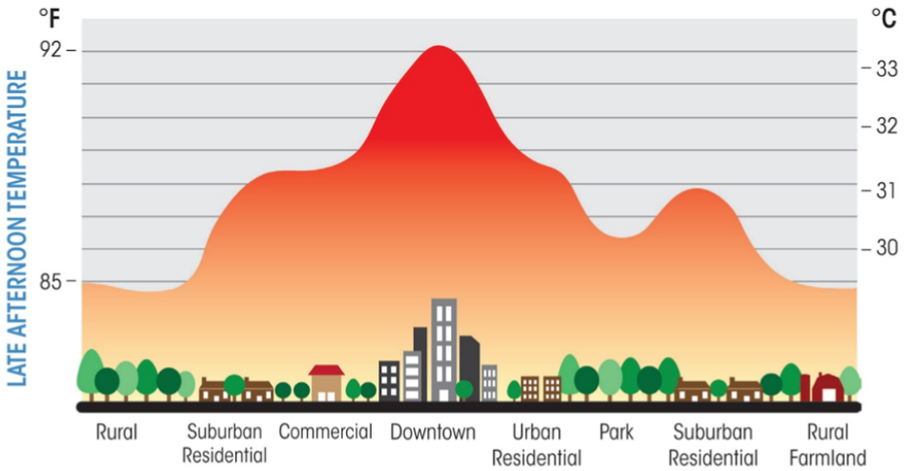
CRED Crunch

Issue No. 46 "Heatwaves and health" *April 2017*

A - Temperature differences between areas with different levels of built environment.



Warm conditions affect human health, but the largest impacts are created by strong and prolonged events. These events, which are called 'heatwaves', are generally described as a period of abnormally high and quite often humid weather, usually lasting for a minimum of one day. However, heatwaves that cause high or catastrophic impacts generally last considerably longer, sometimes even weeks at a time. The most hazardous conditions to human health are multi-day heatwaves where extreme daytime temperature is combined with high nocturnal temperatures, high-relative humidity and light wind conditions for a period of several consecutive days.

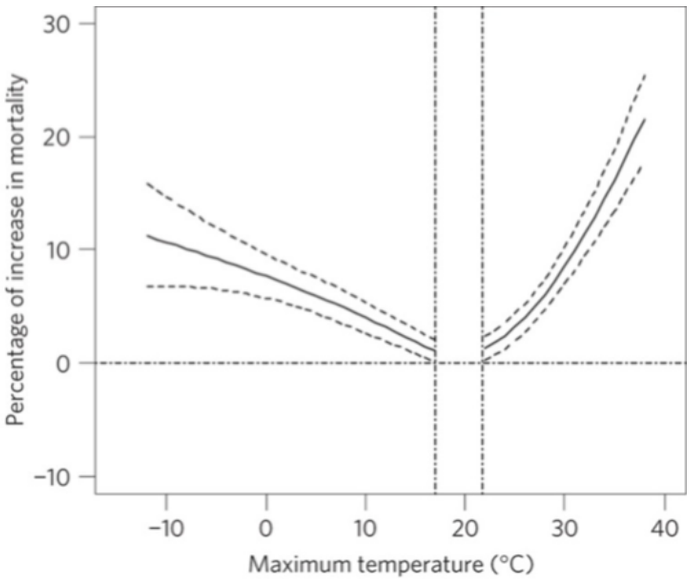
Heat is particularly a problem within large urban areas containing dense populations, because of the amplifying effects of the urban heat island in combination with atmospheric pollutants. The urban heat island effect is the thermal contrast between urban space and its surroundings, primarily occurring due to non-evaporating surface materials such as asphalt and concrete (Figure A). These materials retain the heat during periods when it would normally cool down, for example during the night. The urban heat island effect is the clearest example of an anthropogenic impact of climate at the local level, and can exacerbate already high temperatures in cities. During the 2003 heatwave in Europe, anomalous heat produced nocturnal temperatures in London that reached 6-8 degrees higher than those found in rural environments.

The impacts of heatwaves represent an emerging environmental health concern. Recent heat events, in particular the 2003 event which accounted for up to 80,000 deaths (1), give an example of this health burden. For the period 2000-2016, at least 136,835 fatalities have been recorded in Europe due to heat-related health complications, which represents more than 87.1 % of all disaster-related deaths in that area (2). Figures that illustrate heat-related mortality are deeply alarming, and are likely to be underestimated because of lack of surveys and misreporting.

