

# heatwave<sup>☀</sup>

PLAN FOR ENGLAND 2012



PROTECTING HEALTH AND  
REDUCING HARM FROM SEVERE  
HEAT AND HEATWAVES



MAKING THE CASE: THE  
IMPACT OF HEAT ON HEALTH –  
*NOW AND IN THE FUTURE*

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<b>Description</b>	The Heatwave Plan for England 2012 is to be re-issued in May 2012 to raise both public and professional awareness of the effects of severe heat on health. The purpose of the Plan is to enhance resilience in the event of a heatwave. It is an important component of overall emergency planning and wider health promotion activity.
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<b>For Recipient's Use</b>	

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## Section 1

### Excessive Heat and Health

There is a large and strong evidence base about the risks to health from excess heat.

Many of the deaths due to excessive heat exposure are preventable if a few very simple precautions are taken.

The purpose of the Heatwave Plan is to avoid the adverse health effects of excessive heat by raising public awareness and triggering actions by those in contact with people who are most at risk. This, in turn, could help to reduce pressures throughout the health and social care system.

#### 1.1 The effects of heat on health

The body normally cools itself using four mechanisms:

- radiation in the form of infra-red rays;
- convection via water or air crossing the skin;
- conduction by a cooler object being in contact with the skin; and
- evaporation of sweat.

Increasing temperatures in excess of approximately 25°C are associated with excess summer deaths, with higher temperatures being associated with greater numbers of excess deaths (see figure 5); at 27°C or over, those with impaired sweating mechanisms find it especially difficult to keep their bodies cool.

When the ambient temperature is higher than skin temperature, the only effective heat-loss mechanism is sweating. Therefore, any factor that reduces the effectiveness of sweating such as dehydration, lack of breeze, tight-fitting clothes or certain medications can cause the body to overheat.

Thermoregulation, which is controlled by the hypothalamus, can be impaired in the elderly and the chronically ill, and potentially in those taking certain medications, rendering the body more vulnerable to overheating. Young children produce more metabolic heat, have a decreased ability to sweat and have core temperatures that rise faster during dehydration.

Box 1 describes the effects of overheating on the body, which in the form of heatstroke can be fatal.

**However, the main causes of illness and death during a heatwave are respiratory and cardiovascular diseases.**

A linear relationship between temperature and weekly mortality was observed in England in summer 2006, with an estimated 75 extra deaths per week for each degree of increase in temperature. Part of this rise in mortality may be attributable to air pollution, which makes respiratory symptoms worse. The other main contributor is the effect of heat on the cardiovascular system.

In order to keep cool, large quantities of extra blood are circulated to the skin. This causes strain on the heart, which for elderly people and those with chronic health problems can be enough to precipitate a cardiac event, for example heart failure. Additionally, death rates increase in particular for those with renal disease. An increase in suicide rates during previous heatwaves in England and Wales has also been observed.

Sweating and dehydration affect electrolyte balance. For people on medications that control electrolyte balance or cardiac function, this can also be a risk. Medicines that affect thermoregulation, the ability to sweat, or electrolyte imbalance can make a person more vulnerable to the effects of heat. Such medicines include anticholinergics, vasoconstrictors, antihistamines, drugs that reduce renal function, diuretics, psychoactive drugs and antihypertensives.

Air pollution such as ozone and particulate matter (eg PM<sub>10</sub>, PM<sub>2.5</sub>) also increases the level of cardiovascular-related deaths, as fine particles have been shown to enter the blood stream via the lungs and affect the heart.<sup>1</sup>

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<sup>1</sup> See: Committee on the Medical Effects of Air Pollution (COMEAP). <http://comeap.org.uk/>

## Box 1: Heat-related illnesses

The *main causes of illness and death* during a heatwave are **Respiratory and Cardiovascular diseases**. Additionally, there are specific heat-related illnesses including:

