Heat Resilience for Human Health and Potential

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Chair, WHO-WMO GHHIN Southeast Asia Heat Health Hub

EXTREME HEAT AND SOCIO-ECONOMIC DISPARITIES

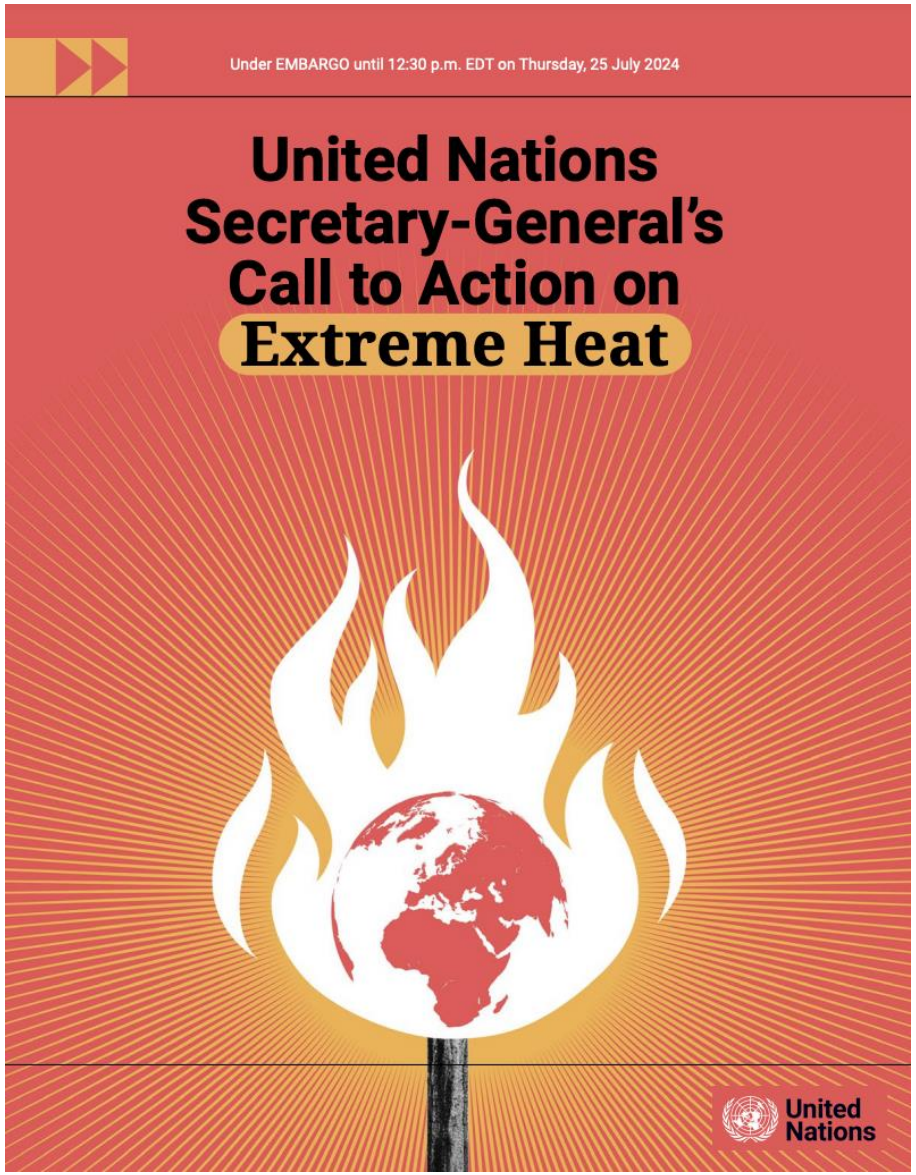
Case Study: Shoemaking factory in Vietnam (Project HeatSafe)

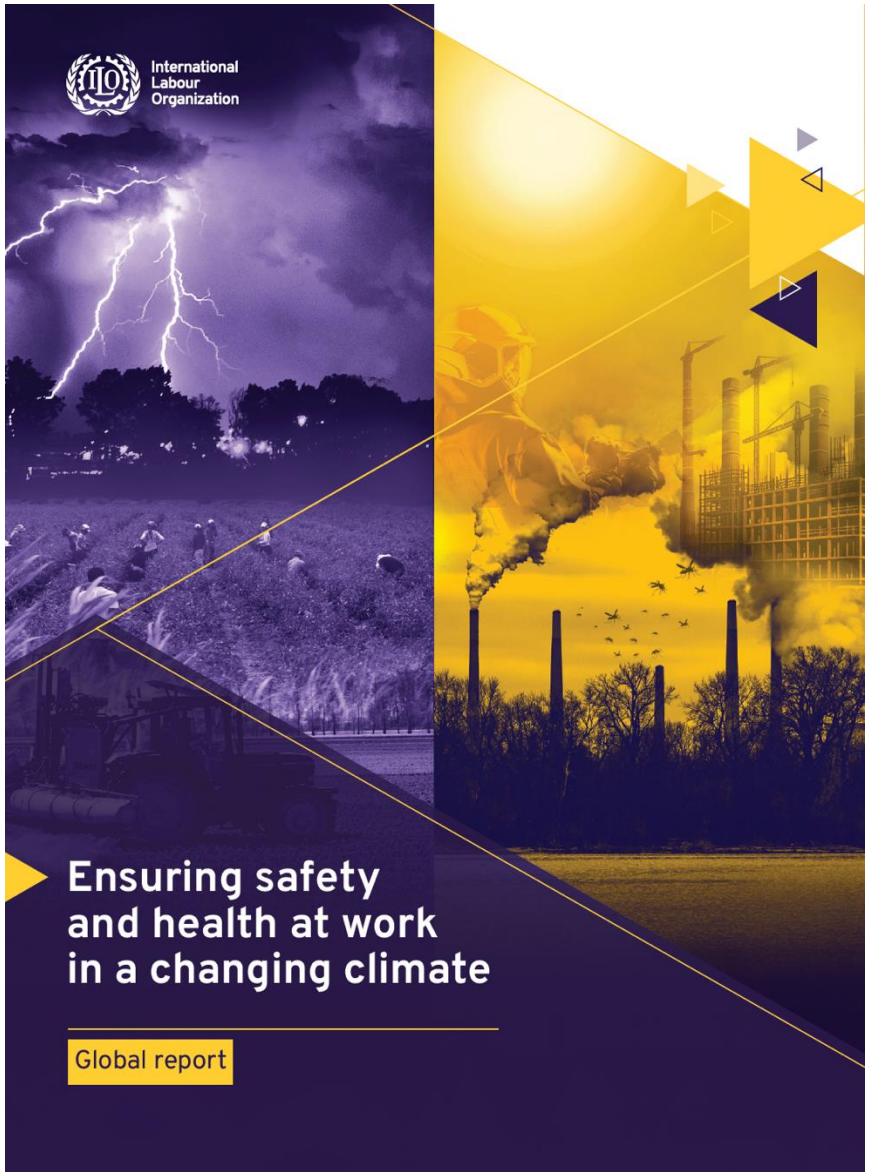
“The era of global boiling has arrived.”

