

UNISDR Scientific and Technical Advisory Group Case Studies - 2015

Disaster risk reduction: plans to reduce human health impacts from heatwaves

The problem

The frequency and severity of heatwaves is expected to increase in future decades, based on projections by IPCC (IPCC 2014). Past events have demonstrated that, during a severe heatwave, multiple health impacts are experienced (Kovats and Hajat 2008). There is a rapid increase in deaths, as well as hospital admissions and other attendance of health care facilities due to excessive heat, and this can cascade into a number of related issues, affecting hospitals, offices, schools, residences, transport systems and others.

The increase in heat load occurs in particular in urban areas and within buildings, at a rate dependent on structural factors such as features of the building (e.g. presence of openings for cross-ventilation, presence of shutters) as well as behavioural factors such as choosing which room to use at different hours of the day, and when to open the windows. Both are affected by cultural factors, as in some latitudes communities are historically adapted to extreme heat whereas in others there is less familiarity with the issue and how to respond.

The science

Following the 2003 heatwave in Europe, several initiatives have led to an increased understanding of social impact of heatwaves. Building scientists and engineers have reviewed vulnerability of dwellings and infrastructure, social scientists have documented the pattern of the behavioural responses, and epidemiologists have analysed the vulnerability of particular groups of the population in relation to a multitude of environmental and social factors. Evidence from Europe, starting from early reports of increased mortality in 2003 (see Figure 1), is now also based on a pooled epidemiological meta-analysis across many years that used the method described by Der-Simonian and Laird (Egger M 2001), and found that the effect of heat waves showed great geographical heterogeneity among cities. Considering all years, except 2003, the increase in mortality during heat wave days ranged from + 7.6% in Munich to + 33.6% in Milan. The increase was up to 3-times greater during episodes of long duration and high intensity. The highest effect was observed for respiratory diseases and among women aged 75-84 years (D'Ippoliti, Michelozzi et al. 2010).

Epidemiology has confirmed the extreme rapidity of onset for the more serious adverse effects, with deaths occurring within hours of specific circumstances affecting local temperature. In addition, the combined effect of heat, exposure to air pollutants, type of care provided, and building characteristics, have been documented. For example in France, it has been possible to identify several factors associated with an increased risk of death

being brought forward, such as room location within the dwelling, or type of health care needs (Vandentorren, Bretin et al. 2006).

The application to policy and practice

Following 2003 heatwaves impacts, several European and other governments assessed the problem of how to develop effective plans for prevention and management of events characterised by extreme heat (Public Health England 2014). In the next few years, new evidence on factors associated with a diminished health impact of heatwaves was accumulated and reviewed. On this basis, several new elements could be included in national heatwave plans, sometimes referred to as Heat Wave Warning Systems (HWWS). In particular the need to design and develop a public health surveillance system, based on the results of the epidemiology and taking into account the baseline features of the morbidity being monitored. Examples of this include (WHO 2009):

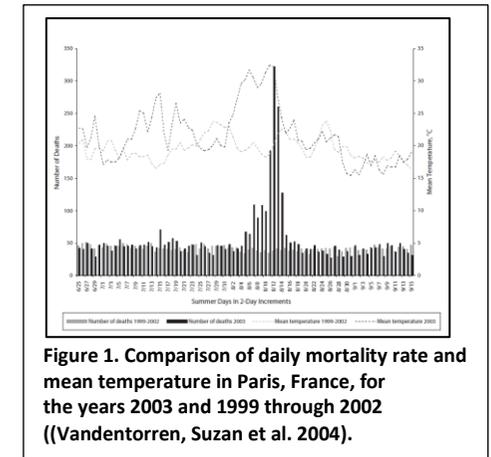
- The requirement for the Real Time Surveillance System in England to monitor specific indicators to provide decision makers with data on early detection of several health impacts;
- The establishment of an ambulance call monitoring system to focus on specific diagnoses in order to provide an early indication of health burdens, in Hungary;
- The development of a mortality surveillance system based on the collaboration with mortuary managers, to provide both an early indication of severe health burdens and of areas requiring assistance, in France.

Did it make a difference?

In heatwave episodes in 2006 2010 and 2012, severe heatwaves occurred in Europe, Russia, North America and Australia. By making use of interventions recommended in the national HWWS and plans, several impacts including mortality and morbidity were reduced. Evaluations of effectiveness of heatwave plans have been conducted in US, France and Italy and have documented several benefits to health and also to social resilience, of having implemented actions indicated in the HWWS. The complexity of the cultural changes required for minimising social burdens of heatwaves on health and infrastructure is such, that both the evaluation and the updating of the available plans will also require ongoing input by several scientific disciplines. Also, many countries still have not had the need or opportunity to develop their own plans, however plans already available can be adapted, and the dialogue between scientists and decision makers on this topic is ongoing.

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