- **heat cramps** – caused by dehydration and loss of electrolytes, often following exercise;
- **heat rash** – small, red, itchy papules;
- **heat oedema** – mainly in the ankles, due to vasodilation and retention of fluid;
- **heat syncope** – dizziness and fainting, due to dehydration, vasodilation, cardiovascular disease and certain medications;
- **heat exhaustion** (more common) – occurs as a result of water or sodium depletion, with non-specific features of malaise, vomiting and circulatory collapse, and is present when the core temperature is between 37°C and 40°C. Left untreated, heat exhaustion may evolve into heatstroke; and
- **heatstroke** – can become a point of no return whereby the body's thermoregulation mechanism fails. This leads to a medical emergency, with symptoms of confusion; disorientation; convulsions; unconsciousness; hot dry skin; and core body temperature exceeding 40°C for between 45 minutes and eight hours. It can result in cell death, organ failure, brain damage or death. Heatstroke can be either classical or exertional (eg in athletes).

**Whatever the underlying cause of heat-related symptoms, the treatment is always the same – move the person to somewhere cooler and cool them down.**

## 1.2 High-risk factors and vulnerable groups of people

There are certain factors that increase an individual's risk during a heatwave. These include:

- **older age**: especially women over 75 years old, or those living on their own who are socially isolated, or in a care home;
- **older women** appear to be more vulnerable to the effects of heat than older men, possibly due to having fewer sweat glands and being more likely to live on their own;
- **chronic and severe illness**: including heart conditions, diabetes, respiratory or renal insufficiency, Parkinson's disease or severe mental illness. Medications

that potentially affect renal function, the body's ability to sweat, thermoregulation or electrolyte balance can make this group more vulnerable to the effects of heat;

- **infants:** are vulnerable to heat due to immature thermoregulation, smaller body mass and blood volume, high dependency level, dehydration risk in case of diarrhoea;
- **homeless people** (those who sleep in shelters as well as outdoors) may be at increased risk from heatwaves. Higher rates of chronic disease (often poorly controlled), smoking, respiratory conditions, substance dependencies and mental illness are more frequent in homeless populations than in the general population. These risk factors increase the risks of heat related morbidity and mortality, on top of social isolation, lack of air conditioning, cognitive impairment, living alone and being exposed to urban heat islands;
- **people with alcohol dependence and drug dependence** often have poorer overall health and increased social isolation which can increase their risk of heat stress;
- **inability to adapt behaviour** to keep cool such as having Alzheimer's, a disability, being bed bound, drug and alcohol dependencies, babies and the very young; and
- **environmental factors and overexposure:** living in urban areas and southfacing top-floor flats, being homeless, activities or jobs that are in hot places or outdoors and include high levels of physical exertion.

In a moderate heatwave, it is mainly the high-risk groups mentioned above who are affected. However, during an extreme heatwave such as the one affecting France in 2003, fit and healthy people can also be affected.

A recent review of the evidence as it affects vulnerable groups of people is being published as part of the Equality Analysis at the same time as this plan (<http://www.dh.gov.uk/health/category/policy-areas/public-health/>). Other groups of people who might be at heightened risk to those noted above might be older carers; and tourists and people attending large scale public events.

People from minority ethnic groups do not seem to have a higher risk of suffering adversely from heatwaves per se. However there is evidence to show that when there is a heatwave the urban 'heat island' effect increases mortality rates. As significant proportions of minority ethnic groups live in urban environments, they would be at increased risk from heatwave with others living in towns and cities. Those people from the Muslim community fasting over Ramadan might also be at heightened risk as this year Ramadan takes place between 20 July to 18th August 2012. (See Box 1 in the Heatwave Plan).

The general guidance contained in the Heatwave Plan is applicable to these groups. Authorities with large number of tourists for example should be aware of potential risks and take appropriate preventive actions.

### 1.3 High temperatures, air quality and health

High temperatures are also linked to poor air quality with high levels of ozone which are formed more rapidly in strong sunlight; fine particles (PM<sub>10</sub>, PM<sub>2.5</sub>) also increase in concentration during hot, still air conditions. Both are associated with respiratory and cardiovascular mortality.

Given the recent predictions of the impact of climate change in the UK (UKCP09), recommendations made in the Heatwave Plan aim to be energy neutral, except in very high-risk situations where lives may be saved.

