb temperatures show increasing trends in future climate projections for most considered cities. Additionally, we derive a relationship of daily maximum temperatures and mortality for producing future projections of heat mortality risk due to extreme temperatures based on low (Representative Concentration Pathway; RCP2.6) and high (RCP8.5) emission scenario future climate projections. Our results illustrate that heat mortality increases by about 0.9%/decade in Germany, 1.7%/decade in France and 7.9%/decade in Spain for RCP8.5 by 2050. The future climate projections also show that wet-bulb temperatures above 30°C will be reached regularly with maxima above 40°C likely by 2050. Our results suggest a significant increase of heat mortality in the future, especially in Spain. On average, our results indicate that the mortality risk trend is almost twice as high in all three countries for the RCP8.5 scenario compared to RCP2.6.