



**Climate change and
health in Europe:
opportunities for action
in partnership**



EUROPE



Fifth Ministerial Conference on Environment and Health

“Protecting children’s health in a
changing environment”

Parma, Italy, 10–12 March 2010



EUROPE

EUR/55934/PB/3
3 March 2010
100572
Original: English

Climate change and health in Europe: Opportunities for action in partnership

Conference Secretariat

WORLD HEALTH ORGANIZATION • REGIONAL OFFICE FOR EUROPE
Scherfigsvej 8, DK-2100 Copenhagen Ø, Denmark Telephone: +45 39 17 12 52/16 06 Fax: +45 39 17 18 78/18 92
E-mail: parma2010@euro.who.int World Wide Web address: <http://www.euro.who.int/parma2010>

Address requests about publications of the WHO Regional Office for Europe to:

Publications
WHO Regional Office for Europe
Scherfigsvej 8
DK-2100 Copenhagen Ø, Denmark

Alternatively, complete an online request form for documentation, health information, or for permission to quote or translate, on the Regional Office web site (<http://www.euro.who.int/pubrequest>).

© **World Health Organization 2010**

All rights reserved. The Regional Office for Europe of the World Health Organization welcomes requests for permission to reproduce or translate its publications, in part or in full.

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature that are not mentioned. Errors and omissions excepted, the names of proprietary products are distinguished by initial capital letters.

All reasonable precautions have been taken by the World Health Organization to verify the information contained in this publication. However, the published material is being distributed without warranty of any kind, either express or implied. The responsibility for the interpretation and use of the material lies with the reader. In no event shall the World Health Organization be liable for damages arising from its use. The views expressed by authors, editors, or expert groups do not necessarily represent the decisions or the stated policy of the World Health Organization.

CONTENTS

	Page
Acknowledgement.....	iv
Key points	v
Introduction.....	1
The nature of the effects of climate change on health: an overview of the evidence	1
Addressing climate change and health: key policy options	3
Raise awareness to encourage the implementation of healthy climate change mitigation and adaptation policies in all sectors	3
Ensure that all current and future climate change mitigation and adaptation measures, policies and strategies integrate health issues at all levels	4
Strengthen health, social and environmental systems and services to improve their capacity to prevent, prepare for and cope with climate change	6
Increase the health and environment sectors' contribution to reducing greenhouse gas emissions.....	7
Share best practices, research, data, information, technology and tools on climate change, environment and health.....	8
Conclusions	8
References	9

Acknowledgement

This paper was produced by the WHO Secretariat. It is based on the results of two WHO consultations (at meeting with senior health officials from ministries of health in Bonn in April 2007, and on the Climate, health and environment information system in Bonn in January 2010) and incorporates comments made at meetings of the Task Force on Climate Change and Health (Rome, January 2009; London, March 2009; Bonn, April 2009; and Copenhagen, December 2009 and January 2010). This document also builds on earlier peer-reviewed publications, such as *Protecting health in Europe from climate change* (Menne, 2008), the Joint European Environment Agency/Joint Research Centre/WHO report *Impacts of Europe's changing climate* (EAA/JRC/WHO, 2008) and the findings of the Fourth Assessment Report of the Intergovernmental Panel of Climate Change (IPCC, 2007a).

Key points

Climate change puts at risk the protection and improvement of human health and the well-being of populations in the WHO European Region. More frequent extreme weather events and changes in the most fundamental prerequisites for good health (air, water, and food) affect health already today. Many of the impacts of climate change can be felt far beyond the locations in which they originally occur and create conflicts and competition for resources.

Different policies at various levels have been identified within the *European Regional Framework for Action* (EUR/55934/6 Rev.1) and should be considered in order to address the challenges of climate change to health and the environment in Europe and to orient action at local and national levels.