#### Box 2 Information on air quality

Regular updates on levels of particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>), sulphur dioxide, nitrogen dioxide and ozone are available on <http://uk-air.defra.gov.uk/> which offers health advice to those who may be particularly sensitive to air pollution.

Alert systems are available to remind those at risk to take their medication (inhalers etc), otherwise advice to those with respiratory problems is consistent with the advice to all others during a heatwave – to keep windows shaded and closed when outside temperatures are hotter during the daytime to reduce heat (and ozone) entering the home; and opening windows at night or when it is cooler outside, to aid cooling of their home.

Ozone is the main air pollutant that affects respiratory symptoms during heatwaves and has a diurnal variation, peaking during the hottest period of the day and dropping to very low levels at night. Other air pollutants tend to be at lower levels indoors, and therefore the other main advice to those with respiratory problems is to reduce activity, particularly outdoors, and especially during the hottest period of the day. If you would like more information about air pollution in the UK or health advice to those who may be particularly sensitive to air pollution:

- automated freephone recorded information service run by Defra on **0800 55 66 77**
- Defra website (<http://uk-air.defra.gov.uk/>) or
- follow UK-AIR on Twitter: @DefraUKAIR.

These provide regular updates on levels of particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>), sulphur dioxide, nitrogen dioxide and ozone across the UK.

**Thunderstorm asthma** is a term used to describe any observed increase in acute bronchospasm cases following the occurrence of thunderstorms in the local vicinity, placing increased pressures on health services. Although thunderstorm asthma doesn't occur after every thunderstorm, it is important that professionals and the general public are aware of the potential risks over the summer period.

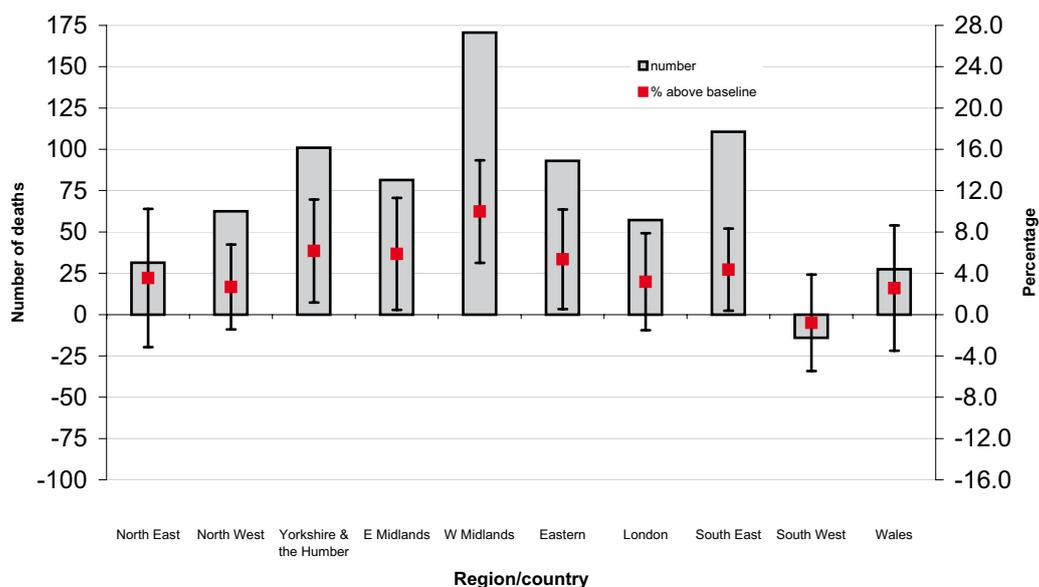
#### 1.4 Heatwaves and geography

People gradually adapt to changing temperature patterns, and therefore heatwaves are a relative experience. We adapt to temperature during each summer and gradually over long periods of time; however, there is always a level to which we become accustomed. Therefore, thresholds vary for each region and risks to health appear to be greater earlier in the summer. In northern parts of England the temperature threshold is lower than for London and the South East. This explains the variation in the Met Office National Severe Weather Warning Service regional heatwave temperature thresholds listed in Annex 1 of the Heatwave Plan <http://www.dh.gov.uk/health/category/policy-areas/public-health/>.

