

Narratives

Disasters arise from the interaction of extreme events with vulnerabilities within natural and/or human systems. Because the probability of these events is unknown, it is difficult to determine the human health risks, where risk is the product of exposure and consequence. Further, the local vulnerabilities that can be as important as exposure in determining the magnitude of possible impacts also are not well characterized at the temporal and spatial scales needed. There is also the potential for significant health burdens resulting from impacts in multiple sectors. Disasters not only severely affect population health, but also the political stability of the affected regions and thus have national security implications.

This workshop brought together health and climate scientists, policy advisors and decision makers from Europe and North America to look at plausible future scenarios and consider the population health implications of global anthropogenic climate change. The narratives have three interrelated objectives:

1. Improve understanding and description of the impacts of population health associated with extreme climate events.
2. Provide a venue for essential interdisciplinary, intergenerational and international discussion and debate on the population health implications of low probability but high impact consequences of climate change, in both high and low income settings.
3. Offer recommendations regarding future research and policy areas.

Workshop participants were divided into 2 groups to address the two narratives described below. The narratives were chosen to provide an example for a high and low income setting, and one where some evidence was available about potential impacts.

The groups were asked to address the following questions to aid the development of the narratives:

- What are the key mechanisms by which the climate event affects population health? What are the main uncertainties?
- Can social/health “tipping points” or thresholds be identified? What are they?
- Characterise and quantify (to the extent possible) the first and second order impacts¹ of the “climate event” on population health.
- What methods and tools should be developed to quantify these risks?
- Can these tools be used to support decision making and policy (i.e., to analyse tradeoffs: economic growth vs. security vs. equity vs. environmental sustainability)?
- What are the key research needs for climate and health scientists?

¹ First order impacts are immediate and direct impacts, and second order impacts consider longer term impacts after the event.

General Background: The World in 2020²

2008 was a watershed year for climate change: the Northwest Passage thawed for the first time in human memory; China experienced record snowstorms; a devastating cyclone hit Myanmar; rising energy prices combined with drought, other climate conditions and governance problems raised food prices around the world, sparking unrest on three continents; and the American Midwest had a 500-year flood for the second time in 15 years.

The intervening years, 2008 to 2020, saw more – in some cases much more – of the same. Changing weather patterns and increased numbers of severe weather events, along with small but perceptible increases in sea level rise, had major impacts on agricultural productivity and availability of freshwater.

Regional effects for China, Europe, India, and the United States varied, but all are facing difficult challenges. India is experiencing flooding in some places and droughts in others, with marked declines in agricultural productivity. A cyclone landed in Bangladesh in 2013 that challenged the capacity of the region to respond. Southern Europe saw severe heat, with wildfires, droughts, and brownouts due to higher temperatures. The United States experienced drought in some places and flooding in others.

The way nations deal with the challenge of global climate change shifted. A major international agreement on climate change went into effect in 2012. The treaty included a target of an 80 percent cut in global greenhouse gas emissions by 2050 relative to 2005, with interim national targets. It also included increased funding for adaptation assistance, global meteorological monitoring, and the clean development mechanism.

In 2014, the Fifth Assessment of the IPCC released, with findings that climate change is happening much faster and more dramatically than any model projected. The situation is urgent. The report prompts a global “political tipping point,” with broad acceptance of the urgency of stepping up adaptive capabilities and emissions cutting schemes.

Narrative A - Category 4 hurricane hits southern US city

Time Frame: Year 2020

Background³

The U.S. capacity for disaster relief and humanitarian assistance is under tremendous strain as a result of severe domestic weather events that continue to tax already limited resources. With economic growth, the aggregate economic and social damages due to extreme events and

² Modified from Burke and Parthemore 2008

³ Modified from NIC 2000; Cour and Snrech, 2005

disasters fell throughout the century. However, ecological damages increased with repeated damage to natural systems, resulting in escalating losses. Environmental degradation of coastal environments has increased due to weak regulation and enforcement.

Political Profile

The political situation in the United States was relatively consistent from 2008 to 2020. Environmental issues, and climate change specifically, have risen to top-tier national concerns as measured by public opinion. However, there is still limited enthusiasm for mitigation, with sharp regional differences.

The strongest action was Congress passing legislation establishing a cap and trade regime that went into effect in 2012 and is still in a start-up phase. The private sector responded to public environmental interest, however, and 2015 marks a new high in venture capital investment in renewable and low-emission energy. The U.S. continues to lag behind Europe in the implementation of adaptation policies and measures.

