

Heat Guide

INFORMATION FROM THE DORTMUND HEALTH AUTHORITY

Inhalt

Foreword.....	3
Heat.....	4
Heat production/absorption.....	5
Heat loss/release (cooling).....	5
Dangers in extreme heat	6
Sunstroke	6
Heat exhaustion.....	6
Heat collapse.....	7
Heatstroke	7
Prevention in hot weather.....	7
Information.....	8
Individual risks	8
Room temperature	8
Body temperature	8
Activities	9
Nutrition	9
Risk groups	10
Age and special phases of life	10
Dementia / impairment of mental capacity	10
Physical disabilities	10
Drug or alcohol consumption	10
Heart failure or high blood pressure	11
Thrombosis.....	11
Medication	11
Skin changes, overweight	12



Diseases with reduced organ function	12
Nutrition	12
Dealing with medication in the heat	12
Reasons for a change in the effect of medication.....	12
Storage of medicines and possible changes in effectiveness.....	13
Altered physical reactions to heat	13
Medication groups that can cause problems in hot weather	14
Allergies and intolerances	14
Pregnancy and heat	14
Behavioural tips for pregnant women.....	14
Children and teenagers	15
Behavioural tips for children and their carers and guardians	15
Caution! Dangers!.....	16
Heat stroke.....	16
Sunstroke.....	16
Behavioural tips for working outdoors.....	17
Behavioural tips for working in the office	17



Foreword

The heat in recent summers has led to an increase in illnesses and several thousand deaths across Europe. The first major heatwave in Europe in 2003 claimed an estimated 40,000 lives across Europe, probably 7,000 of them in Germany, due to an increase in heart attacks and strokes, respiratory diseases and metabolic, renal and cardiovascular disorders.

It can be assumed that, as a result of climate change, there will also be increasing heat and drought in the summer months.

In Dortmund, too, the number of hot days with temperatures above 30°C and the so-called tropical nights, in which it no longer cools down below 20°C, has increased. From a health perspective, prolonged periods of heat are particularly problematic, as was the case in Dortmund in 2018, for example, with 23 hot days in a row. In response to the heatwave summer of 2003, the German Weather Service (DWD) developed a heat warning system, which has been used in all German states since 2004.

A heatwave is generally understood to be an episode of extreme heat stress that poses a threat to human health. The duration and intensity of this episode are of decisive importance. However, there is no standardised definition of heatwaves.

In city centres with a high population and building density, average temperatures are already higher than in undeveloped surrounding areas. On a summer night with radiant weather conditions (cloudless sky and only low wind speeds), it can be over 10°C warmer in Dortmund city centre than in the undeveloped surrounding area. The German Weather Service (DWD) differentiates between two levels of heat stress: Severe heat stress is felt when the weather lasts for several days and is associated with intense sunlight, high air temperatures (around 29°C in the shade), increased relative humidity and low wind movement. The perceived temperature is over 32°C. Extreme heat stress is felt in stable weather conditions that last for several days and are characterised by intense sunlight, extremely high air temperatures (around 35°C in the shade), increased relative humidity, low wind movement and little cooling at night. The "perceived temperature" here is over 38°C. The following information should help you to recognise and prevent dangers.

It is possible to receive early warnings of heat or unhealthy weather conditions ([Deutscher Wetterdienst/Warnungen](#)). Inform and, if necessary, warn those around you (family, friends, acquaintances, or neighbours) in the event of heat stress.



Increased attention must be paid to risk groups such as children, the elderly or the sick (offer help, at least daily telephone contact). Elderly or disabled people also need support on hot days, e.g. with shopping. In hot weather, we should also look out for people in need of help, especially outdoors, and accompany them to shady and cooler areas. **In the event of recognisable danger, call 112.**

The perception of heat stress is a complex process and does not depend solely on the air temperature. The so-called thermal effect complex plays a decisive role in weather-related stress on the organism. In addition to air temperature, this includes wind speed, humidity, solar radiation, and heat radiation from the atmosphere. The interplay of the individual components has a major influence on the heat emitted by the organism and therefore the sensation of warmth.

