

## Heat stress study

**The Netherlands Labour Authority has conducted a survey on heat stress in the workplace. The survey was prompted by the increasing focus on heat in Europe and several reports on working in hot weather received by the Labour Authority. This study was conducted at a limited number of companies where workers are comparatively more exposed to the risks of working under high (outdoor) temperatures. The results of this exploration provide an indicative impression, as set out in the key points below.**

**The appendices discuss the definition of heat stress, its health effects, how prepared for it employers and employees are, and the level of awareness of heat stress risks and measures. The appendices also discuss the 28 exploratory inspections carried out by the Labour Authority, insights from experts, desk research and a social media campaign.**

### Key points

1. Heat presents a risk in many sectors. That is shown, among other things, by the National Survey of Working Conditions<sup>1</sup> (NEA, see appendix). The risk of heat stress is expected to increase due to warmer periods and higher outdoor temperatures. Therefore, the risks of heat stress in the workplace must be explicitly addressed. That is not least because *the population at risk* is large and likely to grow even larger. Parties that should pay attention to this at least include employers, employees, occupational health and safety specialists, safety experts, industry associations and the government.
2. Experts point out that heat stress is underestimated.<sup>2</sup> That relates to estimating the effect of heat by the person who has to endure it as well as estimating its effect on others.<sup>3</sup> Underestimation at the individual level may relate to a person's own vulnerability to heat. Examples include elderly people who consider themselves less vulnerable to heat than they actually are<sup>4</sup>, the vulnerability of others, or the deterioration of a person's own performance, as in the case of the elite athletes during the 2020 Summer Olympics.<sup>5</sup>
3. The exploratory inspections show that employers and employees are largely aware of the adverse effects of working under high outdoor temperatures and exposure to UV radiation. They cite adverse effects on workers' health and safety, as well as effects on the atmosphere at work and loss of productivity. Around two-thirds of employers say they have specific policies or agreements in place for working under high outdoor temperatures, usually in the form of a heat plan or heat protocol. This is often without a proper assessment of the risks of working under high outdoor temperatures. The exploratory inspections show a wide variation in implementing policies or agreements. There is also a pressing need among employers and employees for knowledge and correct information. This need was also evidenced by the strong interest in the Netherlands Labour Authority's social media campaign on heat stress last summer.
4. Thus, there is room for improvement, especially in properly identifying risks at the company and industry level. Sometimes, outdoor climate is not seen as a manageable risk, or there is insufficient knowledge to properly determine the risk of heat stress, or there is an outdated or

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<sup>1</sup> In Dutch: Nationale (!) Enquête Arbeidsomstandigheden

<sup>2</sup> [Effect of temperature on task performance in office environment \(escholarship.org\)](#)

<sup>3</sup> Building and Environment 2020 51: 06915 Folkers, Gerrett, Kingma, Zuurbier, Daanen 'Care provide assessment of thermal state of children in day care centres.

<sup>4</sup> RIVM indicates that research on public perceptions shows that a third of elderly people say they do not belong to a vulnerable group.

<sup>5</sup> Sports Medicine 2021 51: 2423-2436 Korte, Bongers, Hopman, Eijsvogels 'Exercise Performance and Thermoregulatory Responses of Elite Athletes Exercising in the HEAT: 'Outcomes of the Thermo Tokyo Study'.

incomplete risk assessment. The risk assessments pay little attention to measures to prevent heat-related accidents, while the mental consequences, such as loss of concentration, can lead to workplace accidents.

5. The Labour Authority stresses the importance of involving experts with knowledge of heat when drawing up a risk assessment and Health and Safety Catalogue on company and industry level. More attention to identifying and preventing the effects of heat is needed in various training courses for health and safety professionals.<sup>6</sup> The impact of conditions related to climate should also be included in assessment methods for physical strain in work situations.
6. More than a third of workers report that heat is commonplace during work on days with high outdoor temperatures. Around half of the workers say heat sometimes or often affects them. According to them, this is mainly because indoor spaces heat up due to the outside temperature, because physically demanding work is even harder by high outside temperatures, because of the combination with outdoor work and because of clothing that retains heat. Workers cite short-term adverse health effects, an adverse impact on the work atmosphere, and loss of productivity, as the most significant risks in their own company. These are the adverse effects of heat stress that they themselves have experienced the most in the past five years.
7. Based on the evaluation of inspections, inspectors endorse the importance of a risk assessment per site if the company's headquarter is located elsewhere. The location of a branch office may have a different type of building, and the activities and weather conditions may differ, which means that risks and measures should also be specific to the site. In that case, a risk assessment for the headquarter alone is not enough.
8. To determine whether there might be a risk of heat stress, the employer mainly uses weather information from the Royal Netherlands Meteorological Institute<sup>7</sup> and information from employees about whether they or a supervising colleague suffer from heat. As a result, when heat stress is diagnosed, rarely every factor is considered. Air humidity, air movement and air pollution, for example, are factors that are often measured to a lesser extent (or not at all) while they do affect the heat stress burden of workers. Interviews with employees confirm this.
9. Companies appear to have little awareness of technological applications such as apps to determine thermal stress. Regarding bottlenecks and the need for support, several employers and employees stress the importance of making old buildings more sustainable and thus also providing better protection against high outdoor temperatures. They also need readily available and practical information on heat stress.
10. Experts confirm that information on heat is incomplete and fragmented across different websites and target groups. There is no manageable or accessible understanding of the 'state of the art/science'. The need for practical guidelines and tools appears to be high, especially in terms of elaborating measures and specific information at the sector and occupational level. The various stakeholders/knowledge holders must hold periodic consultations with each other across sectors. That allows them to provide 'supported documentation and direction' on heat stress, health, and effective measures from different perspectives. An initiative for this, aimed at harmonisation and communication, has been taken by TNO<sup>8</sup> in coordination with the National Institute for Public Health and Environment<sup>9</sup>, the Faculty of Movement Sciences of the VU Amsterdam and the Royal Netherlands Meteorological Institute. That will involve a wider network, including trade unions and civil society organisations.
11. Besides employers not including all heat stress factors in risk assessment, certain factors are also missing from legislation. The currently valid article 6.1(1) of the Working Conditions Degree only mentions the temperature factor. On the one hand, this simplifies making agreements, such as in a risk assessment, health and safety catalogue, or collective agreement. On the other hand, this limitation to temperature only may lead to other relevant (source) measures being left out of the picture. A person's thermal load is influenced not only

