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# Health and climatic hazards: Framing social research on vulnerability, response and adaptation

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**Abstract**

Floods, windstorms, drought and wildfires have major implications for human health. To date, conceptual advances in analysis of vulnerability and adaptation to climatic hazards from the environmental and social sciences have not been widely applied in terms of health, though key progress is being made particularly in relation to climate change. This paper seeks to take this conceptual grounding further, examining how key themes relate to health concerns, exploring connections with existing health literatures, and developing an organising framework to aid analysis of how vulnerability to health impacts varies within society and how actors make decisions and take action in relation to climatic hazards and health. Social science research on this theme is challenging in part because of the complex mechanisms that link hazard events to health outcomes, and the many-layered factors that shape differential vulnerability and response within changing societal and environmental contexts (including the dual effect of hazards on human health and health systems, and the combination of 'external', 'personal' and 'internal' elements of vulnerability). Tracing a 'health impact pathway' from hazard event through health risk effects to health outcomes can provide a research tool with which to map out where the different factors that contribute to vulnerability/coping capacity come into effect.


*Keywords:* Health; Disease; Hazards; Floods; Drought; Windstorms; Vulnerability; Coping capacity; Health care systems; Adaptation; Climate change

## 1. Introduction

When weather extremes lead to hazard events such as floods, windstorms, droughts and wildfires, threats to human health are among the most immediate and urgent concerns. Health is a crucial aspect of natural hazard risk, yet it is a topic that has been largely under-theorized in this context and the subject of relatively little empirical research. In part this may reflect a broader lack of engagement by health specialists in issues of environmental change in general, as argued recently in this journal by Campbell-Lendrum (2005). Conversely, the growing body of inter-disciplinary research on natural hazards has tended to focus rather less on health than on sectors such as infrastructure, resource use and economic livelihoods—possibly because health may be regarded as a subject for medical or public health specialists.

The purpose of this paper is to place health more explicitly within the established nexus of ideas on hazards, risk and vulnerability that has consolidated from fields such as the political ecology of hazards, disaster studies and climate change adaptation. In doing so it explores some of the distinctive aspects of risk to human health, highlights key publications that have explicitly addressed health and extreme events, and demonstrates links with more mainstream literatures in health. The focus of the paper is on how to analyse vulnerability and response not so much in the sense of deriving aggregate measures/indicators of risk, but in terms of understanding how and why the health impacts of hazards vary between individuals and groups in society and what shapes the ability of people and institutions to cope. To this end, it offers an organising framework for social and behavioural research that may prove productive for a health and climatic hazards research agenda, and sets this in a dynamic perspective that highlights risk reduction and adaptation to environmental change.

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## 2. Health impacts of climatic hazards

First it is important to outline briefly the nature of health impacts from climatic hazards and their implications for health care systems. One of the most striking aspects of this topic is its diversity. Together with the danger of physical injury associated with their destructive power, climatic hazards can result in increased exposure to disease pathogens and/or their vectors, exposure to airborne allergens and chemical releases, nutritional deficiencies caused by food shortages, and psychosocial and mental health outcomes associated with loss, disruption and displacement (Hales et al., 2003; Waring and Brown, 2005; Street et al., 2005; Manuel, 2006). Heightened exposure to infectious disease is a concern particularly in lower-income countries where disruption of water and sanitation systems, impairment of hygiene practices, changes to the local environment during and population displacement during after extreme events may lead to elevated risk from a range of endemic water-borne, insect-borne, rodent-borne and food-borne diseases. The severity of health impacts varies from minor illness to mortality, and the pathways through which hazards affect health may be simple or complex, direct or indirect. For a rapid-onset event such as a flash flood, for example, impacts may range from trauma sustained during the onset of an event through infection resulting from environmental contamination in the flood's aftermath, to the long-term psychosocial effects of repeated exposure to flood risk.

For illustrative purposes, Table 1 provides some examples of how hazards may impact on health. Note that some impacts may have an interactive effect, such as linkage between malnutrition and susceptibility to disease, and between morbidity in general and mental health. The full complexity of potential health impacts from climatic hazards is impossible to convey here, and, indeed, surveying different health effects is not the main objective of the paper. More detailed discussions of the health impacts of different climatic hazards can be found instead in works such as Noji (1997), Menne and Bertollini (2000), Hales et al. (2003), Ahern et al. (2005) and Shultz et al. (2005). Many of these point out that deriving reliable data on the incidence of disease outcomes from specific hazard events presents methodological and logistical challenges (Dominici et al., 2005). In a review of research on flooding and health impacts, for example, Ahern and Kovats (2006, p. 52) particularly point out the need for data collection both before and after floods, noting that 'it is extremely difficult to assess the duration of symptoms and disease, and the attribution of cause without longitudinal data'. In many countries, baseline (routine) data collected by health authorities is seldom sufficient for such purposes. After major hazard events, quantification of health data is commonly limited by difficulties in undertaking surveillance, together with issues of how to incorporate indirect effects and long-term consequences for health (Hales et al., 2003).

Here, health impacts are being articulated largely in the sense used in clinical medicine, where 'disease as defined biomedically is a deviation from normal functioning, observable and measurable by biomedical techniques in the examining room and laboratory' (McElroy and Townsend, 1996, p. 43). But it is important to note also that conceptions of health are not limited to a focus on the presence or absence of specific pathologies. The widely quoted (but not uncontested) definition of health in the Constitution of the World Health Organization sees it as 'a state of complete physical, mental and social wellbeing, and not merely the absence of disease or infirmity' (WHO, 1946). The biomedical conception of 'disease' also disconnects health outcomes from their social context, in a way often challenged by work in the sociology and anthropology of medicine, which may place emphasis instead on analysing personal, communal and cultural interpretations of the experience of health and ill-health,

Table 1
Examples of how climatic hazards can impact on health

| | Floods/windstorms[a] | Droughts/wildfires[b] |
|---|---|---|
| Faecal-oral and water-washed diseases | Contamination of the home and living environment; disruption of water and sanitation facilities | Shortage of water for hygiene and food preparation; use of untreated water sources; inadequate sanitation in refugee camps |
| Vector-borne diseases | Altered breeding conditions for mosquitoes; rodents taking refuge in houses | Altered breeding conditions for mosquitoes; human population movements |
| Respiratory diseases | Dampness and mould in the home environment | Inhalation of smoke from wildfires |
| Injury | Collapse of shelter; contact with submerged objects/ flying debris; vehicle incidents | Burning injuries from wildfires |
| Malnutrition | Crop damage and loss of subsistence food; disruption of food supplies; disruption of livelihood/income | Loss of subsistence food or income; regional food shortages; use of nutrient-deficient alternative foods |
| Mental health impacts | Psychosocial responses to danger, disruption, illness, displacement and losses | Psychosocial responses to danger, disruption, illness, displacement and losses |

[a]Floods and windstorms are grouped together here because of a close association between the two (aside from wind damage, the major impacts of storms arise via coastal flooding and flash floods).

[b]Similarly, wildfires and drought are commonly associated (both are typically most severe during intense periods of low rainfall).