These include:

- raising awareness to encourage the healthy implementation of climate change mitigation and adaptation policies in all sectors;
- ensuring that all current and future climate change mitigation and adaptation measures, policies and strategies integrate health issues at all levels;
- strengthening health, social and environmental systems and services to improve their capacity to prevent, prepare for and cope with climate change;
- increasing the health and environment sectors' contribution to reducing greenhouse gas emissions;
- sharing best practices, research, data, information, technology and tools on climate change, environment and health.

Introduction

This policy brief aims to complement the *European Regional Framework for Action* (EUR/55934/6 Rev.1), which has been developed through a broad consultative process involving Member States in the WHO European Region and is being presented at the Fifth Ministerial Conference on Environment and Health, (Parma, Italy, 10–12 March 2010).

It highlights the possible scope and benefits of a range of policy options that would support attainment of the five objectives set out in the *European Regional Framework for Action*, linking these to the global commitments already taken by WHO Member States at the Sixty-first World Health Assembly through the adoption of resolution WHA61.19 on climate change and health.

The nature of the effects of climate change on health: an overview of the evidence

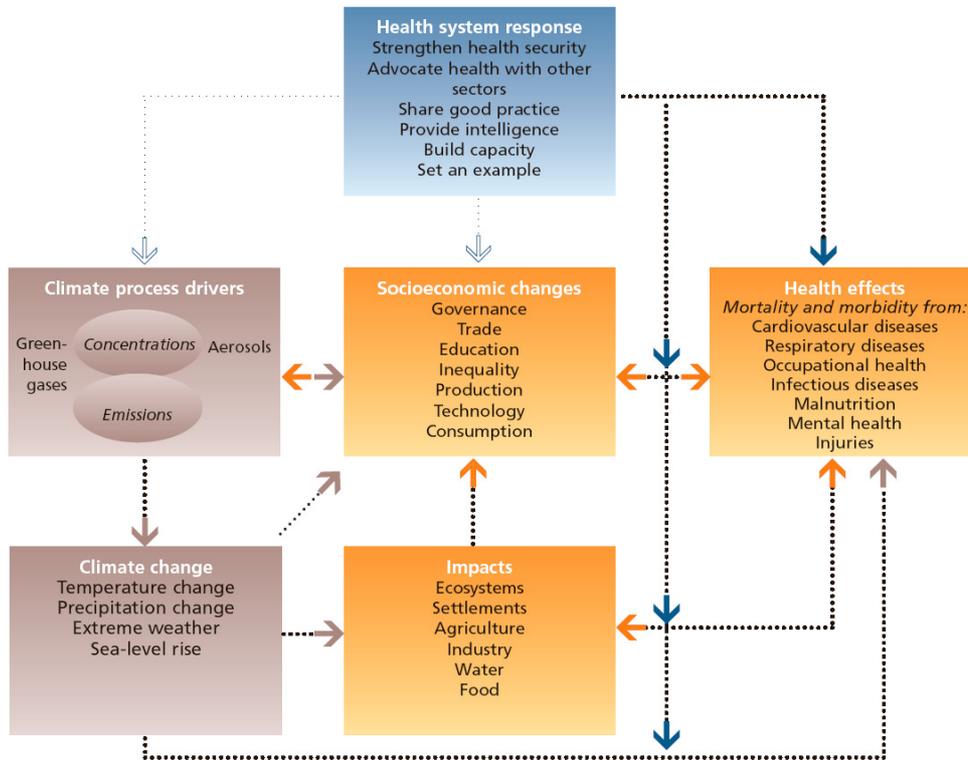
There is now a strong, global scientific consensus that the climate is changing and that if current trends of global warming continue, rising temperatures and sea levels and more frequent extreme weather events (heat-waves, storms, floods, droughts, cyclones, etc.) can lead to severe shortages of food and water, loss of shelter and livelihoods, and extinction of plant and animal species. In its fourth assessment report, the United Nations Intergovernmental Panel on Climate Change (IPCC) concluded that globally:

The health status of millions of people is projected to be affected through, for example, increases in malnutrition; increased deaths, diseases and injury due to extreme weather events; increased burden of diarrhoeal diseases; increased frequency of cardio-respiratory diseases due to higher concentrations of ground-level ozone in urban areas related to climate change; and the altered spatial distribution of some infectious diseases (IPCC, 2007a).

