



Heat stress in Cambodia's construction sector

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WORKSHOP

Capacity Strengthening for Civil Society Organisations: Understanding and Addressing Heat Stress

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Venue: Tribe

ORGANISED BY

Women Empowerment Network (GIZ FABRIC) and
Cooperation Committee for Cambodia (CCC)

About the speaker



Dr. Latin Heang

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PhD, Energy Technology and Management, ITC (2025)

Dissertation on how heat stress affects construction workers' productivity in Cambodia



Certified ASEAN energy professional

ASEAN Energy Manager (2022) and Energy Management Professional (2025), AJEEP scheme



Trainer in national energy-efficiency programs

Cambodia Energy Manager and Auditor Training (CEMAT) since 2023; Low Carbon Building (LCB) since 2025



Visiting scholar, Hong Kong PolyU (2023)

Analyzed heat stress and labor productivity data with researchers at Hong Kong Polytechnic University

Agenda



1. Why heat stress matters on construction sites
2. How we measured heat exposure
3. What the field data shows
4. Recommendations for workers, employers, policymakers and CSOs



SECTION 01

Why heat stress matters on construction sites

Heat comes from three sides at once

01

The sun

Most tasks happen outdoors, in direct sunlight, for hours at a time.

02

Humid air

Sweat cannot dry easily, so the body struggles to cool itself.

03

Heavy work

Carrying steel and building formwork makes the body produce its own heat.

Construction is about **10% of Cambodia's economy**, and its workers stay outdoors through the hot season.



SECTION 02

How we measured heat exposure

We followed 74 workers on five Phnom Penh building sites



74

workers

32 steel fixers and 42 formwork carpenters, all healthy men

5

building sites

across Phnom Penh

8

months

November 2022 to June 2023, cool and hot seasons

30,000

observations

of work, heart rate and site heat

What we measured



Heat on site, with a WBGT meter



Heart rate, with a chest sensor



How hot and tired workers felt, every 15 minutes



What each worker was doing, minute by minute

Ethics approval: National Ethics Committee for Health Research (037 NECHR); all workers gave informed consent

WBGT: a heat thermometer that counts more than air temperature



It combines

Air temperature

Humidity

Sunshine

Wind

Low risk

Below 29.3°C

Moderate risk

29.4 to 32.1°C

High risk

Above 32.1°C

The higher the WBGT, the harder the body must work to stay cool.