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<sup>6</sup> They include training courses for occupational hygienists, safety experts, general health and safety experts or occupational physicians.

<sup>7</sup> Dutch translation: Koninklijk Nederlands Meteorologisch Instituut (KNMI).

<sup>8</sup> In Dutch: Nederlandse Organisatie voor toegepast-natuurwetenschappelijk onderzoek (TNO).

<sup>9</sup> In Dutch: Rijksinstituut voor Volksgezondheid en Milieu (RIVM).

by temperature but also, for example, by humidity, air movement and radiation. That makes this section of the Health and Safety Order very vague. It can therefore get in the way of good (source) measures, such as shielding heat radiation. The action perspective of stakeholders is therefore limited.

12. Following the preventive concrete heatstress measures following the hierarchy of control (STOP approach) , measures to work healthily and safely should be taken in a certain order. The first step is to look at the source of the problem, then collective measures, then individual measures and only then personal protective equipment. The Labour Authority notes that taking measures higher in the hierarchy of control (STOP approach) is not encouraged by the wording of the current Section 6.1 (2) of the Occupational Health and Safety Decree.

# Appendices

## What is heat stress?

When high outdoor temperatures increase ambient heat, and/or the body produces heat due to exertion, the body strives to stabilise core temperature by releasing heat to the environment, for example by sweating. If the body is insufficiently able to dissipate this heat, heat stress occurs. Heat stress can have adverse effects on workers' health and safety, both in the short and long term.<sup>10</sup>

In the development of heat stress, not only the (outdoor) temperature, but also humidity, air movement, thermal radiation, physical exertion and the wearing of (protective) clothing.<sup>11</sup>

Like heat stress, UV radiation can have significant health implications.<sup>12</sup> Exposure to sunlight during work is also linked to an increased risk of skin cancer.<sup>13</sup> The amount of UV radiation has increased in the Netherlands in recent decades.<sup>14</sup>

For people and accordingly also for workers, especially those in certain occupations, heat can lead to short- and long-term health problems. Several sources point to the increasing risks of heat stress due to climate change. The Health Council issued a letter of opinion on 'heat stress in the workplace' in 2011, complementing an earlier report published in 2008.<sup>15</sup> The *World Health Organization* (WHO),<sup>16</sup> the *HEAT-SHIELD Research Project*<sup>17</sup> and The Dutch Society for Occupational Hygiene<sup>18</sup> state that heat is a serious risk to the health and safety of workers and that more attention is needed.

## Health effects when exposed to high temperatures

The human body temperature (core temperature)<sup>19</sup> at rest is about 37°C. This value is achieved through the balance of heat production and heat release (circulation, sweating, breathing). If this balance is disturbed, the following health effects (occupational diseases) can occur:

- **Heat rash:** is caused by overloaded or dysfunctional drainage passages of the sweat glands and is manifested by small or large red patches on the skin, giving a burning or itching sensation.
- **Heat cramps:** are caused by salt deficiency usually due to excessive sweating and or drinking. That manifests itself through painful contractions in the muscles.
- **Heat syncope:** is caused by fluid loss and or transient low blood pressure due to (incipient) circulatory failure. It manifests as 'fainting', a short-term loss of consciousness, tiredness, clamminess, dizziness, or yawning.

If the core temperature rises above 38°C, the following health effects may also occur:

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<sup>10</sup> When referring to heat stress, this exploration refers to heat stress due to climatic heat, not process heat, which comes from a heat source or factors other than climate, such as ovens in bakeries.

<sup>11</sup> Information from the WBGT standard. See: [WBGT PSH Directive Heat Health \(rivm.nl\)](#)

<sup>12</sup> Too much UV radiation has adverse health effects. The skin burns and ages faster. Also, eyes can be damaged by too much sunlight. Solar power is a measure (number) of the amount of UV radiation in sunlight reaching the ground on Earth. The greater the solar power, the greater the health implications. RIVM continuously measures the sun's radiation and uses it to calculate the solar power.

<sup>13</sup> M. Fartasch et al, [The relationship between occupational sun exposure and non-melanoma skin cancer: clinical basics, epidemiology, occupational disease evaluation, and prevention - PubMed \(nih.gov\)](#), *Deutsche Arzteblatt International*; 2012. T. Loney, Global evidence on occupational sun exposure and keratinocyte cancers: a systematic review, *British Journal of Dermatology*, 2021 (184), p. 208- 211

<sup>14</sup> [CBS et al. 2020.; Sun strength and UV | RIVM](#)

<sup>15</sup> [Heat stress | Opinion | Health Council](#)

<sup>16</sup> WHO, heat and health European Region, update evidence for effective prevention (2021) WHO/Europe | Climate change - Heat and health in the WHO European Region: updated evidence for effective prevention (2021)

<sup>17</sup> [HEAT-SHIELD Infographics | hscopy1](#), [Guide for employers and enterprises | hscopy1 \(heat-shield.eu\)](#), [Scientific Articles | hscopy1 \(heat-shield.eu\)](#)

<sup>18</sup> [NVvA meetings 2021 | NVvA \(arbeidshygiene.nl\)](#)

<sup>19</sup> Body core temperature: temperature in the trunk and brain for which the temperature of blood in the pulmonary artery is the standard. From: health Council advice on heat in the workplace (2008 and 2011).

