




Update on Climate-Related Hazards to Workers: Research and Practice Needs

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- There is a growing body of evidence that workers are at increased risk of adverse effects from climate-related hazards and stressors.

(Roelofs & Wegman 2014; Gubernot et al 2015; Schulte et al 2016; Moda et al 2019; Dillender 2021; Petek 2022)

Why are workers at risk of occupational safety and health effects from climate?

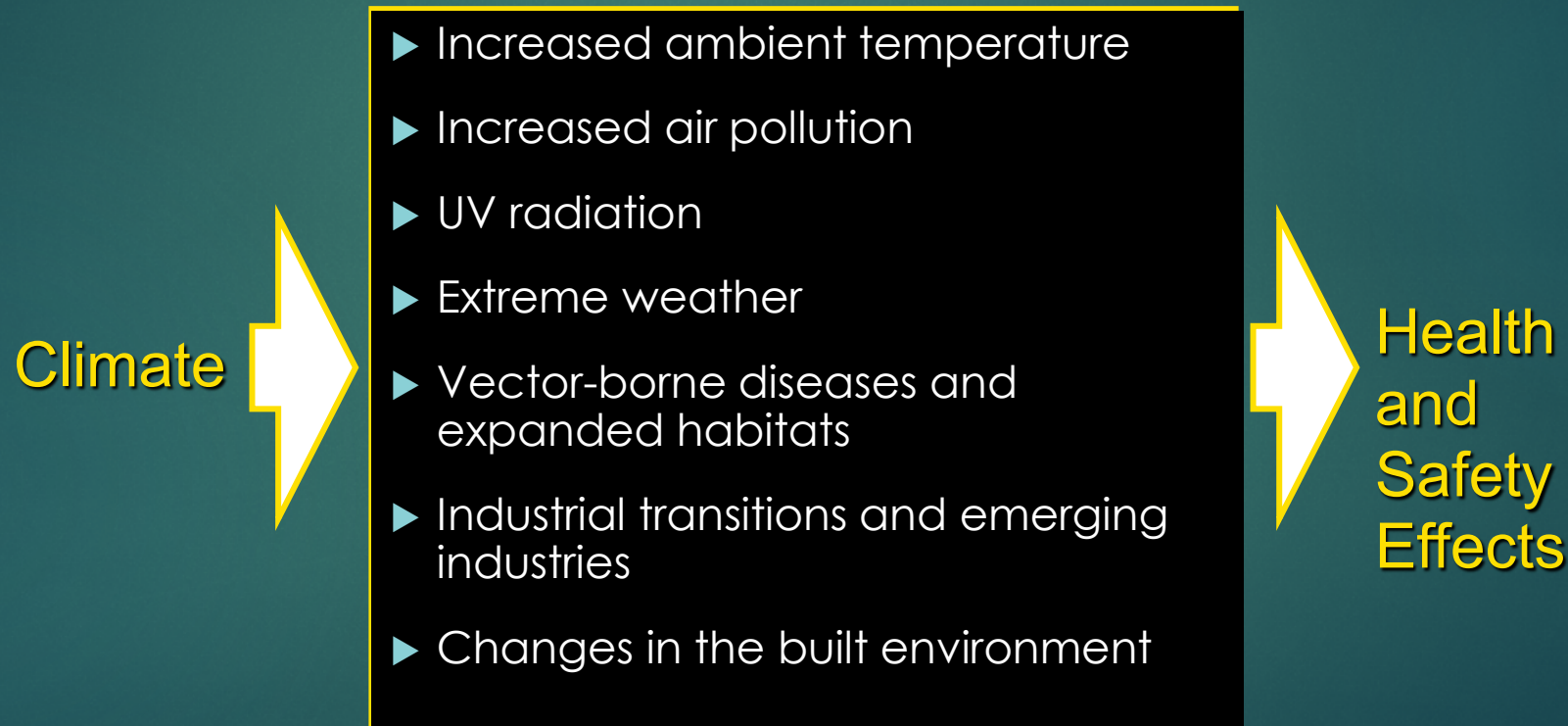
- ❑ Likely to have more and greater exposure than general public
- ❑ Many of these hazards or stressors can occur simultaneously or consecutively; and impact can accumulate
- ❑ Employers may not be sufficiently informed or prepared to institute adequate risk management
- ❑ Workers are not a specific part of states' or businesses' climate-change action plans

History

- ❑ Prior to 2009, the relationship between climate and occupational safety and health generally had not been comprehensively characterized
- ❑ There was a broad range of literature on individual hazards
- ❑ Comprehensive overviews were lacking

Links between Climate and Occupational Safety and Health Effects

Occupational Hazards/Exposures




(Schulte and Chun 2009; Schulte et al 2016)



Ways to characterize worker hazards

- ❑ Amplification of existing hazards
- ❑ Known hazards in new situations
- ❑ New, unanticipated or unrecognized hazards