Europe will not be spared. European populations are exposed to climate change directly through changing weather patterns and indirectly through changes in water, air, food quality and quantity, ecosystems, agriculture, livelihoods and infrastructure (Confalonieri et al., 2007). These direct and indirect exposures can result in a variety of health impacts, as outlined in Fig. 1 (Menne et al., 2008).

Indeed, in the WHO European Region many countries have experienced major heat-waves, floods and droughts that have led to deaths and human suffering, social disruption and a substantial burden to health systems. Over 70 000 excess deaths were observed in 12 European countries in the heat-wave during the summer of 2003 (Robine et al., 2007). Changes in the spatial distribution of some infectious disease vectors, plant and animal species and changes in pollen seasonality have also been observed (IPCC, 2007a, b).

Fig. 1: The relationship between climate change, its drivers, effects on systems and socioeconomic development, health, mitigation and adaptation



A variety of impacts are projected for the WHO European Region. The biggest risks appear to be expected from an increase in the frequency of extreme weather events and changes in environmental determinants of health and the geographical distribution of infectious diseases (EEA, 2009). For example, it is expected that European summer temperatures as high as those experienced in 2003 will be the norm by the middle of the century, leading to almost 107 000 net extra heat-related deaths per year in 2071–2100 in the 25 EU Member States, as compared with 1961–1990 (Ciscar et al., 2009). Up to 20% of Europe’s population live in river basins that are likely to be affected by increased flood hazard. In the Mediterranean area and in northern and western Europe, it has been estimated that up to an additional 1.6 million people each year might experience coastal flooding by late this century (Nicholls et al., 2004). Projected declines in crop productivity and food production will particularly affect countries that depend heavily on agriculture. In central Asia, it is projected that crop yields could decrease up to 30% by the middle of the 21st century (Easterling et al., 2007). Changes in wind patterns, increased desertification and fires are expected to influence the long-range transport of air pollutants, including aerosols, ozone, desert dust, mould spores and pesticides (Confalonieri et al., 2007). Climate change may challenge the great progress made towards eliminating malaria in countries of the WHO European Region (from 90 712 cases in 1995 to only 589 in 2008) and raise further concerns with regard to changes in the geographical range of vector- and rodent-borne diseases (such as tick-borne encephalitis, Lyme disease, Crimean Congo hemorrhagic fever, leishmaniasis, dengue fever and West Nile fever) (Menne et al., 2008).

Many of the impacts of climate change can be felt far beyond the locations in which they originally occur. They can also create conflicts and competition for resources. In

the southern part of Europe and in semi-arid areas (e.g. in central Asia), a decrease in precipitation of up to 20% is expected. It is anticipated that in the Mediterranean the increased demand for water for human consumption by 2025 will compete with the demand for water for irrigation in agriculture and for the industrial sector (IPCC, 2007a).

Avoiding and reducing the health effects of climate change and developing and implementing the associated policies and measures requires intersectoral cooperation and forward thinking. The need for health system action to address the health impacts of climate change has been recognized at both global and European political levels. At the Sixty-first World Health Assembly, the 193 Member States of WHO adopted a resolution on climate change and health calling for intensified action to strengthen adaptation policies and plans and asking WHO to support these efforts through a workplan for scaling up the Organization's activities in this area, with special reference to advocacy, partnership within the health system and with other sectors, scientific evidence and health system development (WHO, 2008 a and b).

In the WHO European Region, the health impacts of climate change and the need for action have been recognized at both the third and fourth ministerial conferences on environment and health, held in London and Budapest in 1999 and 2004, respectively. At the London Conference, ministers recommended strengthening interagency collaboration to monitor, research and review the early human health effects of climate change, carrying out national health impact assessments, and reviewing mitigation and adaptation options and strategies (WHO, 1999). At the Budapest Conference, ministers stressed the need to reduce the current burden of disease resulting from extreme weather and climate events and to promote healthy and energy-efficient approaches in other sectors (WHO, 2004).