- **Heat exhaustion (shock):** occurs due to insufficient heat release, causing temperature rise, further circulatory failure, and severe fluid and salt loss. That manifests as low blood pressure, weakness, fatigue, clammy and pale skin, dizziness, nausea, and headache.
- **Heat stroke:** the heat balance is severely disrupted; core temperature rises further (>40.6°C), leading to damage and breakdown of cells in various organ systems and risk of fatality. Dysfunction of the brain causes abnormal behaviour, delirium, unconsciousness, and convulsions. The skin is warm and dry.

Long-term heat exposure can result in chronic health effects: insomnia, decreased appetite, dizziness and irritability. The ability to concentrate also declines, increasing the risk of accidents. This can be detrimental and dangerous in jobs that require attention and concentration: public transport, surveillance/security, working at height, etc.

## Section 6.1 Working Condition Decree on heat

Section 6.1 Working Condition Decree:

1. *Taking into account the nature of the activities carried out by workers and the physical load resulting from them, the temperature at the workplace should not cause harm to workers' health.*
2. *If the temperature at the workplace or unfavourable weather conditions may nevertheless cause damage to workers' health, personal protective equipment should be provided. If the personal protective equipment provided cannot prevent damage to health, the duration of the work must be limited to such an extent or the work must be alternated with such frequency by a temporary stay in a place where a temperature as referred to in the first paragraph prevails, so that no damage to health occurs.*

## NEA data analysis

In 2021, at the request of the Ministry of Social Affairs and Employment, the National Survey of Working Conditions (NEA) included a one-off question on heat ("*Do you feel that measures are needed against heat?*"). The analysis of this NEA data shows that 81% of respondents do not think any measures are necessary. These are workers who are not exposed to heat.

Of the remaining 19% who are exposed to heat, 56% indicate that no measures are needed because sufficient measures are already in place. 44% indicate that measures are needed because current measures are insufficient (33%) or completely lacking (11%).

The NEA reveals the following high-risk sectors where people are significantly more likely than average to feel that measures are needed against heat: public road transport, mail and couriers, agriculture, forestry and fisheries, primary and secondary education, construction, healthcare, security, and law enforcement.

## Experts and desk research

Experts<sup>20</sup> have contributed knowledge through expert meetings and (additional) interviews. It is important to note that increased ambient heat levels due to climate change significantly jeopardise human health, well-being and sustainability. They highlight the relevance of good, internationally recognised measurement methods to determine heat stress.<sup>21</sup>

The literature and interviews with experts show that the likelihood and severity of adverse health and safety impacts on workers depend on environmental factors, the exertion involved in the work, person-related characteristics and the clothing they wear. The risk of heat stress is amplified when these issues occur in combination, such as high humidity and difficulty sweating. Some other

<sup>20</sup> From the VU Amsterdam (faculty of exercise science), TNO, the National Institute for Public Health and Environment, the Public Health Service (GGD), the Netherlands Trade Union Federation (FNV), the SER Health and Safety, Prevent Partners and BMD Advice. Separate discussions were held with KNMI (see nr. 7) and the Netherlands Food and Consumer Product Safety Authority (NVWA).

<sup>21</sup> International Journal of Biometeorology 2018: Special issue on trans-disciplinary approaches to climate change, 62: 291-306 Kjellstrom, Freyberg, Lemke, Otto, Briggs 'Estimating population heat exposure and impacts on working people in conjunction with climate change'. This raises an important measurement method for determining working people's thermal load ('heat stress'), the Wet Bulb Globe Temperature (WBGT). This WBGT standard has been incorporated into an international NEN primary standard. This and another NEN standard on heat were included in the Explanatory Memorandum of the Occupational Health and Safety Decree until 2007. Since 2007, the link to these NEN standards no longer applies.

factors, such as medication use, limited autonomy to adjust work (such as in the police, military or fire brigade in crisis situations) or mandatory regulations regarding (protective) clothing when working with hazardous substances, for example, can increase the risk of heat stress. Private circumstances of employees at home (before someone goes to work or after someone comes home after a working day in a low-heat home) or the combination with process heat/radiant heat (such as that from furnaces) can also increase the risk of heat stress, as can working in full sunshine.

Adverse effects of heat stress can occur either in the short<sup>22</sup> or long term and can have both a physical and mental component.<sup>23</sup> The risk of skin cancer from UV exposure is also highlighted. On 8 November 2023, the World Health Organisation (WHO) and the International Labour Organisation (ILO) published the first global estimates of the burden of non-melanoma skin cancer attributed to occupational sunlight exposure. They call on governments to protect outdoor workers from it. Skin cancer is the most common form of cancer in the Netherlands.

Experts and the literature indicate that employers underestimate the risks of heat to workers.<sup>24</sup> Similarly, those who endure the heat underestimate their own decline in performance due to heat.<sup>25</sup>

Less research has been conducted on heat stress in workers than in, for example, elite athletes and healthcare.<sup>26</sup> Experts say it is important to look at heat stress holistically and communicate measures holistically as well. This is also because one sector can benefit from the knowledge and insights of the other. Since 2023, for instance, the National Institute for Public Health and Environment has been using a heat plan so that vulnerable groups, care organisations, carers and informal carers are warned in time for an expected period of sustained hot weather and can take measures. These advance warnings are also of interest to employers. This heat plan can be used more widely, and more links can be made to information on measures to be taken.

