World Health Organization

REGIONAL OFFICE FOR Europe

PUBLIC HEALTH ADVICE

on preventing health effects of heat

NEW and UPDATED information for different audiences

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ABSTRACT

Adverse health effects of hot weather and heat-waves are largely preventable. Prevention requires a portfolio of actions at different levels: from health system preparedness, coordinated with meteorological early warning systems, to timely public and medical advice and improvements to housing and urban planning. This publication offers detailed information for various target audiences, and on medical advice and treatment practices.

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The adverse health effects of hot weather and heat-waves are largely preventable. Prevention requires a portfolio of actions at different levels: from health system preparedness, coordinated with meteorological early warning systems, to timely public and medical advice and improvements to housing and urban planning. These actions can be integrated in a defined heat–health action plan.

This publication offers detailed information for various target audiences, and on medical advice and treatment practices. It builds on the WHO publication *Heat–health action plans – guidance* (Matthies et al., 2008) and contains new information on vulnerable population groups, vegetation fires, occupational health and housing. This information, along with the guidance on heat–health action plans, can be used to formulate behavioural and medical advice adapted to a particular national or regional context.

The information sheets can be printed off together or separately, as required. They reflect current evidence and can be used to develop information materials for the general public, medical professionals and health services at the national or subnational level. The information is intended to be scrutinized for its feasibility and applicability at the national or regional level and may need to be adapted accordingly.

Countries are invited to consider this publication as a proposal and to share their comments and experiences. Further information can be obtained from the WHO Regional Office for Europe web site (http://www.euro.who.int/en/what-we-do/health-topics/environment-and-health/Climate-change).

Information for the general public during heat-waves (UPDATED)

THROUGHOUT A HEAT-WAVE, FOLLOW THE RECOMMENDATIONS OF THE LOCAL HEALTH AUTHORITIES

Keep your home cool

- Aim to keep your living space cool. Check the room temperature between 08:00 and 10:00, at 13:00 and at night after 22:00. Ideally, the room temperature should be kept below 32 °C during the day and 24 °C during the night. This is especially important for infants or people who are over 60 years of age or have chronic health conditions.
- Use the night air to cool down your home. Open all windows and shutters during the night and the early morning, when the outside temperature is lower (if safe to do so).
- Reduce the heat load inside the apartment or house. Close windows and shutters (if available) especially those facing the sun during the day. Turn off artificial lighting and as many electrical devices as possible.
- Hang shades, draperies, awnings or louvers on windows that receive morning or afternoon sun.
- Hang wet towels to cool down the room air. Note that the humidity of the air increases at the same time.
- If your residence is air conditioned, close the doors and windows and conserve electricity not needed to keep you cool, to ensure that power remains available and reduce the chance of a community-wide outage.
- Electric fans may provide relief, but when the temperature is above 35 °C, may not prevent heat-related illness. It is important to drink fluids.

Keep out of the heat

- Move to the coolest room in the home, especially at night.
- If it is not possible to keep your home cool, spend 2–3 hours of the day in a cool place (such as an air-conditioned public building).
- Avoid going outside during the hottest time of the day.
- Avoid strenuous physical activity if you can. If you must do strenuous activity, do it during the coolest part of the day, which is usually in the morning between 4:00 and 7:00.
- Stay in the shade.
- Do not leave children or animals in parked vehicles.

Keep the body cool and hydrated

- Take cool showers or baths. Alternatives include cold packs and wraps, towels, sponging, foot baths, etc.
- Wear light, loose-fitting clothes of natural materials. If you go outside, wear a wide-brimmed hat or cap and sunglasses.
- Use light bed linen and sheets, and no cushions, to avoid heat accumulation.
- Drink regularly, but avoid alcohol and too much caffeine and sugar.
- Eat small meals and eat more often. Avoid foods that are high in protein.

Help others

- Plan to check on family, friends, and neighbours who spend much of their time alone. Vulnerable people might need assistance on hot days.
- Discuss extreme heat-waves with your family. Everyone should know what to do in the places where they spend time.
- If anyone you know is at risk, help him or her to get advice and support. Elderly or sick people living alone should be visited at least daily.
- If a person is taking medication, ask the treating doctor how it can influence thermoregulation and the fluid balance.
- Get training. Take a first-aid course to learn how to treat heat emergencies and other emergencies. Everyone should know how to respond.

If you have a health problem

- Keep medicines below 25 °C or in the refrigerator (read the storage instructions on the packaging).
- Seek medical advice if you are suffering from a chronic medical condition or taking multiple medications.

If you or others feel unwell

- Try to get help if you feel dizzy, weak, anxious or have intense thirst and headache; move to a cool place as soon as possible and measure your body temperature.
- Drink some water or fruit juice to rehydrate.

- Rest immediately in a cool place if you have painful muscular spasms (particularly in the legs, arms or abdomen, in many cases after sustained exercise during very hot weather), and drink oral rehydration solutions containing electrolytes. Medical attention is needed if heat cramps last more than one hour.
- Consult your doctor if you feel unusual symptoms or if symptoms persist.

△ If one of your family members or people you assist presents hot dry skin and delirium, convulsions and/or unconsciousness, call a doctor/ambulance immediately. While waiting for help, move the person to a cool place, put him or her in a horizontal position and elevate legs and hips, remove clothing and initiate external cooling, for example, by placing cold packs on the neck, axillae and groin, fanning continuously and spraying the skin with water at 25–30 °C. Measure the body temperature. Do not give acetylsalicylic acid or paracetamol. Position an unconscious person on his or her side.

FOR SERVICE PROVIDERS

In material for the public, include information on help lines, social services, ambulances, cool spaces and transport.

Provide access to cool spaces and ensure active assistance for people most at risk.

For health authorities, medical professionals and care providers: risk factors for heat illness and mortality (NEW)

In addition to the information for the general public, targeted information should be provided for population groups at high risk of health effects from heat-waves: elderly and very elderly people, or people with chronic diseases and their caregivers. See the table below for details. It should contain:

- practical tips (such as for keeping cool and well hydrated);
- information on first aid treatment; and
- important contact details for social and medical services, including ambulance services.

