

## Brief for GSDR – 2016 Update

### Heat Waves: A Growing Climate Change-related Risk

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#### The concerns

The social and economic impacts of natural disasters have been continually increasing. Between 1970 and 2012, 8,835 disasters, directly linked to meteorological and hydrological conditions were reported worldwide (WMO, 2014). Although trends show a decrease in the amount of human life losses, the toll remains high. Table 1 shows the worldwide disasters with the highest death toll in 2013. It is noteworthy that eight of the ten major events, in terms of human life loss, were connected to extreme climate. From these, three are related to heat waves, a phenomenon that has historically received little attention.

Climate change is expected to increase not only the average temperature, but also the occurrence of extreme climate events, including heat waves (UNESCO, 2009; Peng et al, 2011). In some regions from both, developed and developing countries, a clear increase in the number and duration of heat waves have been reported, increasing the risk to human health and being the latter the most vulnerable (Shehadeh and Taraweh, 2014; Smith et al, 2014; Martínez-Austria and Bandala, 2015).

**Table 1.** Natural disasters causing the highest deceases in 2013\*

Event/Month	Country	Deceases
Cyclone Haiyan, Nov	Philippines	7,354
Flood, June	India	6,054
Heat wave, July	UK	760
Heat wave, Apr-Jun	India	557
Earthquake, Sept	Pakistan	399
Heat wave, May-Sep	Japan	338
Flood, Aug	Pakistan	234
Flood, July	China	233
Earthquake, Oct	Philippines	230
Flood, Sept-Oct	Cambodia	200
	Total	16,359

\*Source Guha-Sapir et al, 2014

#### Current knowledge and the need for public policies

A heat wave is generally defined as a period of time, usually of several days, when temperatures significantly higher than average are registered. This definition, though easy to understand, is not accurate when preventive measures should be applied or effects on human health or the environment should be mitigated. Importance of heat waves is more evident when their effects on human health are considered. At this point, because of the corresponding consequences, the definition of a threshold becomes necessary in order to define when temperature values higher than average should be considered a heat wave. Several ways for determining thresholds (or heat indexes) to estimate the danger for human health have been developed. A first set of heat indexes refers not only to ambient temperature, but also to the thermal sensation experienced by people. These heat indexes consider, besides the ambient temperature, relative humidity and human activity, among other factors. Its application in developing countries is difficult, because the lack of necessary information, mainly when a prediction of the relative humidity is needed.

Another widespread procedure to determine heat indexes is by establishing temperature thresholds, the ambient temperature value becoming a threat for human health. Temperature thresholds are set up by defining specific values or limit percentile. These thresholds are, usually, local in nature, and further research in the most threatened regions on the health effects of different temperature ranges and health effects is needed.

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Lack of information in developing countries is the main paramount for the use of thresholds. Usually, only the cases of heat stroke syndrome are reported, but extreme heat has not been linked to diseases such as kidney disease or lung disorders, usually increasing during extreme heat episodes (Anderson et al 2011). As result, only few countries have implemented clear and efficient policies to prevent and address the problems imposed by heat waves on their citizens. The situation, however, is not prevalent only for developing countries. In Europe, a recent study has recognized that most effective interventions, measures and policies to protect health of vulnerable Europeans need to be developed and evaluated (WHO Europe, 2004).

### **Health Effects and alert systems**

Heat waves possess major effects on the environment and agricultural production, although they should be considered important also due to their direct and indirect effects on human health. The most important direct ailments are disorders causing minor alterations or augmentation of respiratory, kidney, or digestive system diseases. The collapse of the ability of individual's body to regulate its temperature through the blood stream or by sweating is one of the most commonly reported effects leading to death, in extreme cases. The most vulnerable sectors of population to heat waves are elder and infants (Martinez and Bandala, 2015). Indirect effects refer to the influence of heat waves on the quality of water. Heat waves favor the flourishing of harmful algae, capable of producing toxins in drinking water supply water bodies, increasing the risks of intoxication for the population (John et al., 2008). Heat waves threaten environmental and social resilience by reducing food and water supplies, with consequent increase in potential conflicts. All these effects, such as the mortality due to heat waves, the environmental quality, and the population's characteristics, have been linked in the past (Martinez et al., 2015).

Additional to the absence of public policies, the lack of registers on the heat wave's effect on population (i.e. mortality and morbidity) in several developing countries contribute significantly on the poor interest of public opinion on the potential risk and the generation of alert system to avoid undesirable consequences. Implementing an alert system, though, requires of a wide amount of scientific tasks included, primarily, the establishment of proper temperature and length threshold for different regions, an accurate record of the temperature's effect on population's health and the statement of appropriate measurements to avoid the main health effects, once the heat wave has been detected.

There are numerous examples where the population is not properly warned. Often, people are unaware even of the concept of heat waves and their effects on health. As a consequence, authorities' warnings are limited to the minimum actions, such as hydration and, in some cases, recommendations on outdoor activities. Those warnings do not include, for example, alerting most vulnerable sectors such as people suffering diabetes or asthma, which can be complicated during heat waves.

### **The urgency of better understanding and actions over heath waves vulnerability**

According to the scenario described above, greater attention to the study and definition of local indicators of heat waves, as well as statistic analysis and a better understanding of their health effects, is urgently needed.

Due to the complexity of the problem and the lack of scientific and economic resources in some of the most vulnerable countries, it is necessary that the international scientific community develop interdisciplinary research programs on prevention, forecast and management of this natural risk. Particularly in the implementation of early warning systems, improved communication with society, and effective emergency measures during heat waves, including appropriate health services.

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