Excess summer deaths show regional variations, which relate largely to differences in temperature levels across the country (see Figure 1). The excess deaths and illness related to heatwaves occur in part due to our inability to adapt and cool ourselves sufficiently. Therefore, relatively more deaths occur in the first days of a heatwave, as happened in 2006 during the first hot period in June (which did not officially reach heatwave status). This emphasises the importance of being well prepared for the first hot period of the season and at the very beginning of a heatwave.

**Figure 1. Regional variations in excess mortality.**

Number and percent of excess deaths between 16 and 28 July 2006 by Government Office Region of England, and Wales, (Health Statistics Quarterly, 32)



## Section 2

### The Future – why long-term planning is essential

*The climate is changing and current analysis in the first national Climate Change Risk Assessment (UK CCRA 2012)<sup>2</sup> suggests that summers are going to get hotter in the future, ‘despite the uncertainties related to future climate change and its impacts, the evidence is now sufficient to identify a range of possible outcomes that can inform adaptation policies and planning... For example, there is high confidence that heat-related deaths will increase to between 130–1700/ year by the 2020s’.*

The Intergovernmental Panel on Climate Change (IPCC) also predicts that as a result of climate change, it is *very likely* that heatwaves will increase in frequency, duration and intensity (IPCC 2012).<sup>3</sup>

The UK CCRA 2012 considers that ‘rising temperatures, mainly during the summer, may result in an increase in deaths and hospital admissions due to cardio-vascular and respiratory illnesses. This may particularly affect vulnerable groups such as the elderly. South-east England may be the region most affected’.

The Assessment goes on to note: ‘Healthcare provision may also be affected by heatwaves if temperatures in hospital wards, care homes and medicine stores are not effectively controlled, affecting both patient recovery and the performance of staff. In addition, warmer temperatures may contribute to some increased risk from water-borne and food-borne diseases as well as diseases carried by insects and parasites’.

*Climate change will result in ‘changes in temperature, rainfall patterns and sea levels and will have a range of impacts on human health in the UK, mainly due to higher average temperatures and an increase in the frequency and severity of extreme weather events (eg floods and heatwaves). In some cases, the effects of climate change may exacerbate, or be exacerbated by, other pressures on the sector’. (UK CCRA 2012 – Health Sector Report)*

As a result we might also expect increased risks associated with summer and heatwaves of increased exposure to sunlight; ozone; and flooding.

2 Department for Environment Food and Rural Affairs (2012), UK Climate Change Risk Assessment 2012. <http://www.defra.gov.uk/environment/climate/government/risk-assessment/>

3 Reference: Intergovernmental Panel on Climate Change (IPCC) (2012): *Summary for Policymakers*. In: *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation* [Field, C.B., V. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, K.J. Mach, G.-K. Plattner, S.K. Allen, M. Tignor, and P.M. Midgley (eds.)]. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, UK, and New York, NY, USA, pp. 3-21. [http://ipcc-wg2.gov/SREX/images/uploads/SREX-SPM\\_FINAL.pdf](http://ipcc-wg2.gov/SREX/images/uploads/SREX-SPM_FINAL.pdf) (Accessed 30 March 2012)

Although, climate change awareness is gradually increasing within the health sector, the Assessment notes that 'sectors such as the built environment, agriculture and floods and coastal erosion have a direct bearing on people's health, so their adaptation to climate change will have a significant influence on health and wellbeing across the UK'.

**In other words, unless we take steps now to plan for the longer term changes we will not be prepared. Moreover, these need to be taken on a multi-agency basis in conjunction with partners to meet the expected challenges posed by climate change in the medium and longer term.**

## Section 3

### Preparing to meet the Challenge

England, however, is in a good position to meet these challenges. Indeed, the Heatwave Plan draws on experience since 2004 in preparing the general public; the NHS and partners in social care, local authorities and in the community and voluntary sector to recognise; prepare for; and deal with the health impacts of heatwave.

