

**Submission to  
Senate Inquiry for  
Recent trends in and preparedness for  
extreme weather events**

Submission from  
Doctors for the Environment Australia Inc.  
David Shearman, Hon Secretary  
College Park House, 67 Payneham Road  
COLLEGE PARK SA 5069  
Phone: 0422 974 857  
Email: [admin@dea.org.au](mailto:admin@dea.org.au)  
<http://www.dea.org.au>



The following are members of our Scientific Committee and support the work of  
Doctors for the Environment Australia

Prof. Stephen Boyden AM; Prof. Peter Doherty AC; Prof. Bob Douglas AO; Prof. Michael Kidd AM;  
Prof. David de Kretser AC; Prof. Stephen Leeder AO; Prof. Ian Lowe AO; Prof. Robyn McDermott;  
Prof. Tony McMichael AO; Prof. Peter Newman; Prof. Emeritus Sir Gustav Nossal AC; Prof. Hugh Possingham;  
Prof. Lawrie Powell AC; Prof. Fiona Stanley AC; Dr Rosemary Stanton OAM; Dr Norman Swan;  
Professor David Yencken AO

## Preamble

Australia is already experiencing the global trend of increasing severity and frequency of extreme weather events. These include extreme heat events, bushfires, storms and floods, all of which have health impacts. The scientific connections between health, weather and climate have recently been described in a joint publication from the World Health Organization and the World Meteorological Organization (Atlas of Health and Climate 2012

<http://www.who.int/globalchange/publications/atlas/report/en/index.html> ).

Mortality and morbidity from extreme weather events impose extra physical and financial burdens on communities and health services at a time of tightening budgets. This trajectory of extreme weather events has the potential to slow progress in achieving health gains globally and locally.

## Recommendations

1. Adequate health service planning to cope with changed conditions and demands to enable the adequate treatment of expected increases in the numbers of injured and ill, resulting from extreme weather events, immediately and in subsequent months and years.
2. Examination of the ability of all essential health services to operate during extreme conditions which may cause loss or disruption of health infrastructure, medication and equipment supply chains, energy, water, sewerage and waste treatment and staffing levels.
3. Strengthen the role of primary care practitioners in the management and education of their patients on preventative measures aimed at minimizing health risks during extreme weather events eg. tailored personal adaptation behaviours during heat waves or poor air quality periods.
4. Establish a national 'Disaster and Recovery fund' funded by a levy on the predominant source of anthropogenic CO<sub>2</sub> emissions, coal and gas production, thus providing immediate finance for each disaster without the need for drastic cuts to existing budgets.

# Doctors for the Environment Australia

Doctors for the Environment Australia (DEA) is an independent, self-funded, non-government organisation of medical doctors in all Australian States and Territories. Our members work across all specialties in community, hospital and private practices. We work to prevent and address the diseases – local, national and global – caused by damage to our natural environment. We are a public health voice in the sphere of environmental health and encompass such issues as asbestos exposure, lead poisoning and environmental pollution and the health impacts of greenhouse emissions. DEA authored “Climate Change Health Check 2020” [http://dea.org.au/images/general/Climate\\_Change\\_Health\\_Check\\_2020.pdf](http://dea.org.au/images/general/Climate_Change_Health_Check_2020.pdf) for The Climate Institute in 2008 and in 2011 assisted in the launch of the Climate Commission’s report The Critical Decade: Climate Change and Health [http://climatecommission.gov.au/wp-content/uploads/111129\\_FINAL-FOR-WEB.pdf](http://climatecommission.gov.au/wp-content/uploads/111129_FINAL-FOR-WEB.pdf). Both reports outline research on health risks and effective responses with a focus on minimising human health impacts of climate change in Australia in 2020 and beyond, including extreme weather events.

## Introduction

Doctors for the Environment Australia welcomes the opportunity to highlight to the Committee that the present level of national and international action on climate change, which is contributing to the severity and frequency of extreme weather events, is so inadequate that we are accelerating towards a 4°C rise in global average temperature by the end of this century (WB, 2012). If we continue on this trajectory then we have to consider how we are to live with this rapidly changing world and the damage to vital infrastructure, and in particular the subsequent health implications.