Additional issues in addressing the relationship between climate-related hazards and adverse effects on workers:

- **Mental health**
- Economics
- Inequalities
- Geoengineering

Mental Health Effects of Climate-Related Occupational Hazards

- Post-Traumatic Stress Disorder
- Depression, anxiety, stress-related effect, inappropriate substance abuse
- Combined psychological effects
 - With other hazards, e.g. heat
 - With personal loss
- Link between climate-related occupational hazards and mental health does not appear to be a major consideration of employers

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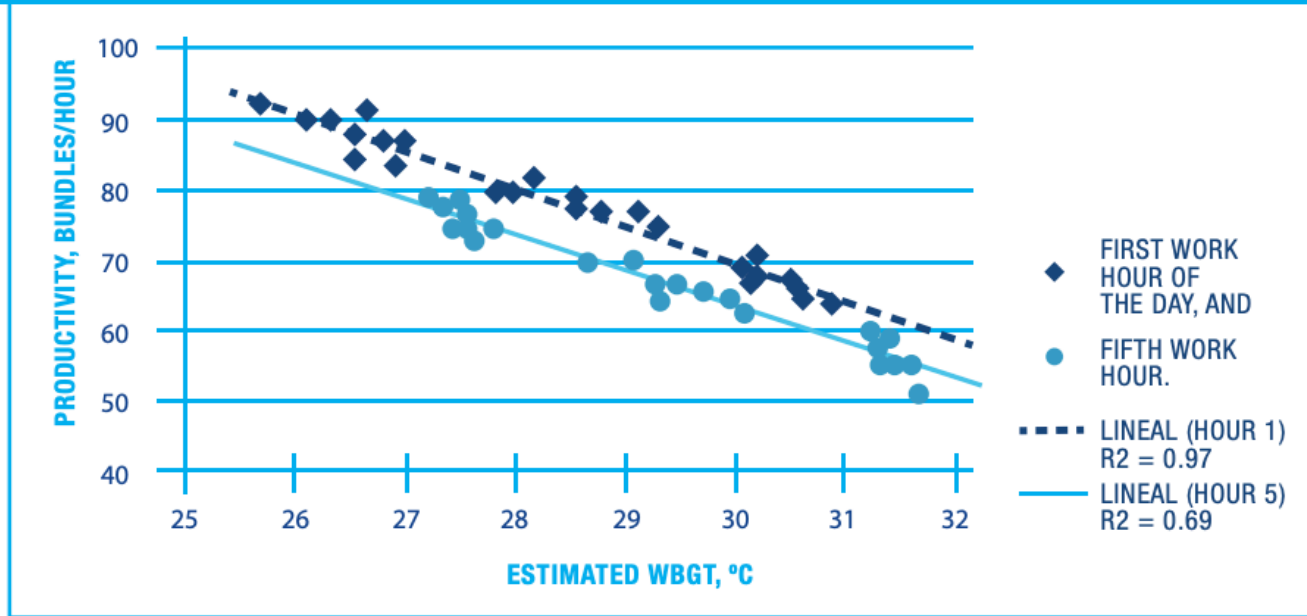
- Mental health
- **Economics**
- Inequalities
- Geoengineering


FIGURE 3.

Reduced labour productivity due to heat.

- ▶ Bundles of rice harvested per hour (productivity) at different environmental heat levels (WBGT). Regression lines and equations and correlation coefficients shown. (Each point is a group average of 10-18 workers); (Sahu et al., 2013).

RELATIONSHIP BETWEEN ESTIMATED WBGT AND HOURLY PRODUCTIVITY






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- Mental health
- Economics
- **Inequalities**
- Geoengineering

Inequalities

- ❑ Systematic inequality shapes all forms of health (Clayton et al 2021)
- ❑ Climate-related effects compound each other and can exacerbate existing inequalities (Goubert 2021)
- ❑ Alliances for climate justice (Vachon 2019)



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- Mental health
- Economics
- Inequalities
- **Geoengineering**

Geoengineering

- ❑ Intentional manipulation or alteration of the environment
 - e.g., large mirrors; release of particles in atmosphere; chemical capture of carbon
- ❑ Extent of hazards unknown
- ❑ Need scenario development

Finnish survey of 500 occupational safety and health officers and representative.

- ❑ Climate change rarely addressed from viewpoint of occupational safety
- ❑ Need to increase competence of safety and health personnel so “... workplaces, can prepare for occupational safety and health risks caused by climate-change.”