Information on heat is currently incomplete and fragmented across different websites, and there is no manageable understanding of the state of the art/science. There is a pressing need for practical guidelines and tools. Experts say it is important that the risk assessment pays more attention to the subject of heat. It is also important that training courses for occupational hygienists and safety experts<sup>27</sup>, among others, pay more attention to heat and its assessment. It is also important to include the impact of climatic conditions in assessment methods for physical strain in work situations.<sup>28</sup>

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<sup>22</sup> Possible short-term consequences include heat cramps, heat shock or heat stroke. Chronic exposure to heat increases the risk of insomnia, decreased appetite, dizziness and irritability. The decline in concentration can increase the risk of accidents. See Kingma et al, *Time perception and timed decision task performance during passive heat stress* (2020).

<sup>23</sup> Among mental consequences, the Health Council in 2011 lists: decrease in vigilance, increased error proneness, increase in accidents, reduction in short-term memory and concentration and increase in psychological discomfort (distress) when the ambient temperature increases. See: [letter advisory heat stress \(8\).pdf](#). Experts indicate that sleep deprivation due to heat can also have mental consequences.

<sup>24</sup> See [Effect of temperature on task performance in office environment \(escholarship.org\)](#).

<sup>25</sup> This is according to research on performance deterioration in elite athletes during a maximum exercise test and simulated heat in preparation for the Tokyo Olympics. Performance deteriorated by over 26%. See Sports Medicine 2021 51: 2423-2436 Korte, Bongers, Hopman, Eijsvogels 'Exercise Performance and Thermoregulatory Responses of Elite Athletes Exercising in the HEAT: 'Outcomes of the Thermo Tokyo Study'. Another study on the effect of temperature on performance in an office environment shows that performance deteriorates in a working environment above 23-24 Celsius. (*The results show that performance increases with temperature up to 21-22 °C, and decreases with temperature above 23-24 °C. The highest productivity is at temperature of around 22 °C. For example, at the temperature of 30 °C the performance is only 91.1% of the maximum i.e. the reduction in performance is 8.9%*). [Effect of temperature on task performance in office environment \(escholarship.org\)](#).

<sup>26</sup> ZonMW and NWO mainly fund research on the effect of heat on sport and public health. According to the experts, no known funds finance research in the field of occupational health in the Netherlands.

<sup>27</sup> This would also be useful for occupational physicians, general health and safety experts.

<sup>28</sup> [Climate conditions in relation to physical load | BMD Advice](#)

## Notifications and exploratory inspections

Between 2018 and 2022, the Labour Authority received a total of 775 reports and complaints related to heat (stress) due to climate, excluding process heat.<sup>29,30</sup> The heat waves of 2018 and 2019 show clear peaks in reports (around 200 per year). Analysis shows that proportionally, reports and complaints originated most from the following sectors: mail and couriers, retail and agriculture. The complaints usually come from workers complaining of heat in indoor locations due to excessive outdoor temperatures. The reports concern employers who do not take up complaints much, if at all. In the cases where the Labour Authority investigated, relatively often there was a combination with other violations, such as in the field of dangerous substances or corona. For one in eight heat reports, there is a possible risk of increased damage to health, and the report is followed up in accordance with Section 6.1 of the Working Conditions Decree.<sup>31</sup> The complaint is handed over to an inspector and sent out for investigation.

The Netherlands Labour Authority carried out 28 exploratory inspections in 2023 at companies where risks of heat exposure during work are expected to be relatively high. It based its selection on incoming reports and complaints supplemented by an analysis of data from the NEA. To obtain an (indicative) picture in the companies, semi-structured interviews were conducted: 28 with employers and 29 with employees.

Based on an analysis of complaints, reports and NEA data, a diverse selection of companies was made prior to and during the project. The selection includes both occupational groups performing outdoor work (direct exposure to heat and UV radiation) and those (partly) performing indoor work (heat due to outdoor climate).<sup>32,33</sup>

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<sup>29</sup> Sometimes the report included other aspects of poor work practices (such as PSA and hazardous substances) besides heat; (climatic) heat was then not the only element.

<sup>30</sup> Reports related to process heat were excluded from this analysis. It is possible that there could be more heat stress due to climatic heat at farms with an indoor heat source.

<sup>31</sup> Reports of or complaints about poor working conditions trigger further investigations by the Labour Authority in about a third of cases. For heat reports, this is less frequent: in 156 cases (20% of the total number of reports). One explanation could be that a violation of Section 6.1 of the Working Conditions Decree is not categorised as a "serious offence", and there is rarely evidence of acute health hazard. Also, incomplete information from the reporter may result in the report not being followed up. Many of the complaints seem to be about discomfort. After all, the Labour Authority works risk-oriented and will try to persuade the employer to act when such reports are made. In most cases, this is what happens.

<sup>32</sup> However, one report was included that was subsequently found to relate to process heat (namely, a complaint about the manufacture of products on plastic and rubber). The report was received as a complaint during the period when the inspections took place.

<sup>33</sup> Four cases included in this track stemmed from a (current) complaint or report. Interviews were conducted in three cases; this resulted in warnings in two cases. In one case, the work on site had already ended.



Sector	Occupations	Number of exploratory inspections
Nursing, care, support with overnight stay	Care and nursing home staff	7
Construction or construction-related	Construction workers	6 <sup>34</sup>
Agriculture, hunting and fishing	Gardeners, arable farmers, livestock farmers	5
Public road transport	Drivers of vehicles and operating mobile machinery	3
Mail and couriers	Administrative staff, vehicle drivers and mobile machinery operators	3 <sup>35</sup>
Education	Teachers	1
Collective category under which animals and botanical gardens fall	Ranger (guiding and transport)	1
Manufacture of rubber and plastic products	Plastic bag maker	1 <sup>36</sup>
Forestry	Gardener/machinist	1

Due to the exploratory nature of the project, the companies visited were not selected based on a random sample, and the number of companies visited was small. Moreover, social desirability cannot be ruled out when answering specific questions. Where this survey makes statements about 'the employers' or 'the employees', this refers only to the employers and employees spoken to and does not give an overall picture of the companies visited. The results provide an indicative picture of risk awareness, measures taken and bottlenecks.

