

**FACT SHEET – OCCUPATIONAL HEALTH AND SAFETY**  
**Exposure: Hot temperature conditions and extreme heat - Cardio vascular diseases**

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## 1 BASIC DESCRIPTION

### *Vulnerable Groups In General*

- poor people, Low and middle income countries
  - low socio-economic status is associated with a higher **BMI** because unhealthy food is often less expensive and poor people have less opportunities for **physical activity** → obesity increases vulnerability (Karen Yeares et al., 2016)
  - increased prevalence of **hypertension, high blood cholesterol and tobacco** use in LMICs (Karen Yeares et al., 2016)
  - People in LMICs have the greatest vulnerability, least resilience and capacity to cope with NCDs → Much of the care and prevention of NCDs requires out-of-pocket costs (Karen Yeares et al., 2016)
  - medical access and disease treatment is less than in high income countries which can amplify CVD (Rosengren et al., 2019, p 749.)
- Indigenous/aboriginal people, black people
  - Two major risks for CVD in Aboriginal groups are high rates of **smoking and T2DM** (Karen Yeares et al., 2016)
  - colonization, dispossession of land, loss of language, culture and traditional practices – that contribute to their poorer health status which, in turn, influence the modifiable risk factors for NCDs including CVD (**diet, physical activity and nontraditional tobacco use**) (Karen Yeares et al., 2016)
- People with low level of education
  - people with a higher level of education are less likely to have CVD (Rosengren et al., 2019, p 754.)
- Old(er) people
  - Heat sensitivity increases with age, which can intensify existing CVDs (Herrmann, 2019)

### *Vulnerable Occupational Groups*

- **Plant and machine operators** and assemblers and **Elementary workers** are more likely to experience traditional CVD risk factors, while 'Professionals' were less likely to experience these risk factors (Barnes, 2020)
- **'Clerks'** were more likely to have high blood pressure (Barnes, 2020)
- **Higher occupational class** (professionals and managers) was associated with excess risk for CHD (Zaitsu, 2020)
- **construction/extraction** → heat-related mortalities due to their constant work with machinery tools, working aloft, heavy workload, hot accommodation, and constant and direct exposure to sunlight (Liu, 2015)
- **agricultural workers** also showed high rate of heat-related deaths among all industries because of working in extreme outdoor heat in summer → dehydration (Liu, 2015)

### *Legal Regulations (WHO, OSH Profile Germany)*

- Prevention of CVD is in the domain of the Ministry of Health and there is no specific regulation on the prevention of these diseases in the employment context
- Cardiovascular parameters will be generally assessed by occupational physicians in the context of health examinations
- Prevention of CVD may also be targeted in WHP programmes
- There are also preventive initiatives offered by public health insurance and accident insurance institutions in cooperation.

## 2 MAIN IMPACTS OF EXTREME TEMPERATURE AND HEAT ON HUMAN HEALTH

The physiological effects of excessive heat affect all people to different degrees. Existing conditions are often strengthened and can even lead to premature death or disability (WHO, 2020). Global temperatures and the frequency and intensity of heat waves are increasing as a result of climate change. Climate change leads to rising temperatures and an increase in heat waves. As a result, longer periods occur with high day and night temperatures, which negatively burden the physiology of the human body. These in turn aggravate the most famous causes of death such as respiratory diseases, cardiovascular diseases, diabetes mellitus and kidney diseases. Furthermore, heat waves can hit large parts of the population acutely. Particularly vulnerable population groups are affected, (WHO, 2020). Physiological or socioeconomic reasons can make them more susceptible to physiological stress, exacerbated diseases and an increased risk of death from excessive heat. This includes older people, infants and children, pregnant women, outdoor and manual workers, athletes, and the poor (WHO, 2020).

The heat gain in the human body can be caused by a combination of external heat from the environment and internal body heat, which is generated by metabolic processes. Metabolic processes lead to the generation of heat in the human body. This is done by combining internal (body heat) and external heat (environment). In the event of a sudden increase in heat gain due to above-average warmth, the body may find it difficult to balance its temperature. This can lead to a number of illnesses such as heat cramps, heat exhaustion, heat stroke and hyperthermia. Serious health consequences such as death and hospital stays, due to small differences to the seasonal average temperatures, can occur very quickly, even on the same day or a few days later. An accelerated death or a disease in those who are already vulnerable is feared, especially in the first days of the heat wave. The indirect health effects of heat should also be noted. These can affect people's behavior, disease transmission, health service performance, air quality and critical social infrastructures such as energy, transport and water. These factors depend on the degree and type of health impact from heat, the timing, strength and length of a temperature event, and the adaptability of the population (WHO, 2020).