Risk factors	Mechanism	Selected evidence
Individual (demographic)		
Elderly and very elderly	Changes in thermoregulation, renal function and health status, reduced water intake and reduced physical ability	Flynn, McGreevy & Mulkerrin, 2005 Kenny et al., 2010 Kovats & Hajat, 2008 Schifano et al., 2009
Female and elderly or very elderly	Differences in thermophysiological functioning + above	
Single and elderly or very elderly	Social isolation + above	
Infants	Thermoregulation immature, smaller body mass and blood volume, high dependency level, dehydration risk in case of diarrhoea	Falk, 1998 Tourneux et al., 2009 Tsuzuki-Hayakawa & Tochihara, 1995
Health		
Acute health conditions	Conditions such as acute renal failure, cerebrovascular disease, heart failure, pneumonia and infectious diseases impair thermoregulatory responses during heat-waves	Fouillet et al., 2006 Semenza et al., 1999 Stafoggia et al., 2008
Chronic health conditions	Reduced thermoregulatory ability, high risk of acute events, exacerbations of disease, reduced ability to care for oneself, and take appropriate protective action and/or seek assistance Cardiovascular and respiratory diseases and their treatment are of highest priority (see information sheets on health conditions and adverse effects of medications)	Bouchama et al., 2007 Kovats & Hajat, 2008 Kenny et al., 2010 Schifano et al., 2009
Medication use	Interaction with physiological response to heat and hydration status, concurrent chronic diseases	Bouchama et al., 2007 Hajat, O'Connor & Kosatsky, 2010
Being confined to bed	Poor health status, reduced mobility and high dependency level	Bouchama et al., 2007
Being hospitalized	Poor health status, lack of air conditioning	Stafoggia et al., 2008
Living in institution (e.g. nursing home)	High care dependency and poor health status; potentially too hot rooms and spaces	Stafoggia et al., 2006 Kovats & Hajat, 2008

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Risk factors	Mechanism	Selected evidence
Socioeconomic		
Low economic status (poverty; low income), low educational level	Poor people tend to have a higher underlying prevalence of chronic diseases, lower housing quality and less well-heated and -cooled homes	Basu & Samet, 2002 Flynn, McGreevy & Mulkerrin, 2005 Kenny et al., 2010 Kovats & Hajat, 2008
Being homeless	Lack of shelter, concomitant chronic diseases (physical and psychiatric diseases)	Bouchama et al., 2007 Kovats & Hajat, 2008 Kenny et al., 2010
Social isolation	Delay in receiving help and medical care	Kovats & Hajat, 2008
Not leaving home daily	Lack of social interaction	Bouchama et al., 2007
Lack of access to air conditioning at home	Prolonged exposures to high temperatures don't allow the body's physiological mechanisms to recover	Stafoggia et al., 2006 Bouchama et al., 2007
Lack of access to health care	Lack of advice on and treatment of existing health conditions, and delay in care for heat-related conditions	
Environmental conditions		
Air pollution	Combined effect of high temperature and air pollution (particulate matter (PM) and ozone)	WHO Regional Office for Europe, 2009 Ren et al., 2008, 2009 Stafoggia et al., 2006
Poor housing conditions	Risk factors include living on the top floor, or in poorly ventilated or crowded accommodation; not having air conditioning; poorly insulated buildings; windows exposed to sun, etc.	Kovats & Hajat ,2008
Occupational exposures (especially for males)	High exposure levels that reduce thermoregulatory ability, risk of dehydration	Kamijo & Nose, 2006
Urban areas	Cities tend to become hotter than surrounding areas due to the heat island effect. This increases the severe heat stress experienced during the day and further impairs the body tolerance of heat combined with the absence of relief at night	de'Donato et al., 2011 Smargiassi et al., 2009 Voogt 2002

△ Risk factors are often clustered in people at particular high risk, such as: being female and elderly, having a chronic disease and being socially isolated, and probably even living on the top floor. Such people should be targeted as a priority.

Active and specifically tailored approaches to reach vulnerable population groups and individuals need to accompany any public health measures: such as a buddy system, visits and telephone calls. Distributing information through leaflets and brochures has proved ineffective in many situations: for example, for reaching elderly or homeless people.

Other population groups that may need to be considered for specific information may include athletes, tourists and parents of infants.

For medical professionals and care providers: health conditions that create high risk of health effects from heat (NEW)

General practitioners (GPs) and other health professionals, as well as people with certain health conditions, need to be informed about the particular risks of heat exposure combined with these conditions. Health professionals might invite patients to adapt their lifestyles or advise them on whether and how to adjust medication (see the note below). Useful information, particularly for patients and their caregivers, includes practical tips (e.g. for keeping cool and well hydrated), advice on first aid and important contact details for social and medical services and the ambulance service.

The table addresses only chronic (long-term conditions), not acute diseases. Infections, fever, gastroenteritis and skin infections are also risk factors for heat-related mortality (Kilbourne, 1997).

Health conditions	Mechanism	Selected evidence
Diabetes mellitus, other endocrine disorders	Types 1 and 2 diabetes are associated with impairment in skin blood-flow response, which may play a role in reducing heat dissipation. Sweating responses may also be reduced. Metabolic alterations can occur	Bouchama et al., 2007 Kovats & Hajat, 2008 Kenny et al., 2010 Schifano et al., 2009
Organic mental disorders, dementia, Alzheimer disease	Reduced awareness of heat-related risks and adaptive behaviours, high dependency level, interaction of many medications with the body's ability to thermoregulate	Belmin et al., 2007 Faunt et al., 1995
Substance misuse disorders	Changes in physiological response mechanisms and changes in behaviour due to psychoactive substances and alcohol	Kovats & Hajat, 2008
Schizophrenia, schizotypal and delusional disorders	High level of dependency, prescribed psychotropic drugs	Bouchama et al., 2007 Kovats & Hajat, 2008
Neurological diseases, e.g. Parkinson's disease and those involving cognitive impairment	Potentially limited awareness and mobility; High level of care dependency, prescribed psychotropic drugs	Kovats & Hajat, 2008
Cardiovascular diseases (including hypertension, coronary artery disease, heart conduction disorders)	Impairment of thermoregulatory responses and high risk of acute coronary and cerebral thrombosis, reduced cardiovascular and thermoregulatory responses and changes in blood composition due to dehydration (1% of body weight deficit) Changes in renal function may be related to life-threatening cardiac rhythm disturbances in older patients Worsening the existing condition, cardiovascular, thermoregulatory and blood changes in hypertensive patients followed by a sudden fall in arterial pressure may lead to fatal cerebral ischaemia. Peripheral circulatory changes may lead to reduction in core-temperature regulation	Carberry, Shepherd & Johnson, 1992 Keatinge et al., 1986 Kenny et al., 2010

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Health conditions	Mechanism	Selected evidence
Diseases of the respiratory system, chronic lower respiratory disease	Combined effect of high temperature and air pollution on the pathogenesis and clinical history of respiratory diseases (i.e. asthma, chronic bronchitis) Worsening of existing condition (i.e. chronic obstructive pulmonary disease – COPD), due to hyperventilation and dyspnoea) difficulty in dissipating excess heat (e.g. peripheral vasodilatation, hypovolaemia)	Ren et al., 2008 Sprung, 1980 Stafoggia et al., 2008 Schifano et al., 2009
Diseases of the renal system, renal failure, kidney stones	Diminished renal function due to the electrolyte and water imbalance consequent to hyperthermia and dehydration, especially in elderly people	Flynn, McGreevy & Mulkerrin, 2005
Obesity	Sensory impairment to heat, or reduced capacity for heat dissipation due to the smaller ratio of body surface area to body mass that hampers sweat evaporation	Herman et al., 2007, Kenny et al., 2010
Other chronic diseases	Examples: absence of sweat glands in people with scleroderma, high loss of electrolytes through sweating in those with cystic fibrosis	Orenstein, Henke, Green, 1984 Paquette & Falanga, 2003

A person suffering from any of the above-mentioned conditions should to contact his or her GP before the summer for advice on what to consider during the warm season.