Even when a heatwave is not technically in progress, warm temperature conditions are linked to mortality and morbidity (3). Every year, a significant number of people die and/or require hospitalisation because of the physiological stress imposed by elevated levels of ambient heat. A 'j-shaped' (see Figure B) graph often represents the connection between mortality and both cold and warm temperatures. The optimum or 'healthy' temperature is dependent on average temperatures experienced in a geographical region (linked to latitude) as well as the implementation and effectiveness of adaptive measures designed to acclimatise populations to warmer or colder temperatures conditions.

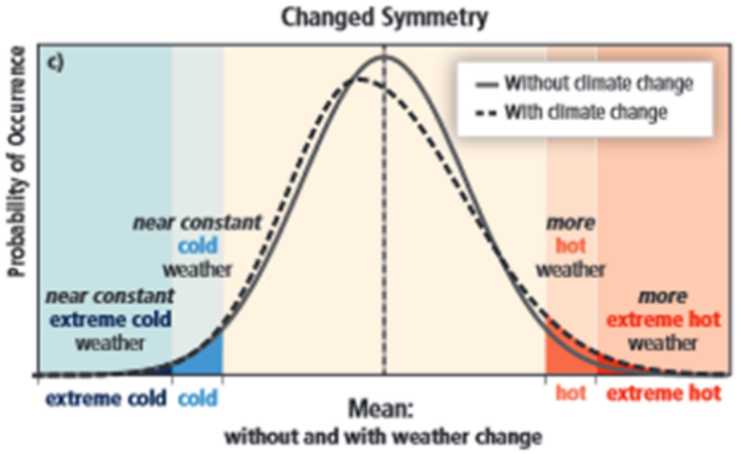
While there is a predominance of research focused on heat-associated mortality in Europe, a significantly smaller number have been preoccupied with heat-related morbidity.

A recent study carried out by CRED has shown that temperatures above a reference value of 21 °C lead to a higher risk of being hospitalised for respiratory diseases and potential heat-related diseases (such as heat stroke and acute renal failure), but not for circulatory diseases.



B – The exposure-response relationship for temperature-associated mortality (4).

Heatwaves are among the hazards most strongly associated with the influences of climate change. The IPCC report 'Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation' (5) highlights that warming trends will probably result in more frequent, intense and persistent heat periods in years to come due to anthropogenic induced change. Climate change experts and meteorologists agree that the extreme summer of 2003, which was very unusual by historical standards, will become normal by 2050 (5). Figure C shows the expected shift in the incidence of extreme heat events.



C – The effects on temperature extremes, in scenarios with and without climate change (5).

The impact of heatwaves on population health is of great concern for health practitioners, policymakers and the hazard management community. Heat mortality and morbidity are likely to increase due to demographic change, urbanisation, and the climate change-induced warming of the atmosphere. However, the adverse effects of extreme heat are largely preventable. Mitigation strategies are most effective when populations, the health sector, emergency planners and responders, care and social services, and public infrastructure are prepared. This gives the best chance in both current and future risk to significantly reduce heat-related mortality and morbidity.

References:
1) Robine JM, Cheung SL, Le Roy S, Van Oyen H, Griffiths C, Michel JP, et al. Death toll exceeded 70,000 in Europe during the summer of 2003. Comptes rendus biologies. 2008;331(2):171-8.
2) Centre for Research on the Epidemiology of Disasters. EM-DAT: the international disaster database. 2017.
3) Kovats RS, Kristie LE. Heatwaves and public health in Europe. European journal of public health. 2006;16(6):592-9.
4) Li T, Horton RM, Kinney P. Future projections of seasonal patterns in temperature-related deaths for Manhattan. Nature climate change. 2013;3:717-21
5) SREX. Managing the risks of extreme events and disasters to advance climate change adaptation: Special report of the intergovernmental panel on climate. 2012.

CRED News

- CRED is delighted to present the 2017 Summer Course on *Assessing Public Health in Emergency Situations* (APHES). This course will take place on July 3-14, 2017 in Brussels, Belgium. More information at www.aphes.be.
- CRED has launched a satisfactory survey on the EM-DAT website
- Two new articles published in scientific peer reviewed journals:
  - DARGE DELBISO, T., RODRIGUEZ-LLANES J.M., DONNEAU A-F., SPEYBROECK N., GUHA-SAPIR D. (2017) Drought, conflict and children's undernutrition in Ethiopia 2000-2013: A meta-analysis. WHO Bulletin; 95 (2): 94-102
  - GIL CUESTA J., VAN LOENHOUT J.A.F.; COLACO, C., GUHA-SAPIR D. (2017) General population knowledge about extreme heat: A cross-sectional survey in Lisbon and Madrid. Int J Environmental Research and Public Health; 14: 122

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