The so-called "perceived temperature" describes the heat sensation of an average adult outdoors. This "perceived temperature" rises much faster than the air temperature in warm, sunny, and windless summer conditions. In extreme cases in Central Europe, it can be up to 15°C above the measured air temperature. (Source DWD)

Heat

Humans are homothermic organisms. The body tries to keep its core temperature (the temperature in the inner body cavities, i.e. in the abdomen and chest) constant even when the ambient temperature changes. The metabolism and organ functions are orientated towards an average body temperature of around 37°C. Deviations upwards or downwards can only be tolerated by the body by a maximum of 5°C and for a shorter period of time without damaging health.

The extremities (arms and legs) and the human skin, on the other hand, are regulated by alternating temperatures. They are of crucial importance for regulating the body's core temperature: people need a regulated body temperature with a balance between heat production/absorption and heat loss/release.



Heat production/absorption

The body produces heat by converting food into energy, through muscle activity (sport, strenuous physical labour) and by absorbing heat from the environment.

At rest, approx. 50% of heat is produced by the internal organs and approx. 20% by the muscles and skin; during physical activity, heat production via the muscles increases massively.

If the ambient temperature or heat radiation in the vicinity of the human body rises higher than the temperature of the skin, the body absorbs heat.

Heat loss/release (cooling)

The heat produced in the body can only be transported via the blood to the body surface (skin) for heat dissipation if the temperature of the skin is lower than the temperature of the inside of the body.

The extent of this heat transport is controlled by the extent of blood flow to the skin. If the surrounding air is cooler than the heat of the skin, the body can release heat. Air movements above the skin (wind) increase the heat dissipation. However, this form of heat dissipation decreases with increasing ambient temperatures and from an outside temperature of approx. 36°C the body can no longer dissipate heat with this alone.

The most important form of cooling, especially at these high ambient temperatures, is sweating, i.e. the evaporation of sweat from the skin. The body can release almost 600 kcal of heat per litre of evaporated liquid. However, if the outside temperature is very high, the body also absorbs more heat via heat radiation and must then further increase heat release via evaporation.

Another prerequisite for heat dissipation through evaporation/sweating is that the ambient air is sufficiently dry. This is familiar to sauna users, for example, who can tolerate temperatures well above 50°C for a while due to the very dry air, but then must quickly release the increased heat absorption by cooling down in water or an ice bath.

However, if the humidity is too high, cooling by evaporation can no longer take place and the human body can generally only tolerate outside temperatures of up to approx. 33°C at high humidity. In order for sweat to evaporate, it is also necessary for the moisture to be released into the surrounding air.



Dangers in extreme heat

If the body cannot regulate the heat sufficiently, this can lead to increasingly serious health problems. When the core body temperature rises to over 41°C, body proteins begin to be destroyed and the body produces so-called cytokines, which in turn lead to disorders in the body cells, but also to disorders in blood coagulability. If this process is not stopped, it leads to increasing organ failure.

Especially in summer, it is therefore important not to wear tight-fitting, "breathable" clothing, i.e. clothing that allows air and moisture to pass through. Sweat that drips off, is wiped off or absorbed by clothing can no longer cool or can only cool less.

The human body can lose more fluid per hour through sweating than it can take in by drinking in the same unit of time. Breaks to reduce sweating are therefore also absolutely essential in extreme heat. Dangerous health risks also arise for fit and younger people when the temperature rises, the humidity is very high and there is no cooling from the wind, for example. In these cases, it is essential to pay attention to the severity of the work and the need for increased recovery times with breaks to drink.

Acclimatisation to increased ambient temperatures usually takes years, even with regular stays, e.g. in Africa or South East Asia. The human body is not acclimatised to the heat that occurs in the summer months.

Sunstroke

Prolonged exposure of the unprotected head to the sun can lead to sunstroke with the symptoms of headache, sensitivity to light, stiff neck, loss of alertness and orientation, nausea and possibly vomiting. Medical assistance should be sought if symptoms are severe. Move affected persons to cooler areas and out of the sun, allow them to rest and, if possible, provide them with fluids.

Heat exhaustion

Heat exhausting is an expression of the loss of water and electrolytes in the heat. It leads to physical weakness with muscle cramps, nausea and vomiting due to the loss of electrolytes, sometimes also to fever and loss of consciousness.