United Nations Secretary-General

António Guterres

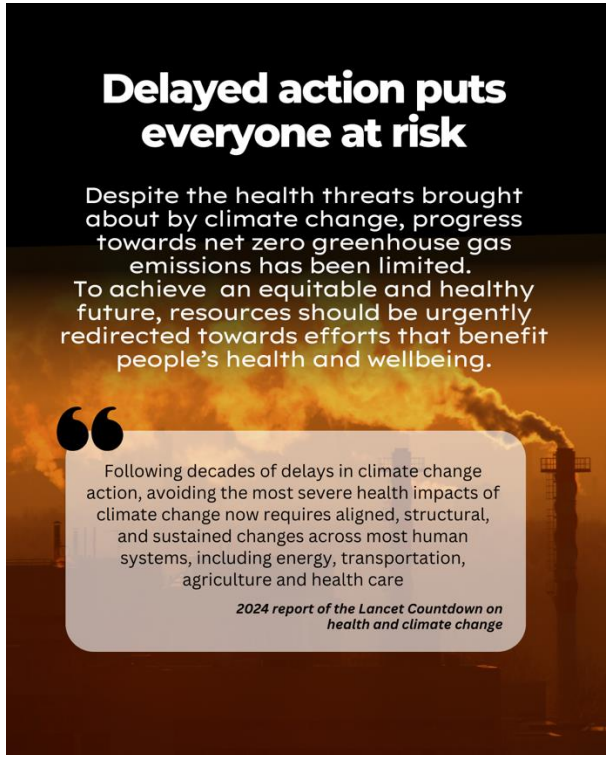
July 2023

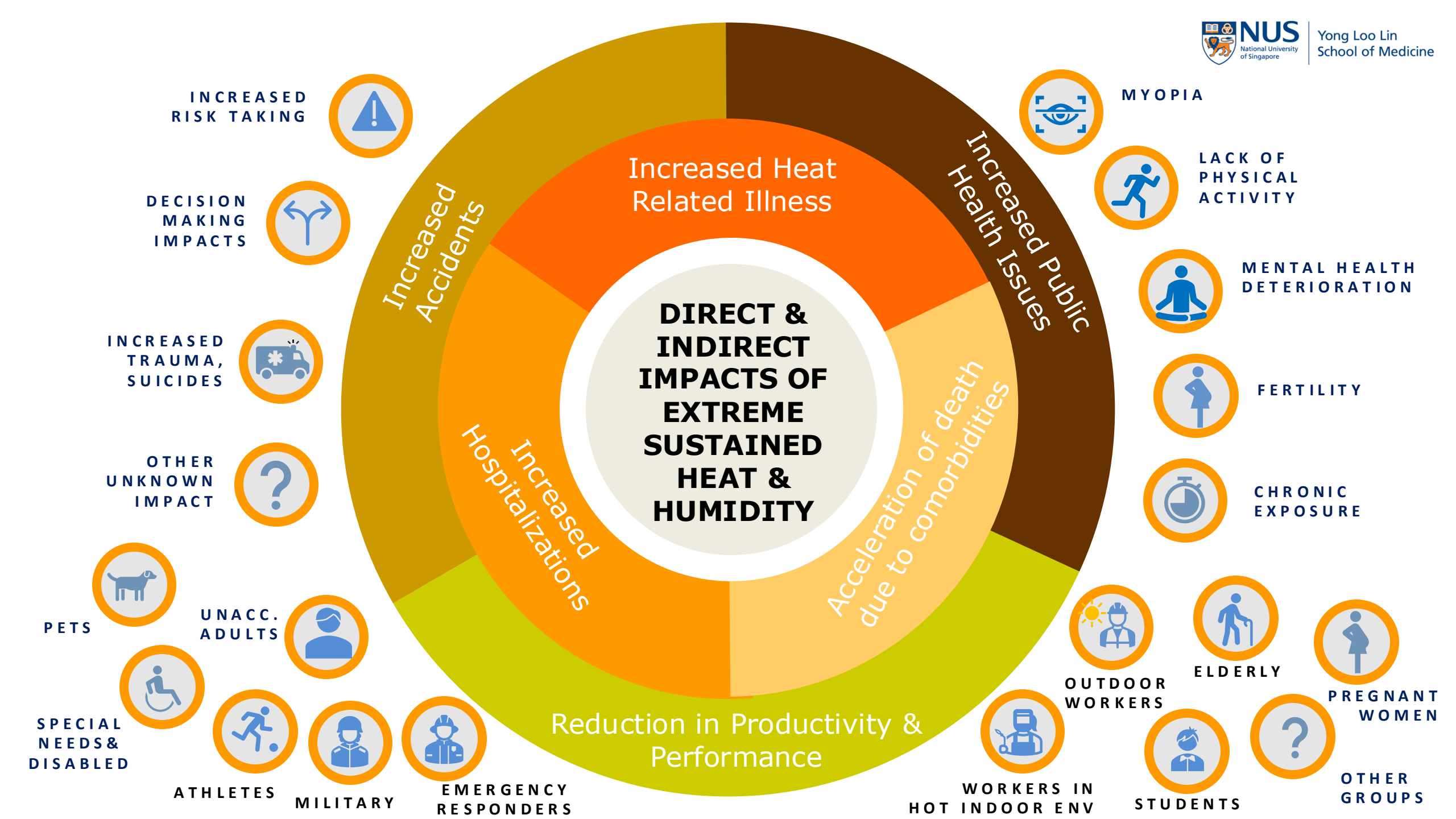

Under EMBARGO until 12:30 p.m. EDT on Thursday, 25 July 2024
United Nations Secretary-General's Call to Action on Extreme Heat
United Nations


International Labour Organization
Ensuring safety and health at work in a changing climate
Global report

The 2024 report of the *Lancet* Countdown on health and climate change: facing record-breaking threats from delayed action

Marina Romanello, Maria Walawender, Shih-Che Hsu, Annalyse Moskeland, Yasna Palmeiro-Silva, Daniel Scamman, Zakari Ali, Nadia Ameli, Denitsa Angelova, Sonja Ayeb-Karlsson, Sara Basart, Jessica Beagley, Paul J Beggs, Luciana Blanco-Villafuerte, Wenjia Cai, Max Callaghan, Diarmid Campbell-Lendrum, Jonathan D Chambers, Victoria Chicmana-Zapata, Lingzhi Chu, Troy J Cross, Kim R van Daalen, Carole Dalin, Niheer Dasandi, Shouro Dasgupta, Michael Davies, Robert Dubrow, Matthew J Eckelman, James D Ford, Chris Freyberg, Olga Gasparyan, Georgiana Gordon-Strachan, Michael Grubb, Samuel H Gunther, Ian Hamilton, Yun Hang, Risto Hänninen, Stella Hartinger, Kehan He, Julian Heidecke, Jeremy J Hess, Louis Jamart, Slava Jankin, Harshavardhan Jatkar, Ollie Jay, Ilan Kelman, Harry Kennard, Gregor Kiesewetter, Patrick Kinney, Dominic Kniveton, Rostislav Kouznetsov, Pete Lampard, Jason K W Lee, Bruno Lemke, Bo Li, Yang Liu, Zhao Liu, Alba Llabrés-Brustenga, Melissa Lott, Rachel Lowe, Jaime Martinez-Urtaza, Mark Maslin, Lucy McAllister, Celia McMichael, Zhifu Mi, James Milner, Kelton