Economic Profile

Gross domestic product in the United States today is \$16.4 trillion (on a PPP basis, in 2007 U.S. dollars), up from \$13.8 trillion in 2007. Real growth since 2007 has been a little faster than Europe's, but slowed compared to growth from 2001 to 2007. As in Europe, per capita income recently increased; in the case of the U.S. by about \$4,300, from \$45,800 in 2007 to \$50,100 today. As in Europe, the U.S. share of the world economy has fallen by about three percentage points: from 21.4% in 2007 to 18.4% today. The distribution of incomes within the U.S. has not improved, and the gap between the richest and poorest of the population has increased.

Population Growth

Driven by immigration, the U.S. population continued to grow at about 1% annually and now stands at 327 million (up from 302 million in 2007). The trend in urbanisation has slowed. However, there has been an increase in migration to coastal areas, increasing the urban populations in the coastal cities of the southern states.

Narrative B – Drought in West Africa

Several years of drought result in a precipitous decline in crop yields in West Africa, resulting in hundreds of thousands of farmers and their families migrating.

Time Frame: Year 2020**Background⁴**

West Africa has experienced increasing urbanisation. The urban market demand has played a significant role in stimulating food production. However, there also has been a climate-related increase in the frequency of crop failures. There has been a significant increase in intensive cropping in some areas and an expansion of cropping to environmentally marginal areas. The response of many populations has been a radical change in livelihood, such as changing from croppers to livestock keepers, or the abandonment of agriculture.

Political Profile

The hallmark of the modern African State system (inviolability of borders and non-interference in internal affairs) is increasingly challenged. The OAU and regional organizations will continue to work at developing African-led intervention and peacekeeping forces to reduce conflict. The changes will not, however, lead to structuring of states into homogeneous ethnic units. While many African countries are making political and economic gains, such progress is halting and fragile.

Economic Profile

The success of key African states and inter-state organizations will continue to hinge on military and financial help from outside powers, principally the United States and France, and on a world economy hospitable to African exports of primary products. West Africa will be increasingly integrated into the world markets but will continue to base its economic growth on those natural assets that are readily exploited. Changes in the global export market now favour countries with a dynamic domestic market and a supply of qualified labour, making it difficult for many countries to compete. Countries will be vulnerable to imports, including surpluses of subsidised farm productions. The pace of technological change will be rapid and lead to tensions between and within countries as income gaps widen. Growth will carry new demands on infrastructure--water, energy, communications, waste disposal, urban transportation, public health, housing, and education. Failure to accommodate these demands will trigger disaffection with government.

Population Growth and Movement (Migration)

West Africa has experienced both rapid population growth and urbanisation and these trends will continue. The population in West Africa will be approximately 470 million, which is a doubling of the population in a generation. Fertility rates have not declined as rapidly as predicted. Population mobility will increase, the key dimensions of which are: from North to South within each country, from the interior to the coast, and from rural to urban. More than 60% of the population will be living in towns in 2020.

⁴ Modified from NIC 2000; Cour and Snrech, 2005

Workshop conclusions and recommendations

Current climate impact models, including integrated assessment models, cannot project the potential consequences of the more extreme events that are increasingly likely with climate change, the so-called fat tails of climate change. Because the consequences of these low probability events can significantly affect communities and nations, estimating the potential impacts are important for informing decision making. There is increasing awareness amongst economists that fat tails present challenges to developing and implementing policy options because of the potential magnitude, extent, and complexity of possible consequences. Among the potential consequences are serious population health impacts that could overwhelm the capacity of communities and affect development pathways and national security. Population health is a better indicator of welfare than GDP/costs. Providing better evidence of these health impacts is needed to inform climate policy and adaptation discussions.

Estimating the impacts of high consequence low probability events is challenging. There are few, if any, analogues on which to draw. Significant differences exist within and between countries in the capacity to prepare for and respond to extreme events, such that aggregate estimates over a region or continent can give a very different picture of the possible risks than estimates at smaller geographic scales. There also are challenges with estimating acute impacts and cumulated impacts (e.g. life course consequences of malnutrition and how having a significant number of malnourished children could affect community development). Difference in health systems and governance leads to lack of a standardised or systematic evidence-base on impacts or responses.

The workshop demonstrated that narratives can be used to estimate the consequences of high consequence low probability events. More time would be needed to be able to develop detailed narratives with quantitative and qualitative estimates of how specific events could affect population health, exploring the different pathways by which impacts could arise (e.g. directly from the event, indirectly through changing health determinants).

Several key themes emerged from the group discussions of the narratives.

