

## Mortality rates increase due to extreme heat and cold

Neuherberg, 30 June 2014. When temperatures are extremely high or low, there is a significant increase in the number of deaths caused by heart failure or stroke. This has been confirmed by epidemiological studies conducted by researchers at the Helmholtz Zentrum München, who have now published their results in the medical journal *Heart*.



Dr. Alexandra Schneider (left), Dr. Susanne Breitner | Source: HMGU

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.

## Further information

### Original publication:

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

### Link to publication

The Helmholtz Zentrum München the German Research Center for Environmental Health, pursues the goal of developing personalized medical approaches to the prevention and therapy of major common diseases such as diabetes and lung diseases. To achieve this, it investigates the interaction of genetics, environmental factors and lifestyle. The Helmholtz Zentrum München has about 2,200 staff members and is headquartered in Neuherberg in the north of Munich. It is a member of the Helmholtz Association, a community of 18 scientific-technical and medical-biological research centers with a total of about 34,000 staff members.

The Institute of Epidemiology II (EPI II) focuses on the assessment of environmental and lifestyle risk factors which jointly affect major chronic diseases such as diabetes, heart disease and mental health. Research builds on the unique resources of the KORA cohort, the KORA myocardial infarction registry, and the KORA aerosol measurement station. Aging-related phenotypes have been added to the KORA research portfolio within the frame of the Research Consortium KORA-Age. The institute’s contributions are specifically relevant for the population as modifiable personal risk factors are being researched that could be influenced by the individual or by improving legislation for the protection of public health

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### Media contact

Communications Dept., Helmholtz Zentrum München – German Research Center for Environmental Health, Ingolstaedter Landstr. 1, D-85764 Neuherberg - Tel.: +49 89-3187-2238 - Fax: +49 89-3187-3324 - E-Mail

### Specialist contact

Dr. Susanne Breitner, Helmholtz Zentrum München - Deutsches Forschungszentrum für  
Gesundheit und Umwelt (GmbH), Ingolstaedter Landstr. 1, D- 85764 Neuherberg - Tel. +49 89  
3187-4481 - Fax: +49 89 3187-3380 - E-Mail