

Mortality rates increase due to extreme heat and cold

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Epidemiological studies have repeatedly shown that death rates rise in association with extremely hot weather. The heat wave in Western Europe in the summer of 2003, for example, resulted in about 22,000 extra deaths. A team of researchers led by Dr. Alexandra Schneider at the Institute of Epidemiology II at the Helmholtz Zentrum München examined the impact of extreme temperatures on the number of deaths caused by cardiovascular disease in three Bavarian cities and included both high and low temperatures in the study.

"Our findings confirm the results of our previous studies, which indicated that the elderly and people with pre-existing medical conditions respond particularly sensitively to heat and cold," says Alexandra Schneider. "If you are aware of the effects of air temperature on health, you can identify population subgroups who are particularly at risk and take preventive action."

The elderly are particularly at risk

Dr. Susanne Breitner, Dr. Alexandra Schneider and Prof. Annette Peters evaluated almost 188,000 deaths due to [cardiovascular disease](#) between 1990 and 2006 in the cities of Munich, Nuremberg, and Augsburg. They were able to demonstrate that when temperatures rose from 20°C to 25°C or fell from -1°C to -8°C, the number of deaths from cardiovascular disease increased significantly by 9.5% and 7.9%, respectively. While the effects of the heat lasted for one or two days, the

effects of cold weather lasted for up to two weeks. Elderly people were most affected. The impact on [death rates](#) due to heart failure, arrhythmia and stroke was particularly striking.

The mechanisms that cause these deaths, however, are not yet fully understood. Up to now it has been known that high temperatures, amongst other things, can affect the blood-clotting mechanism (haemostasis) and make the blood more viscous, thereby increasing the risk of thrombosis. Furthermore, as decreasing temperatures have an impact on blood pressure, it can be assumed that there is a link between cold temperatures and the increase in cardiovascular events and stroke.

Preventative programs

"Our findings give an indication of the diseases that are responsible for the observed link between air temperature and death rates, and thus provide a partial explanation as to why some people react more strongly to heat or cold than others and are, therefore, exposed to a greater health risk on hot or cold days," says Alexandra Schneider. "These results are important in order to develop or adapt preventive programs and codes of practice."

The scientists plan to conduct further research into the mechanisms that may be responsible for the health effects observed during cold and, in particular, hot temperatures. They are also interested in possible interactions with air pollutants, which are required in order to predict the effects of climate change on the health of the population, especially in cities and in major conurbations.

More information: Breitner S. et al. (2014). Short-term effects of air temperature on cause-specific cardiovascular mortality in Bavaria, Germany, *Heart*, 0:1–9. [DOI: 10.1136/heartjnl-2014-305578](https://doi.org/10.1136/heartjnl-2014-305578)

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