The drivers of vulnerability (secular trends) were similar for both narratives. These included:

- Population issues
 - Migration issues
 - Population ageing
 - Increases in absolute number of vulnerable people
- Poverty
 - Increases in absolute number of vulnerable people
- Infrastructure
- Institutional Setting

All groups considered that the social and development trends in the narratives outlined before the workshop are general adverse (i.e. increasing vulnerability), although in some areas, positive trends (such as higher economic growth) should be taken into consideration. A major uncertainty was how these trends could be affected by climate change and by climate policy.

Table 2 Drivers of vulnerability in Narrative A

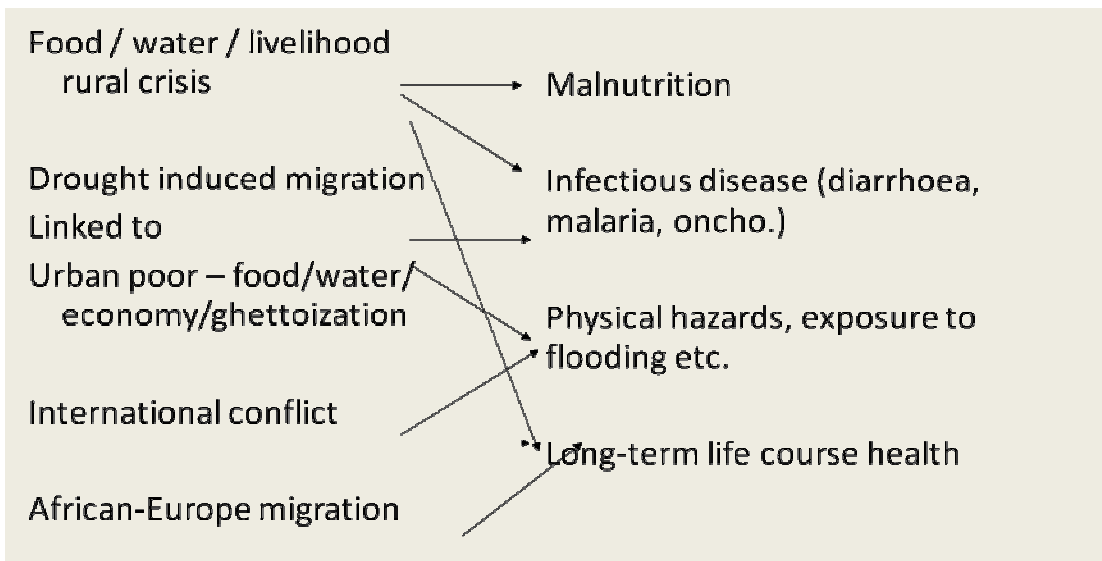
<i>Driver</i>	<i>Specific factors that determine population health impact</i>
Population:	<ul style="list-style-type: none"> • Rising population • Lots of elderly • Lots of recent migrants • Poor background health status • Already displaced population/temporary housing
Poverty	<ul style="list-style-type: none"> • Lots of urban poor • High unemployment • Increasing incomes over time, though not at the bottom
Infrastructure	<ul style="list-style-type: none"> • Health infrastructure not flood proof • High population density • Inadequate private insurance • Poor quality building codes/compliance
Institutional setting	<ul style="list-style-type: none"> • Early warning systems • Some institutional memory • Affected community participation
Increasing number of climate events	<ul style="list-style-type: none"> • Federal Emergency Management Agency (FEMA) already stressed • Damage to natural environment • Household stress • Health system stress

Disentangling the way drivers and stresses might actually interact with each other in the real world is an essential part of the narrative approach. Figure 2 shows the complex system described in Narrative B. The most important pathways would need to be identified if narrative development was carried further. Overall, there is not enough research evidence of how climate change will determine the range of social and economic determinants of food insecurity.

Quantification of the health impacts of the narrative events was difficult. The impacts were estimated for Narrative B but numbers are only approximate.

- W. Africa pop = 400 m
- 20% of that under 5 (80-160m in 2020)
- 8% mortality
- 4% attributable to malnutrition (normal year)
- 25-100% increase in malnutrition-related mortality.

Figure 3 Mechanisms of how drought event will affect health.



Research and data gaps

Several research and information needs were identified.