The World Health Organization views **climate change as one of the biggest health threats of this century**, not only can there be direct loss of life and injury from extreme weather events but the fundamental determinants of health: access to appropriate air, water, food, shelter and freedom from disease are also indirectly threatened by our surrounding climate and subsequent weather events (Costello *et al.*, 2009, WHO 2008, McMichael *et al.* 2012). The United Nations has repeatedly emphasised that **climate change threatens all our goals for development and social progress and is a true existential threat to the planet.**

This submission focuses on the health and related economic impacts of extreme weather events. Health and climate change is firmly in our sphere of expertise. DEA has many experts in the scientific aspects of climate change who have contributed to IPCC reports and other published

studies. Extreme weather events are a problem of rapidly increasing magnitude that will not be alleviated by present inadequate national and international measures to control greenhouse gas emissions.

## **(TOR a) Extreme weather events**

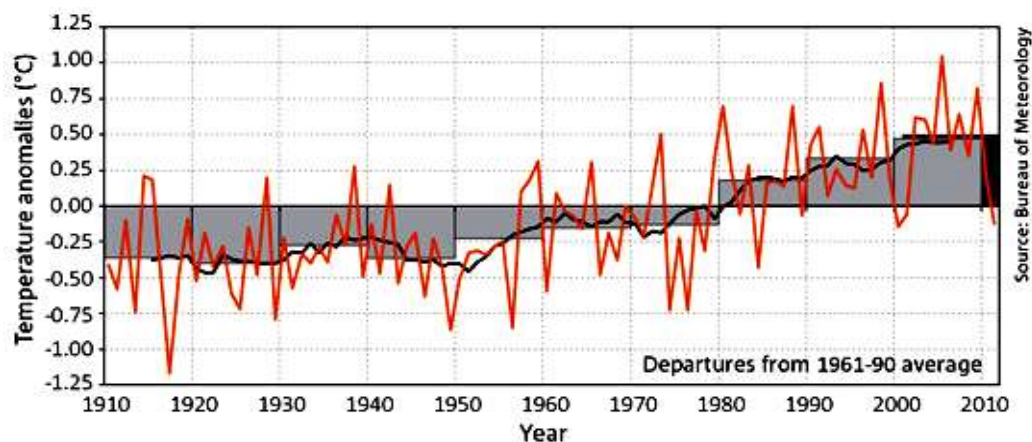
There is global scientific and meteorological evidence of an increase in the severity and perhaps number of extreme weather events in all continents and we expect many scientists will submit to you the evidence. We will not reiterate this.

## **(TOR bi) Projections for Extreme events**

Many climate scientists will review this evidence. There are credible Australian data showing the warming trend associated with extreme weather in this country. Data from the Bureau of Meteorology shows the progression of temperature anomalies in recent decades. Australian average temperatures are projected to rise by 1.0 to 5.0°C by 2070 when compared with the climate of recent decades. Weather associated with high fire danger has shown a rapid increase in the late 1990s to early 2000s at many locations in south eastern Australia.

<http://www.csiro.au/en/Outcomes/Climate/Understanding/State-of-the-Climate-2012/Future-Changes.aspx>

Australian data shows that the underlying cause for increased events is occurring here. Data from the Bureau of meteorology shows the progression of temperature anomalies in recent decades; these provide the basis for more extreme events.



Changes in average temperature for Australia for each year (orange line) and each decade (grey boxes), and 11-year average (black line – an 11-year period is the standard used by the Intergovernmental Panel on Climate Change). Anomalies are the departure from the 1961-1990 average climatological period. The average value for the most recent 10-year period (2002–2011) is shown in darker grey.

<http://e.bom.gov.au/link/id/z44fb041f2593a3011Pzzzz4f38960e5d034009/page.html>

## **(TOR bii) Extreme weather events and impacts on human health**

### **1. Global Mortality**

WHO estimates that the number of deaths due to climate change is rising and it is possible to quantify the number of deaths caused by increases in greenhouse emissions. Australia, as the world's greatest greenhouse emitter per capita, bears some responsibility for these. Deaths, illness and injuries are also occurring in Australia due to the extreme events such as heatwaves and bushfires. A conservative estimate of the annual number of excess deaths, globally, occurring from the 1970s to the year 2000 because of human induced climate change is over 150,000 (WHO 2008). Most are children, in poorer countries, the result of climate-amplified malnutrition, diarrheal disease, malaria and flooding. However these figures were estimated before the climate season of 2010-2011 when there was unprecedented flooding in several continents and huge loss of life. Displacement of people and conflict, with the associated physical and mental health implications, can be added to this scenario of human suffering.