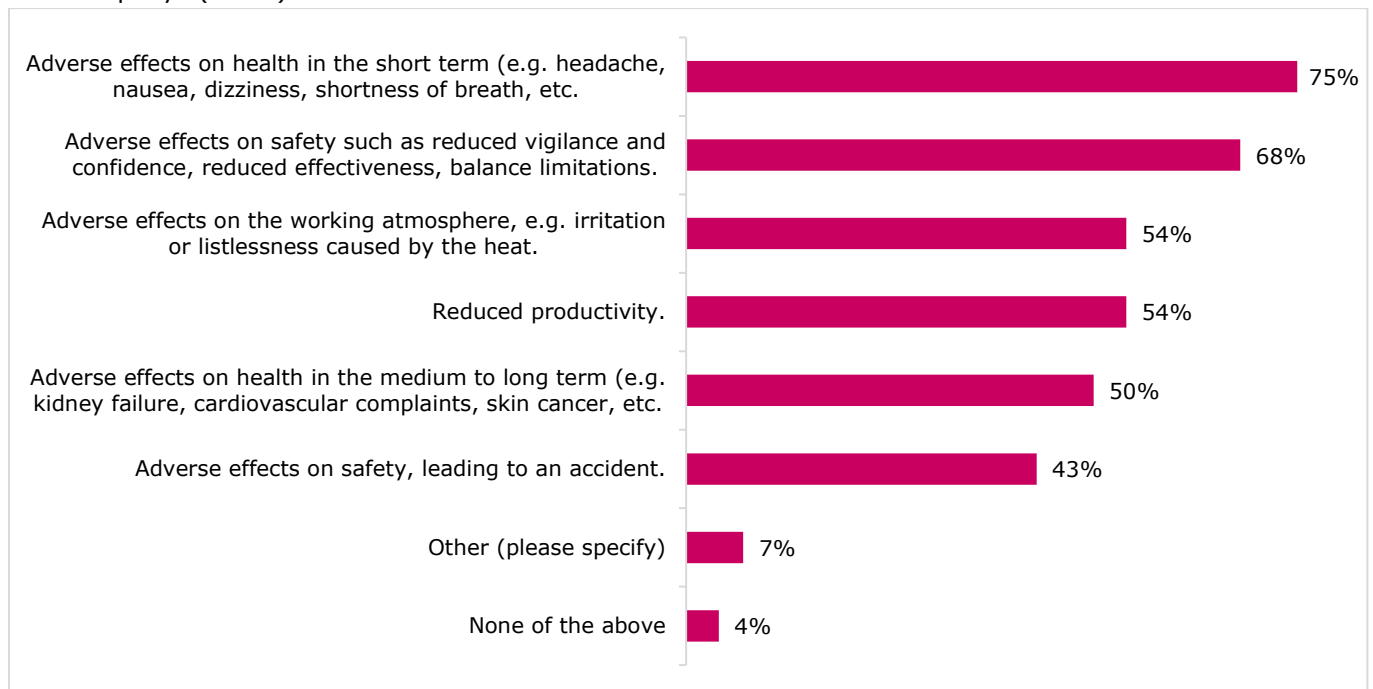
<sup>34</sup> One case involved a questionnaire when a building inspection found a worker working on the roof with a gas burner at an outdoor temperature of around 30 degrees Celsius. One case concerned the laying of power lines, and the other was related to laying solar panels.

<sup>35</sup> One case stemmed from a complaint/report earlier this summer. Warnings were issued for the following offences. The risk assessment for the workplace and commercial vehicles was found to be incomplete (Art. 5(1) Working Conditions Act). The action plan does not describe sufficient measures for the physical risks and hazards (heat/heat stress) that the work presents for the employees (art. 5 Section 3 Health and Safety Act). The risk assessment has not been reviewed by a certified core expert even though the company has more than 25 employees (Section 14(1) of the Occupational Health and Safety Act).

<sup>36</sup> One case stemmed from a complaint a few days earlier. The reporter had a headache, was dizzy or nauseous. The reported worked in 30 degrees Celsius without proper ventilation with a device (to melt plastic together) that gave off additional heat. The risk assessment had not been reviewed by a certified core expert, leading to a warning.



**Figure 1** What do employers see as the risks of working under high outdoor temperatures in their own company? (N=28)



## Employers

### Risk (awareness)

Employers are largely aware of the negative consequences of working under high outdoor temperatures and exposure to UV radiation. They cite adverse consequences not only for the health and safety of workers, but also on the work atmosphere and loss of productivity.

However, half of employers do not identify the risks properly. The reason is that employers do not always find it necessary or they do not see the outdoor climate as a manageable risk. There is also sometimes a lack of sufficient knowledge on determining the risk of heat stress or an outdated or incomplete risk assessment.<sup>37</sup> Risk assessments pay virtually no attention to occupational accidents due to heat.