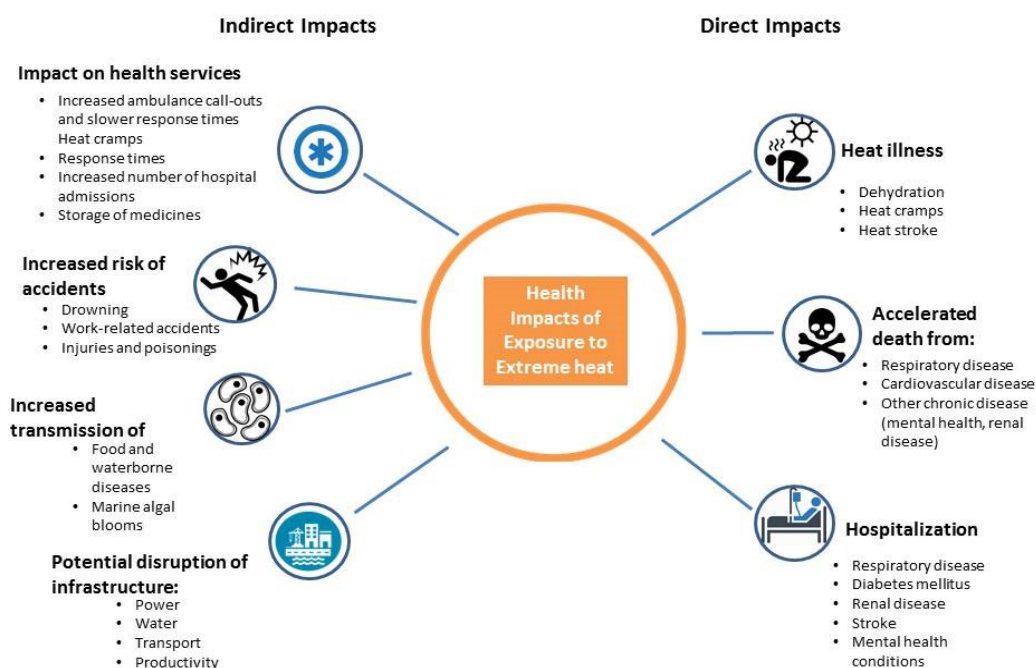


Fig. 1: Impacts of extreme temperature (WHO, 2020)

### 3 MAIN IMPACTS OF EXTREME TEMPERATURE AND HEAT ON THE HEALTH OF PEOPLE WITH CARDIO-VASCULAR DISEASES

- **Extreme heat leads to an increase in hospitalisation, morbidity and mortality.**
- Impaired **thermoregulation** due to reduced autonomic control and endothelial function may explain why diabetic patients are particularly vulnerable to heat during an extreme heat episode (Kenny, Sigal and McGinn, 2016).
- Since **Thermoregulation** may be disturbed in people with CVDs, preventive measures such as wearing light clothing, reduction of physical activity or fans for cooling should be considered. An adequate water supply must also be ensured in accordance with correct drug dose adjustment (a.m.) (Bailman et al., 2017).
- **Water and electrolyte balance** in the human body is an important parameter for heart failure patients. In extreme heat, this balance can easily become unbalanced (either through dehydration or excessive water consumption), which can have negative effects on drug therapy. Body weight has to be monitored carefully. Moreover drug dose and water consumption has to be correctly adjusted to heat exposure (Hermann et al., 2019).
- **Blood pressure** can be affected by intense heat. Self-control of blood pressure is essential, as well as a reduction in the dose of antihypertensive drugs (Smirnova, Svirida and Agreev, 2019).

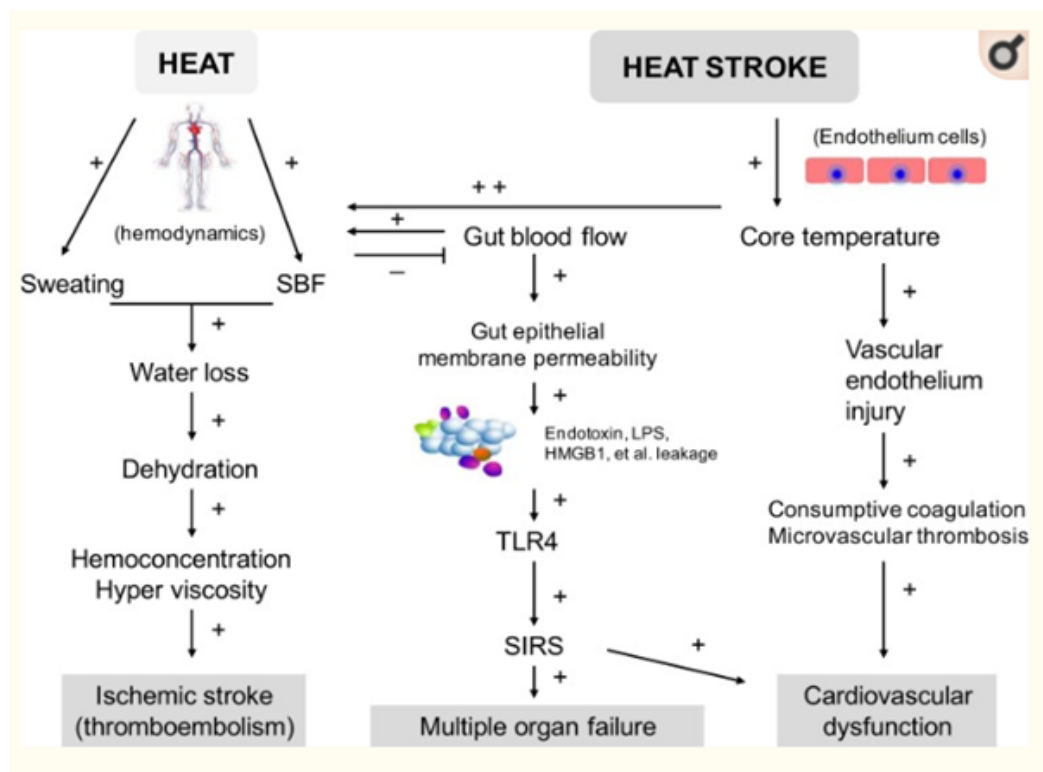


Fig.2. Summary of hypothesized mechanisms by which heat and heat stroke induce cardiovascular disorders (Lui, Yavar and Sun, 2015)

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