△ Many chronic health conditions require medical treatment with drugs that in turn might raise the risk of health effects through heat exposure (see information sheet on adverse effects of medication). Instead of adjusting essential medication, it is advisable to ensure that these patients have access to cool places and are not exposed to heat.

For medical professionals: adverse effects of medication during hot weather (UPDATED)

Medications can affect the body's usual cooling mechanisms and potentially cause increased health problems in a number of ways (WHO Regional Office for Europe, 2009); by:

- altering central thermoregulation and therefore physiological and behavioural responses;
- changing cognitive alertness, leading to, for example, increased drowsiness and reduced heat avoidance behaviour;
- changing blood pressure and cardiac output, affecting cooling by vasodilation or increasing dizziness and fainting;
- inhibiting normal sweating mechanisms for cooling by evaporation due to anti-cholinergic effects blocking the parasympathetic nervous system;
- altering renal function and electrolyte balance, with increased risks from dehydration and drug toxicity, or overhydration and electrolyte imbalance.

Medication	Mechanism
Anti-cholinergics	Can affect central thermoregulation, reduce cognitive alertness, and prevent or reduce sweating (many drugs below have anti-cholinergic effects)
Antipsychotics	Can inhibit the sweating mechanism, and reduce systolic blood pressure, central thermoregulation, cognitive alertness and vasodilation
Antihistamines	Can inhibit the sweating mechanism, and reduce systolic blood pressure
Anti-Parkinson agents	Can inhibit the sweating mechanism, reduce systolic blood pressure, and cause dizziness and confusion
Antidepressants	Reduce sweating, some can decrease centrally induced thermoregulation and cognitive alertness
Anxiolytics and muscle relaxants	Reduce sweating and increase dizziness, decrease cardiac output and therefore reduce cooling by vasodilation, and worsen respiratory symptoms
Antiadrenergics and beta-blockers	Can prevent dilation of the blood vessels in the skin, reducing the capacity to dissipate heat by convection
Sympathomimetics	Vasodilators, including nitrates and calcium channel blockers, can worsen hypotension in vulnerable patients
Antihypertensives and diuretics	Can lead to dehydration and reduce blood pressure; hyponatraemia is a common side effect and can be worsened by excess fluid intake
Antiepileptics	Can reduce cognitive alertness and increase dizziness
Other drug classes such as antiemetics, anti-vertigo drugs, gastrointestinal drugs, urinary incontinence drugs	Also have anti-cholinergic effects

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Sources: adapted from Health Canada (2011b) and building on the work of Bouchama (2007), the National Centre for Diseases Prevention and Control (2011) and Hajat, O'Connor & Kosatsky (2010), National Collaborating Centre for Environmental Health (2011).

Excessive heat exposure can:

- increase cardiac output (for cooling by vaso-dilation);
- cause dehydration, changes in blood volume distribution and the thermoregulatory response, and influence drug levels, their kinetics and excretion, and hence their pharmacological activity (this is for all medicaments);
- increase toxicity and/or decrease the efficacy of drugs, particularly those with a narrow therapeutic index, such as digoxin or lithium.

△ Drugs need to be stored and transported at temperatures below 25 °C or in a refrigerator if indicated. High ambient temperatures can reduce the efficacy of drugs, as most manufactured drugs are licensed for storage at temperatures up to 25 °C. This is particularly important for emergency drugs, including antibiotics, adrenergic drugs, insulin, analgesics and sedatives.

△ The contents of medical bags heat up in warm weather (Crichton, 2004). Health professionals should be careful not to transport medicaments for prolonged periods during hot weather, and should keep medical bags in cool places.

△ Many of the above health conditions require medical treatment with drugs that in turn might raise the risk of health effects through heat exposure. Instead of adjusting essential medication, it is advisable to ensure that these patients have access to cool places and are not exposed to heat.

△ Antipyretics are not effective in reducing high body temperature related to heat. They lower the body temperature only when thermoregulation has been raised by pyrogens. Their use may be harmful in treating heat related illness due to their renal and hepatic side effects.

△ Many drugs may cause diarrhoea and vomiting as a side effect and may lead to an increased risk of dehydration in hot weather.

For medical professionals: considerations regarding drinking advice during hot weather and heat-waves

"Drinking a lot of fluids" means ingesting the volume of water needed to compensate for the fluid deficit (essentially urine and sweat losses) by approximately 150% (Sharp, 2006).

During hot weather and heat-waves, people must drink even if they do not feel thirsty. This is particularly true for the elderly, who have a decreased perception of thirst.

Excessive drinking of pure water can lead to severe hyponatraemia, potentially leading to complications such as stroke and death. The addition of sodium chloride and other soluble substances in the beverage (20–50 mmol/l of beverage) decreases the urinary water loss and facilitates the recovery of the fluid balance (Sharp, 2006).

Each older person or patient needs to receive personalized drinking advice depending on his or her health status. Individuals can be differentiated as follows:

- healthy old adults;
- vulnerable people, whose risks are increased in cases of heat stress through haemoconcentration (increased viscosity, red cell and platelet counts) and possible coronary thrombosis, cerebrovascular ischaemia and renal insufficiency (Raphael et al., 1995);
- patients with a history of stroke, hypertension, diabetes, coronary events, renal insufficiency or dementia.

Guidance has to be adapted to, accessible by and understandable to various categories of people: the lay public and health care professionals.

Information for general practitioners (GPs)

Develop a proactive approach by:

- understanding the thermoregulatory and haemodynamic responses to excessive heat exposure;
- understanding the mechanisms, clinical manifestations, diagnosis and treatment of heat illnesses;
- recognizing early signs of heatstroke, which is a medical emergency;
- initiating proper cooling and resuscitative measures (for early signs and out-of-hospital treatment, see the separate information sheets on treatment of heatstroke and mild heat-related illnesses);
- being aware of the risk and protective factors in heat-wave-related illness;
- identifying the patients at risk and encouraging proper education regarding heat illnesses and their prevention (particularly for caregivers of the old and infirm and parents of infants);
- including a pre-summer medical assessment and advice relevant to heat into routine care for people with chronic diseases (reduction of heat exposure, fluid intake, medication);
- being aware of the potential side effects of the medicines prescribed and adjusting dosage if necessary, during hot weather and heat-waves;
- by making decisions on an individual basis, since there are, according to current knowledge, no standards or formal advice for changing medications during hot weather;
- being aware that high temperatures can reduce the efficacy of drugs, as most manufactured drugs are licensed for storage at temperatures up to 25 °C, and ensuring that emergency drugs are stored and transported at proper temperature; and
- being prepared to monitor drug therapy and fluid intake, especially in the old and infirm and those with advanced heart diseases.