Minor, Jan Minx, Nahid Mohajeri, Natalie C Momen, Maziar Moradi-Lakeh, Karyn Morrisey, Simon Munzert, Kris A Murray, Nick Obradovich, Megan B O'Hare, Camile Oliveira, Tadj Oreszczyn, Matthias Otto, Fereidoon Owfi, Olivia L Pearman, Frank Pega, Andrew J Perishing, Ana-Catarina Pinho-Gomes, Jamie Ponmattam, Mahnaz Rabbaniha, Jamie Rickman, Elizabeth Robinson, Joacim Rocklöv, David Rojas-Rueda, Renee N Salas, Jan C Semenza, Jodi D Sherman, Joy Shumake-Guillemot, Pratik Singh, Henrik Sjödin, Jessica Slater, Mikhail Sofiev, Cecilia Sorensen, Marco Springmann, Zélie Stalhandske, Jennifer D Stowell, Meisam Tabatabaei, Jonathon Taylor, Daniel Tong, Cathryn Tonne, Marina Treskova, Joaquin A Trinanes, Andreas Uppstu, Fabian Wagner, Laura Warnecke, Hannah Whitcombe, Peng Xian, Carol Zavaleta-Cortijo, Chi Zhang, Ran Zhang, Shihui Zhang, Ying Zhang, Qiao Zhu, Peng Gong, Hugh Montgomery*, Anthony Costello**




NUS National University of Singapore
Yong Loo Lin School of Medicine
DIRECT & INDIRECT IMPACTS OF EXTREME SUSTAINED HEAT & HUMIDITY
Increased Heat Related Illness
Increased Public Health Issues
Acceleration of death due to comorbidities
Increased Hospitalizations
Increased Accidents
Reduction in Productivity & Performance
INCREASED RISK TAKING
DECISION MAKING IMPACTS
INCREASED TRAUMA, SUICIDES
OTHER UNKNOWN IMPACT
MYOPIA
LACK OF PHYSICAL ACTIVITY
MENTAL HEALTH DETERIORATION
FERTILITY
CHRONIC EXPOSURE
PETS
UNACC. ADULTS
SPECIAL NEEDS& DISABLED
ATHLETES
MILITARY
EMERGENCY RESPONDERS
OUTDOOR WORKERS
ELDERLY
PREGNANT WOMEN
WORKERS IN HOT INDOOR ENV
STUDENTS
OTHER GROUPS

