



## **Effects of hot summer periods on human mortality: increases or displacements?**

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Impacts of hot summer periods on total mortality and mortality due to cardiovascular diseases (CVD) are examined in individual age groups in the population of the Czech Republic over the period since 1982. The daily death counts were standardized to account for the long-term decline and the seasonal and weekly cycles. The lag of mortality impacts after hot weather, and the magnitude of the short-term displacement effect which results in lower than expected mortality after heat waves are quantified. The analysis covers several extraordinarily hot summers with severe heat waves, including the hottest summer in central Europe in 2003. It is shown that both excess total and CVD mortality are positive during all heat waves, the increase being significant at  $p=0.05$  in most events. The response is stronger in females than males and similar regardless of whether total or CVD mortality is used. The largest relative increases, exceeding 20% in both total and CVD mortality, are associated with heat waves in early summer. However, mortality tends to be lower than expected after hot periods, and a large fraction of the excess deaths must be interpreted as short-term displacements. A comparison of the impacts of the 2003 heat waves with past events of a similar magnitude (mainly in 1992 and 1994) is presented. The large relative increases during some heat waves are particularly noteworthy since the study was not restricted to an urban area and/or elderly population. The research is supported by the Czech Science Foundation under project 205/07/1254.