Educate, counsel and inform patients about:

- he importance of adhering to the information spelt out in the information sheet for the public;
- individual adjustments of behaviour, medication and fluid intake according to clinical status; and
- contact details of social and medical services, helplines and emergency services.

Source: adapted from Bouchama (2007).

Information for retirement and care home managers

- See the information sheet for the general public for advice on how to keep facilities cool and ensure that patients and residents keep out of the heat, cool and hydrated.
- Monitor indoor temperatures. Provide at least one cool room (such as an air-conditioned room with a temperature below 25 °C). Move residents to this cool area for several hours each day.
- Ask GPs to review clinical management of residents at risk, for example, due to chronic disease.
- Monitor residents' fluid intake. Offer them non-alcoholic, unsweetened beverages.
- Monitor their body temperature, pulse rate, blood pressure and hydration.
- Monitor them closely for any early signs of heat illness, and initiate appropriate treatment when needed.
- Inform and train staff and increase staffing levels if necessary.

△ A new information sheet from Health Canada (2011c) gives recommendations for retirement and care facility managers.

Source: adapted from existing European heat–health action plans.

For medical professionals: mild and moderate heat illnesses and their management

Medical condition	Signs and symptoms/mechanisms	Management
Heat rash	Small red itchy papules appear on the face, neck, upper chest, under breast, groin and scrotum areas. This can affect any age but is prevalent in young children. Infection with Staphylococcus can occur. It is attributed to heavy sweating during hot and humid weather.	Rash subsides with no specific treatment. Minimize sweating by staying in an air-conditioned environment, taking frequent showers and wearing light clothes. Keep the affected area dry. Topical antihistamine and antiseptic preparations can be used to reduce discomfort and prevent secondary infection.
Heat oedema	Oedema of the lower limbs, usually ankles, appears at the start of the hot season. This is attributed to heat-induced peripheral vasodilatation and retention of water and salt.	Treatment is not required as oedema usually subsides following acclimatization. Diuretics are not advised.
Heat syncope	This involves brief loss of consciousness or orthostatic dizziness. It is common in patients with cardiovascular diseases or taking diuretics, before acclimatization takes place. It is attributed to dehydration, peripheral vasodilatation and decreased venous return resulting in reduced cardiac output.	The patient should rest in a cool place and be placed in a supine position with legs and hips elevated to increase venous return. Other serious causes of syncope need to be ruled out.
Heat cramps	Painful muscular spasms occur, most often in the legs, arms or abdomen, usually at the end of sustained exercise. This can be attributed to dehydration, loss of electrolytes through heavy sweating and muscle fatigue.	Immediate rest in a cool place is advised. Stretch muscles and massage gently. Oral rehydration may be needed, using a solution containing electrolytes. Medical attention should be sought if heat cramps are sustained for more than one hour.
Heat exhaustion	Symptoms include intense thirst, weakness, discomfort, anxiety, dizziness, fainting and headache. Core temperature may be normal, subnormal or slightly elevated (less than 40 °C). Pulse is thready with postural hypotension and rapid shallow breathing. There is no alteration of mental status. This can be attributed to water and/or salt depletion resulting from exposure to high environmental heat or strenuous physical exercise.	Move the patient to a cool shaded room or air-conditioned place. The patient should be undressed. Apply cold wet sheet or spray cold water and use fan if available. Lay the patient down and raise his or her legs and hips to increase venous return. Start oral hydration. If nausea prevents oral intake of fluids, consider intravenous hydration. If hyperthermia above 39 °C or impaired mental status or sustained hypotension occurs, treat as heatstroke and transfer the patient to hospital.

Source: adapted and updated from Bouchama & Knochel (2002), and Knochel & Reed (1994).

For medical professionals: management of life-threatening heatstroke

Condition	Intervention	Goal
Out of hospital		
Exposure to heat stress (heat-wave, summer season and/or strenuous exercise) Changes in mental status (anxiety, delirium, seizures, coma	Measure core temperature (rectal probe). If > 40 °C, move to a cooler place, remove clothing, initiate external cooling:[b] cold packs on the neck, axillae and groin, continuous fanning (or keep ambulance windows open) while skin is sprayed with water at 25–30 °C. Position an unconscious patient on his or her side and clear airway. Administer oxygen 4 l/min. Give isotonic crystalloid (normal saline). Rapidly transfer to an emergency department.	Diagnose heatstroke.[a] Lower core temperature to < 39.4 °C. Promote cooling by conduction; maintain currents of air. Promote cooling by evaporation. Minimize risk of aspiration. Increase arterial oxygen saturation to > 90%. Ensure volume expansion.
In hospital		
Hyperthermia	Confirm diagnosis with thermometer calibrated to measure high temperatures (40–47 °C). Monitor skin and rectal temperature; continue cooling.	Keep skin temperature > 30 °C. Stop cooling when rectal temperature is < 39.4 °C.[c]
Seizures	Consider benzodiazepines.	Control seizures.
Respiratory failure	Consider elective intubation (for impaired gag and cough reflexes or respiratory function deterioration).	Protect airway and augment oxygenation (arterial oxygen saturation to > 90%).
Hypotension[d]	Administer volume expanders, add vasopressors and consider central venous pressure monitoring.	Increase mean arterial pressure > 60 mmHg, restore organ perfusion and tissue oxygenation (consciousness, urinary output, lactate level).
Rhabdomyolysis	Expand volume with normal saline, intravenous furosemide and mannitol or intravenous sodium bicarbonate. Monitor serum potassium and calcium and treat even modest hyperkalaemia.	Prevent myoglobin-induced renal injury. Promote renal blood flow and diuresis. Ensure urine alkalinization.
Post-cooling	–	Prevent life-threatening cardiac arrhythmia.
Multiple organ system dysfunction	Use nonspecific supportive therapy.	Aid recovery of organ function.