‘HEAT-SENSITIVE’
HEALTH CONDITIONS

Health conditions that can worsen or become more difficult to manage in high temperatures

e.g. chronic conditions

Cardiovascular disease

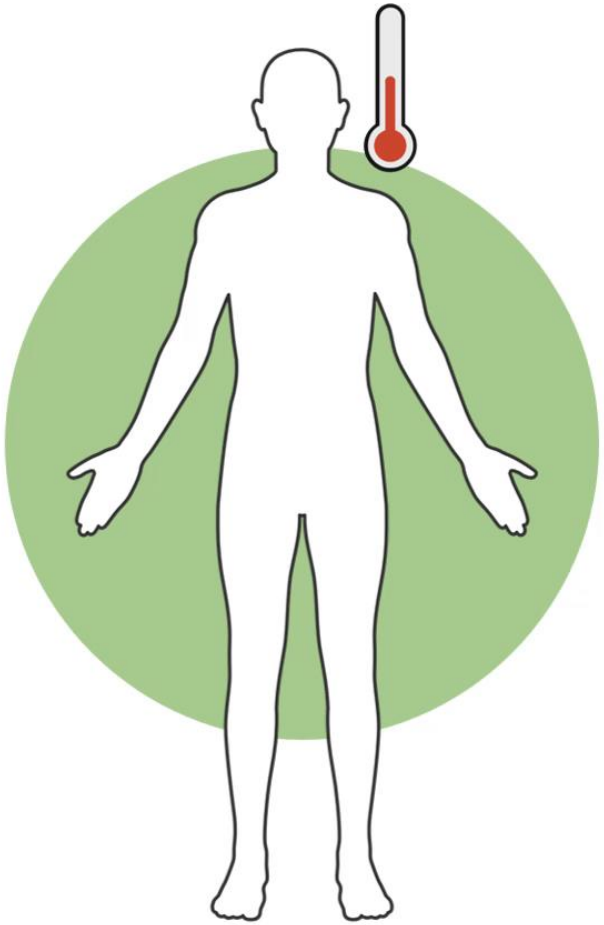
Renal disease

Pulmonary disease

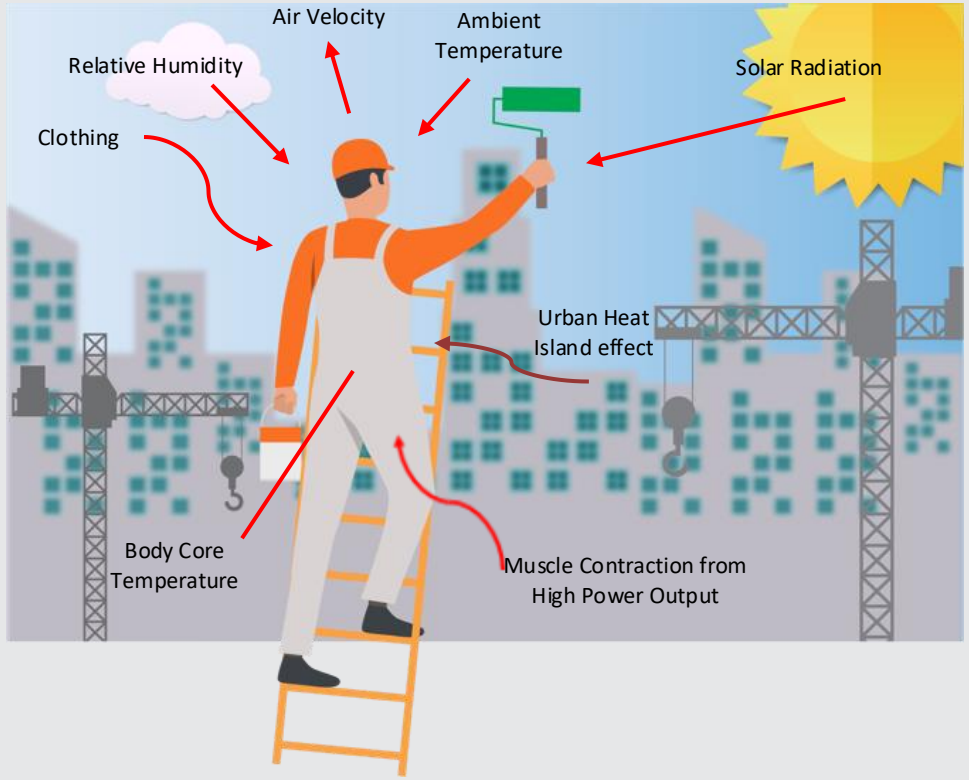
Hypertension

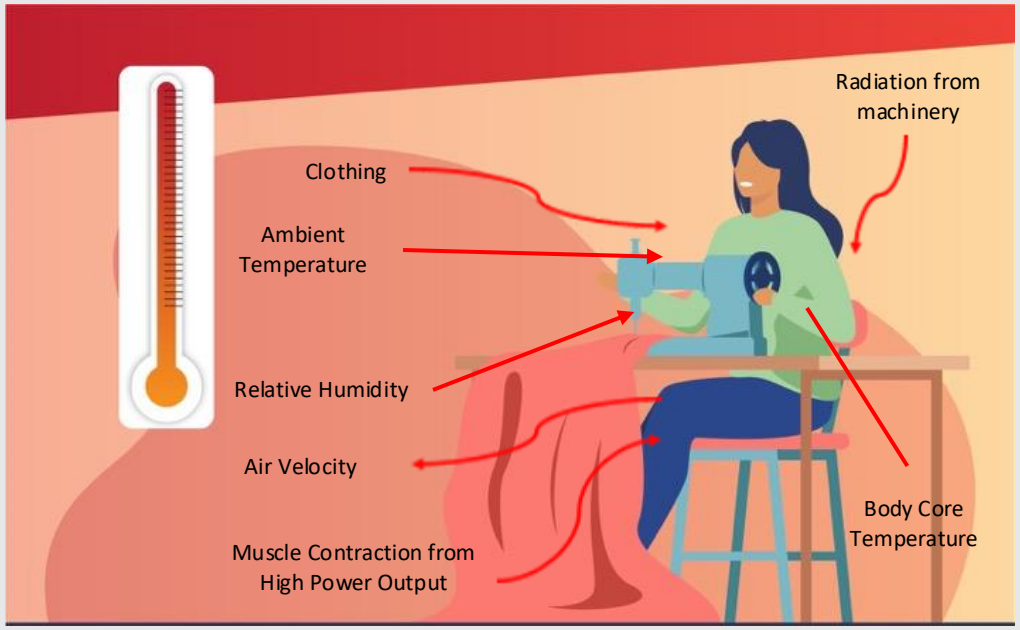
HOW DOES THE BODY RESPOND TO HEAT?