As with most factors affecting health, to address the multi-factorial nature of the root causes requires concerted and co-ordinated efforts across agencies. The development of **local health and wellbeing boards**, could support and facilitate such co-ordinated long-term planning between agencies to protect people and infrastructure from the effects of severe hot weather and thus reduce excess summer illness and death.

The following section gives some examples of medium term and longer term actions which can be taken to mitigate or ameliorate some of the effects of future heatwaves and hot weather.

Given the recent predictions of the impact of climate change, recommendations made in the Heatwave Plan aim to be energy neutral, except in very high-risk situations where lives may be saved.

#### 3.1 Actions which can be taken now to prepare for the future

##### 3.1.1 Example 1: Urban Heat Islands

Cities and urban areas tend to be hotter than rural areas, creating urban heat island effects (see Box 3). This is due to several factors, including: increased absorption and reflection of the sun on hard surfaces compared with green or brown spaces; reduced airflow and cooling from breezes in built-up areas due to buildings; and increased heat production from energy use in houses, industry, businesses and vehicles. These factors have important implications for long-term planning in order to reduce the impact of heatwaves by targeting high-risk geographical and urban areas.

### Box 3: Urban Heat Islands

During a heatwave it is likely to be hotter in cities than in surrounding rural areas, especially at night. Temperatures typically rise from the outer edges of the city and peak in the centre. This phenomenon is referred to as the 'Urban Heat Island' (UHI) effect and its impact can be significant. In London during the August 2003 heatwave, the maximum temperature difference between urban and rural locations reached 9°C on occasions. A range of factors vary between rural and urban areas and contribute to the UHI – for example:

- **thermal properties** of building and road materials, the height and spacing of buildings and air pollution levels. These factors result in more of the sun's energy being captured, absorbed and stored in urban surfaces compared to rural surfaces during the day and a slower loss of this energy at night, thus resulting in comparatively higher air temperatures;
- **less evaporation and shading**, with the consequent reduction in associated cooling, taking place in the typically drier urban areas as there is less vegetation; and
- **greater inputs of heat** as a result of the high density of energy use in cities. All this energy, for example from buildings and transport, ultimately ends up as heat.

Strategic planning is therefore required which takes account of the above factors, particularly in the context of climate change.

There are a number of actions which can be taken to locally to help mitigate the effects of hotter weather. For example, in relation to 'urban heat islands' at a local scale, actions which can be taken include the modification of surface properties and integration of green infrastructure, for example 'cool roofs', 'green roofs' and 'cool pavements'.

#### 3.1.2 Example 2: Creating cool environments with green spaces

Trees change summer urban micro-climates for the better by creating shade and allowing cooler air to accumulate and circulate at ground level. Planting trees and vegetation and the creation of green spaces to enhance evaporation and shading are other options, as temperatures in and around green spaces can be several degrees lower than their surroundings.

Trees also help to reduce the air temperature by the cooling effect of evaporation. Trees 'transpire' water, releasing large amounts of moisture into the air. One large tree can release 200 to 300 gallons of water on a summer day. Studies suggest that air-conditioning demand can be reduced by up to 30 per cent through the effects of well-placed trees. Water features such as lakes, ponds

and fountains also help to cool the environment by the cooling effect of evaporation.

By extracting CO<sub>2</sub> from the air, trees also help to reduce the impact of climate change – over one year a mature tree will remove about 22kg of carbon dioxide from the air. Trees with white or paler leaves can potentially help to reflect heat upwards increasing their cooling effect. Additionally, creating more green spaces and planting trees speeds up drainage and reduces the risk of flooding.

In summary, urban green space and trees can have the following beneficial effects:

- **reduces urban heat islands** – predictions for urban temperatures over the next 70 years show that if there is less than 10 per cent urban green cover, urban temperatures will increase by about 8.2°C, whilst if green cover exceeds 10 per cent it will keep temperatures to only 1°C above current temperatures;
- **reduces pollution** – each year 1.3 million trees would remove 2,535 tonnes of pollutants from the air;
- **reduces flooding** – each year 1.3 million trees would catch 7 billion tonnes of rainwater, thereby reducing the impact of flooding; and
- **reduces noise** – a belt of trees can reduce noise levels by as much as 6–8 decibels for every 30 metres width of woodland.

