



Hazards

EXTREME RAINFALL & FLOODING

Extreme precipitation happens when a location receives much more rain or snow during a short period of time than is normal. This very large volume of water may be more than water and drainage systems are able to manage, leading to short and long term flooding.

Flooding may relate to water moving in and through a site (e.g. in gutters, through drains) or it may occur when water makes its way too quickly into watercourses overtopping them.

Flooding may also occur when water storage or barriers fail (e.g. dam overtopping or failing).

The risk of flooding may increase in drier weather as the flow of water into open ground is reduced on hard dry ground. Widespread building and infrastructure design can also increase the risk of flooding by speeding up water flow into water courses.

DIRECT HEALTHCARE IMPACTS

- Patients/Staff/Suppliers not able to access or leave site.
- Parts of site become inaccessible due to flood waters.
- Parts of site or equipment damaged by water or water-based pollution.
- People killed or injured by flood waters.

EXPOSED/VULNERABLE SITES

Not all parts of a healthcare site will be affected in the same way by surface water flooding. The following areas or situations may lead to more flooding risk:

- Buildings with low volume water drainage systems
- Sites where water moves quickly through and around buildings. Urban areas with inadequate drainage systems are more vulnerable.
- Land near rivers, floodplains, and coastlines is naturally prone to flooding as it is the lowest point where water will naturally accumulate - Coastal areas are particularly vulnerable to storm surges and sea-level rise.
- Areas with high water tables, like those with permeable ground materials (chalk, sand, or gravel), can experience groundwater flooding.
- Areas with impermeable surfaces. Urban development with extensive hard surfaces (roads, buildings, car parks) reduces the land's ability to absorb rainfall, leading to increased surface runoff and potential flooding.
- Culverts (pipes carrying watercourses) can exacerbate flooding by restricting flow and potentially clogging.

LEADING TO (INDIRECT HEALTHCARE IMPACTS)

- Extreme rainfall may be accompanied by storms and extreme winds.
- Infection risk.
- Parts of building or site out of action during recovery activity.
- Patient records lost or damaged.

EXPOSED/VULNERABLE PEOPLE

- People who live in low lying areas.
- People in emergency situations who require immediate life-saving interventions (and who emergency medical services cannot reach)
- People who need regular access to medical professionals, travel services (e.g. PTS) or medication (e.g. from pharmacies or deliveries) who might not be able to access it.
- People who are injured as a result of flooding who require access to non-urgent medical treatment.
- People living in homes built on flood risk areas.

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HEATWAVE

A heatwave is an extended period of hot weather relative to the expected conditions of the area at that time of year, which may be accompanied by high humidity.

A UK heatwave threshold is met when a location records a period of at least three consecutive days with daily maximum temperatures meeting or exceeding the heatwave temperature threshold. The threshold varies by UK county, see the UK temperature threshold map below. *Source: Met Office*

DIRECT HEALTHCARE IMPACTS

- Impacts on physical buildings and estates (e.g. building material degrading or failing, temperatures increasing internally and externally)
- Impacts on equipment functioning (e.g. fridges failing, cooling systems failing - e.g. on MRIs)
- Impacts on staff and patients overheating (uncomfortable or uninhabitable spaces to work or to be treated)
- Medication failing or causing adverse reactions

EXPOSED/VULNERABLE SITES

Not all parts of a healthcare site will be affected in the same way. The following areas of site or situations may lead to more overheating risk.

- Areas exposed to extreme sunshine, in particular rooms with large east, west or south-facing windows/glazing or facades.
- Spaces with little sun shading externally (e.g. no shutters or shades, overhangs or brise soleil or trees), or internally (e.g. no curtains or blinds).
- Airtight areas with inadequate ventilation:
 - With restricted window openings and safety catches installed
 - Windows only on one side
 - Highly insulated or energy-efficient buildings which may trap heat inside.
 - Where appliances release excess heat (e.g. server rooms)
 - Top floors because heat rises and because of solar gain from the roof.
- Site located in a densely built-up urban area with little green space nearby

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LEADING TO (INDIRECT HEALTHCARE IMPACTS)

- Staff welfare issues - staff being able to work for less time or needing more breaks and refreshments, shifts may need to be moved)
- Pharmacy stock control issues (stock may be damaged or different medication used to treat illness)
- Increased numbers of patients with certain medical conditions exacerbated by heat
- Increased deaths (both from increased illness and increased accidents - e.g. from drowning)
- Pollutants and pesticides to evaporate into the air, worsening air pollution - increased air inhalation, leading to breathing and heart-related illness.
- Heatwaves may also be accompanied by a period of hot dry weather leading to drought, wildfire and air quality issues.
- Parts of the building may become 'no-go' zones as they become uncomfortably hot to pass through or stay in.

EXPOSED/VULNERABLE PEOPLE

Vulnerability (being susceptible) to heat is shaped by physiological factors, such as age and health status.

- People with chronic health conditions exacerbated by heat (e.g. heart and respiratory diseases)
- People whose medication is affected by heat and works poorly or stops working.
- The elderly or young.
- People who are less mobile
- People who are unable to cognitively recognise they are overheating and or take steps to stay hydrated and cool down.

