

Extreme Weather Events and Human Health

Rais Akhtar
Editor

Extreme Weather Events and Human Health

International Case Studies

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Foreword

As I write this foreword, three events have occurred that have indicated the extreme importance of extreme weather events. The Intergovernmental Panel on Climate Change has just produced its latest analysis of the consequences of a 1.5 °C rise in temperature (http://report.ipcc.ch/sr15/pdf/sr15_spm_final.pdf) (accessed 12 November 2018). The UK Meteorological Office has just produced a detailed analysis of recent changes in the occurrence of extreme events in the UK (https://www.metoffice.gov.uk/binaries/content/assets/mohippo/pdf/uk-climate/state-of-the-uk-climate/soc_supplement-002.pdf) (accessed 12 November 2018). Thirdly, and, tragically, there has been huge loss of life in California as a result of severe fires associated with a long continued drought that may be a consequence of climate change.

Floods, dust and sand storms, thunderstorms, droughts, hurricanes, tornadoes, landslides and mudflows, extreme warm events, severe freezing, rapid ice and snow melting, rising storm surges and high tides and various other phenomena have severe impacts on human health. This is partly because of the adverse effects of global climate change brought about by human actions, partly because of the normal occurrence of extreme events, the expansion of urban environments (with heat island and other effects), burgeoning human populations living in potentially dangerous locations and land cover changes such as deforestation. The range of factors involved is well shown by the case of Brazil (chapter “[Extreme Weather Events Under a Changing Climate: A Brief Context for Brazil and the Role of the Health Sector](#)”). Among the factors that help to explain the increasing frequency of extreme events in that country, in addition to the threat of global environmental change itself, are increasing unplanned urbanization, environmental degradation, weak responsiveness of institutions and the population, the lack of infrastructure, and poverty. These conditions, combined with the occupation of locations with high exposure to natural hazards, have generated places with intense vulnerability and low response capacity.

This book takes a welcome international view and comprises case studies from 18 countries covering all continents: Taiwan, East Asia, Hong Kong, Fiji, Thailand, Indonesia, Australia, India, Malaysia, Horn of Africa, South Africa, Italy, France,

Canada, USA, Mexico, Brazil and Argentina. It also contains some more systematic chapters as, for example, on the health implications of dust storms in areas downwind from the world's great deserts. It also draws attention to especially vulnerable communities, including the elderly, the very young and those with pre-existing health conditions. As chapter "[Climate Change, Wildfires, Heatwaves and Health Impacts in Australia](#)" shows, in Australia, deaths attributable to heatwaves and fire smoke pollution are more commonly due to exacerbations of pre-existing health conditions, than to specific direct impacts such as heat stroke. Some groups, such as the elderly, infants and those with pre-existing conditions, tend to be more vulnerable to these impacts. In Thailand (chapter "[Extreme Weather and Climate Events and Occupational Health in Thailand](#)"), research revealed locations where that sunstroke, muscle cramps and/or heat exhaustion were possible with prolonged exposure. It also stressed that a heat health warning system is essential to reduce the negative impacts of such extreme weather. In neighbouring Malaysia (chapter "[Climate-Related Disasters and Health Impact in Malaysia](#)"), heat stress is exacerbated by the urban heat island effects, but also by fire hazes associated with deforestation. Fire effects are also severe in California (chapter "[Wildland Fire, Extreme Weather and Society: Implications of a History of Fire Suppression in California, USA](#)"), where there has been much debate about the role played by fire suppression and forest management policies. Thunderstorms have been implicated in asthma attacks, as shown in a study (chapter "[Thunderstorms During Pollen Season as Risk Factors for Allergic Respiratory Diseases and Severe Asthma](#)"). Increasing thunderstorm incidence may be a feature of urban growth. In northern Canada, Inuit communities and much of their infrastructure will be greatly impacted by changes in ice extent and thickness (chapter "[The Impacts of Climate Change on Health and Development in Canadian Arctic and Sub-arctic Communities in the Twenty-First Century: A Systematic Review](#)"). Desert dust (chapter "[Dust Storms and Human Health](#)") has been implicated in cardiovascular problems, asthma, allergy-related diseases, accidents and many other health effects.