The development of 'green spaces' can not only help to alleviate the impact urban heat islands but have been shown to have other health impacts.

#### Box 4 Wider health benefits of green space

- Living in closer proximity to green spaces is associated with improved wellbeing, reduced mental health problems, and reduced health inequalities.
- Children with attention deficit hyperactivity disorder (ADHD) have reported significant improvements in symptoms when in contact with natural environments and green spaces.
- The presence of green spaces in otherwise identical urban areas is associated with reduced indicators of stress and family aggression.
- Exposure to natural environments or scenes of nature have shown reduction in physiological stress indicators such as reduced blood pressure and muscle tension and changes to EEG alpha wave activity.
- Access to green spaces and natural environments can increase the likelihood of physical activity and active travel in adults and children.

### 3.1.3 Example 3: How insulating homes can protect against heat

Insulating homes has multiple health benefits, improving physical and mental health. In most cases, insulating homes protects against hot weather as well as reducing heating needs in the winter. It has wider climate change benefits:

- **mitigation** – installing insulation will improve the energy efficiency of the home and will reduce CO<sub>2</sub> emissions by an estimated average of 1.2 tonnes/year; and
- **adaptation** – helping future-proof existing homes to reduce the health impact of excessive thermal gain in the warmer summers ahead.

The way insulation is installed, as well as the way occupants use heavily insulated homes, can help protect against overheating. For instance, external wall insulation can be better than internal wall insulation in preventing overheating – as it prevents heat getting in rather than trapping it inside. This may be particularly important for instance with elderly occupants at home during the day. A small number of types of properties – for instance light-weight top floor flats – may be vulnerable to overheating even if insulation is external.

Insulation is particularly effective in preventing overheating when it is combined with measures to keep out heat – for instance shading, awnings and shutters, or reflective external wall surfaces. Some of these measures are low cost – for instance curtains with white reflective linings kept closed during the day will help prevent heat gain through windows.

Ventilation is also important – for instance opening windows when the air outside is cooler at night time or in the early morning. Concerns about security may mean that people are reluctant to keep windows open – windows that can be locked open securely may make it easier to keep homes cool. The way buildings are designed, refurbished and maintained can help make it easier for people to do the right thing to prevent overheating.

Some homes are more vulnerable than others to overheating. Recent research suggests that:

- top floor 1960s flats can experience over six times the overheating of ground floor flats, depending on orientation, and almost nine times that of Victorian terraced houses;
- other risk factors include poor protection from solar gains, such as unshaded south and south west facing windows, and east facing windows for rooms occupied in the mornings such as homes of the elderly; and
- light-weight buildings with heavily glazed facades, including flats with lack of access to cool space, may also be vulnerable.

### 3.1.4 Example 4: Cooling hospital estates and care homes

- Create cooling green spaces in the surrounding environment, with trees, shrubs, trellises, arbours, climbers (though avoid ivy as it can damage buildings), green roofs and water features.
- Do not extend car parks at the expense of green spaces – this adds to surrounding heat. Introduce an active transport plan or car-sharing schemes to reduce the demand for car park spaces (with resulting health benefits to staff and the patients' environment). Plant trees around existing car parks and on top of multi-storey car parks.
- Ensure that buildings are well insulated – both loft and cavity insulation helps to reduce heat build-up (and also reduces carbon emissions and increases energy efficiency).
- Increase opportunities for night-time ventilation either through vents or windows.
- Reflective paint may help on south-facing walls and roofs. This could also be considered for hospital transport – all London buses now have white roofs to reflect heat.