[a] Diagnosis of heatstroke should be suspected in any patient with changes in mental status during heat stress even if the temperature is < 40 °C.
[b] There is no evidence that one cooling technique is superior to another. Non-invasive techniques that are easy to apply, well tolerated and less likely to cause cutaneous vasoconstriction are preferred. Antipyretics such as acetylsalicylic acid and acetaminophen should be avoided because of their potential to aggravate the coagulopathy and liver injury of heatstroke.
[c] There is no evidence to support specific endpoint temperature to halt cooling. Nevertheless, a rectal temperature of 39.4 °C has been used and proved to be safe.
[d] Hypotension usually responds to volume and cooling. Vasodilatory shock and primary myocardial dysfunction may underline sustained hypotension refractory to volume expansion. Therapy should be individualized and guided by clinical response.

Source: updated from Bouchama & Knochel (2002) and Bouchama, Dehbi & Carballo-Chaves (2007).

For the general public and care home managers: reducing indoor temperatures during hot weather (UPDATED)

SHORT-TERM MEASURES FOR EXISTING BUILDINGS

Measures	Comment
Practical measures that can be taken easily	
Using thermometers to measure indoor temperatures	Check the room temperature between 8:00 and 10:00, at 13:00 and at night after 22:00. The room temperature should not exceed 32 °C during the day and 24 °C during the night.
Using night ventilation for passive cooling	Open all windows during the night and the early morning to use the night air to cool down your home.
Closing any windows or registers during the hottest part of the day	Keep heat outside and cool air inside.
Shading windows	Hang shades, draperies, awnings, or louvers on windows that receive morning or afternoon sun.
Reducing internal heat loads	Turn off artificial lighting and as many electrical devices as possible, but not the refrigerator.
Conserving electricity	If your home has air conditioning, conserve electricity not needed to keep you cool, so power can remain available and reduce the chance of a community-wide outage.
Hanging wet towels to cool the room air	**Note.** Air humidity increases at the same time.
Technical measures	
Increasing external shading	External shading of windows reduces solar heat gains; internal shading of windows to avoid solar loads inside the room is always advisable.
Using electric fans	Electric fans may provide some relief, if temperatures are below 35 °C. However, at temperatures above 35 °C fans may not prevent heat related illness. Additionally, fans can cause excess dehydration. The advice is to place the fan at a certain distance from people, not aiming it directly on the body and to have regular drinks. This is especially important in the case of sick people confined to bed.
Using mobile evaporative coolers	The cooling effect of evaporative coolers increases with temperature and decreases with relative humidity of the air.
Using dehumidifiers	The effect of reducing humidity can be useful in areas with high humidity, but not very high temperature levels.
Using local air conditioning	Air conditioners provide relief. If you buy or install air conditioning, please use an air conditioner that is as energy efficient as possible. Proper cleaning and maintenance are important to avoid health effects. Be aware of the possibility of electricity blackouts in summer.

There may be no wind during heat-waves, which could interfere with free ventilation technologies such as window opening and cross-ventilation. There may be problems with open windows during night in cities and on busy streets.

Air conditioning is inherently inequitable, since it increases anthropogenic heat production and may increase heat-related exposure in vulnerable people without access to it. Power blackouts may prevent increased use of air conditioning during heat-waves; power stations may fail if there is no cooling water available. Air conditioning causes extra electric power load.

To reduce indoor temperature in a sustainable way, various medium- and long-term measures are available to increase the reflection of heat from the surface (albedo) of buildings (see information sheet on measures in the built environment).

For a broader range of possibilities, including urban planning and land-use change, see the document *Heat-waves: risks and responses* (Koppe et al., 2004).

For health authorities: information on protecting health from vegetation fires during heat-waves (NEW)

When biomass fuel burns, combustion is not complete and the pollutants released include particulate matter (PM), carbon monoxide, nitrogen oxides, sulfur dioxide and organic compounds. Once emitted, the pollutants may undergo physical and chemical changes.

HEALTH EFFECTS FROM VEGETATION FIRES

Type of effect	Details
Acute health effects	> Internal burns from the inhalation of hot gaseous products of combustion, causing serious respiratory complications > External burns > Worsened pulmonary function and respiratory distress > Acute exacerbation of asthmatic and respiratory disease > Acute respiratory illness in children > Acute cardiovascular events.
Chronic health effects	> Increased incidence of asthmatic and respiratory disease > Development of new cases of chronic respiratory diseases > Decreased life expectancy.
Other possible risks	> Traffic, marine and aircraft crashes due to reduced visibility from thick smoke > Deaths during emergency evacuations, with increased risk to emergency service staff, including fire-fighters > Interruption of the delivery of routine health services.

Vulnerable population groups include:

- people with existing medical conditions: asthma, other respiratory diseases and cardiovascular diseases;
- elderly people, children and pregnant women;
- smokers; and
- fire-fighters.

Public health services should ensure the provision of:

- early information on fire hazards;
- information for the general public about possible health effects and advice on protection, and on helplines, social services, ambulances, clean-air and cooling-down spaces, transport and emergency medical services;
- local hospital services for treatment of medical emergencies and acute illness;
- primary care services and outpatient services for management of cases in the community;
- facilities for oxygenation and respirators for particularly vulnerable people;
- local medical assistance and attention, including by doctors (primary health care);
- outpatient assistance in hospitals;
- public spaces to serve as clean-air and cooling-down shelters; and
- information to other sectors on health effects from vegetation fires and heat-waves and how to protect human health.

LONG-TERM MEASURES

The required portfolio of actions at different levels (from health system preparedness, coordinated with meteorological early warning systems, to timely public and medical advice and improvements to housing and urban planning) can be integrated in a heat–health action plan.

To avoid accidental propagation of fires and an increased risk of fires from heat and droughts, it is essential that proper land-use measures be available, forests be properly

maintained over time, fire reduction measures be constantly available and systematically implemented, and people be informed about the hazards. In areas known to be at risk, proper annual fire planning and community protection measures are also essential.

For targeted public health advice, effective and accurate air quality monitoring should be available, particularly measuring levels of fine PM (particles with diameters of ≤ 10 μm and ≤ 2.5 μm – PM_{10} and $PM_{2.5}$).

In areas where fires are likely to occur, state and local public health agencies should consider making preparations to inform the population and to take action.

Sources of further information on fires

WHO: Violence and Injury prevention: burns (http://www.who.int/violence_injury_prevention/other_injury/burns/en/index.html)

California Office of Environmental Health Hazard Assessment (2008). *Wildfire smoke. A guide for public health officials.* Sacramento, California Office of Environmental Health Hazard Assessment (http://oehha.ca.gov/air/risk_assess/wildfirev8.pdf, accessed 11 July 2011).

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WHO (2008). *Air quality and health.* Geneva, World Health Organization (Fact sheet 313; http://www.who.int/mediacentre/factsheets/fs313/en/index.html, accessed 11 July 2011).

WHO (2011a). *Respiratory tract diseases.* Geneva, World Health Organization (http://www.who.int/topics/respiratory_tract_diseases/en, accessed 11 July 2011).