*In Australia changes to our weather patterns will subject Australians to more severe heat waves, droughts, fires, floods and storms all of which can have direct and indirect adverse health effects and strain our health services.*

### **2. Heatwaves and Fires**

Heatwaves have been referred to as the 'silent killer' and are the leading cause of weather related deaths in Australia. They result in increased risks of heart attacks, strokes, kidney failure, accidents and heat exhaustion (Hughes and McMichael 2011). Heat stroke is a medical emergency with a death rate as high as 33%. Although most heat related deaths can be prevented, the elderly, young and those with existing medical conditions are the most at risk as are those less able to regulate their activity due to job requirements or other constraints.

Decreased productivity and performance levels occur with extreme temperatures due to dehydration, raised body temperatures and impaired cognitive function. Workers and those surrounding them can be vulnerable to accidents and injuries, consequently many industries cease working at a certain ambient temperature to protect worker's health and safety with potential adverse economic impacts.

Mental health is adversely affected by rising temperature. Hospital admissions for mental and behavioural disorders in both rural and urban areas rise once ambient temperatures go above about 27°C. In metropolitan South Australia, admissions for mental, behavioural and cognitive disorders have been found to increase by around 7% during

heat waves (Hughes and McMichael 2012).

During the Victorian heat wave of February 2009 there were 374 excess deaths in the week immediately before Black Saturday, February 7<sup>th</sup>, and Melbourne Metropolitan ambulance call outs increased by 46% over the 3 hottest days. The greatest number of deaths occurred in those 75 years and older; with almost a 3-fold increase in the number of patients dead on arrival to emergency departments (69% being 75 years or older) (Vic DHS 2009).

Victorian's morgues were full prior to the 173 deaths resulting directly from the fires on Saturday 7<sup>th</sup> February 2009. Fires can cause significant morbidity from heat exhaustion, burns, traumatic injuries, smoke-inhalation, and the triggering of acute cardiac events. Over 400 people presented to emergency departments in Victoria in the first 72 hours of the Black Saturday Bushfires (MJA 2009). In addition over 2,000 homes were lost, leaving over 7,000 people homeless. Long-term there are serious mental health consequences (AEMI 2011).

Smoke from fires can threaten the health of communities many kilometres from the event (Meyer 2013). Fine particulate matter (PM<sub>2.5</sub>) appears to be the main hazard for the general population although increased concentrations of CO<sub>2</sub>, carbon monoxide, methane, other volatile organic compounds and oxides of nitrogen also occur – all are potential health hazards and concentrations during a fire can exceed short term standards by 100-1000 times. For every 10ug/m<sup>3</sup> increase in daily average concentration of PM<sub>2.5</sub> the average population death rate increases by 1% (AHA 2010).

### **3. Storms and Floods**

More frequent and/or intense storms and floods can result in injuries, diseases, mental health effects and death. Studies have indicated that 70% of people required to move out of homes due to flooding have reported health problems (both physical and mental with children being particularly susceptible to the latter), whilst almost 2/3 of those affected by floods reported that their health had been adversely affected (Gray 2008).

The Hunter region of NSW experienced severe flooding and storms in 2007 resulting in 10 deaths and 6,000 evacuations. Local infrastructure was severely affected with 200,000 homes and businesses losing electricity supply as did the water and sewerage pumps. The damage bill was \$1.5 billion. 60 sewerage pumps failed, leading to back-up and overflow of sewer mains and sewage contamination of flood water. Although no microbiological water quality failures were detected during this event this is not always the case (Cretikos *et al.*, 2007). During the Queensland floods of 2010/11 the mortality and morbidity rate was far

higher as was the damage bill, and several council water supplies were contaminated by infectious organisms, necessitating the supply of bottled water.

Flooding can lead to increases in diarrhoeal disease, respiratory infection and skin infections. Mould in houses after the event can trigger respiratory problems. Following Hurricane Katrina there were increases in diarrhoea and respiratory disease due to faecal, lead and volatile organic compound contamination of water supplies.

The psychological and mental health effects associated with loss, disruption and displacement due to extreme weather events have been demonstrated. As have the cumulative mental health impacts that can develop from repeated exposure to natural disasters. There is also the potential for emotional stress and anxiety created by understanding the full extent of the long-term social and environmental challenges anticipated to occur from our changing climate (Fritze 2008).