Exposure factors (more likely to be exposed to the heat) include occupation and socio-economic conditions:

- Those in low quality housing or who are rough sleepers, and therefore can't cool down.
- People working out doors.
- People unable to take breaks to rehydrate or cool down.



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WILDFIRE RISK

There is no single definition of what constitutes a wildfire in the UK, with different definitions used by government agencies, the media and FRS. The UK government used to define a wildfire as any “unplanned and uncontrolled fire(s) in the natural environment”, but now defines the term to mean an “uncontrolled fire that burns vegetation, such as grass, heather, woodland, crops and scrubland”.

Climate change is likely to lead to changes in the weather patterns that affect the UK, with longer drier summers anticipated. This could lead to drier vegetation and more frequent, larger wildfires.

Source: <https://lordslibrary.parliament.uk/wildfires-reducing-the-risks-and-mitigating-the-effects>

DIRECT HEALTHCARE IMPACTS

- Wildfires present hazards which may injure or kill emergency responders and members of the public during the response to the fire.
- Wildfires also present a direct risk to infrastructures - at risk of being caught in the flames.
- Exposure to wildfire smoke can cause respiratory and cardiovascular health impacts over great distances.
- Wildfires can increase the prevalence of mental health conditions in impacted communities.
- Uncontrolled fires may reach industrial or commercial properties releasing noxious chemicals.

EXPOSED/VULNERABLE SITES

- Sites close to areas with a high wildfire risk (e.g. open moorland or heathland - with a high fuel load (e.g. dry grassland or bracken).
- Sites with main arterial routes adjacent to wildfire risk sites.
- Parts of the building with the most natural ventilation.
- Sites in peri urban areas.
- The type and condition of vegetation in an area can significantly impact the risk of wildfires. Areas with heather, gorse, and peat are particularly susceptible due to their flammable nature.
- Sites offering services for respiratory illness.

LEADING TO (INDIRECT HEALTHCARE IMPACTS)

- The potential for healthcare building evacuations.
- Increased injuries and illness in those directly involved in managing the fire.
- Increased numbers of patients presenting with respiratory or cardiovascular disease.
- If this occurs at the same time as a heatwave, there may also be local area water shortages and it may not be possible to use normal ventilation methods.
- There may be access issues due to reduced visibility and road closures.

EXPOSED/VULNERABLE PEOPLE

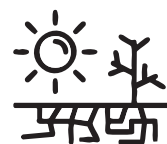
Some people are disproportionately impacted by wildfire due to demographic, social and economic conditions.

- Children, the elderly, and those with respiratory conditions are particularly at risk.
- People without physical, social or economic mobility, who are unable to move out of the area to less polluted air or away from the direct fire risk – in the immediate or long term.
- Wildfires may disproportionately affect those living in poverty because of factors such as inadequate housing, social exclusion, and a diminished ability to prepare before a fire or relocate afterwards. (<https://wildfirerisk.org/reduce-risk/vulnerable-populations/>)

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DROUGHT

Persistent periods of low or no rainfall can lead to drought - some droughts are short and intense, caused by a hot, dry summer. Others are long and take time to develop over multiple seasons due to low amounts of rainfall. There is no consistent definition for drought. Source: <https://www.metoffice.gov.uk/research/climate/understanding-climate/uk-and-global-extreme-events-drought>.

The main types of drought, which may occur separately or together are:

Agricultural drought – when there isn't enough rainfall and moisture in soils to support crop production or farming practices such as spray irrigation.

Environmental drought – when lack of rainfall has a detrimental impact on the environment and ecology.

Water supply drought – when a lack of rainfall leads to concerns from water companies about supplies for their customers.

DIRECT HEALTHCARE IMPACTS

- Reduced or intermittent water supply.
- Water quality issues affecting water supply to the hospital.
- Challenges maintaining adequate (or regulated) hygiene standards.
- Increased demand for treatment for infectious diseases and those aggravated by droughts.
- Systems that rely on water (e.g. for cooling) may fail.
- Staff and patients may become poorly hydrated if access to clean water is compromised.
- In the long term, plants and green spaces around site may die.

EXPOSED/VULNERABLE SITES

Drought is likely to be more evenly distributed at a site level than say flooding or heatwaves, but in any wider geographic region will be affected by:

- Average rainfall in the area
- Demand for water in the area (including leaks, and domestic and commercial usage)
- Water storage in the area (e.g. server rooms)

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LEADING TO (INDIRECT HEALTHCARE IMPACTS)

- A need to conserve limited water supplies and prioritise limited water supplies - stopping or reducing water for certain tasks or activities.
- A need to find alternative sources of water (e.g. bottled or grey water) for certain tasks.
- Over time, subsidence or heave may occur (either during the drought or afterwards when dry sites receive rainfall) - leading to cracks and building instability.
- Flash Flooding as water falls on dry hard ground (increased run off).

EXPOSED/VULNERABLE PEOPLE

Increases in infectious disease can be a direct consequence of drought.