WBGT = wet bulb globe temperature. Risk levels: US Army WBGT guideline



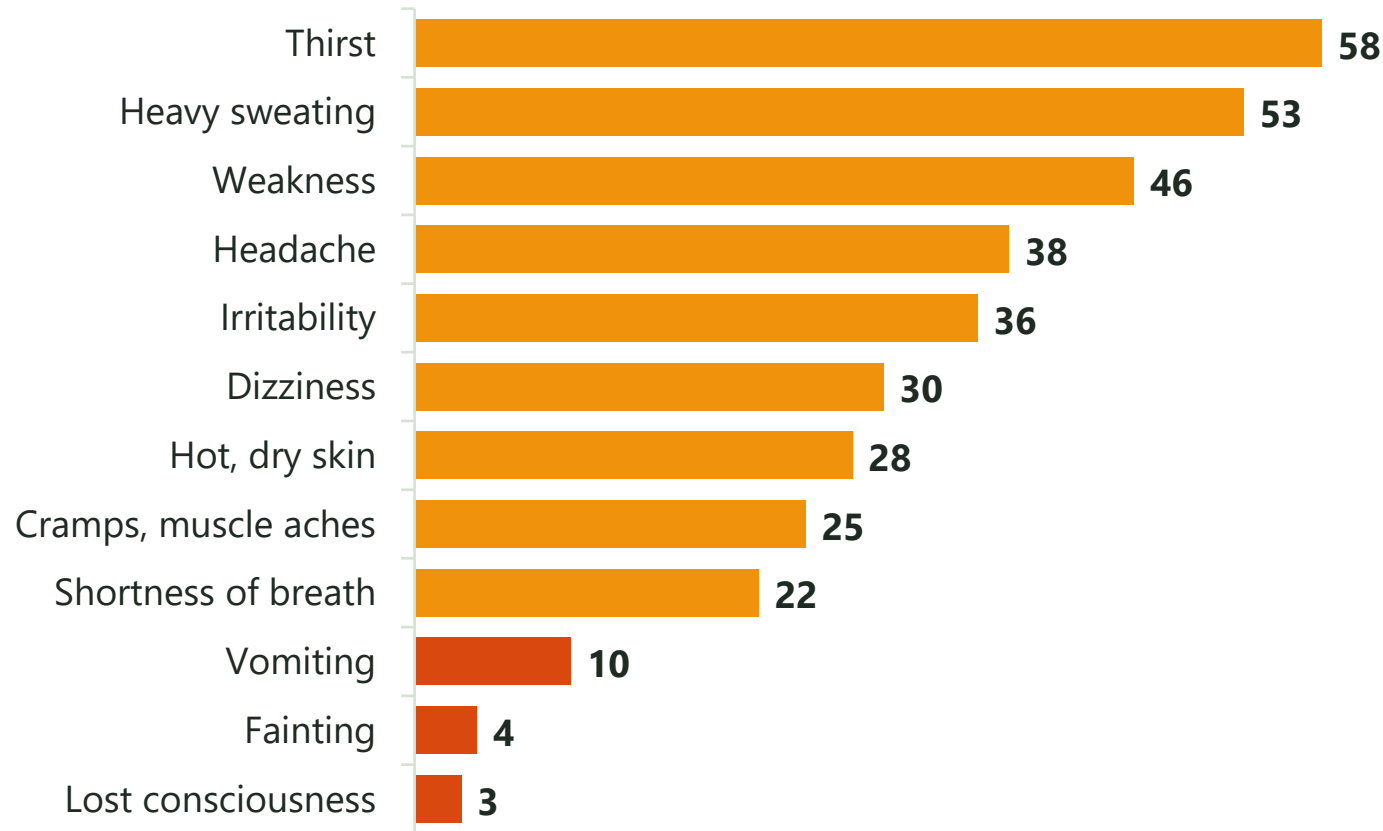
SECTION 03

What the field data shows

Most workers already feel the heat



Heat symptoms reported by the 74 workers (number of workers)



58 of 74

workers said they felt thirsty from the heat at work.

Thirst, sweating and weakness are early warnings.

Vomiting, fainting and passing out (darker bars) are emergencies.

Self-reported symptoms. Source: Heang (2025), doctoral dissertation, ITC

Heat risk peaks between 10:00 and 15:00



1 in 4

heat readings in the hot months were in the high-risk zone

1.4×

more often high-risk than on Hong Kong sites in a similar study

Times approximate, from site measurements 07:00–17:00 (lunch break 11:00–13:00 not measured). Source: Heang et al., (2025)

In the hottest conditions, workers got about a third less work done



COOLER: WBGT 27°C

75%



of working time on productive work:
about 45 minutes in every hour

HOTTEST: WBGT 35°C

48%



of working time on productive work:
about 29 minutes in every hour

Productive work = time on direct tasks. Source: Heang et al. (2026), ASEAN Engineering Journal 16(1): 27–36

As heat rises, bodies work harder and workers feel more strain



Felt strain doubled



1.5 **2.2** **3.0**

Low Moderate High

Average strain score (0–10) from how hot and tired workers felt, by heat risk level

Hearts worked hardest after lunch

99 bpm

Average heart rate from 13:00 to 14:00, the highest hour of the day. Single readings reached 160.

Afternoons cost output

13:00–17:00

Afternoon shifts produced less work than morning shifts (07:00–11:00), even after taking heat and other factors into account.

Source: Heang et al., (2025), doctoral dissertation, ITC

KEY MESSAGE

Workers did not stop trying. Their bodies slowed them down to avoid overheating.

Lost output in the heat is a warning from the body, not laziness. Protecting workers protects productivity too.



SECTION 04

Recommendations for workers, employers, policymakers and CSOs

Some workers face higher risk than our study could measure



What our study showed

- Smokers got less work done
- Afternoon work brought higher heart rates and lower output
- About half the workers had only primary schooling or less, so messages must be simple and visual

Not in our study, likely at higher risk

- Women workers, including pregnant women and those with care work at home
- Older workers and people with health conditions
- New workers not yet used to the heat
- Daily-wage and piece-rate workers who cannot afford breaks

Our study included healthy men in two trades only

Heat stress has three kinds of cost

1

Health

Heat exhaustion and heat stroke, plus accidents when workers are tired or dizzy.

2

Income

Less work done can mean lost pay, especially for daily-wage and piece-rate workers.

3

Projects

Slower work leads to delays and higher costs for companies and the economy.

As climate change brings more hot days, all three costs will grow unless we act.

Simple, low-cost steps make a difference



1 Employers and site managers

- Schedule heavy work before 10:00 or after 15:00
- Provide shade, cool rest areas and drinking water
- Give short, regular rest breaks
- Use a buddy system to spot warning signs
- Ease new workers into the heat over their first days

2 Workers

- Drink water often, before feeling thirsty
- Check urine colour: dark means drink more
- Wear light clothing and a hat; rest in shade
- Take short, frequent breaks
- Report symptoms early and watch co-workers

3 Policymakers

- Set heat-specific workplace safety rules
- Require rest breaks in high-risk heat
- Support training, cooling measures and research

Based on study recommendations and NIOSH (2016) heat stress guidance

CSOs can turn this evidence into action



1 Raise awareness

Share the warning signs and the 10:00–15:00 danger hours, in simple Khmer and pictures.

2 Support workers

Help workers raise heat concerns safely and learn basic heat first aid.

3 Collect evidence

Record workers' stories, symptoms and incidents, and partner with researchers.

4 Advocate

Push for heat rules, rest breaks and water, with attention to women and informal workers.

More on CSO roles in this afternoon's group discussion (15:15)

Three things to remember



1

On hot-season sites, heat risk is high from about **10:00 to 15:00**.

2

In the hottest conditions, workers lost **about a third of their productive time**, and their bodies worked harder.

3

Water, shade, rest and cooler working hours protect both health and productivity.



QUESTIONS & DISCUSSION

Thank you

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