Professor Tony McMichael, a member of DEA's Scientific Advisory Committee and former advisor to WHO has reviewed the health impacts of climate change at Chatham House <http://www.chathamhouse.org/publications/papers/view/180439> and we urge the Committee to read this review and '*Health risks, present and future, from global climate change*' (McMichael et al., 2012).

## **(TOR c + d) Preparedness of key sectors for extreme weather events including the emergency service sector/health services**

Preparedness necessitates governments having plans to minimise disruption and provide emergency relief and restitution.

### **1. The capacity of health services to operate under expected extreme weather events**

Health services need to be prepared for the unavoidable. Research and planning as to how essential health services will operate during and after extreme weather conditions is necessary. Ensuring that adequate treatment of the injured and ill directly resulting from an event is available, as well as the continued health care that will inevitably be required. Much of Australia's health infrastructure is itself susceptible to extreme weather events.

Blashki et al. (2011) propose that the 3 key principles of flexibility, strategic allocation of resources and robustness are used to guide policy makers and planners in preparing the health system for climate change –



and hence adaptation for extreme weather events. They describe how the personnel, infrastructure and co-ordination within and between emergency services, including health services, needs to be considered.

Flexibility to meet varying demands in type and scale of service from health services to cope with the initial up-scaling of emergency and high acuity health services treating the direct injuries will be necessary. Provisions for the health management of longer term flow on effects is likely to also increase, for example, increases in respiratory disease from air pollution secondary to fires or communicable diseases and infections within flood effected communities. Displaced populations, those who have experienced a traumatic event and their relatives often require ongoing psychological support.

Allocation of resources to protect the most vulnerable from extreme weather events should be a priority. It is the young, elderly, those with existing medical problems (eg cardiorespiratory diseases) and those unable to alter their immediate environment (eg homeless, mentally ill, no financial resources or supportive networks) that are most at risk. Prioritising of existing health services and preventative measures to build a population less vulnerable to extreme weather through improved population health is necessary. As is the concurrent dissemination of health promotion messages advising minimisation strategies to avoid adverse health effects during an event such as health stress avoidance.

Essential services and infrastructure should be able to withstand and function during and after extreme weather events from heat waves, fires, floods or storms. However it is not only the buildings that are susceptible during and after such events. Consideration of the robustness of vital supply chains of medical drugs and equipment, energy sources, water supplies, sewerage and waste disposal is also vitally important for the effectiveness of many health services. Finally the ability of staff to care for others whilst an extreme weather event is impacting on their community and family must be considered.

## **2. The Health Costs**

As far as we are aware these have not been estimated within the costs of the recent extreme weather events around the world.

However as extreme events increase more resources will need to be deployed to the health services for appropriate emergency management and treatment of victims, as well as the ongoing medical, mental and social consequences. These resources will be coming from diminishing budgets.

In the IBIS report on the economic impact of the Queensland floods with estimates at \$10b, (\$15.5 billion has been set aside for capital spending



for 2012-13) the costs of health impacts including deaths were not mentioned. Impacts were studied on construction, tourism, transport, mining and agriculture. There are methods of assessing the cost to the community of death and injury however they are not being used in calculating present economic impacts of extreme weather events, in effect existing health and social services absorb these costs.

Important is also the emerging phenomenon of balancing the budget after costly calamity and as we have seen in Queensland there have been subsequent widespread cuts in health services. In Budget papers it is of course difficult to show this 'cause and effect' but the general point is made that health budgets are being reduced in many countries which have concomitant impacts from the financial crisis and extreme weather events.

This brings us to the crucial medical point of this submission.

It is time for all sectors of the community to recognise that more and more national income will be spent on response and recovery, as indeed Queensland and New York State have recently found. The health and medical advances for our patients over the past few decades have been extensive. However, as doctors, we are gravely concerned that future advances will be constrained by conflicting priorities and progressively contracting budgets. Prevention is always better than cure and we need leadership from our elected representatives to reduce emissions and minimise dangerous climate impacts. Compared to the need for real action the despairing dialogue over the carbon tax is metaphorically ***a struggle to determine who should hold the bucket of water in the face of a raging bushfire.***

Health burdens and costs for all Australians will rise due to increasing climate change and the greater intensity and frequency of extreme weather events.