Move affected persons to cool areas and cool the body slightly (e.g. cooling compresses), allow them to rest and, if possible, provide them with fluids (possibly slightly salty fluids). If there is no improvement after one hour or the condition worsens, seek medical advice!

Heat collapse

Heat collapse is a significant increase in heat exhaustion and sunstroke caused by exposure to high temperatures. The body tries to release heat by increasing blood flow to the skin, resulting in an increasing drop in blood pressure. If the brain is not sufficiently supplied with blood due to the drop in blood pressure, this can lead to changes in consciousness or loss of consciousness.

In such a case, medical assistance is always necessary. Until then, move affected persons to cool areas and cool the body slightly (e.g. cooling compresses), allow them to rest and, if possible, provide them with fluids (if necessary, slightly salty fluids).

Heatstroke

In heatstroke, the body absorbs more heat than it can release under massive heat stress. The body temperature can no longer be regulated and rises to up to 41°C. Warning signs are feverish temperatures, headaches, dizziness, increasing tiredness and confusion with subsequent loss of consciousness. The skin is dry, reddened, and hot. In such cases, medical or emergency assistance is required. Until then, move affected persons to cool areas and cool the body slightly (e.g. cooling compresses), allow them to rest and, if possible, provide them with fluids (possibly slightly salty fluids).

Prevention in hot weather

Vulnerable people need support! Children, the sick, the disabled and the elderly suffer more from extreme heat. Healthy people should therefore pay attention to their surroundings and be approachable. Help and advice should be offered specifically in your own neighbourhood!

- Do not leave children and elderly people alone in hot weather!
- NEVER leave a person in closed rooms that cannot be cooled!
- NEVER leave children or animals in vehicles!



Information

Obtain information about impending heat hazards in good time, for example here: [Homepage German Weather Service](#)

Individual risks

- Talk to your doctor about your personal risks and individual precautionary measures in advance of the heat. Coordinate your medication intake if necessary.
- If necessary, make use of shopping assistance or visits from welfare services or outpatient care services. You can discuss this in advance with the doctors treating you.

Room temperature

- Only ventilate your home in the cool morning, evening and night hours. Prefer ventilation via opposite windows.
- If possible, install shutters or awnings in front of windows or doors and close them to minimise sunlight. Curtains indoors can also help but are less effective.
- Cooling and air conditioning units can lower the temperature in the home, but they also require energy and sometimes give off heat.
- Remember to only leave the electrical appliances and lamps that are necessary switched on, as these generate heat.
- If it is very hot in your home, move to cooler areas such as the cellar if necessary. If possible, stay there for 2 to 3 hours a day.
- Hanging up damp cloths can cool the air in the room through evaporation.

Body temperature

- To cool down, moisten the skin on your arms and legs and, if necessary, your head/neck with cool water or apply damp cloths. If you are fit enough: take a cool shower.
- Wear breathable, light, and loose-fitting clothing made from natural fabrics such as cotton or linen. Light-coloured clothing reflects the sunlight and heats up less.



Activities

- Avoid strenuous physical activity or sport. Take regular breaks when you are active in the heat.
- If possible, older people should not leave their homes when it is hot outside. If necessary, only in the cooler morning and evening hours.
- If possible, do not spend lunchtime outdoors when it is very hot.
- If you feel ill, such as dizziness, headaches, fever (temperature above 37.5°C) and/or increased tiredness, seek help. Talk to other people! Seek medical help if symptoms persist and do not improve with drinking and staying in cooler places.
- When leaving the house, remember to protect yourself from the sun with sun cream and appropriate clothing (sunglasses, headgear or a parasol and light clothing that covers your arms). Please also note our information on UV light.
- If possible, avoid large concrete or asphalt surfaces outside the home, as these materials store heat very well.
- When bathing/swimming in very hot weather, check your own fitness (swimming ability and circulatory capacity) and endeavour to cool down slowly in the water. When swimming in bodies of water or open bathing areas, please observe the safety instructions of the German Life Saving Association (DLRG).