(Toivanen & Uusitulo 2022)

Priorities for Action



- ❑ Research
- ❑ Surveillance
- ❑ Risk Assessment
- ❑ Risk Management

Research



- ❑ Identify indicators of climate effects on workers
- ❑ Determine interactions between climate and work hazards and other factors
- ❑ Identify most vulnerable workers
- ❑ Investigate effectiveness of mitigation strategies and hazard controls
- ❑ Need multi-disciplinary approach

(Schulte et al 2016)

Determinants of Vulnerability

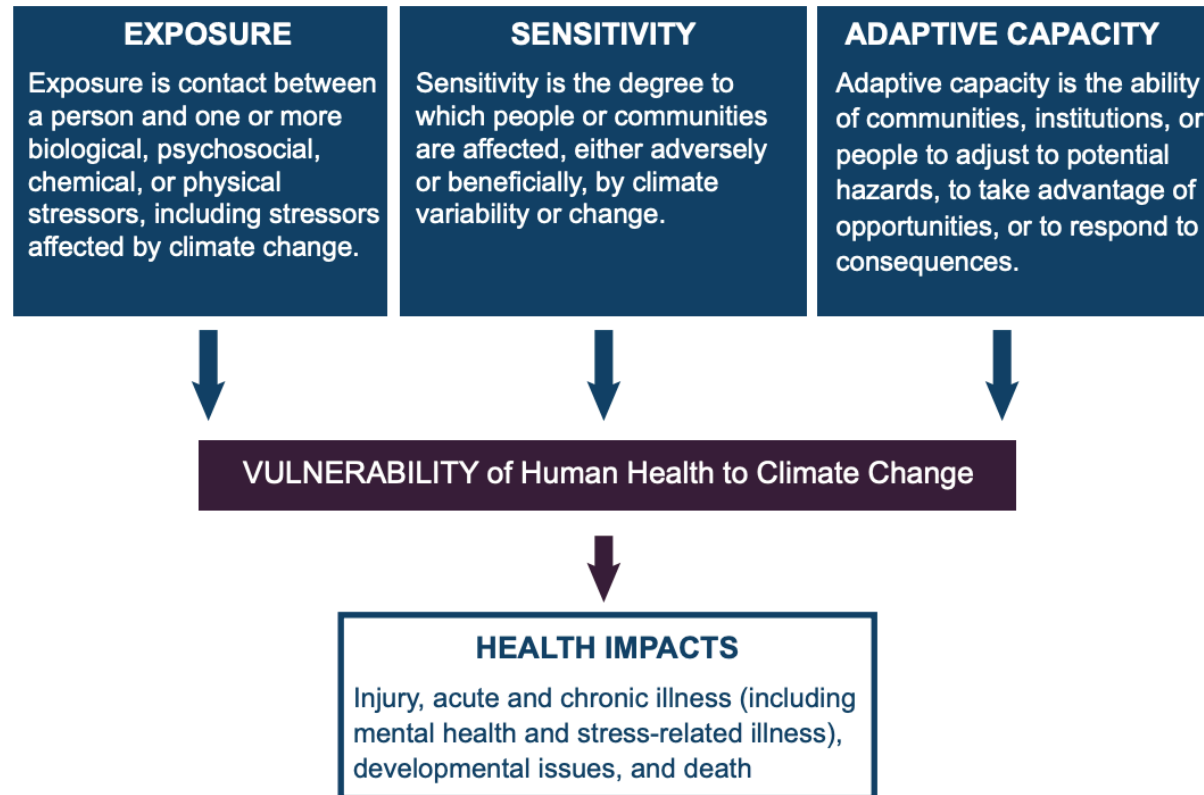


Figure 1: Defining the determinants of vulnerability to health impacts associated with climate change, including exposure, sensitivity, and adaptive capacity. (Figure source: adapted from Turner et al. 2003)⁴

Surveillance

- ❑ Determine risk by hazard, occupation, and location; change over time
- ❑ Enhance sentinel event/early warning systems
- ❑ Modify existing surveillance systems
- ❑ Develop new surveillance systems
- ❑ Utilize surveillance data to develop prevention programs

(Schulte et al 2016)

Risk Assessment

- ❑ Identify new models
- ❑ Integrate OSH, climate data, and vulnerability data
- ❑ Consider how to address uncertainties
- ❑ Incorporate consideration of worker risks into planning

(Schulte et al 2016)



Risk Management and Policy Development

- ❑ Develop adaptive response/control guidance and training
- ❑ Develop employer and worker guidance
- ❑ Integrate occupational safety and health with public health efforts
- ❑ Build resilience
- ❑ Enhance preparedness

(Schulte et al 2016)

Conclusions

- ❑ Workers are the canaries in the coal mine of climate change (Roelofs & Wegman 2014; Kiefer et al 2016)
- ❑ The occupational safety and health field needs to make a concerted effort to address climate-related hazards.

Acknowledgements



Thanks to Brenda Jacklitsch Ph.D and the NIOSH Climate and Work workgroup.

Disclaimer: The findings and conclusions in this presentation are those of the author and do not necessarily represent the views of the National Institute for Occupational Safety and Health.