THERMOREGULATION



HEAT STRESS VS. HEAT STRAIN?



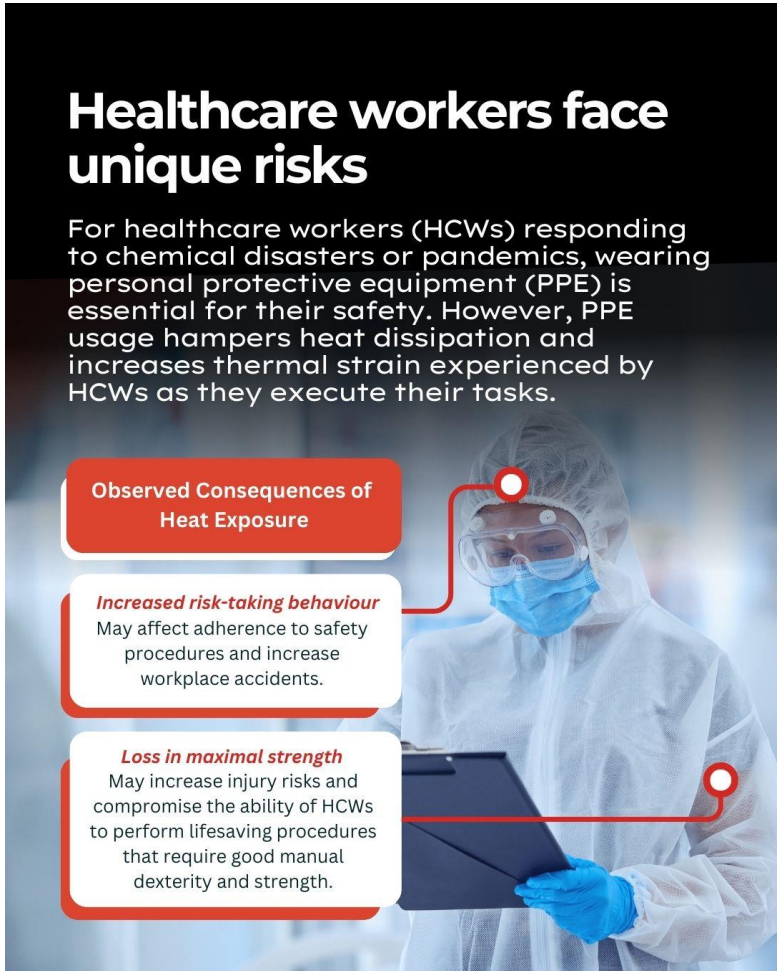


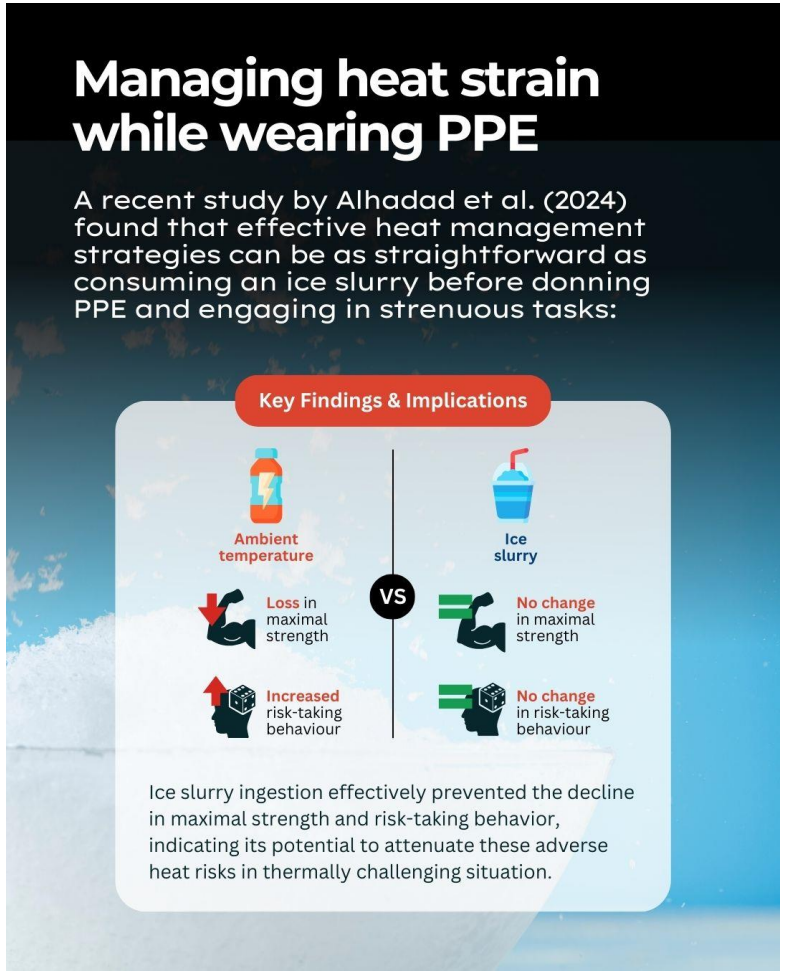
Weather + Attire + Physiology (Heat Stress) → **Heat Strain** ⚠

THE STRAITS TIMES SINGAPORE

Worker who died after falling off rooftop likely disoriented from heat stress: Coroner