- Viruses, protozoa, and bacteria can pollute both groundwater and surface water when rainfall decreases - affecting those who enter that water recreationally
- People who get their drinking water from private wells may be at higher risk for drought-related infectious disease.
- People who have certain chronic health conditions such as asthma and some immune disorders.

Drought-related changes in air quality, such as increased concentrations of air particulates and airborne toxins resulting from freshwater algal blooms, can irritate the eyes, lungs, and respiratory systems of persons with chronic respiratory conditions.

Water quality changes (e.g. increased concentrations of contaminants), can threaten immuno-compromised people.



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COASTAL FLOODING, SURGING & EROSION

Coastlines naturally erode over time causing them to retreat inland, however, the rate of erosion is increasing due to climate change, which is leading to sea level rise and larger, more frequent storm surges. This all increases the risk of coastal flooding which affects coastal communities and infrastructure. Storm surges may reach far in land.

This can have a negative impact on the economy, as well as on the mental health of residents and business owners, as they may live in fear of heavy rain, storms and flooding. Erosion and flooding can also cause coastal areas and farmland to be destroyed and even to fall into the sea.

DIRECT HEALTHCARE IMPACTS

- Mental health impacts from constant uncertainty and fear of coastal flooding.
- Direct injuries and illness in the event of storm surges and coastal flooding.
- Disruption to services are any sites at risk of erosion or flooding - requiring closure of the service.

EXPOSED/VULNERABLE SITES

- Healthcare sites in coastal and low lying communities near the coast will be subject to more coastal erosion and flooding due to more frequent storms and increasing sea levels.
- Coastal areas which are frequently flooded and show evidence of significant erosion may be more likely to deter investment and less likely to attract new businesses into the area.
- Due to the unpredictability of climate change, coastal flooding and erosion, people and business owners may be less likely to relocate to an 'at risk' area, with fear of flooding, abandonment, and an uncertain future.

Source: <https://thefloodhub.co.uk/coastal-change>

LEADING TO (INDIRECT HEALTHCARE IMPACTS)

- Similar issues to the general flood hazard card.
- Long-term need to find new health service delivery locations and delays in planning permission / additional costs to meet any adaptation needed in flood risk areas. Or no planning permission granted.
- Changing needs of the local at risk population.

EXPOSED/VULNERABLE PEOPLE

- Some people are disproportionately impacted by coastal flooding and erosion due to social and economic conditions.
- In the long term it may be necessary to move inundated communities inland.
- For example - it may disproportionately affect those living in poverty because of factors such as inadequate housing, social exclusion, and a diminished ability to prepare before a flood or relocate before or afterwards.

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STORMS specifically HIGH WINDS

For flooding please refer to general flood card

The term storm is usually applied to any violent atmospheric disturbance, whether it's a thunderstorm, squall or snowstorm. A storm means different things to different people and is commonly used to describe a deep and active area of low pressure with associated strong winds and precipitation (rain), leading to flash floods.

Wind speeds of 90km/h (56mph) can impact on human safety and speeds of 126km/h (78mph) can cause damage to buildings, which in turn can endanger human life. Uprooted trees, loosened roof coverings and unsecured walls (particularly on construction sites) can all threaten health, cause extensive damage to property and disrupt services.

Power transmission cables can be brought down, water supplies contaminated and transport services interrupted. High wind gusts can cause uplift on roofing due to the drop in air pressure caused by the moving air currents; coupled with rain, then even the under-layers can be vulnerable to damage.

Source: <https://weather.metoffice.gov.uk/learn-about/weather/types-of-weather/storms> and <https://www.thenbs.com/knowledge/climate-change-adaptation-in-buildings-wind>

DIRECT HEALTHCARE IMPACTS

- Storms can cause direct damage to healthcare infrastructure e.g. by damaging windows, lifting roofs and light structures off the ground.
- Patients and staff injured by storm debris during or after storm.
- Damage to utilities supplies (e.g. power down due to fallen trees) going into the site.
- Local roads and travel conditions poor or closures in place near the hospital.
- Likely to be accompanied by water damage and flood risk.

EXPOSED/VULNERABLE SITES

- Areas of site exposed to high winds in general, gusts of wind, or wind tunnel affects.

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LEADING TO (INDIRECT HEALTHCARE IMPACTS)

- Staff and patients cannot move around site freely.
- Business continuity plans needs to be put in place to cope with reduced power supply/water supply.
- Potential lack of access to patient healthcare records.
- Staff may be unable to get into or leave work due to the road / travel conditions in the local area, during or after a storm.
- Potential for issues with general supply chain and getting resources to site.
- Staff may need to stay at home to care for dependents or clear up storm damage.

EXPOSED/VULNERABLE PEOPLE

Storms and high winds can affect anyone, but there are some groups that are exposed or vulnerable:

- People aged 65 and over
- People in rural and coastal communities
- People with disabilities people who routinely rely on carers or power supplies for their care and treatment.
- People who live alone or who are socially isolated
- People who are homeless or sleeping rough
- People who are not able to receive, understand or act on early warnings