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WHO Regional Office for Europe (2007). *Health relevance of particulate matter from various sources.* Copenhagen, WHO Regional Office for Europe (http://www.euro.who.int/__data/assets/pdf_file/0007/78658/E90672.pdf, accessed 11 July 2011).

WHO Regional Office for Europe (2010). *Wildfires and heat-wave in the Russian Federation. Public health advice.* Copenhagen, WHO Regional Office for E (http://www.euro.who.int/__data/assets/pdf_file/0012/120090/190810_EN_Russia_wildfire_advisory.pdf, accessed 11 July 2011).

For the public: information on protecting your health from vegetation fires during heat-waves (NEW)

Measures

- Throughout the period of such fires, monitor and follow the recommendations of the local health authorities.
- Remain indoors. During episodes with high air pollution, all people – particularly those at risk (e.g. children and elderly people) – should stay indoors.
- Keep windows closed during episodes of high air pollution. Nevertheless, try also to consider the suggestions on keeping your home cool during periods of high temperatures (see also the information sheet on reducing indoor temperatures).
- Air conditioners can protect people from both heat and outdoor air pollution. The following are important points to consider.
  - o If you air conditioner has both "outdoor air" and "recirculate" settings, set it on "recirculate" during fire/smoke events.
  - o If possible, replace the filter with a pleated medium- or high-efficiency particle filter.
  - o If your air conditioner has a "fresh air ventilation system", turn it off during smoke events.

  Mechanical ventilation systems used in public and commercial buildings differ, and require special attention.
- Reduce other sources of indoor air pollution, such as smoking cigarettes, using propane gas or wood-burning stoves, spraying aerosol products, and frying or grilling food.
- Particulate respirators are indicated for particularly susceptible individuals with pre-existing respiratory and cardiovascular problems.
- Wearing a special mask when you go outside can protect you against air pollution from fires (particularly against particulate matter – PM). When you buy a mask, ensure that it can filter very small particles (PM2.5), fits well and provides a tight seal around the mouth and nose.
- People with chronic diseases, such as respiratory or cardiovascular diseases, are more vulnerable to the effects of air pollution from fires, and need extra protection from exposure and access to health care.
- Vulnerable people should go to cool centres with effective ventilation, if these are available.

Emergency number:

to be inserted according to nation/regional context.

Contact phone number/help line:

to be inserted according to nation/regional context.

Web site for further information:

to be inserted according to nation/regional context.

For health authorities, care home managers and employers: standards for occupational safety during heat-waves (NEW)

ISO (International Organization for Standardization) TC (Technical Committee) 159/SC (Subcommittee) 5 produces standards related to human response to the physical environment, including extreme weather events. The standards are concerned with the effects of heat and cold on people's health and comfort. Those for heat have been developed with occupational exposure in mind, but in principle are not restricted to it. The ISO web site offers access to standards (http://www.iso.org/iso/iso_catalogue.htm) and documents for purchase.

ISO standard	Purpose
ISO 7243:1989 Hot environments – Estimation of the heat stress on working man, based on the WBGT-index (wet bulb globe temperature)	A simple method of assessment uses a direct thermal index and limit values. If predicted or measured WBGT values are greater than a limit value for health, there may be casualties when people are exposed to heat.
ISO 7933:2004 Ergonomics of the thermal environment – Analytical determination and interpretation of heat stress using calculation of the predicted heat strain	The standard makes analytical assessment of thermal strain (considering air temperature, radiant temperature, humidity, wind, clothing and activity). Predictions are determined from body heat exchange and storage calculations, leading to an increase in internal body temperature, sweat rate and level of dehydration, and are interpreted in terms of likely effects on a person's health.
ISO 9886:2004 Ergonomics – Evaluation of thermal strain by physiological measurements	This standard describes methods for making physiological measurements of heat strain. It can be used directly to monitor people who are exposed to hot environments, to ensure that safe limits are kept.
Standards related to extreme weather and health	
ISO 8996:2004 Ergonomics of the thermal environment – Determination of metabolic rate	EThis generic standard allows estimation of the metabolic rate.
ISO 9920:2007 Ergonomics of the thermal environment – Estimation of thermal insulation and water vapour resistance of a clothing ensemble	The standard can be used to assess clothing insulation.
ISO 12894:2001 Ergonomics of the thermal environment – Medical supervision of individuals exposed to extreme hot or cold environments	The standard can be used to screen people for exposure to heat and cold.
ISO 15265:2004 Ergonomics of the thermal environment – Risk assessment strategy for the prevention of stress or discomfort in thermal working conditions	The standard can be used for risk assessment.

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ISO standard	Purpose
Standards related to extreme weather and health	
ISO/TS (technical specification) 14515:2005 and ISO/DIS (draft international standard) 28003:2011 Ergonomics of the physical environment – Application of international standards to people with special requirements	The standard can be used to screen vulnerable people for exposure to heat and cold.

Institutions involved in producing ISO standards related to heat, cold and health include the British Standards Institution as the secretariat and 27 others across the world. Working groups of international experts produce the standards, which are confirmed by democratic voting according to ISO rules (the ISO set up in 1947 and has over 130 member countries. It follows the principles of a single representative organization from each country and a democratic system of voting). In Europe, standards for heat and cold are produced by parallel voting under the Vienna agreement, and all standards in this area are also accepted by the European Committee for Standardization (CEN) and the countries of the European Union. The degree to which they are used and embedded in regulations depends on the requirements of each country.

For health authorities and city planners: interventions in the built environment for the protection of health from effects of heat (NEW)

Time frame	Measures	Health co-benefits	Health risks	Other risks or benefits
Short term (see also information on reducing indoor temperatures)	Advice on behaviour	> Increased thermal comfort	> Risks depend on local situation, levels of outdoor air quality, crime, etc.	> Cheap > Can be implemented by individuals
	Going to a cool public space	> Increased thermal comfort	> Risks depend on the technology used to cool large spaces	> Difficult for people with physical impairment or confined to bed > Not available in some places
	Mobile evaporative coolers	> Cooling effect increases with temperature and decreases with relative humidity of the air	–	–
	Electric fans	> May provide relief, but may not prevent heat-related illness when the temperature is above 35 °C	> Do not allow the fan to blow air directly on the body, especially in the case of sick people confined to bed > It is important to drink enough fluids, to avoid more rapid dehydration	–
	Energy-efficient heat ventilation air conditioning and cooling (HAVC) systems	> Increased thermal comfort > Reduced noise exposure > In settings with significant outdoor air pollution, reduced respiratory symptoms and asthma – if proper system purchased (see advice on fires) > Reduced risk of cardiovascular disease due to heat exposure > Reduced risk of vector-borne disease due to closed windows	> Greater risk of airborne infectious diseases (e.g. tuberculosis – TB) and upper and lower respiratory symptoms in air-conditioned rooms/spaces lacking sufficient fresh air exchanges > More noise and pollution exposure for those not using air conditioning > Bacterial proliferation/ legionellosis in very large HVAC tanks/cooling towers > Climate-related health effects from added greenhouse gas emissions of air conditioners	> Inherently inequitable > Increased urban dependence on air conditioning stimulates vicious cycle of exacerbated urban heat-island effect

