Training as a tool to boost workers' adaptation to increased workplace temperatures

Policy Brief | August 2020

Key messages:

- Providing individuals working in the heat with access to adequate and regular **training preserves their health** and **reduces economic losses**.
- **Regulations** demanding employers to **provide adequate and regular health and safety training** to workers and their supervisors should be in place to mitigate such damages.
- Policy makers can **facilitate** employers' and workers' organizations' **compliance** to the regulations **by launching relevant educational and awareness-raising campaigns**.
- Training and care should be prioritized for older workers, those with pre-existing health conditions, and those taking medications who are the most vulnerable to the effects of heat.

Climate change is making the planet warmer. The global surface temperature has constantly and dramatically increased since the 1960s, and it will keep raising in the next decades. One of the consequences is that hundreds of millions of people working in the heat are now exposed to harsher and more dangerous environmental conditions. Due to the increased environmental heat, the capacity of workers' bodies to cool down is often inadequate and their body accumulates heat resulting in dangerous elevations of the body core temperature. Such a phenomenon is usually referred to as occupational heat stress, and can lead to illness or death as well as enormous economic losses.

Occupational heat stress arises as a result of one or more of the following factors:

1. Harsh environmental conditions (e.g. increased air temperature and humidity, limited air flow),
2. Increased accumulation of heat due to performing physically demanding tasks, and
3. Requirement to wear insulated and/or impermeable protective clothing, which limits the ability to dissipate heat through sweat evaporation.

A recent study found that 35% of individuals who frequently work in occupational heat stress conditions experience significant negative health effects, while 30% reported productivity losses.[1]

Effects of heat

Occupational heat stress can lead to mild as well as severe illnesses. Hyperthermia is a term used when the body's core temperature exceeds 38°C. In such a situation, heat cramps and other minor health complications may occur. In this level of stress, heat exhaustion may also occur, which is characterized by the inability to sustain enough blood supply to the different tissues of the body. If hyperthermia is left untreated and

[1] F., D., I. et al. 2018. Workers' health and productivity under occupational heat strain: a systematic review and meta-analysis. *The Lancet Planetary Health.* 2(12):e521-e531. Available at bit.ly/2WO5PEU

the individual keeps working, the body core temperature can surpass 39°C and can lead to neurological as well as kidney, liver, and gut damage.

Occupational heat stress can lead to death. If the body's core temperature rises above 40.5°C, it can lead to heatstroke, which is a medical emergency that often kills. Heatstroke is caused by a failure of the neural system which prohibits the normal function of our hypothalamus, the region of the brain that works as our thermostat. The hypothalamus regulates mechanisms such as sweating and rapid breathing. Thus, when the hypothalamus fails, so does our ability to dissipate heat. Heat stress is also associated with fatal injuries and accidents, explained by the link between ambient conditions and unsafe behaviours.[2]

Occupational heat stress leads to enormous economic losses. An estimated 1.4 per cent of total working hours were lost across the world in 1995 as a result of high heat levels – the equivalent of around 35 million full-time jobs.[3] Estimates obtained by combining a global temperature rise of 1.5°C by the end of the twenty-first century with labour force trends suggest that, by 2030, the share of total working hours lost will rise to 2.2 per cent – equivalent to 80 million full-time jobs.[3] The distress, fatigue, and illnesses associated with heat stress decrease workers' productivity by forcing them to slow down their work pace to keep themselves healthy or, when self-pacing is not allowed, to take more leave days due to pathologies induced by heat stress.

Some workers are more vulnerable than others to occupational heat stress. People aged 55 years or older, taking medications, and/or with pre-existing medical conditions such as obesity, cardiovascular diseases, respiratory diseases, and diabetes mellitus are exceptionally vulnerable to occupational heat stress (Fig. 1).[4]