Addressing climate change and health: key policy options

Different policies at various levels should be considered in order to address the challenges of climate change to health and the environment in Europe and to orient action at local and national levels. The following paragraphs complement the *European Regional Framework for Action* and are intended to support actions by Member States in the WHO European Region.

Raise awareness to encourage the implementation of healthy climate change mitigation and adaptation policies in all sectors

Policy-makers, health professionals and the public must be aware of the health impacts of climate change in order to prompt action in the form of adaptation measures. A recent "Eurobarometer" study showed that European Union citizens rank climate change as the most serious problem in the world after poverty and the lack of food and drinking water (European Commission, 2009). But surveys on climate change and health risk perception in European countries show that it is difficult for people to name specific health impacts of climate change (Vincenti, in press). Promoting communication strategies and advocacy campaigns, and engaging the media, would facilitate targeted dissemination of such information to various groups.

A better understanding of the effects of climate change on health would also facilitate social acceptance of and system support for adaptation and mitigation actions, for example to reduce greenhouse gas emissions in areas such as transport or energy production. Promotional activities should particularly involve children and young people, as well as scientific, technical and managerial personnel in settings such as schools, hospitals and workplaces.

Awareness-raising will call for health sector professionals to show leadership in supporting rapid and comprehensive actions, as well as in promoting mitigation and adaptation strategies. For this to happen, health and environment professionals will need to be given further training and capacity-building with regard to the health effects of climate change and the co-benefits and risks of mitigation and adaptation measures.

Better awareness among policy-makers of the health impacts of climate change would ensure the appropriate inclusion of public health concerns in national and international processes that guide policy and resource allocation on climate change, such as the preparation of national communications and national adaptation programmes of action (NAPAs) and global developments under the United Nations Framework Convention on Climate Change. The relevance of health impacts and their consequences for public health security should be emphasized in the development of global and national initiatives.

Ensure that all current and future climate change mitigation and adaptation measures, policies and strategies integrate health issues at all levels

The health and environment communities have an opportunity to cooperate more closely in decision-making on mitigation and adaptation policies, strategies and measures.

Choosing more sustainable development paths and lifestyles can help tackle important health hazards, as well reducing greenhouse gas emissions. Actions such as shifting to cleaner energy sources, facilitating safe public transport and physical activity, and making more sustainable dietary choices bring important health gains to communities and individuals. In many cases, these benefits are substantial and would help address some of the largest and fastest growing global health challenges and the greatest drains on health sector resources, such as acute respiratory infections, cardiovascular disease, obesity, cancer and diabetes (Chan, 2009). For example the replacement of short (i.e. less than 5 km) trips by car with increased walking, cycling and public transport could counteract the negative health effects of sedentary lifestyles and physical inactivity, which are estimated to be associated with around 992 000 deaths per year in the WHO European Region (WHO, 2009a). These health co-benefits have the potential to offset a large part of the financial costs of climate change mitigation policies (Haines et al., 2009; IPCC, 2007a). Further action is needed to value these co-benefits and provide incentives to those aiming at health and climate protection.

Failure to select the most health-enhancing actions would be a lost opportunity for society and would reduce the return on investment in greenhouse gas mitigation. Some measures, however, can also bring health risks. Unless carefully managed, these may cause health damages, which would also have the side-effect of undermining support for

action on climate change. It is essential to carry out health impact assessment before choosing measures. Health and environment professionals can contribute to this with applied research and policy guidance, as well as with overall help to select the best paths to a low-carbon future.

Improving environmental conditions could prevent up to a quarter of the global burden of disease in the WHO European Region (Prüss-Üstün and Corvalán, 2006). For example, scaling up water and sanitation services would immediately reduce diarrhoea and, at the same time, lessen the health impacts of decreasing and more variable water supplies. The benefits of such interventions are already several times greater than the costs (Hutton and Haller, 2004), and the threat of climate change makes these preventive health measures an even wiser investment.