Thermal Discomfort and Risk Taking





HEAT RESILIENCE

HEALTH PILLARS

Sleep

Diet

Exercise

LIFE STAGES

Infants

Children

Adults

Elderly

POPULATION-SPECIFIC

Occupational health

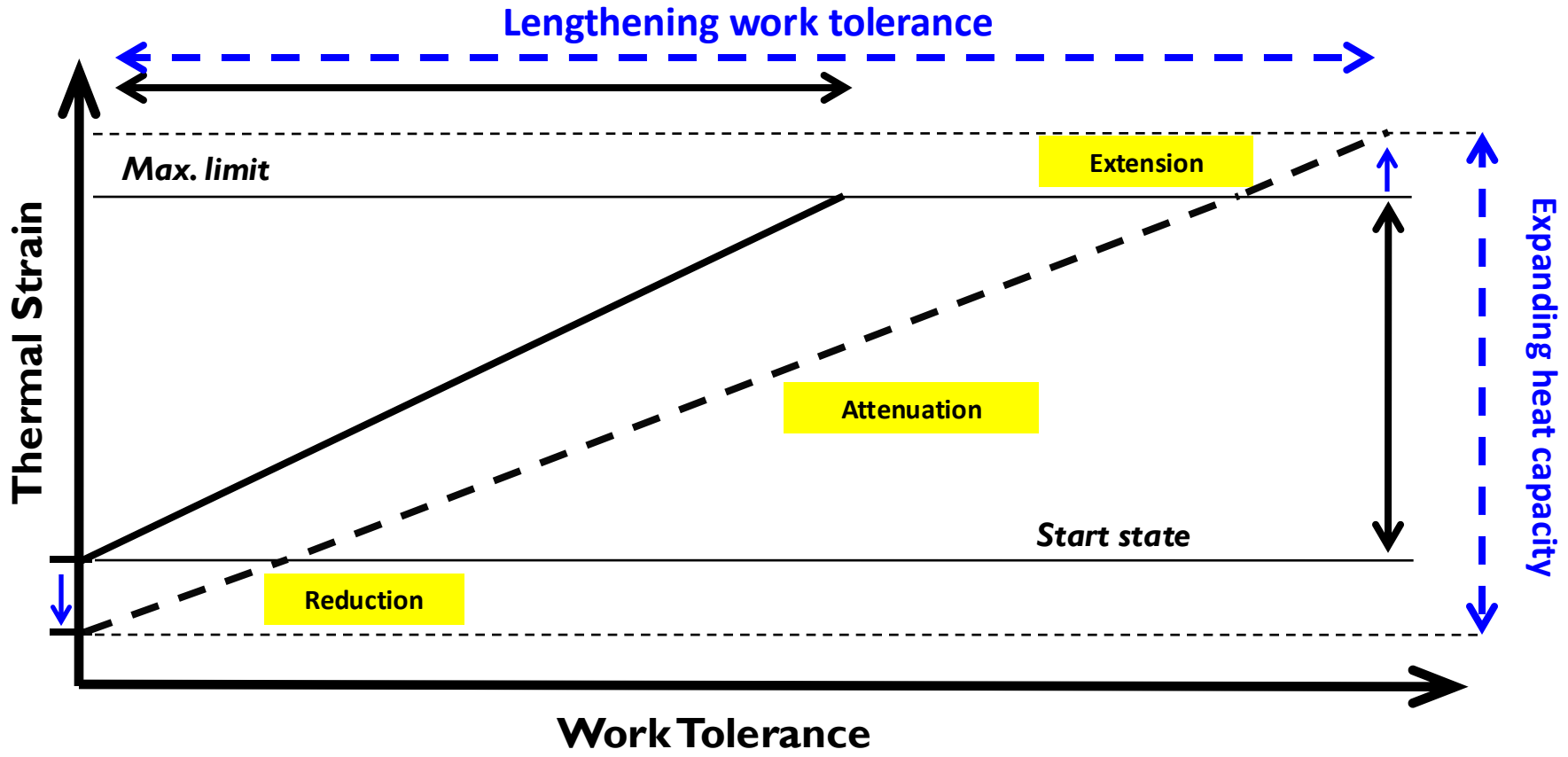
Children's development

Maternal Health