### Employer from transport and logistics sector

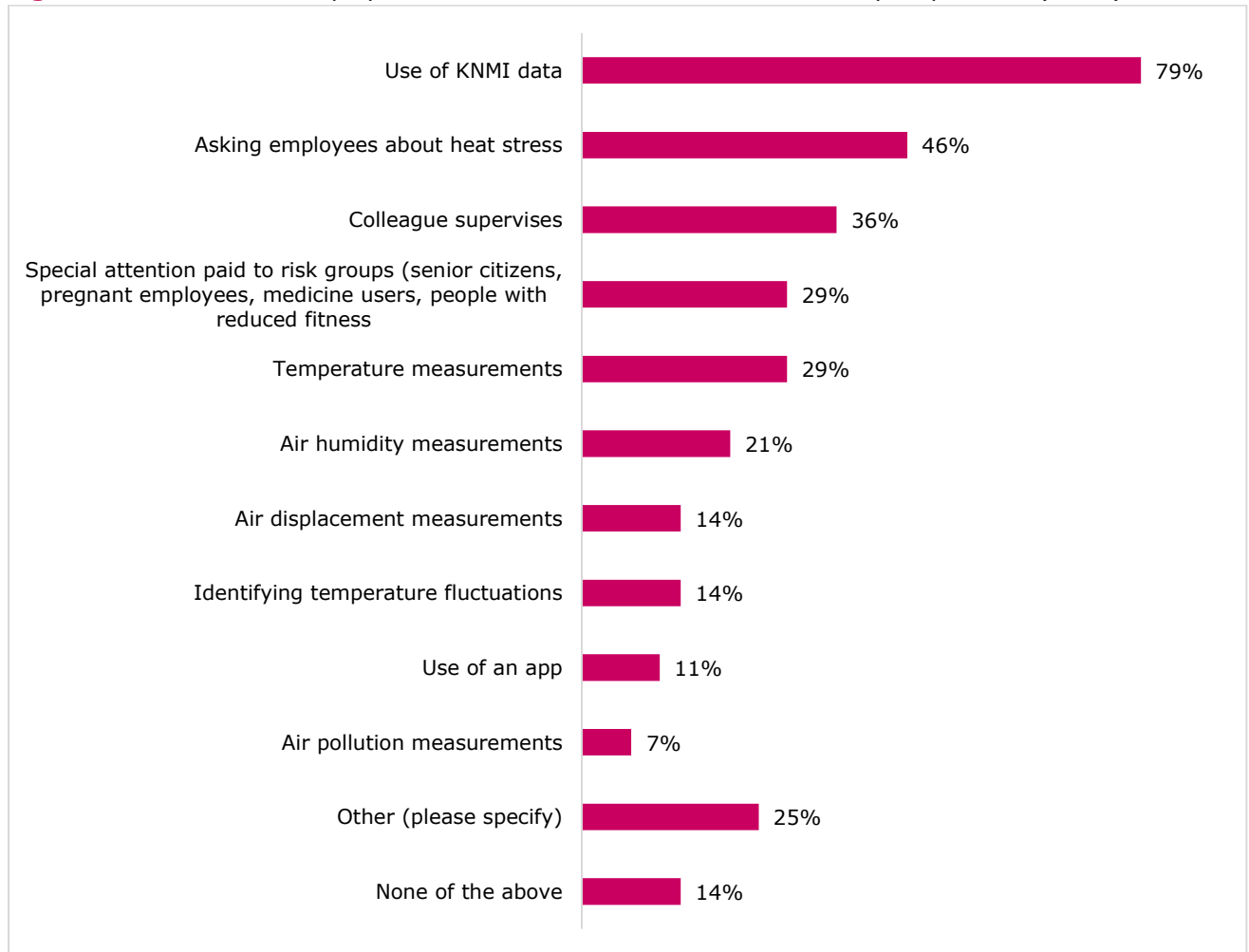
"There is little or no focus on heat, and there is a cost-benefit trade-off when buying air conditioning in commercial vehicles. Weather-related risks are taken for granted."

"Heat leads to other problems, such as downtime and road safety."

<sup>37</sup> Furthermore, one-third say 'no' and 18% say 'other'. The reasons given for this were:- the risk assessment only briefly and summarily addresses it :

- risks are known but substantively difficult to identify and quantify
- due to changing personal circumstances, weather conditions, environmental factors or care taking place at home- Self-employed- in high outdoor temperatures, work is carried out indoors- are in the Health, Safety and Environment plan and protocol and not in a risk assessment.

**Figure 2** What does the employer do to determine whether heat stress may be present? (N=28)



To determine whether heat stress may be present, employers mainly use data of the Royal Netherlands Meteorological Institute (79%), ask employees whether heat stress is present (46%) or have a colleague monitor the situation (36%). Only 11% mention using an app.<sup>38</sup> Taking measurements such as temperature (29%) or temperature changes (14%), humidity (21%), air movement (14%), air pollution (7%) are also mentioned less by employers.