Health needs to be further integrated into national adaptation strategies. Since 2004, eighteen European Union countries have or are developing such strategies (Swart et al., 2009). The main health actions suggested include strengthening health systems as well as early warning and disaster preparedness mechanisms, raising awareness among citizens and introducing specific legislative changes related to buildings and construction (to protect people from cold and heat in indoor environments). In central Asian countries,¹ Albania, the former Yugoslav Republic of Macedonia and the Russian Federation, capacity is being developed to assess the health impacts of climate change and draw up specific health adaptation plans (HAPs). The inclusion of health into such multisectoral developments presents a gateway for government action and sustained funding. In particular, countries in the east of the Region could benefit from financial assistance to engage in important structural, technological and economic initiatives in this regard.

The development of adaptation strategies or plans also requires the assessment of impacts, vulnerability and adaptation capacity. Thirteen European countries have completed national health impact assessments and identified a range of risks to health, their differential distribution between groups and locations, and their likely course over time under several plausible trajectories of climate change. Several other assessments are under development. Some of them are part of multisectoral assessments (e.g. in the former Yugoslav Republic of Macedonia, Kyrgyzstan, Portugal and Spain) others are health-specific ones (e.g. in Malta, Switzerland, Turkey and the United Kingdom) (Confalonieri et al., 2007; Menne et al., 2008) These assessments further provide evidence when formulating health adaptation measures for the national communications under the United Nations Framework Convention on Climate Change. In addition to considering present and likely future impacts, it is essential that the assessments also address (a) current national and subnational capacities for preparedness and response to climate change in the health sector; (b) co-benefits and risks to health and the environment of climate mitigation and adaptation measures, technologies and policies in other sectors; (c) costs of health impacts, adaptation and mitigation; (d) adaptation and mitigation effectiveness over decades to come, and (e) additional national, subregional

¹ The United Nations Development Programme funds the development of multisectoral adaptation strategies including water, agriculture and energy, in central Asian countries. In the same countries, WHO (supported by the German Federal Ministry of Environment, Nature Conservation and Nuclear Safety) assists with the elaboration of health adaptation plans.

and local measures needed to protect population health, vulnerable groups and the environment.

Strengthen health, social and environmental systems and services to improve their capacity to prevent, prepare for and cope with climate change

Climate change is and will be a challenge for all health systems across the Region, even though the problems will be different and the solutions will need to be tailored to the specific vulnerability of each European population. Health system action will be required both to address the immediate health consequences of climate change (adaptation) and to contribute to reducing greenhouse gas emissions through advocacy for health and direct action within the health sector (as a contribution to the implementation of effective mitigation strategies).

Protection from climate change is part of a basic, preventive approach to public health, not a separate or competing demand. The public health and environment communities have a wealth of experience in protecting people from climate-sensitive hazards. Many of the most important actions are public health interventions of proven effectiveness, from controlling vector-borne disease to providing clean water and sanitation and reducing reliance on energy sources that pollute the environment and harm health. Widening the coverage of these measures will save lives now, and it is a critical contribution to the global effort to adapt to climate change.

It is already necessary to strengthen public health and environment systems: climate change makes this need even more critical. Today's shortfalls in providing basic public health services in many countries, for instance, leave a significant fraction of the European population exposed to climate-related health risks. There is a need for additional investment to strengthen key functions and for forward planning to address the new challenges posed by climate change.