### **3. Expected constraints in finance for extreme events and restitution**

There is evidence from insurance claims in the western world that considerable costs are being incurred from extreme events. Munich Re, the world's leading reinsurer, has announced that in 2012 natural catastrophes caused US\$160 billion in overall losses and US\$65 billion in insured losses worldwide (Munich Re 2013). Losses in kind in the developing world are probably extensive but are uninsured or not documented.

The rapid progression of climate change and the increase of extreme events raises the question of where the money will come from for restitution of services and infrastructure. This must be considered in the

context of world economics and debt and the possibility that we are moving into a new economic paradigm for the world. In summary, the following factors are pertinent

- 1) The world is finite and the panacea of growth to produce more revenue is in serious jeopardy for this reason alone. In the UK, the government's review (2006) on the economic costs of climate change, the eminent economist Lord Stern said that rich nations will need to reconsider making growth the goal of their societies because of the possibility of dangerous levels of greenhouse gases. At that time he felt that "robust expansion could be achieved till 2030" —but this is before the present rapidity of climate change was recognized.
- 2) In the scenario depicted in (1) the developed nations face debt as a result of the indiscretions of banks which operate mainly as autonomous players. At the same time the mantra of free markets has led to production being transferred to the developing world which feeds the prolific consumption of the West; this creates more debt. In conventional economic thinking, growth as the solution to debt is now problematic.
- 3) The cost of combating climate change is escalating with delay. Unless action is taken now a 4°C temperature increase is probable and the costs of a low carbon economy will have to be provided at a time of huge expenditure on extreme events. A recent report of the International Institute for Applied Systems Analysis in Austria published in the prestigious journal *Nature* indicated that an immediate global price of US\$30 a tonne on emissions of carbon dioxide (CO<sub>2</sub>), the main greenhouse gas, would give a roughly 60% chance of limiting warming to below 2°C. Delay until 2020 and the carbon price would have to be around US\$100 a tonne to retain that 60 percent chance (Rogelj *et al.*, 2013). Presently the Australian, and many other Parliaments, have not implemented strong enough action.
- 4) Cost of extreme events is already apparent and is requiring additional borrowing and expenditure that cannot be afforded.

The results of these processes are that "contraction and convergence" is occurring. This process was proposed by Aubrey Meyer in 1992 as the logical solution to climate change. It says there is a fixed amount of greenhouse emission that can be produced by all nations. The developed nations will have to drastically reduce emissions to allow poor nations to develop; in effect growth in the developed world will have to be curtailed. This process was never going to happen by agreement but in effect it is now being forced upon humanity by the above processes.

The requirements necessary to maintain healthy present and future generations need to be considered against this background.

## **Secure financing arrangements**

We believe this to be an essential component of TOR c, d and e.

As described, extreme events will be costly in terms of emergency services, the provision of continued health services to those affected and the climate proofing and remediation of infrastructure.

Elected representatives are averse to raising taxes for it is easy to denounce new taxes as harmful to the community, as with the carbon tax. However, the fact remains, that a civilized society which cares for the sick and needy and provides infrastructure for all, depends on the raising of taxes and their appropriate use. Governments will need to spend huge sums to alleviate the imminent further impacts of the changing trends in extreme weather events from climate change. The wise and prudent will prepare for this.

Levies should be used to emphasise to the community and policy makers that a specific fund relates to a specific need and to ensure it cannot be spent on unrelated initiatives. The need is to have a fund immediately available and collected over time that does not impact current budgets, a type of Future Fund that would be required to ethically invest in industries that were not contributing to the changes in extreme weather patterns.

A levy should relate to the cause of the problem- green house emissions. With the experience of the carbon tax it would be most logical to levy coal and gas production, for these are the biggest emitters locally and through export.

## **Conclusion**

Although adaptation to the unavoidable increases in severe weather events is vital, mitigation of anthropogenic CO<sub>2</sub> emissions, from a human health perspective, represents the ultimate prevention initiative for current and future risks to health (McMichael 2011). Prevention rather than cure is almost always more effective, particularly in relation to health, when financial, physical wellbeing and ethical aspects are considered. In addition there are the more immediate health advantages that can be gained from decreasing CO<sub>2</sub> emissions, the health co-benefits. For example less dependence on cars for transport improves our fitness and the air we breathe whilst also aiding to mitigate the impact of future extreme weather events. However to finance the unavoidable changing

requirements and demands being placed on our essential services and infrastructure, including our health systems, a Disaster and Recovery fund formed by an extreme weather levy is urgently needed.