Nutrition

- Remember to stock up on drinks and light foods in good time.
- Also make sure that the food is sufficiently cooled, as pathogens such as salmonella can multiply more quickly in food in warm temperatures.
- In hot weather, eat salty foods or salty snacks to compensate for the loss of sodium (table salt).
- Several small and light meals (e.g. fruit, fish) are better than one or two large meals.
- Fruit and vegetables usually have a high water-content and many necessary minerals and electrolytes. They should be eaten more often.
- Fat and meat should not be eaten in large quantities in hot weather.
- Drink plenty of mineral water, diluted fruit juices, herbal and fruit teas, or broth. Older people should drink more than they feel thirsty.
- However, avoid alcoholic, caffeinated and highly sweetened drinks.



- Lukewarm drinks are better absorbed by the body than very cold drinks, which in turn can also increase the body's heat production.

Risk groups

Particularly at risk in hot weather are overweight, untrained, and elderly people as well as patients with cardiovascular diseases, endocrinological or mental illnesses, sweat secretion disorders or cancer.

People who have one or more of the following characteristics should pay particular attention to our advice!

Age and special phases of life

Very young and old people do not have the ability to adapt quickly to heat.

- With increasing age, the feeling of thirst decreases and leaves us drinking too little even in hot weather. The number of sweat glands decreases and blood circulation in the arms and legs deteriorates.

- Children are at high risk as they have a larger body surface area compared to their body volume and can absorb more heat. Children often react more slowly to thirst.

- Special phases of life such as pregnancy also harbour special risks. Read more about this below.

Dementia / impairment of mental capacity

In the case of dementia or impaired mental capacity due to congenital or acquired disabilities, the perception of heat, but also the physical consequences of heat, is reduced.

Physical disabilities

Physical disabilities often restrict mobility and independence in everyday life - regardless of whether they are due to age or illness. In hot weather, for example, it is not possible to change clothes or move independently to a cooler environment.

Drug or alcohol consumption

Drug or alcohol consumption limits both the perception of heat and its consequences as well as mobility and independence.



Heart failure or high blood pressure

If you have heart failure, the heat can lead to physical overload. Due to the heart's pumping weakness, the body can no longer provide the increased blood flow to the skin necessary for sweating and heat builds up in the body.

The first consequences are more rapid exhaustion and tiredness. On the other hand, heat stress can lead to an increase in blood pressure. Both phases of high blood pressure and low blood pressure can occur.

If diuretics are also given, this can lead to electrolyte imbalances or increased water retention or dehydration of the body.

Daily weighing in the morning and evening can provide information about the body's fluid balance. Patients with relevant illnesses should always speak to their treating cardiologist or GP if they are warned about heatwave days. Only the doctor should decide whether to change the dosage of medication.

Thrombosis

When it is hot, the blood "thickens" due to increased sweating. The risk of thrombosis and therefore heart attacks or strokes can increase.

Anyone who has already had a thrombosis or is taking anticoagulants (e.g. Marcumar, ASA, clopidogrel) should speak to their doctor before a hot day. However, a causal relationship between taking medication and a risk of heat exposure has not yet been proven. (Source: German Heart Foundation)

Medication

Medication with an anticholinergic effect, for example (including some antidepressants), leads to a reduction in sweating capacity, which means that the body can only release a reduced amount of heat.

If the composition of the trace elements in the body (electrolytes, e.g. sodium (table salt)) changes due to medication (e.g. diuretics), sweating is reduced.

In hot weather, the body also "dilates" the blood vessels, especially in the arms and legs, in order to achieve cooling. In combination with heat, blood pressure-lowering medication can increase this effect, possibly to the point of circulatory collapse.

Other medications can reduce the sensation of thirst.

Patients should discuss their medication with their doctor or pharmacist in advance if they are going to be exposed to heat. You will also find further information further down on this page.



Skin changes, overweight

Skin changes such as sunburns or some skin diseases (e.g. eczema, psoriasis), as well as significant obesity, can reduce sweating.

Diseases with reduced organ function

Cardiovascular diseases, severe lung diseases (COPD, etc.), liver disorders or impaired kidney function can exacerbate the physical effects of heat. People with chronic illnesses such as diabetes mellitus are also more affected by heat.

