WORLD HEALTH ORGANIZATION
EUROPE

EUROHEAT

IMPROVING PUBLIC HEALTH RESPONSES TO EXTREME WEATHER/HEAT-WAVES

Summary for Policy-Makers

Heat threatens health.
Climate change increases heat-waves.
Can the health effects
of hot weather be prevented?
What public health strategies and measures
can be adopted?

EuroHEAT, a project coordinated by the **WHO Regional Office for Europe** and co-funded by the European Commission (EC) Directorate-General for Health and Consumers (DG SANCO), has quantified the health effects of heat in cities in the WHO European Region and has identified options for improving the preparedness of health systems and their responses to protect health. The project contributed to the implementation of the commitments specified in the Declaration of the Fourth WHO Ministerial Conference on Environment and Health (identifying, mitigating, preventing and adapting to the health impacts of climate change and taking action to reduce the current burden of disease due to extreme weather and climate events) and in the EC environment and health action plan. The EuroHEAT team was composed of representatives from 7 European scientific institutions and was supported by an advisory committee of 19 experts from 14 countries and the EC.

Despite the greenhouse-gas mitigation policies that are now being implemented in Europe, some degree of global climate change is thought to be inevitable. As a result, heat-waves are projected to increase in number, intensity and duration over most land areas in the 21st century[1]. This trend will increase the risk of heat-related mortality and morbidity, especially for elderly, chronically ill, very young and socially isolated individuals. More than 44 000 additional deaths were recorded in August 2003 in 12 European countries[2]. A ten-year analysis in 15 European cities, carried out by the project on the assessment and prevention of acute health effects of weather conditions in Europe (PHEWE), estimated a 2% increase in mortality in northern cities and a 3% increase in southern cities for every 1 °C rise in apparent temperature[3] above the city threshold level[4]. The aim of EuroHEAT was to improve public health responses to weather extremes and in particular heat-waves.

Heat threatens health. Hot weather can cause illness and kill.

What is a heat-wave and how does it affect health?

There is no standard definition for a heat-wave. EuroHEAT defined a heat-wave as "a period where the maximum apparent and the minimum temperature are over the 90th percentile of the monthly distribution for at least two days".
Long and intense heat-waves are more deadly. In the nine European cities analysed by EuroHEAT (Athens, Barcelona, Budapest, London, Milan, Munich, Paris, Rome and Valencia), the estimated increase in mortality ranged from 7.6% to 33.6% during heat-wave episodes. The impact of longer heat-waves (more than four days) on mortality was 1.5-5 times higher than that of short heat-waves.

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The combined effect of heat-waves and peaks of ozone or fine particulate matter (PM_{10})[5] air pollution increases mortality.

There is growing evidence from EuroHEAT that the effects of heat-wave days on mortality are larger when levels of ozone or PM_{10} are high, particularly among the elderly (75–84 years). The total daily number of deaths in this age group increased by 16.2% on heat-wave days with high ozone levels and by 14.3% on days with high PM_{10} levels, respectively, compared to an increase of 10.6% and 10.5% on days with low levels of ozone and PM_{10}. Future heat-wave studies thus need to adjust their estimated effects for air pollution levels. The mortality increase due to the combined effect of heat and air pollution can be reduced by decreasing exposure to PM_{10} and ozone on hot days.

Some people are less able to cope with heat stress than others.

A wide range of chronic diseases (including being confined to bed) and medical treatments, social isolation and some types of occupation increase the risk of heat stress in individuals.
Across Europe, housing and socioeconomic conditions show varying influence on the impact of heat on health. In European cities, the elderly suffer the greatest effects of heat-waves, with more women dying than men.
Public health interventions need to identify and target particularly vulnerable population groups and individuals.

Heat-related deaths are expected to grow as a consequence of projected increases in heat-wave frequency, intensity and duration, due to climate change.

For 2030, under a high carbon dioxide (CO_2) emission scenario more than 400 deaths per year due to high temperatures are expected, for example for each of the following cities: Athens, Paris, Rome and Budapest.

Heat–health action plans help prevent the adverse health effects of heat-waves.

The adverse health effects of heat-waves are largely preventable.

EuroHEAT recommends the development and implementation of **heat–health action plans** at national and regional level in Europe, to prevent, react to and contain heat-related risks to health.

As part of EuroHEAT, the German Weather Service has developed an **online tool providing medium-term forecasting of heat** (http://www.euroheat project.org/dwd). This tool, which maps the probability of a forthcoming heat-wave, can support health services in planning and in taking decisions.

1 IPCC (2007). Summary for policymakers. 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 Intergovernmental Panel on Climate Change. Cambridge, Cambridge University Press: 7–22.
2 Robine J-M et al. (2008). Death toll exceeded 70 000 in Europe during the summer of 2003. Comptes Rendus Biologies, 331(2): 171–178.
3 Apparent temperature is a measure of relative discomfort due to combined heat and high humidity, developed on the basis of physiological studies on evaporative skin cooling. It can be calculated as a combination of air temperature (Temp) and dew point (Dew) in °C.
4 Baccini M et al. (2008). Effects of apparent temperature on summer mortality in 15 European cities: results of the PHEWE project. Epidemiology, 19(5): 711–719.

5 With a diameter under 10 µm.

Eight steps to build a heat–health action plan

1 Collaboration between bodies and institutions and identification of a lead body to coordinate responses
This includes the definition of roles and responsibilities for actors at the national/regional level. Exploration of financial incentives, legislation and synergies with the International Health Regulations (2005) and existing national disaster plans is advised.