## References

American Heart Association (AHA) 2010 Scientific Statement: Particular Matter Air Pollution and Cardiovascular Disease by Brook R *et al.*, *Circulation* 2010: 121:2331-2378.

Australian Emergency Management Institute (AEMI). (2011) Attorney-General's Department Disasters Database [database on the Internet]. Australian Government. <http://www.disasters.ema.gov.au>

Blashki G, G. Armstrong, H Berry, H Weaver, E Hanna, P Bi, D Harley, J Spickett (2011). Preparing Health Services for Climate Change in Australia. *Asia-Pacific J Pub Health Supp to* 23(2): 133S-143S.

Cretikos M, T Merrit, K Main, K Eastwood, L Winn, L Moran, D Durrheim. (2007). Mitigating the health impacts of a natural disaster-the June 2007 long-weekend storm in the Hunter region of New South Wales. *MJA* 187: 670-673.

Fritze J, Blashki G, Burke S, Wiesman J. (2008) Hope, despair and transformation: Climate change and the promotion of mental health and well being. *Int J Ment Health Syst.* 2008; 2:13. 10.1186/1752-4458-2-13ray S. 2008.

Gray S (2008). Editorial Long term health effects of flooding. *Journal of P Health* 30;4: 353-354 <http://jpubhealth.oxfordjournals.org/content/30/4/353.full>

Horton G and A. McMichael (2008). Climate change health check 2020. [http://dea.org.au/images/general/Climate\\_Change\\_Health\\_Check\\_2020.pdf](http://dea.org.au/images/general/Climate_Change_Health_Check_2020.pdf)

Hughes, L. and McMichael, T. (2011) The critical decade: climate change and health. Climate Commission Secretariat, Commonwealth of Australia. [http://climatecommission.gov.au/wp-content/uploads/111129\\_FINAL-FOR-WEB.pdf](http://climatecommission.gov.au/wp-content/uploads/111129_FINAL-FOR-WEB.pdf)

McMichael A. (2011) Climate Change and Health: Policy Priorities and Perspectives. Chatham House <http://www.chathamhouse.org/publications/papers/view/180439>

McMichael, A., Montgomery, H. and Costello, A. (2012) Health risks, present and future, from global climate change. *BMJ*, 344:e1359.

Meyer Mick (2013) Smoke from bushfires poses a health hazard for all of us. In The Conversation. January 10, 2013

<http://theconversation.edu.au/smoke-from-bushfires-poses-a-health-hazard-for-all-of-us-11493>

Munich Re. (2013) Natural catastrophe statistics for 2012 dominated by weather extremes in the USA. Press Release 3<sup>rd</sup> January 2013.

[http://www.munichre.com/en/media\\_relations/press\\_releases/2013/2013\\_01\\_03\\_press\\_release.aspx](http://www.munichre.com/en/media_relations/press_releases/2013/2013_01_03_press_release.aspx)

Rogelj J, D McCollum, A Reisinger, M Meinshausen, K Riahi. (2013) Probabilistic cost estimates for climate change mitigation. Nature 493: 79-83.

Victorian Government Department of Human Services (DHS). (2009) January 2009 Heat wave in Victoria: an Assessment of Health Impacts. Melbourne, Victoria.

[http://www.health.vic.gov.au/chiefhealthofficer/downloads/heat\\_impact\\_rpt.pdf](http://www.health.vic.gov.au/chiefhealthofficer/downloads/heat_impact_rpt.pdf)

The World Bank (WB) (2012). A report for the World Bank by the Potsdam Institute Research and Climate Analytics. Turn Down the Health. Why a 4°C Warmer World Must be Avoided.

<http://climatechange.worldbank.org/content/climate-change-report-warns-dramatically-warmer-world-century>

World Health Organization (2008) Protecting Health from Climate Change.

[http://www.who.int/world-health-day/toolkit/report\\_web.pdf](http://www.who.int/world-health-day/toolkit/report_web.pdf)

World Health Organization and World Meteorological Organization (2012). Atlas of health and climate

<http://www.who.int/globalchange/publications/atlas/report/en/index.html>