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Time frame	Measures	Health co-benefits	Health risks	Other risks or benefits
Medium term	Reduced cooling loads on buildings through design features and improved natural ventilation (orientation of building, clustering buildings, using high-reflectivity building materials, increasing insulation, providing fixed or adjustable shading, using selective glazing on windows with a low solar heat gain and a high daylight transmission factor, utilizing thermal mass to minimize daytime interior temperature peaks)	> Increased thermal comfort > Reduced asthma/ respiratory illness from particulate matter, radon, mould, etc. > Reduced risk of transmission of TB and other airborne infections > Less airborne disease transmission via air-conditioning systems	> May not work when night temperatures remain high; need to be adapted to regional humidity > Design must take account of winter as well as summer risks > Natural ventilation without screens on windows and doors may increase vulnerability to vector-borne diseases > May increase exposure to high concentrations of outdoor air pollution, causing respiratory symptoms, unless filters are used > Avoid use of lead in paint (e.g. white paint for albedo effect)	> Can be designed without increasing energy consumption > Important when design measures are adopted in low-income settings > Can be implemented throughout a building > Synergetic effects throughout the year > Advanced planning needed > Selection of measures at the building scale needs to consider local circumstances > Moderately expensive > Important to address benefits for both hot and cold weather
	Improved thermal performance of building envelope (improved insulation materials and windows and reduced air leakage)	> Increased thermal comfort > Reduced noise exposure > Reduced cardiovascular diseases, bronchial obstruction, asthma and other respiratory conditions > Reduced vector-borne disease due to infestations and pests > Better mental health through thermal comfort	> Risks of inadequate ventilation: (a) reduced indoor air quality leading to potentially increased concentrations of indoor air pollutants (e.g. radon, mould and moisture) as a cause of asthma, bronchial obstruction and other illnesses (b) increased airborne infections transmissions (e.g. TB); risk of exposure to health damaging insulation materials and fibres that cause cancer and other illnesses	> Depends on access of poor to technology

Time frame	Measures	Health co-benefits	Health risks	Other risks or benefits
Medium term	Low-carbon heating and cooling (passive solar heating, district heating and cooling systems, combined systems, (passive) solar systems that provide both space and water heating)	> Increased thermal comfort > Hygiene > Reduced asthma and respiratory symptoms related to cold exposure, damp and mould > Reduced pneumonia and chronic obstructive pulmonary disease (COPD) in case of reduced biomass use > Better mental health due to better thermal comfort	–	> Field studies have found that more cost- and energy-efficient heating does not always reduce net household energy use (and thus energy-related greenhouse gases and air pollutants) by an equivalent amount. This is because some households may allocate a portion of their cost savings to increase their energy consumption (electricity or heat): the rebound effect > Not necessarily equitable, as it depends on access by the poor to technology
Long term	A combination of revised building regulations; urban planning (such as tree and vegetation planting, green spaces and ponds or moving water, fountains and shading) and land-use changes	> Reduced energy consumption and greenhouse gas emissions > Can be combined with active transport and reductions in air pollution	–	> Most effective in the long term > Costly > Long lead times > Require political will > Inherently equitable, with major potential health benefits

Sources: WHO (2011) and WHO Regional Office for Europe (2009).

For health authorities: communicating "heat" (UPDATED)

Trust

The overriding goal is to communicate with the public in ways that build, maintain or restore trust. Using a credible source of information – a public health doctor rather than a politician – may be helpful.

First announcement

The first official announcement sets the parameters of trust and has most opportunity to allow people to take preventive action in time. This message's timing, candour and comprehensiveness may make it the most important of all communications. Following critical timelines for health risks in heat-waves allows for effective behaviour change and prevention measures.

Transparency

Maintaining the public's trust throughout an event requires transparency: communication that is candid, easily understood, factually accurate and emphasizes key messages. Transparency characterizes the relationship between the event managers and the public. It allows the public to see the information-gathering, risk-assessing and decision-making processes associated with responding to an extreme event.

Understanding the public

Understanding the public is critical to effective communication. Changing existing beliefs is usually difficult unless one explicitly addresses them, and one must know what people think in order to design successful messages that bridge the gap between the expert and the public.

Risk communicators teach that crisis communication is a dialogue. The communicator's job is to understand the public's beliefs, opinions and knowledge about specific risks. He or she must appreciate the public's concerns even if they seem unfounded. Identifying and analysing audiences and their needs enable the communicator to consider the needs of particular communities, such as elderly people or communities in rural areas.

Communicating what an individual can do

Risk communication messages should include information about what the public can do to be safer. Communicators should give pre-tested, consistent and scientifically sound heat–health messages, avoiding contradictory messages when possible. For example, heat–health communication materials can give advice on measures to protect health both from air pollution due to vegetation fires and from hot temperatures.

The content of specific behavioural and medical advice might vary between public health response plans and cultures.

Agreeing on key messages with the media in advance

At the beginning of the season, the communicator should agree with the mass media on the key messages about what the public or health professionals should do to avoid health effects during heat-waves. Once a heat warning is issued, these messages could be repeated through all channels.

Active care for those most at risk

Researchers have stressed that passive dissemination of advice (through leaflets, for example) may not be sufficient to reach the people most at risk. They suggest following the example of some public health response plans that include active identification and care of such people. This includes choosing effective communication channels and vehicles and developing risk communication products and materials tailored to particular audiences.
Merging preparedness plans for various kinds of extreme events into the national emergency plan may help to ensure service delivery.

Sources: adapted from WHO Regional Office for Europe (2005) and Health Canada (2011a).

10 steps towards a heat–health action plan (NEW)

These steps may be useful for Ministries of Health or respective health authorities in countries or regions planning to develop heat–health action plans, building on *Heat–health action plans – guidance* (Matthies et al., 2008). The suggested steps might need to be adapted to the structures and context.

1. Set up a national or subnational steering group and technical working group/writing team. The steering group should consist of senior and multisector stakeholders who provide a governance structure for developing and implementing the plan and can make strategic decisions. An existing group may be able to do this: for example, a steering group for the development of national plans for response to multiple hazards. In addition, the group should ensure policy clearance, implementation, monitoring and sustainable funding of the plan. The suggested tasks of this group are:

- to identify the governance structure and funding mechanisms;
- to ensure sufficient capacity exists to develop and implement the plan;
- to seek initial ministerial/government approval and support for developing the plan;
- to develop terms of reference for the writing team; and
- to identify key members of the writing team(s) to establish the team through a formal process.