2 Availability of accurate and timely alert systems
Heat-health warning systems (HHWS) should be developed in collaboration with meteorological services to trigger warnings, determine the threshold for action and communicate the risks. An HHWS can use various methods for forecasting and an effective system is targeted to local needs and is accurate and timely. Experiences of various countries should be shared.

3 Heat-related health information developed in advance
As heat-waves are likely to occur every summer, although in different locations in Europe, it is advisable to establish a communication plan before the summer. This plan should include advice to people on how to protect oneself and others, how to reduce heat exposure indoors and outdoors and how to recognize heat-related symptoms. Information targeted at particular groups, such as health care institutions and caregivers, should also be provided.

4 Avoidance or reduction of heat exposure
As part of the plan, measures to reduce exposure should be taken, such as adaptation of individual behaviour, short-, medium- and long-term measures in buildings to reduce indoor temperatures and long-term improved urban planning, building design, transport and energy policies. Medium- and short-term options are available for cooling buildings without power consumption (passive cooling), such as cool paints, external shading, radiant barriers and insulation of buildings. Advice should be given to the public on how best to reduce indoor temperatures, with particular attention to avoiding pollutants. Possible electricity shut-offs and reduced water availability need to be considered in heat–health action plans and public advice.

5 Particular care for vulnerable population groups
It is helpful to identify groups at high risk before the summer and to plan and target interventions (advice, follow-up and care) accordingly. Community organizations, medical practitioners and care providers play an important role.

6 Provision of health care, social services and infrastructure
This includes summer health workforce planning, health service provision and training of health personnel and other interest groups. It is advisable that care homes and hospitals meet the European Union criteria for the thermal indoor environment to prevent heat-related illness in patients and staff. Emergency departments of hospitals could be alerted to heat-waves to better manage an increase in patient admissions.

7 Real-time health surveillance incorporated into the planning process
Real-time surveillance is important to detect early impacts of hot weather, to potentially modify interventions and to inform about abnormal outbreaks or clusters of health impacts. The most useful real-time data are all-cause mortality, emergency calls, emergency department visits, hotlines and general practitioner records. They should be available within a maximum of one to two days.

8 Monitoring and evaluation components and criteria
It is crucial at the end of the summer to evaluate whether the heat–health action plan has worked according to defined process and outcome criteria. Monitoring health outcomes over time in relation to heat-waves is another important component of the plan.

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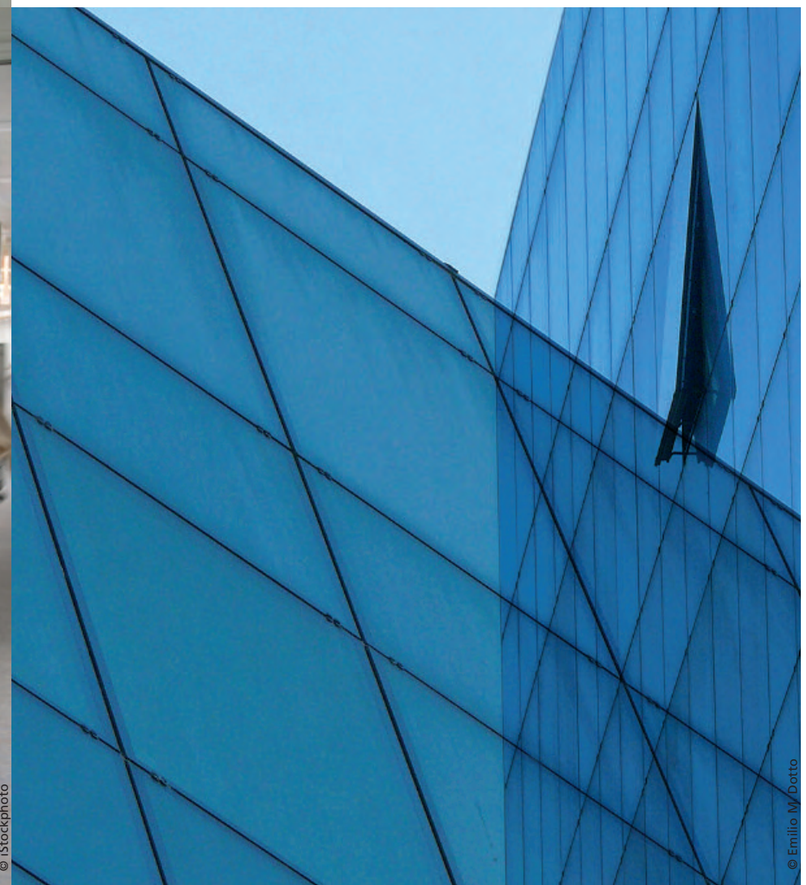

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For details please consult the
Guidance for heat–health action plans
on the WHO Regional Office for Europe web site
(www.euro.who.int/InformationSources/Publications/Catalogue/20080522_1)

The WHO Regional Office for Europe supports its Member States in the development and implementation of heat–health action plans.
It is ready to assist authorities in preventing the adverse health effects of heat-waves by providing:

- technical advice;
- support for strengthening surveillance systems to better describe climate-related health effects;
- valid and reliable evidence on heat-related mortality and morbidity;
- guidance for the definition of criteria for triggering heat–health interventions;
- options for heat–health preparedness and response;
- information exchange on monitoring and evaluation of public health interventions in the framework of heat–health action plans.

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For further information on the EuroHEAT project, see the WHO Regional Office for Europe (http://www.euro.who.int/globalchange/Topics/20050524_2) or contact:

Bettina Menne
WHO Regional Office for Europe
Tel.: +39 06 487751
E-mail: globalchange@ecr.euro.who.int

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 <file://www.euro.who.int>