Enhanced capacity to address public health and environmental emergencies saves lives and protects communities. Acute shocks such as natural disasters and disease epidemics can overload the capacities of health systems in even the most developed nations. The number of disasters reported and the numbers of people affected have risen in recent decades (EM-DAT, 2010). Conversely, the number of people killed has fallen, as societies and individuals have become more able to protect themselves. For example, research and policy development in the WHO European Region in the aftermath of the heat-wave in 2003 concluded that heat-related illness and deaths are largely preventable, by ensuring health systems' preparedness, reducing individual and community exposure to heat, protecting the most vulnerable and providing early warning together with advice to citizens (Matthies et al., 2008). Since 2003, 18 countries and 2 regions have developed and implemented "heat health action plans", but the effectiveness of very few plans has been evaluated. In France it was estimated that 4400 of the expected 6500 extra deaths were avoided during the heat-wave of 2006 (Fouillet et al., 2008). Further reinforcing disaster risk reduction, giving early warnings, and taking health action in emergencies can help to ensure that people are better protected from the increasing hazards of extreme weather and help communities recover faster following a disaster (WHO, 2008c).

Strengthened surveillance and control of infectious disease can protect health, from local to global levels. Effective disease surveillance and control become even more important under conditions of rapid environmental change and movement of people, disease vectors and infections. Rapid and accurate disease notification, in compliance with the International Health Regulations (2005) (WHO, 2005) is the essential basis for planning disease control. Improving access to basic health care ensures faster treatment for patients, alleviating suffering and containing the risks of spread of disease.

The risks posed by climate change call for more equitable access to public health and environment services. The health of the poorest and most disadvantaged people is particularly threatened by climate-sensitive diseases and by climate change. Greater emphasis will need to be placed on protecting the health of particularly vulnerable groups, in order to ensure that this emerging risk does not further widen the gaps in health outcomes between the most and the least privileged.

Activities also need to be targeted at those who are most vulnerable. Children, as developing and long-term exposed organisms, are most at risk from the effects of climate change. Heat and cold primarily affect elderly people. An unhealthy cardiovascular system, multiple chronic diseases, certain medications, being confined to bed and high temperatures indoors can increase the risk of heat-related mortality. Workers are at risk, too: emergency service providers and labourers in outdoor environments are especially affected by extreme weather events.

Climate change also calls for longer-term and more flexible and adaptable public health and environment planning. In addition to increasing coverage with existing interventions, countries need to assess their main health impacts and vulnerabilities to climate change and prioritize those adaptive actions that will give the most protection, in cooperation with other sectors, as mentioned above. This should include consideration of how climate change may alter the effectiveness of specific interventions, for example considering which kinds of water and sanitation technologies will be most robust in the event of increases in floods or droughts in particular areas (WHO, 2009b).

Increase the health and environment sectors' contribution to reducing greenhouse gas emissions

The provision of health care services is an energy-intensive activity. Hence the health sector can play a major role in mitigation efforts. The health sector is one of the largest employers and consumers of energy. This presents both a responsibility and an opportunity to be an “early mover”, to achieve climate-neutrality in its own operations and to demonstrate that this can go hand-in-hand with improved effectiveness and cost savings.

For instance, in 2007, the carbon footprint of the National Health Service (NHS) in England amounted to 21 million tonnes of carbon dioxide equivalent (MtCO₂e) (NHS, 2010). In addition, there is evidence that the health sector's energy use and resulting toxic emissions undermine the health of the very communities the sector is meant to serve. The NHS further estimated that reducing CO₂ emissions to 19 MtCO₂e could save £180 billion (NHS, 2010). The same practices that contribute to climate change

and undermine public health can also have a serious impact on the budget of a hospital or ministry. This is true both in well-resourced contexts, where in some cases bloated health systems have become an overwhelming financial burden on a nation's economy, as well as in countries where health systems have very limited resources.

The health sector can therefore take steps to address all of these problems simultaneously; it can work to mitigate climate change, contribute to public health and save money all at the same time. To achieve this, there are basic steps the health sector can take – from improving hospital design to reducing and sustainably managing waste, using safer chemicals, sustainably using resources such as water and energy, and purchasing environmentally-friendly products.