Nutrition

Older people often eat a low-salt diet and are then no longer able to compensate for the loss of salt through sweating. Reduced fluid intake not only dries out the body, but the resulting reduction in sweating also causes the body to overheat. With heavy sweating and reduced fluid intake, kidney activity also decreases with reduced urine production and an increase in harmful substances in the body.

Dealing with medication in the heat

Medication is sensitive to environmental factors and can lose or change its effect due to temperature, light, and humidity.

If you must take medication, you should therefore check the effect and side effects of your medication before days with high temperatures and changes in humidity and/or strong sunlight. Read the package leaflet for your medication again or talk to your doctor or pharmacist about your intake behaviour, but also about how you personally deal with stressful climatic factors. It may be necessary to adjust the dose of the medication or even take a break for a few days.

A deterioration in health due to extreme heat should always be a reason to consult the doctor treating you. In addition to the health consequences of heat, this can also be a sign of a change in the effect of medication.

Reasons for a change in the effect of medication

- Medication can change under the influence of heat and lose or change its effect.
- Physical reactions to heat (e.g. increased sweating or changes in kidney function or metabolism) lead to a change in the absorption of the active ingredients in the body.



- High levels of sunlight on the skin can cause increased allergies and intolerance to certain medications.

Storage of medicines and possible changes in effectiveness

Medication should always be protected from direct sunlight! It is best to store medicines in dry and cool, but not icy, places. A medicine cabinet is ideal, but a special drawer in a cupboard is usually sufficient.

If you are taking medication with you when travelling in summer, especially in the car, cool boxes should be used. In extreme weather conditions such as severe and prolonged hot days, temperature-sensitive medicines can lose or change their effect. Instructions for correct storage can be found in the medication leaflets and can also be discussed with the responsible pharmacist or doctor.

Medication is available in different forms. The type of preparation results in different stability to environmental influences such as temperature or humidity.

Medication with soft or liquid consistencies such as drops, juices, film-coated tablets, but also suppositories, ointments and creams should not be exposed to temperatures far above 20°C. Tablets and coated tablets are more stable due to their preparation, but should also not be stored at temperatures above 25°C.

Medications that are absorbed through the skin, such as active ingredient patches (e.g. pain patches) or sprays, can lose their effect significantly or completely or their effectiveness can be massively increased in the event of heavy sweating. The adhesion of plasters to the skin can also decrease.

Altered physical reactions to heat

- Sweating leads to dehydration and circulatory problems.
- Reduced drinking/thirst.
- Dehydration tablets lead to dehydration.
- Blood pressure-lowering medication can lead to circulatory collapse when exposed to heat and insufficient drinking.
- Combination of sweating, dehydration and not drinking enough.
- Risk of kidney damage.
- Risk of circulatory collapse.



Medication groups that can cause problems in hot weather

If you are unsure or have any questions, you should always speak to your doctor or pharmacist! You can find a selection of critical medication groups under heat on our homepage in an overview for download.

Allergies and intolerances

Antibiotics or anti-inflammatory drugs such as diclofenac or ibuprofen, but also St John's wort, for example, increase the skin's sensitivity to light and lead to increased sunburn and increased sensitivity to light and a higher risk of sunburn when exposed to higher levels of sunlight.

Pregnancy and heat

Pregnant women are under increased stress in hot weather and react very strongly to heat. Metabolism and blood circulation are altered during pregnancy and the changed hormonal situation. The weight of the unborn child is an additional physical burden. The pregnancy hormones lead to photosensitivity of the skin with the risk of sun allergies and skin irritation. Typical problems during pregnancy are, for example

- Tiredness,
- Circulatory problems,
- Swollen legs,
- hot flushes,
- sweating.

Behavioural tips for pregnant women

- Take plenty of breaks,
- avoid physical exertion,
- drink plenty of fluids,
- favour light food,
- Avoid the sun,
- seek out shady spots outdoors,
- seek cooling, e.g:
 - lukewarm showers,
 - Cool arms and legs, neck with a wet towel,
 - elevate your legs,
- Wear headgear outdoors,



- wear light, breathable clothing that covers the skin.

Children and teenagers

Children and teenagers must be particularly protected from heat and excessive sunlight!