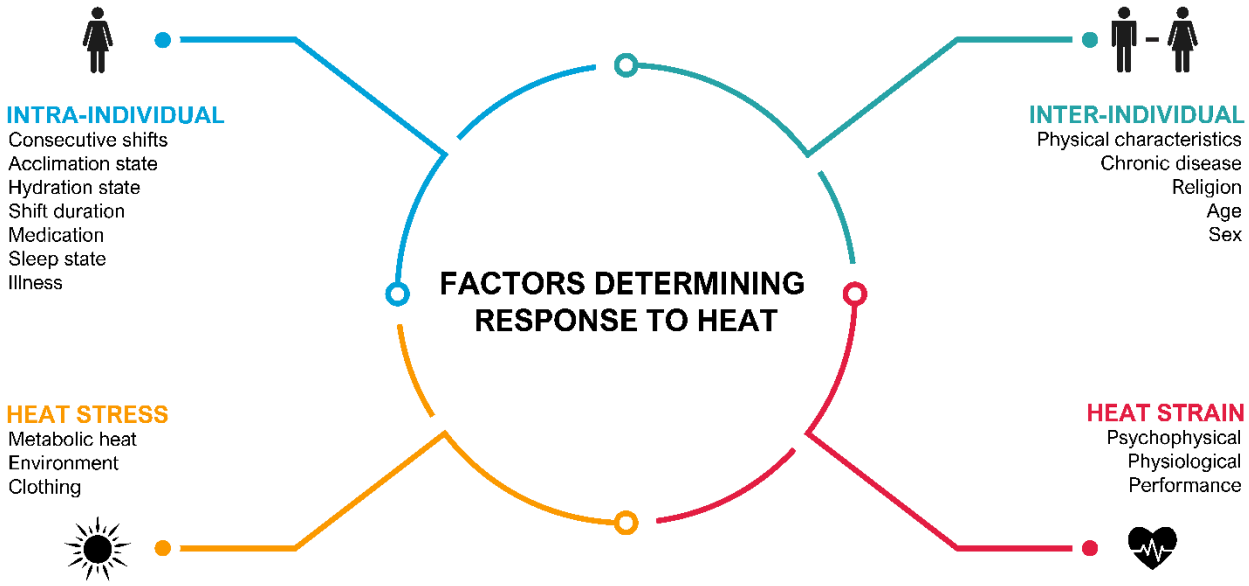

Fig. 1. Factors determining response to heat. The image is a modified version of a previously published illustration.[4]

[2] R., B., B. et al. 1983. Effects of workplace thermal conditions on safe work behavior. *Journal of Safety Research*. 14(3):105-114. Available at bit.ly/2WJZ4UE.

[3] K., M., S. et al. 2019. Working on a warmer planet: *The impact of heat stress on labour productivity and decent work*. Geneva: ILO. Available at bit.ly/3fo7pdm.

[4] N., F., K. 2019. Occupational heat stress management: Does one size fit all? *American Journal of Industrial Medicine*. 62(2). Available at bit.ly/3363nh3.

These conditions decrease the body's ability to adapt to changes in environmental conditions; thus, when people must perform physical work in a hot environment, heat-related pathologies and deaths are more frequent in these groups.

Access to training

Training is key for preventing the negative effects of heat on health and the economy. A worker in the heat periodically and properly trained to prevent and protect her/himself from heat-related complications will be healthier, thus more productive, and able to help other workers avoid the negative effects of occupational heat stress. However, many workers are left with inadequate access to training on these issues. For instance, only 14% of farmworkers in the US receive job training by their employers[5], and 83% of a sample of Ghanaian miners lamented the lack of regular training on occupational heat stress.[6]

A Call to Action

Occupational heat stress is costly to workers, employers, and states. Policy efforts to increase workers' access to adequate training are critical to preserve workers' health as well as to circumvent enormous economic losses.

The United States Department of Labour launched in 2011 the Heat Illness Prevention campaign, aimed at educating employers and workers on the dangers of working in the heat. Through training sessions, outreach events, informational sessions, publications, social media messaging and media appearances, millions of workers and employers have learned how to protect workers from the heat since then.

The HEAT-SHIELD project is an EU-funded research programme started in 2016 which aims to address the negative effects of increasing workplace temperature on the working population. It led to the creation of an online platform providing free and personalized expert advice to employers and workers on how to protect from occupational heat stress.[7]

These state-of-the-art initiatives are important first steps towards addressing workers' climate adaptation by means of training. Nevertheless, further action is necessary to improve workers' access to adequate occupational heat stress training.

We call on policymakers to:

- Put in place regulations demanding employers to provide adequate health and safety training to workers and their supervisors before they begin working in a hot environment and regularly after that,
- Facilitate employers' and workers' organizations to comply with occupational safety and health regulations by launching relevant educational and awareness-raising campaigns,
- Ensure that training and particular care are given to the workers identified as exceptionally vulnerable to the effects of heat due to age, pre-existing heath conditions, and/or medications taken.

[5] H., G. 2018. *Findings from the National Agricultural Workers Survey (NAWS) 2015-2016: A Demographic and Employment Profile of United States Farmworkers.* Available at bit.ly/3fYcaFk.

[6] N., A. A., F. et al. 2020. Barriers to occupational heat stress risk adaptation of mining workers in Ghana. *International Journal of Biometeorology*. 64:1085-1101. Available at bit.ly/3fJoQNg.

[7] M., M., N. et al. 2019. An Occupational Heat–Health Warning System for Europe: The HEAT-SHIELD Platform. *International Journal of Environmental Research and Public Health*. 16(16):2890. Available at bit.ly/39I9byu.

About the FAME Lab

At FAME Lab, we imagine a world in which the vast majority of people understand how the environment impacts their life and plan their goals and activities in harmonious accordance with the long-term well-being of humanity. Our goal is to get closer to that, to stand as a beacon that points towards that, and to offer the tools we can and inspire others to help us build tools to get to that world.

We strive to help society understand and adapt to the impacts of environmental factors on human beings. Understanding and addressing the drivers of poor outcomes in health, productivity, and performance will, undoubtedly, accelerate improvements in quality of life for all people – sustainably and justly.

The FAME Lab was founded in 2008 to study the (F)unctional (A)rchitecture of (M)ammals in their (E)nvironment. Our group is part of the University of Thessaly School of Exercise Science and it currently consists of 15 researchers employed full-time as well as >10 graduate students. To date, we have participated in >18 EU-funded projects, we have published >200 research publications, and have presented our work in >300 international conferences. We also disseminate our work through Twitter, Facebook, and YouTube.

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The TEP-A was established under the United Nations Framework Convention on Climate Change (UNFCCC) process in 2015 and seeks to identify concrete opportunities for strengthening resilience, reducing vulnerabilities, and increasing the understanding and implementation of adaptation actions. The process is organized by the SBSTA and SBI and conducted by the Adaptation Committee. For more information see tep-a.org