Share best practices, research, data, information, technology and tools on climate change, environment and health

There are a number of issues to be clarified both regarding the impacts of climate change and the comparative effectiveness of adaptation and mitigation policies for health protection. A wealth of interagency cooperation, research, pilot projects and bilateral initiatives are ongoing in the WHO European Region. Member States and agencies would benefit from the systematic sharing of information, data and assessments focusing on best practices to improving population health through environmental protection. The results of research projects undertaken at national and international levels should be shared, analysed and assessed, in order to allow for full exploitation of findings for policy-making, as well as to develop further research initiatives on outstanding questions.

Mechanisms should be identified to allow for systematic periodic reviews of the scientific evidence, exchange of good practices and monitoring of health impacts. These mechanisms should be “agile”, target-oriented and time-limited, entail investment of the least possible resources and make innovative use of information technologies within a carbon-neutral approach.

Conclusions

The WHO European Region has a challenge and an opportunity to deal with climate change and health. Addressing health concerns related to climate change calls for genuinely intersectoral action. The *European Regional Framework for Action* has outlined a number of common objectives and activities. Mechanisms now need to be identified for how best to implement such activities and evaluate developments over time.

References

- Chan M (2009). Cutting carbon, improving health. *Lancet*, 374:1870.
- Ciscar J-C, ed. (2009). *Climate change impacts in Europe. Final report of the PESETA research project*. Brussels, European Commission (JRC Scientific and Technical Reports).
- Confalonieri U et al. (2007). Human health. In: Parry ML et al., eds. *Climate change 2007 – Impacts, adaptation and vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the IPCC*. Cambridge and New York, NY, Cambridge University Press: 391–431.
- Easterling WE et al. (2007). Food, fibre and forest products. In: Parry ML et al., eds. *Climate change 2007 – Impacts, adaptation and vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the IPCC*. Cambridge and New York, NY, Cambridge University Press: 273–313.
- EM-DAT (2010). The International Disaster Database [online database]. Brussels, Centre for Research on the Epidemiology of Disasters (CRED) (<http://www.emdat.be/>, accessed 3 March 2010).
- European Commission (2009). *European attitudes towards climate change*. Brussels (Special Eurobarometer 322, http://ec.europa.eu/public_opinion/archives/ebs/ebs_322_en.pdf, accessed 4 March 2010)
- European Environment Agency (EEA), Joint Research Centre (JRC), and World Health Organization (WHO) (2008). *Impacts of Europe's changing climate - 2008 indicator-based assessment*. Luxembourg: Office for Official Publications of the European Communities (EEA Report no. 4/2008. 2008, http://www.eea.europa.eu/publications/eea_report_2008_4/, accessed 4 March 2010)
- Fouillet A et al. (2008). Le plan national canicule (The French national heat wave response plan). Has the impact of heat waves on mortality changed in France since the European heat wave of summer 2003? A study of the 2006 heat wave. *International Journal of Epidemiology*, 37:309–317.
- Haines A et al. (2009). Public health benefits of strategies to reduce greenhouse-gas emissions: overview and implications for policy makers. *Lancet*, 374:2104.
- Hutton G, Haller L. *Evaluation of the costs and benefits of water and sanitation improvements at the global level*. Geneva, World Health Organization, 2004.
- IPCC (2007a). *Climate change 2007: Synthesis report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the IPCC*. Geneva.
- IPCC (2007b). Summary for policymakers. In: *Climate change 2007: The physical science basis. Contribution of Working Group I to the Fourth Assessment Report of the IPCC*. Cambridge and New York, NY, Cambridge University Press.
- Matthies F et al., eds. (2008). *Heat-health action plans. Guidance*. Copenhagen, WHO Regional Office for Europe.
- Menne B et al. (2008). *Protecting health in Europe from climate change*. Copenhagen, WHO Regional Office for Europe.

Menne B, Ebi K, eds. (2006). *Climate change and adaptation strategies for human health*. Darmstadt, Steinkopff.

NHS (2010). *Saving carbon, improving health: NHS carbon reduction strategy*. Cambridge, NHS Sustainable Development Unit.