A number of projects are examining further possible solutions:

- Built Infrastructure for Older People in Conditions of Climate Change (BIOPICCC) <http://www.dur.ac.uk/geography/research/researchprojects/biopiccc/background/>
- Design and Delivery of Robust Hospital Environments in a Changing Climate (DeDeRHECC) – <http://www-edc.eng.cam.ac.uk/robusthospitals/>
- Community Resilience to Extreme Weather (CREW) project – <http://www.extreme-weather-impacts.net/twiki/bin/view>
- NHS Sustainable Development Unit, especially it's work on Sustainable Development Management Plans (SDMPs) [http://www.sdu.nhs.uk/sd\\_and\\_the\\_nhs/sd-governance/sdmp.aspx](http://www.sdu.nhs.uk/sd_and_the_nhs/sd-governance/sdmp.aspx)

## 3.2 Towards a longer term strategy for health and social care

Building on the past evaluation of the Heatwave Plan and the recent UK CCRA 2012 report, an emerging agenda for health and social care might be:

### Short term (0–5 years)

- Embed the work of heatwave and cold weather planning (excess seasonal deaths) into the new health and social care structures emerging following the passage of the Health and Social Care Act 2012. Multi-agency Local Resilience Forums will have a critical role in the preparations and response to a heatwave with health and wellbeing board being involved in longer term strategic planning.
- Directors of Public Health should be prepared to take an active role in setting a local agenda.
- Joint Strategic Needs Assessments (JSNAs) can be used to identify the challenges posed by excess seasonal summer and winter deaths locally, and if they are prioritised by health and wellbeing boards, Joint Health and Wellbeing Strategies (JHWSs) can be used to agree actions to reduce them.
- Continue to work in partnership with local authorities and social care services to identify vulnerable populations and geographical areas to target long-term planning and interventions during a heatwave as per the Heatwave Plan.
- High temperatures during a heatwave may require affected wards to move patients to cooler areas; extra beds may need to be made available in hospitals due to increased demand.
- Laboratories, pharmaceutical storage and food storage areas in hospitals may be adversely affected by increasing temperatures during heatwaves. Most pharmaceutical products are heat sensitive and start to degrade if stored at higher than room temperature (usually 25°C). Higher temperatures also increase the risk of food poisoning occurring.
- IT server overheating and disruption to email communication may occur in hospitals and other NHS organisations during heatwaves – incidents have already been reported.
- Encourage transport plans that maximise active and public transport for staff and patients to lower heat generated by motor vehicle use and car parks.

As the UK CCRA 2012 Health Sector Report noted: To be effective, climate change needs to be factored into:

- design, construction and maintenance of healthcare infrastructure;
- allocation of resources;

- procurement processes;
- training programmes; and
- business continuity.

### **Medium term (10–30 years)**

- Focus on building design of hospitals and other healthcare establishments to aid passive cooling where possible, and target vulnerable areas (patients, medications, IT) with air-conditioning.
- Review external hospital and health care land for ways to aid cooling – for example, consider constructing underground car parks and maximise green space and trees surrounding buildings.
- Transport planning – to encourage active transport and public transport and use of low-emission vehicles for NHS business.
- Partnership work with local authorities to identify and focus on vulnerable urban areas and populations – for example, certain urban areas may be affected more by high temperatures.
- Monitoring of, and the implications of, new diseases arising due to warmer summer (eg new insect-borne diseases not previously endemic in the UK).

### **Long term (30+ years)**

- Planning of new hospitals – ensure maximum green space and water (eg lakes) surrounding buildings to aid passive cooling, and avoid building on flood plains.
- Building ‘zero carbon’ hospitals and minimising energy use in the NHS.
- Development of temperature-resistant drugs and laboratory materials.

### **Implications for other sectors:**

A summary of implications for other sectors can be found under the section on Responsibilities at Level 4 in the Heatwave Plan.

## Section 4

### Monitoring and surveillance

#### Role of the Health Protection Agency (HPA)

The **Health Protection Agency (HPA)**, in collaboration with other agencies provides both information on mortality and morbidity due to heatwaves at each of the four heatwave levels.

