

# Heat, heatwaves, and health in a changing climate

Kristie L. Ebi, Ph.D., MPH

**UW Medicine**  
SCHOOL OF MEDICINE

  
DEPARTMENT OF GLOBAL HEALTH  
UNIVERSITY *of* WASHINGTON

  
SCHOOL OF PUBLIC HEALTH  
UNIVERSITY *of* WASHINGTON

- **People are unnecessarily suffering & dying in the heat**
  - All heat-related deaths potentially preventable
- **Other heat-related effects include occupational health & productivity; increased sports injuries & illnesses; adverse pregnancy outcomes**
- **Core body temperature needs to be maintained within narrow range**
  - Multiple factors substantially affect these limits
- **Exposure to heatwaves has been increasing**
  - In 2020, adults older than 65 years were affected by 3.1 billion more person-days of heatwave exposure than the 1986–2005 average

## **Heat illness – a spectrum**

- **Mild**
  - Heat rash
  - Heat edema
  - Heat cramps
- **Moderate**
  - Heat exhaustion
- **Severe**
  - Heat stroke

- **Heat-related mortality significantly underestimated**
  - Official U.S. estimate about 700 annual deaths, based on 2004-2018 data
  - Modeled estimates around 12,000 annual deaths (7,400 to 16,500)
- **Heat exacerbates inequities**
- **Heatwave early warning and response systems and heat action plans are critical to reduce current and future risks**
  - Multiple ways to stay cool without air conditioning
  - Long-term infrastructure plans needed
- **Magnitude and pattern of future health risks will depend on the extent of adaptation and mitigation**
  - Without adaptation and mitigation, heat-related mortality expected to increase dramatically
  - One estimate for the US, without adaptation and mitigation, suggests by 2100 there could be 97,000 to 134,000 additional annual deaths
- **Urgent investments are required in research & risk management**

## Heat is an all-of-society problem



### PEOPLE

**Heat exacerbates risks of:**

Social inequity,  
Illness and death

**Requiring action from:**

Public health;  
labour; social  
sectors; physiology;  
medicine; sports;  
etc.



### ENVIRONMENT

**Heat exacerbates risks of:**

Fires; poor air quality;  
water scarcity and  
drought; cyclones;  
UV radiation

**Requiring action from:**

Environment;  
meteorology;  
climatology; etc.



### INFRASTRUCTURE

**Heat exacerbates risks of:**

Urban heat islands;  
emergency and power  
service disruptions;  
poor quality housing

**Requiring action from:**

Architecture,  
engineering,  
urban planning; etc.

## Selected sources for more information

- **The Lancet heat and health series:**  
<https://www.thelancet.com/series/heat-and-health>
- **Shindell D, et al. 2020. The effects of heat exposure on human mortality throughout the United States:**  
<https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2019GH000234>
- **Weinberger K, et al. 2020. Estimating the number of excess deaths attributable to heat in 297 United States counties.**  
<https://pubmed.ncbi.nlm.nih.gov/32613153/>
- **Planning for Urban Heat Resilience. 2022.**  
<https://www.planning.org/publications/report/9245695/>
- **National Integrated Heat Health Information System:**  
<https://www.heat.gov>
- **Global Heat Health Information Network:** <https://ghhin.org>