Nicholls RJ (2004). Coastal flooding and wetland loss in the 21st century: changes under the SRES climate and socio-economic scenarios. *Global Environmental Change*, 14:69–86.

Prüss-Üstün A, Corvalán C (2006). *Preventing disease through healthy environments. Towards an estimate of the environmental burden of disease*. Geneva, World Health Organization.

Robine J.M. et al. (2007). *Report on excess mortality in Europe during summer 2003*. Brussels, European Commission (EU Community Action Programme for Public Health, Grant Agreement 2005114).

Swart R et al. (2009). *Europe adapts to climate change. Comparing national adaptation strategies*. Helsinki, Partnership for European Environmental Research (PEER report No 1).

Vincenti K, ed. (in press). *Health effects of climate change in Maltese islands*. Valletta.

WHO (1999). *Declaration. Third Ministerial Conference on Environment and Health*. Copenhagen, WHO Regional Office for Europe (<http://www.euro.who.int/Document/E69046.pdf>, accessed 4 March 2010).

WHO (2004). *Declaration. Fourth Ministerial Conference on Environment and Health*. Copenhagen, WHO Regional Office for Europe (<http://www.euro.who.int/document/e83335.pdf>, accessed 4 March 2010).

WHO (2005). *World Health Assembly resolution WHA58.3 on revision of the International Health Regulations*. Geneva, World Health Organization (http://www.who.int/gb/ebwha/pdf_files/WHA58/WHA58_3-en.pdf, accessed 4 March 2010).

WHO (2008a). *World Health Assembly resolution WHA61.19 on climate change and health*. Geneva, World Health Organization (http://apps.who.int/gb/ebwha/pdf_files/A61/A61_R19-en.pdf, accessed 7 January 2010).

WHO (2008b). *Climate change and health. Report by the Secretariat*. Geneva, World Health Organization (document EB124/11) (http://apps.who.int/gb/ebwha/pdf_files/EB124/B124_11-en.pdf, accessed 7 January 2010).

WHO (2008c) *Environmental health in emergencies* [web site]. Geneva, World Health Organization, 2008 (http://www.who.int/environmental_health_emergencies/en/, accessed 4 March 2010).

WHO (2009a) *European status report on road safety: Towards safer roads and healthier transport choices*. Copenhagen, WHO Regional Office for Europe.

WHO (2009b). *Summary and policy implications. Vision 2030: The resilience of water supply and sanitation in the face of climate change*. Geneva, World Health Organization (http://www.who.int/water_sanitation_health/publications/9789241598422/en/index.html, accessed 4 March 2010).

The WHO Regional Office for Europe

The World Health Organization (WHO) is a specialized agency of the United Nations created in 1948 with the primary responsibility for international health matters and public health. The WHO Regional Office for Europe is one of six regional offices throughout the world, each with its own programme geared to the particular health conditions of the countries it serves.

Member States

Albania
Andorra
Armenia
Austria
Azerbaijan
Belarus
Belgium
Bosnia and Herzegovina
Bulgaria
Croatia
Cyprus
Czech Republic
Denmark
Estonia
Finland
France
Georgia
Germany
Greece
Hungary
Iceland
Ireland
Israel
Italy
Kazakhstan
Kyrgyzstan
Latvia
Lithuania
Luxembourg
Malta
Monaco
Montenegro
Netherlands
Norway
Poland
Portugal
Republic of Moldova
Romania
Russian Federation
San Marino
Serbia
Slovakia
Slovenia
Spain
Sweden
Switzerland
Tajikistan
The former Yugoslav Republic
of Macedonia
Turkey
Turkmenistan
Ukraine
United Kingdom
Uzbekistan

World Health Organization
Regional Office for Europe

Scherfigsvej 8, DK-2100 Copenhagen Ø, Denmark

Tel.: +45 39 17 17 17 Fax: +45 39 17 18 18 E-mail: postmaster@euro.who.int

Web site: www.euro.who.int