- Relationships between environment, household income and population movement
 - Demographic surveys, interviews
- Behaviours following extreme climate events, e.g. factors determining temporary and permanent migration
 - Interviews
- Evidence (systematic reviews) on climate-health associations from the epidemiological literature,
 - E.g. drought-malnutrition
- Improved population scenarios/projections
 - Urbanisation, migration, ageing, etc
- Tool development
 - Bayesian frameworks
 - Sensitivity analysis around the components
- Economic costs of health impacts – indirect impact
 - Methods of costing
 - Econometric approaches to quantify impacts in the wider population
- Development of analytical methods to support
 - Decision-making under catastrophic and irreversible events
 - Decision-making under low probability high impact events

Development of the narrative approach

The workshop participants found the narrative discussions interesting, informative, and enjoyable. The advantage of the narrative approach is that it is able to handle complexities associated with high consequence events, including the interactions between the multiple causes/drivers across a wide range of disciplines and explore multiple outcomes. The workshop participants were able to explore multiple, interacting pathways by which an extreme event could affect population health, only some of which could be quantified. By taking a multi-disciplinary approach, the resulting narratives provide a more comprehensive and potentially more realistic assessment of possible consequences than could be achieved with a model. Having a better understanding of cascading and interacting pathways offers opportunities for identifying intervention points that could avoid or reduce possible consequences. This approach allows the exploration of impacts outside recent experience. Further, the method avoids the amplification of uncertainties in the top-down approaches.

Significant preparation is needed to ensure that the narrative approach is as successful as possible. Of particular importance are the framing of the narratives (including developing a preliminary storyline of the impact explored, the temporal and spatial scale of the narrative, and contextual issues, such as demographics, economics, effectiveness of governance, etc.) and providing quantitative and qualitative information on key pathways. Recommendations include:

- Develop some shared, conceptual, online modelling tools. e.g. weADAPT [<http://www.weadapt.org/>],
- Develop methods to disseminate the results – from science to policy
- Develop guidance on the use of narratives
- Integrate the narrative approach into training tools, e.g. for Red Cross and for conducting vulnerability and adaptation assessments.

Because this is a fairly new approach for public health, there is a need for some evaluation of the method – to identify when the narrative is useful. There is also a need to provide a “mechanism” for generating useful narratives. The narratives was that they could be a potential tool for national, regional or even global level preparedness for a particular organization (e.g. for the International Red Cross and Red Crescent).

Narratives should be seen as another tool, complementary to other methods (such as appropriate quantitative methods for risk assessment) and not a substitute. However, it is clear that narratives can provide an effective communication tool, informed by science. The use of stories should be further developed (e.g. Bangladesh case study, Hamza et al 2011, see above) as they help the public better understand the risks of climate change.

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Appendix 1 – Workshop Programme

Day 1: Wednesday, 9 June 2010			
9.00-9.40	Part I. Introduction and context	Introduction, welcome, objectives of workshop The AVOID Programme	K Ebi - P van der Linden - Met Office
9.40-10.30		Introduction to climate change and health impacts Methods and results	S Kovats - LSHTM
10.30-11.00		Coffee/tea break	
11.00-12.00		Recent results from the AVOID Programme	S Gosling - University of Reading
		Overview of climate science - catastrophic climate change	D Frame - University of Oxford
12.00-1.00		Lunch	
1.00-2.30	Part II. Policy needs	What are the needs of policymakers? Panel discussion	D Campbell-Lendrum - WHO C Scaramella - WFP N Banatvala - DH J Clark - DFID
2.30-3.00		Coffee/tea break	
3.00-5.00	Part III. Scientific evidence	Climate, disasters and health	D Grynszpan – HPA
		Climate, health and malnutrition	A Baschieri – LSHTM
		Environmental determinants of population displacement and migration	C Tacoli - IIED
		Health effects of complex emergencies	E Sondorp – LSHTM
		Summary and discussion	K Ebi – ESS
6.30-9.00		Dinner	
Day 2: Thursday, 10 June 2010			
9.00-10.30	Part IV.	Social “tipping points”	T Downing - GCAP
		Introduction to narratives, context, tasks	K Ebi - ESS

	Narrative case studies	Work in groups Group A - Narrative A [Council Room] Group B - Narrative B [Charter Room]	
10.30-11.00		Coffee/tea break	
11.00-12.00		Work in groups	
12.00-1.00		Lunch	
1.00-2.30		Work in groups	
2.30-3.00		Coffee/tea break	
3.00-5.00		Groups report back, discussion	S Kovats - LSHTM
Day 3: Friday, 11 June 2010			
9.00-10.30	Part V. Conclusions and consensus	Plenary discussions Agree on workshop conclusions [consensus statements for workshop report and publication] <ul style="list-style-type: none">• What do we know about the health impacts of catastrophic climate change?• Can we define/describe “tipping points”?•	S Kovats & K Ebi - Co-Chairs
10.30-11.00		Coffee/tea break	
11.00-12.30		Next Steps <ul style="list-style-type: none">• What are the policy needs?• Research and information gaps• Methods and tools•	A Haines - LSHTM Chair
12.30		Close of workshop	

Appendix 2 – Workshop participants

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