- Children's skin is much more sensitive than that of adults!
- Children are not yet able to regulate heat well and react more quickly with overheating.
- Children sweat less and are less thirsty in the heat than adults.
- In relation to their size, children need more fluids than adults.

You can also find information here: [Federal Centre for Health Education \(BZgA\): Protecting children from the sun](#) (in German).

Behavioural tips for children and their carers and guardians

- The simplest and most effective protection is appropriate clothing and shade.
- Direct sunlight should be avoided until the age of one.
- However, to ensure children's vitamin D supply, children should go out in the sun several times a week for short periods (without the risk of sunburn) without sun protection.
- For children up to the age of four, periods in direct sunlight should be short in summer.
- When playing outdoors, make sure there are shady areas.
- Do not allow children to play outside for long periods of time when UV rays are high (11:00 to 15:00).
- Sun-appropriate clothing for children should cover the body.
- Head and neck protection.
- Breathable, light clothing:
 - Clothing with special UV protection (UV Standard 801 seal of approval) is ideal.
 - Lightweight, comfortable shoes that cover the back of the foot.
 - Sunglasses with a UV filter (especially by the sea or in the mountains).
- From the age of one, also use sun cream (sun protection factor 30 and higher).
- When spending long periods outdoors, reapply skin protection cream several times.
- Protective cream must be reapplied after contact with water.



Caution! Dangers!

Heat can lead to serious dangers, especially for children!

Heat stroke

If your child suffers from heatstroke: Call a doctor immediately!

You can recognise heatstroke by the following symptoms:

- bright red head,
- hot and dry skin,
- unsteady gait and headache,
- A fever develops and consciousness is impaired.

If you notice these symptoms, call a doctor! Also get the child...

- out of the sun,
- Cool the child,
- fluids if the child is responsive,
- Put legs up,
- Calm them down and do not leave them alone,
- Initiate first aid measures if necessary.

Sunstroke

The following symptoms are typical of sunstroke:

- Bright red and hot head,
- no fever,
- Skin normally warm or cool,
- Nausea and possibly vomiting,
- Restlessness,
- Headache and earache,
- stiff neck,
- Dizziness, possibly circulatory problems in the course of the illness.

If you notice such symptoms, you should take the child

- out of the sun,



- cool the head and neck with cool cloths,
- allow the child to drink,
- calm them down and do not leave them alone,
- A doctor is only necessary if there are circulatory or consciousness problems.

Behavioural tips for working outdoors

- Wear headgear (e.g. hat, scarf),
- make sure you wear neck and ear protection, even if you are wearing a hard hat,
- Wear the right clothing (breathable, arms and legs should be covered if possible),
- Wear sunglasses,
- use sun cream (face, hands, ears, neck),
- drink enough,
- take more breaks (including drinking breaks) in the shade,
- create or seek out shady areas (parasol or sunshade, shelter),
- Avoid heavy physical labour between 11:00 and 15:00 if possible, aim to work early in the morning or in the afternoon if possible,
- Ensure that the workplace is adequately ventilated, i.e. do not block up wind corridors,
- If necessary, use air-conditioned vehicles.

Behavioural tips for working in the office

In summer, office workplaces can be exposed to heat and humidity. You can also find information here: [German Social Accident Insurance \(DGUV\): Office workplaces \(Rule 115-401\)](#).

- Stay in cool work areas,
- Ventilate the workplace only in the cool morning, evening and night hours,
- Aim for cross-ventilation via opposite windows: but avoid draughts,
- keep windows closed during the day,
- Reduce solar radiation e.g. roller shutters or marquises (curtains indoors help to a lesser extent),
- Avoid direct sunlight at the workplace,



- Fans cool via the draught, but also generate heat. Watch out for draughts,
- drink enough,
- think about heat sources at the workplace: only leave the absolutely necessary electrical appliances and lamps switched on and, if possible, move them to other rooms,
- if possible, spend two to three hours a day in a cooler place,
- take breaks,
- hanging up damp cloths can cool the office air through evaporation, the relative humidity should be a maximum of 50%,
- Adapt dress code if necessary (in consultation with employer),
- Adjust working hours if necessary (in consultation with the employer).