## Measures

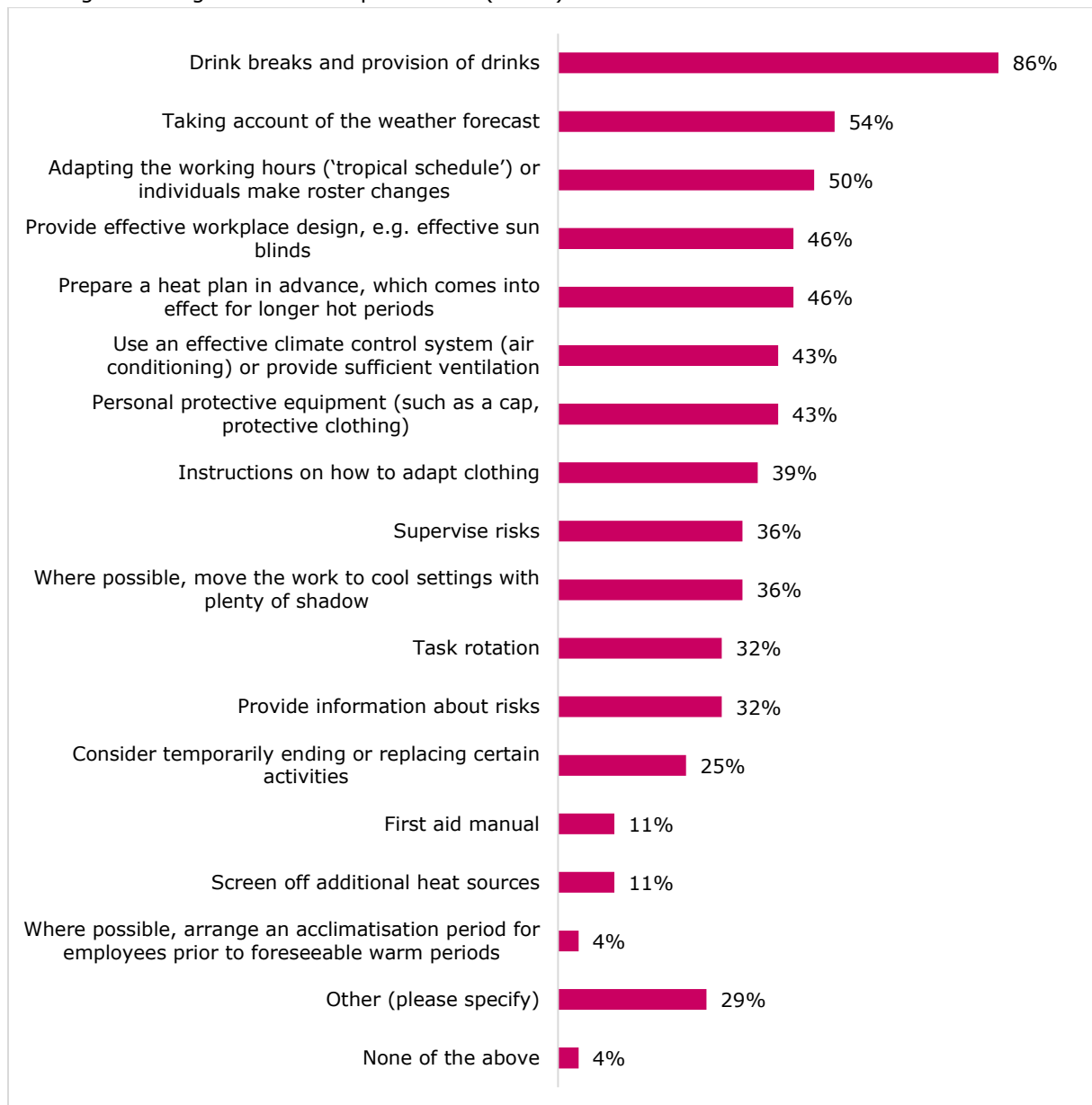
Around two-thirds of employers say they have specific policies or agreements in place for working under high outdoor temperatures, usually in the form of a heat plan or heat protocol. This is often without a proper assessment of the risks of working under high outdoor temperatures. How policies or agreements are implemented varies widely.

### Employer from transport and logistics sector

"There is no policy because there are no complaints. There are air conditioning, electric awnings, heat protection film, clothing line expanded with more airy clothes. Special circumstances will be taken into account when scheduling."

<sup>38</sup> There are several apps that can be used to determine thermal load using the WBGT index to understand whether a person can work within a certain environment and time period. These apps take several elements that affect heat: such as temperature and humidity activity level and personal characteristics such as weight, height, acclimatisation, and clothing.

**Figure 3** What measures has the employer taken to prevent or mitigate the adverse effects of working under high outdoor temperatures? (N=28)



**Employer from horticulture sector**

“We make mutual agreements about starting earlier. Measures include different working hours, taking breaks on time, providing sufficient water, and employing more people. We did packing in the hall for a while because it got cooler there, but as throughput times dropped, we reversed that.”

The most common measures taken were providing drinks and taking drink breaks (86%), taking into account the weather forecast (54%) and adjusting working hours ('tropical schedule') or arranging the schedule individually (50%). Proportionally, when taking measures, personal protection seems to be the first to receive more attention than measures, which is higher in the hierarchy of the preventive heat stress measures following the hierarchy of control (STOP approach).

## **Bottlenecks and need for support**

Employers seem willing to take additional heat measures following the Labour Authority's visit. They consider attention to heat important not only because of the health and safety of workers but also for business reasons, such as workers leaving the company or sector and losing productivity.

Most employers experience bottlenecks when taking measures, such as too few staff or support services to identify risks, dependence on surroundings, laws and regulations that are not clear, or the fact that many heat measures are often technically less feasible. Employers express a need for more up-to-date information in an easily findable central place that clarifies what they can do best. They also need (more) support and advice from the industry, including on policy and action.

### **Employer from health and welfare sector**

"An in-depth health and safety catalogue would be useful. It is too global, and the industry association does not provide enough guidance and solutions. The government should continue to draft practicable laws and regulations, which can also be practically tested in the workplace, based on risks that may exist for the worker, especially if the risk increases in the future."

### **Employer from landscaping sector**

"Sometimes you depend on your environment when operating a tropical schedule. It's not everywhere that you can start at 6:00 am because of noise."

Interestingly, regarding bottlenecks and the need for support, several employers from the care and welfare sector emphasise the importance of preserving old buildings and having sufficient financial resources.