Indeed, the nature and range of health effects as a result of extreme weather events are substantial. For example, if one takes floods, there are direct effects: drowning, injuries, health implications due to contact with cold and polluted water and cardiovascular incidents. There are also indirect effects: waterborne infections, vector-borne diseases (e.g. cholera), food shortages, health effects of chemical pollution, decrease of health care and emergency services, and psycho-social disturbances. During and after a flood, food, clean water and shelter can become scarce, which can increase the risk of starvation, malnutrition and dehydration.

One research finding of recent decades is that substantial changes in the frequency and intensity of extreme events can result from a relatively small shift in temperatures. As the Earth's climate has warmed, some types of extreme weather have become more frequent and severe, with increases in extreme heat, intense precipitation and drought. Heatwaves are longer and hotter. Heavy rains and flooding are more frequent. Drought, too, is more intense and more widespread. It is, therefore, imperative that the international community tries to reduce the growth

in greenhouse gas loadings in the atmosphere and to keep the amount of global warming to less than 1.5 °C. It is also important that we monitor the changes in extreme events that are taking place so that we have firm evidence upon which to base mitigation and adaptation policy, including the appropriate design of engineering schemes. Equally, it is vital to develop forecasting systems so that vulnerable populations are given more accurate warnings of potential catastrophes. Similarly, planners need to make sure that fewer people live in vulnerable locations. For that we need to have a clear view of where such locations occur.

Andrew Goudie
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Preface

Since 1970, the earth's average temperature has risen by 0.8 °C. During this span, the rise in temperature each decade was greater than in the preceding one. The IPCC in the 2007 Fourth Assessment Report clearly showed that since 1880, both annual and five years' average temperatures continue to rise.

Globally, we are witnessing more hot days, heatwaves, increased frequency and intensity of hurricanes/typhoons and increased occurrence of forest fires. The past four years since 2015 have been the hottest on record, and we are seeing the effects. Rising sea level along the coast of most developed and developing countries are causing great concern for real estate values. As McMichael asserted, 'Extreme weather events are projected to increase further with the advance of human-driven climate change. Both recent and historical experiences indicate that infectious disease outbreaks very often follow extreme weather events, as microbes, vectors and reservoir animal hosts exploit the disrupted social and environmental conditions of extreme weather events' (McMichael 2015). It has been estimated that losses from anomalous weather events were more than three times higher in 2016 than in 2010, and as a proportion of GDP, much greater in poor than in rich nations.

From the Paris Climate Agreement to Katowice, scientists have issued warnings about human-induced climate change and in the Katowice conference, in December 2018, David Attenborough opined that the climate change may precipitate the collapse of our civilizations. Consequently, in accordance with the Paris Climate Agreement, developed and developing countries must fulfil the commitment under their own legally binding NDCs in order to keep global warming well below 2 °C above pre-industrial levels and if possible, below 1.5 degrees, encompassing rigorous adaptation and mitigation measures.

Thus, the climate change-induced extreme weather events are worsening the frequency, intensity and impacts of some types of extreme weather events. For example, sea level rise increases the impacts of coastal storms, and warming can place more stress on water supplies during droughts. The increased intensity of forest fires and droughts cause much distress to populations.

Forecasts, early warning systems and effective national weather services play an essential role in protecting local communities from weather and climate impacts such as flooding, hurricanes/typhoons and heatwaves.

Andrew Goudie in his Foreword has rightly stated, ‘Equally, it is vital to develop forecasting systems so that vulnerable populations are given more accurate warnings of potential catastrophes. Similarly, planners need to make sure that fewer people live in vulnerable locations. For that we need to have a clear view of where such locations occur’.

At the same time, ‘the pressures of population and economic growth need to be recognized and addressed. Housing and infrastructure constructed in danger zones such as flood plains or at the foot of unstable hillsides can put lives at risk. Alleviating poverty and strengthening public institutions is vital to reducing this risk’ (<https://www.c2es.org/content/extreme-weather-and-climate-change>).

In order to achieve this, we need to focus not just on development in a country but also to lay emphasis on the spatial distribution of development in all regions in the country. This process may lead to reduced inequalities and may also help in counter-urbanization. The need of the hour is to develop holistic development policies by reducing vulnerability and strengthening the resilience of people as well as regions to the climate change-induced extreme weather events.

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