The working group drafts the plan, and takes part in the consultation process and the pilot-testing and evaluation of the plan. Including people with expertise in a variety of technical areas – such as emergency management, meteorology, ageing, internal medicine, epidemiology and social care – on the team is beneficial.

2. Evaluate the health vulnerability to heat. This includes:

1. setting objectives, timelines and expected outcomes;

2. characterizing exposure to heat, including:
   a. national, subnational or community vulnerability;
   b. other health determinants such as water and air pollution;

3. inventorying existing actions available in the health and other sectors;

4. assessing future risks:
   a. describing the potential additional health risks from future climate change or more frequent and intense heat-waves;
   b. describing trends expected to influence heat-related health outcomes;
   c. describing projected increases in temperature and extreme heat-waves;
   d. prioritizing effects;

5. identifying suitable prevention and response mechanisms:
   a. inventorying and prioritizing possible adaptation options;
   b. assessing potential barriers to implementation;

6. developing evaluation criteria and performance-management protocols, including protocols for:
   a. evaluating adaptation options, including economic costs;
   b. monitoring health outcomes over time.

3. Draft the heat–health action plan based on the analysis carried out. The writing group meets regularly to develop the plan. (It is suggested that the draft plan follow the core elements of the WHO guidance (Matthies et al., 2008).) The team should:

- aim to write a plan 30–50 pages long;
- draft objectives and process for developing the plan;
- develop an initial outline of the plan; and
- distribute writing tasks across the group and perhaps outside experts.

A heat–health action plan could include the following headings:

- executive summary;
- introduction/purpose/context;
- what the plan could mean to health outcomes (mortality and morbidity);

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- patterns of and trends in heat and heat-waves;
- understanding the risks: how heat affects health (physiology, vulnerable groups, threshold temperatures for increased mortality);
- effective interventions and approaches: health and social care interventions including measures in the housing sector and the built environment for long-term planning;
- action before and during a heat-wave: trigger points for alert levels, roles and responsibilities of different sectors and lines of communication;
- ensuring the delivery of the plan: training, governance, research gaps, funding, monitoring, and reporting;
- evaluation: responsibilities and process; and
- communication material: guidance for health and social care, and local authorities (annex).

4. Consult on the first draft. Circulate the first draft to experts for comments on the robustness of the evidence base. If it is a government document, circulate the draft to policy heads to ensure policy coherence and agreement on actions.

5. Consult on the nearly final draft. Consider holding a larger workshop on the nearly final draft to improve its messages and the implementation (feasibility and delivery process) of the plan.

6. Secure ministerial approval for pilot-testing the plan. The steering group ensures ministerial/government approval for a pilot-test of the heat-wave plan.

7. Pilot-test the plan at either the regional or national level. Choose a region that would particularly benefit from a heat-wave plan and has leadership that will supportive a pilot-test.

8. Evaluate the findings from the pilot-test and use the results to improve the plan. This includes:

- process evaluation of feasibility and running of the plan, conducted with the steering group and a seminar of other stakeholders;
- outcome evaluation, including epidemiological studies on heat-related mortality, morbidity and health service utilization; and
- economic evaluation to estimate the costs of delivering the plan, compared to the costs of excess hospital admissions.

9. Define the implementation process at the national level. The steering group secures funding and defines the process for overall implementation.

10. Gain final ministerial approval and implement the plan. The steering group is responsible for gaining final ministerial approval, oversees the implementation process and ensures monitoring and evaluation for continuous update and improvement of the plan in future.

For further information, see the web site of the WHO Regional Office for Europe (http://www.euro.who.int/en/what-we-do/health-topics/environmental-health/Climate-change). For examples of heat–health action plans, see page 30, including web links.

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Web links to selected heat–health action plans

Australia (Victoria)

Victorian Government Department of Health (2009). *Heatwave plan for Victoria 2009–2010. Protecting health and reducing harm from heatwaves*. Melbourne, Victorian Government Department of Health (http://www.health.vic.gov.au/environment/downloads/heatwave_plan_vic.pdf, accessed 23 June 2011).

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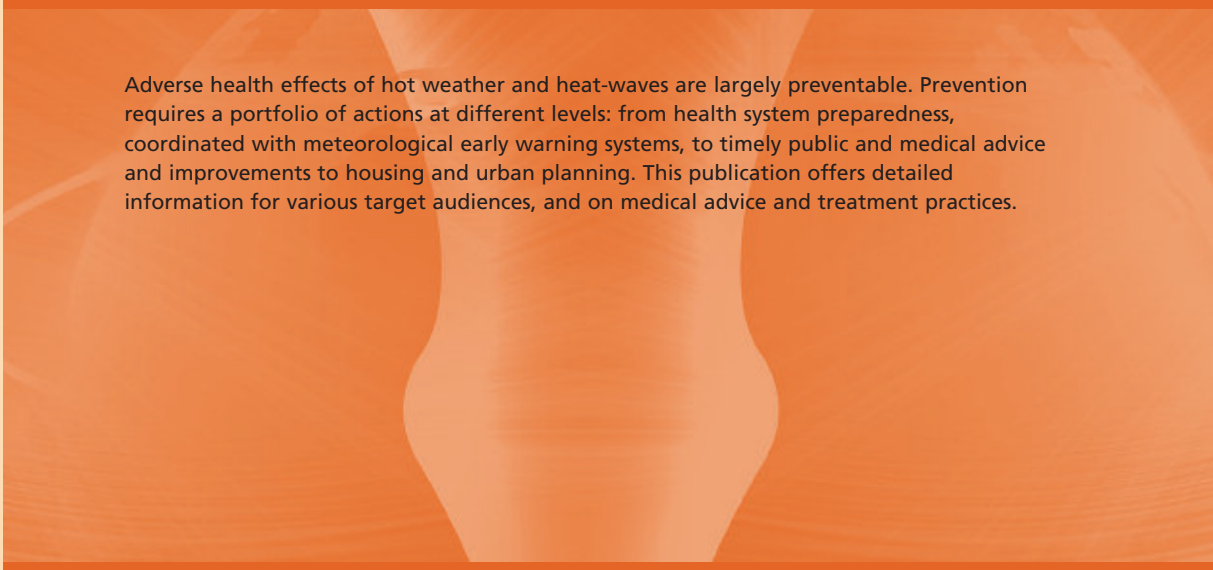
PUBLIC HEALTH ADVICE on preventing health effects of heat



Adverse health effects of hot weather and heat-waves are largely preventable. Prevention requires a portfolio of actions at different levels: from health system preparedness, coordinated with meteorological early warning systems, to timely public and medical advice and improvements to housing and urban planning. This publication offers detailed information for various target audiences, and on medical advice and treatment practices.

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