**Level 1: Heatwave and Summer Preparedness:** The HPA will routinely monitor outputs from real-time syndromic surveillance systems including calls to NHS Direct, GP out of hours/ unscheduled care consultations and emergency department attendances (on a daily basis, week days only), and GP in hours consultations (on a weekly basis only) for the impact of heat-related morbidity using a range of syndromic health indicators. Information on heat-related illness will be included in routine weekly surveillance reports published on the HPA website; these will provide a source of intelligence on how severe the effects are and how well services are responding.

The HPA will continue to refine its heatwave mortality surveillance plans; produce weekly excess all-cause mortality estimates based on ONS weekly data during the summer and publish outputs regularly on the HPA website in the HPA flu report (link to current weekly report: ([http://www.hpa.org.uk/web/HPAweb&HPAwebStandard/HPAweb\\_C/1287147913271](http://www.hpa.org.uk/web/HPAweb&HPAwebStandard/HPAweb_C/1287147913271)), link to archive of reports: (<http://www.hpa.org.uk/Topics/InfectiousDiseases/InfectionsAZ/SeasonalInfluenza/EpidemiologicalData/05influsWeeklyinfluenzareportsarchive/>))

**Level 2: Alert and readiness:** The HPA will continue to monitor routine syndromic surveillance systems for any increases in heat-related illness including calls to NHS Direct, GP out of hours/ unscheduled care consultations and emergency department attendances (on a daily basis, week days only) and GP in hours consultations (on a weekly basis only). It will continue to provide information on heat-related illness in routine weekly surveillance reports.

The HPA will continue to produce weekly excess all-cause mortality estimates based on weekly ONS data during the summer and publish outputs regularly on the HPA website in the HPA flu report. In addition, the HPA will request release of daily deaths data and monitor daily any increase in excess summer deaths based on available data. Daily reporting will continue up until one week after return to Level 1.

**Level 3: Heatwave action:** The HPA will continue to monitor any increases in heat-related illness reported in calls to NHS Direct, GP out of hours/ unscheduled care consultations and emergency department attendances (on a daily basis, week days only) and GP in hours consultations (on a weekly basis only) and will publish an additional single weekly heat wave syndromic surveillance report, in addition to the routine weekly surveillance outputs. This additional report will provide a source of intelligence on how severe the reported effects are including further information on the impact on existing regions and age groups.

The HPA will continue to monitor daily and weekly any increase in excess summer deaths based on available data.

**Level 4: Emergency:** The HPA will continue to monitor any increases in heat-related illness reported in calls to NHS Direct, GP out of hours/unscheduled care consultations and emergency department attendances (on a daily basis, week days only) and GP in hours consultations (on a weekly basis only), providing a daily (weekday only) syndromic surveillance report on heat-related illness in the community.

Excess summer deaths will be monitored as per Level 3.

## Section 5

### Further information

#### **EuroHEAT Project and Heat-Health Action Plan Guidance**

The EuroHEAT project, co-funded by the World Health Organization (WHO) and the European Commission, brought together experts from across Europe to share learning in developing national heatwave plans.

Results of this work are summarised in WHO guidance called *Heat-Health Action Plans*. It explains the importance of the development of heat-health action plans, their characteristics and core elements, with examples from several European countries that have begun their implementation and evaluation.

For more information please visit the WHO Euro weblink at:

[http://www.euro.who.int/\\_data/assets/pdf\\_file/0009/95913/E92473.pdf](http://www.euro.who.int/_data/assets/pdf_file/0009/95913/E92473.pdf)

More recently the WHO Regional Office for Europe has published information for the general public, health and social care professionals and health authorities.

The publication, **Public Health Advice on preventing health effects of heat** ([http://www.euro.who.int/\\_data/assets/pdf\\_file/0007/147265/Heat\\_information\\_sheet.pdf](http://www.euro.who.int/_data/assets/pdf_file/0007/147265/Heat_information_sheet.pdf)) contains a detailed series of information sheets which can be read in conjunction with this Plan.

#### **UK Climate Change Risk Assessment 2012**

For copies of the CCRA Health Sector Report, the CCRA Evidence Report and Devolved Administration Reports, please visit: <http://www.defra.gov.uk/environment/climate/government/risk-assessment/>





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