Male Fertility

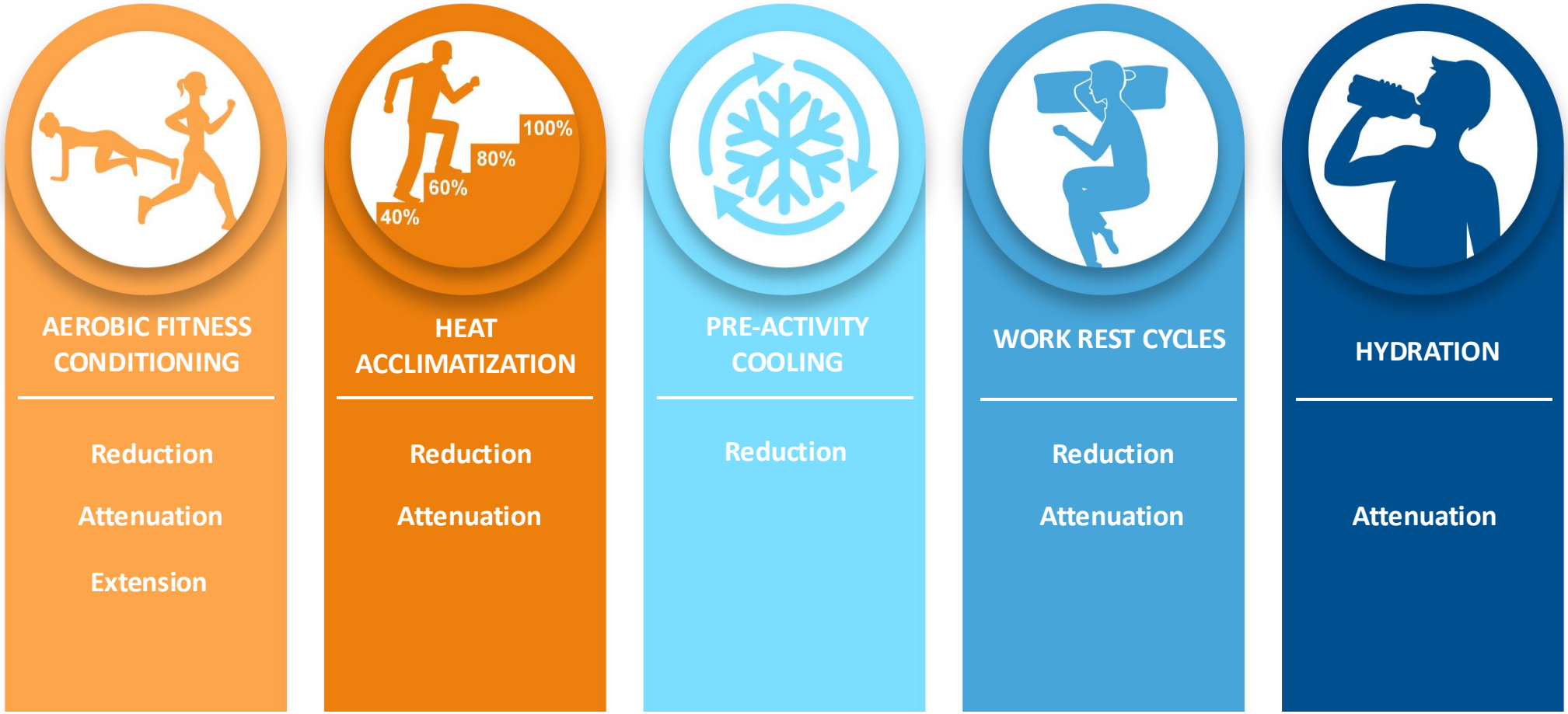
MANAGING HEAT STRAIN

PHYSIOLOGICAL SOLUTIONS



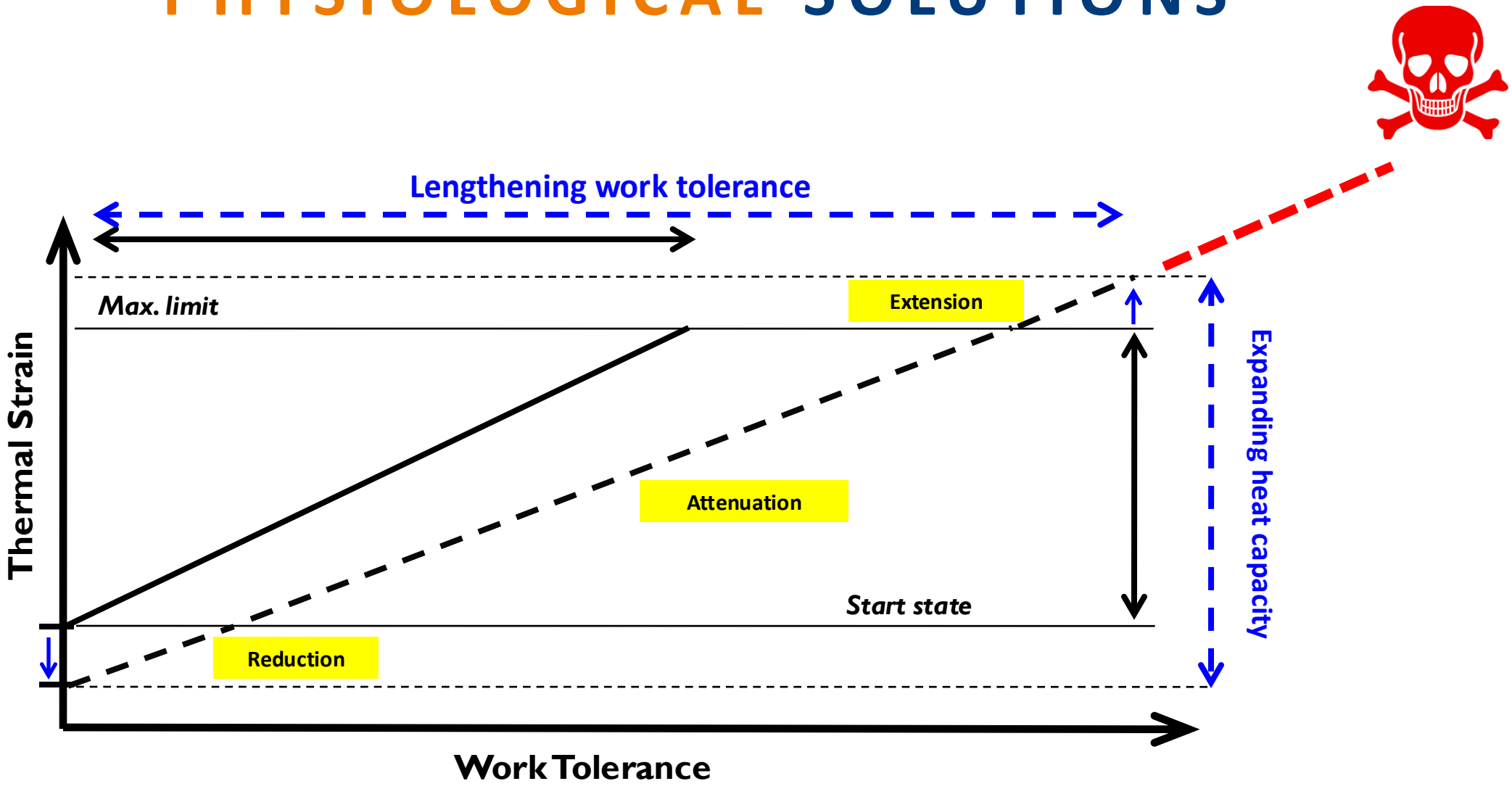
Alhadad et al. (2019); Front. Physiol.

PHYSIOLOGICAL SOLUTIONS



Alhadad et al. (2019); Front. Physiol.