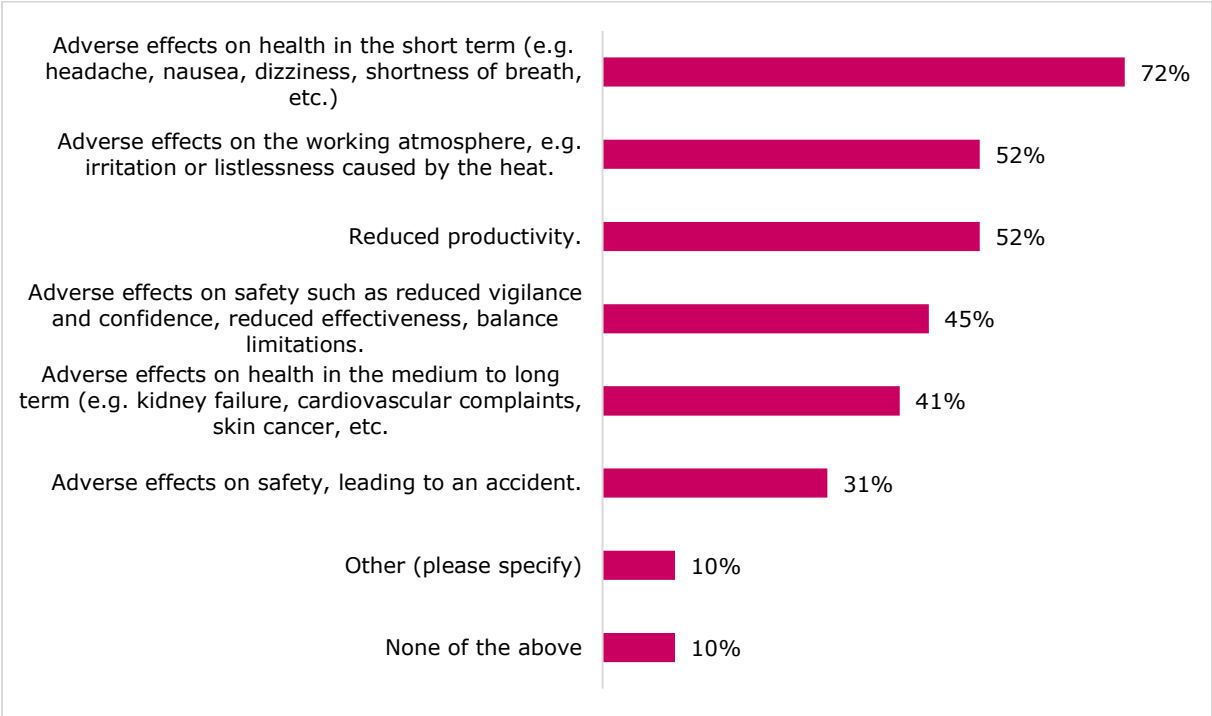
## **Employees**

### **Risk (awareness)**

According to workers, heat stress is mainly caused by warm indoor spaces due to outdoor temperatures, physically demanding work made even harder by high outdoor temperatures, having to regularly work outdoors where high temperatures prevail and because the clothes the worker wears can get very hot and retain heat.

Over a third of workers report frequent heat during work on days with high outdoor temperatures. Around half of the workers indicated that they suffer from the heat sometimes or often themselves.

**Figure 4** What do employees see as the risks of working under high outdoor temperatures in their own company? (N=29)



Workers are largely aware of the negative consequences of working under high outdoor temperatures and exposure to UV radiation. Employees cite adverse short-term health effects (72%) as the most significant risks in *their own company*, as well as adverse effects on the working atmosphere such as irritation and listlessness (52%) and loss of productivity (52%).<sup>39</sup> One in three workers say they have not experienced any adverse effects of heat stress in the past five years.

**Horticulture sector worker**

"You can be so hot that sweat is pouring down your body. I then get languid and work less hard. I also sit in the shade more often. I get tired faster and also drink a lot more."

**Health and welfare sector employee**

"You can get dazed by heat and get headaches sooner. You can also get hot feet, which keeps you warm and increases the risk of foot fungus. We cannot wear sandals and flip-flops for safety reasons when performing the work. We must adhere to the over-the-knee and over-the-shoulder prescription for airy clothing. Sometimes, these clothes are too hot."

<sup>39</sup> Asked about the negative consequences of heat stress that workers *themselves* have experienced in the past five years, the consequences are mentioned in this order: loss of productivity, adverse short-term health effects and adverse effects on work atmosphere such as irritation and apathy due to heat.

## Measures

According to more than half of employees, the employer has specific policies or working arrangements in place for working in high outdoor temperatures. According to employees, to determine whether excessive heat, i.e., heat stress, may be present, the employer mainly uses data of the the Royal Netherlands Meteorological Institute, followed by inquiring whether employees experience excessive heat and measuring the temperature. Measuring humidity, air movement, air pollution and using an app are mentioned significantly less often to determine whether heat stress is present. Only 3 per cent mention using an app.

### Health and welfare sector employee

"It is important that when there is a heat wave, there is close consultation and coordination within the team among themselves about work arrangements (which tasks to drop first or later) and about (individual) work pace."

### Employee from Transport and Logistics sector

"Paying attention to the construction attention is important, e.g. all work halls in open connection for transit. A cooled floor is an ideal solution."

Regarding bottlenecks and the need for support, several workers mention the importance of preserving old buildings.

## Social media campaign

During the course of the exploratory inspections, two successful social media campaigns on heat stress were launched via LinkedIn. These campaigns ran from 16 August to 26 August and from 4 September to 11 September 2023. These two periods were chosen because the National Institute for Public Health and Environment simultaneously made an advance announcement of an upcoming heat period during the inspections. In this campaign, the Labour Authority called for preventing heat stress and making the necessary preparations and measures. It also referred to an information page on [Arboportaal \(in Dutch\)](#). During these campaigns, the following target groups clicked through the most: hospitals and healthcare, construction, catering, arable farming, freight and rail transport.