PHYSIOLOGICAL SOLUTIONS



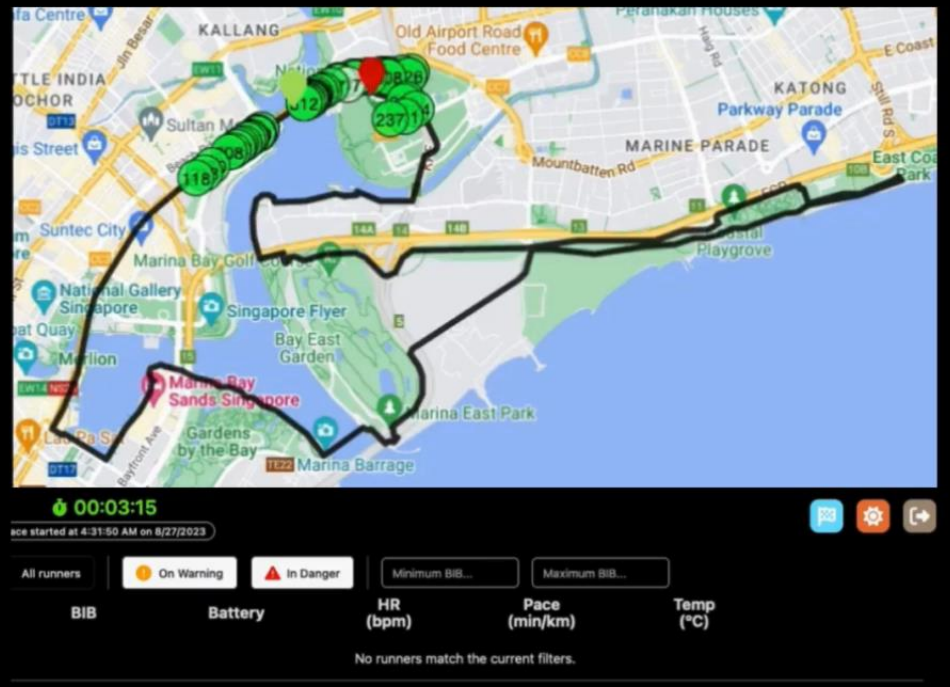
Alhadad et al. (2019); Front. Physiol.

PROOF OF CONCEPT:

REAL TIME HEAT HEALTH MONITORING

HRPC

Start of the 21 km race



Extreme heat is a global health emergency.

Billions of people are at risk of preventable death and illness from extreme heat. The Global Heat Health Information Network is helping to increase awareness and capacity to better manage and adapt to the health risks of dangerously hot weather in a changing climate.

GHHIN Southeast Asia Hub

A platform for Southeast Asia to collectively prepare for and protect populations from the health impacts of extreme heat

GLOBAL HEAT HEALTH INFORMATION NETWORK
SOUTHEAST ASIA

OUR GOALS

PEOPLE

Connect people and institutions form multi-disciplinary partnerships to reduce heat risks

SCIENCE & INFO

Accelerate the generation of evidence, actionable knowledge, standardised guidance, risk metrics, and effective communication

ACTION

Catalyse regional, national and local policy and action to minimize societal consequences of heat impacts

REGIONAL FOCUS AREAS

Urban Heat

Heat at Work

Traditional & Cultural Practices

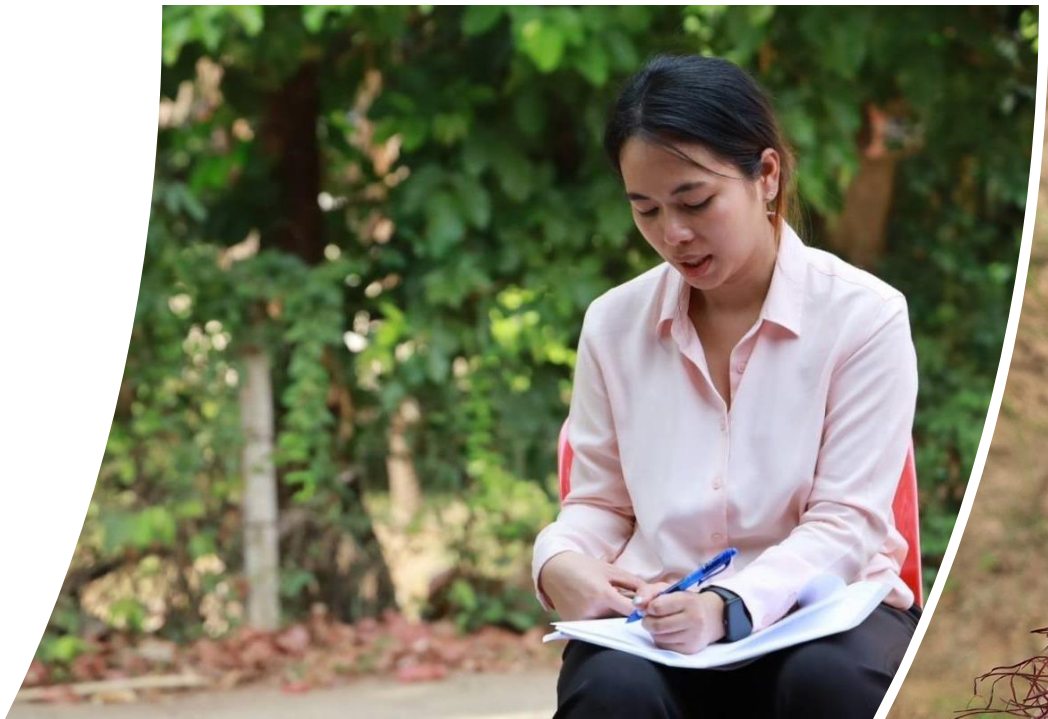
JOIN US

Connect to the Hub & Global Heat Health Digest

NUS National University of Singapore
Heat Resilience & Performance Centre
Yong Loo Lin School of Medicine

WORLD METEOROLOGICAL ORGANIZATION
World Health Organization

Remember them



HEAT RESILIENCE & PERFORMANCE CENTRE

A globally-connected, first-class research centre enabling humans to thrive in a warming world

www.medicine.nus.sg/hrpc