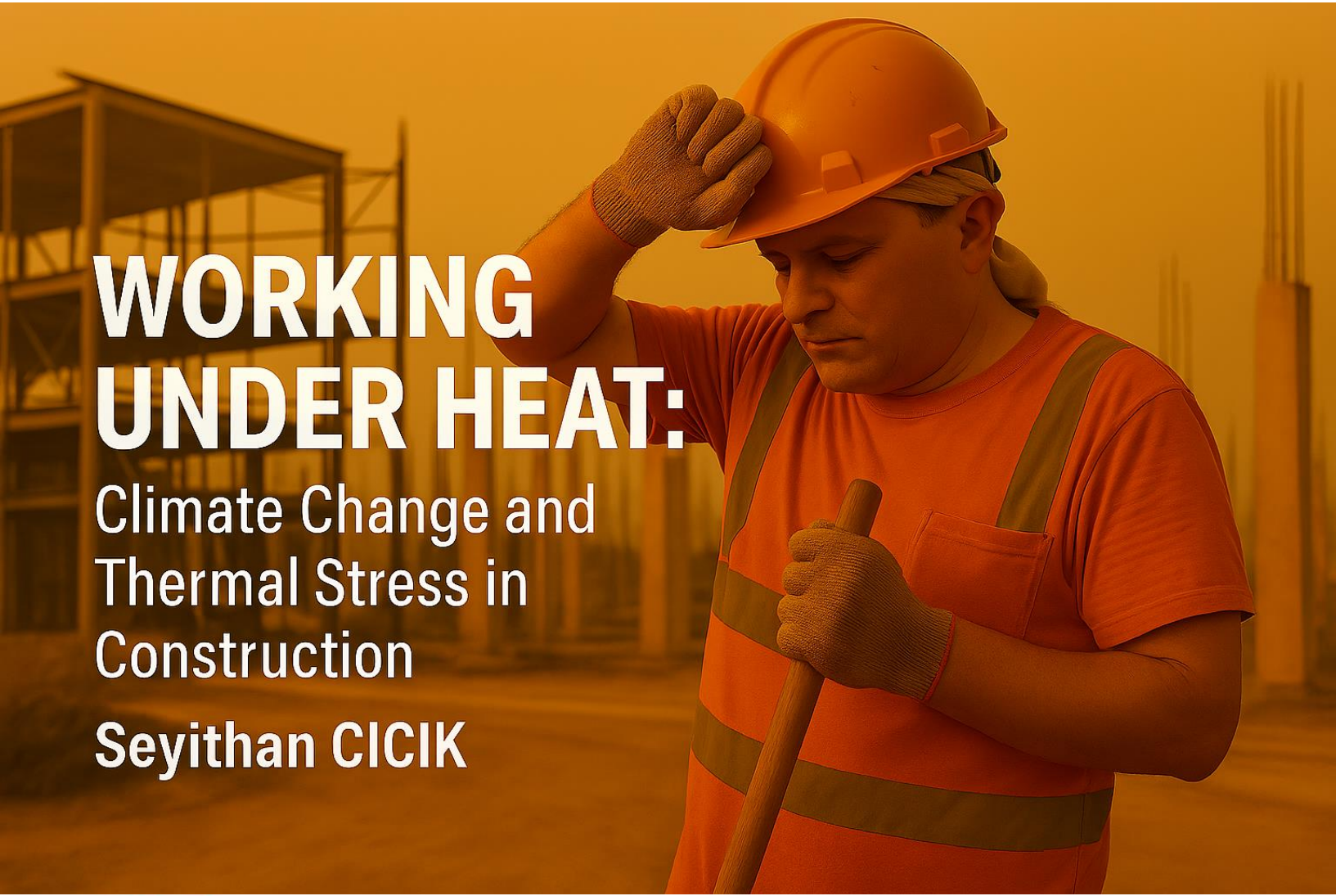

WORKING
UNDER HEAT:
Climate Change and
Thermal Stress in
Construction
Seyithan CICIK

Presentation Outline

- Context: Climate Change and Thermal Stress
- Climate Change – A Global OSH Challenge
- Risks in the Construction Sector
- Health & Productivity Impacts
- Global Challenges in Addressing Heat Stress in Construction
- Legislative Framework and National Measures
- On-site Measures and Good Practices
- Future Strategies and International Outlook
- Q&A and Closing Remarks

Climate Change and Thermal Stress

- "When heat comes, it's invisible. It doesn't bend tree branches...
  The sun feels like the barrel of a gun pointed at you."
- It reminds us that extreme heat is often silent, invisible—yet deadly.
- In the workplace, especially in construction, this invisible force becomes a real occupational hazard.

> When heat comes, it's invisible. It doesn't bend tree branches or blow hair across your face to let you know it's arrived. The ground doesn't shake. It just surrounds you and works on you in ways that you can't anticipate or control. You sweat. Your heart races. You're thirsty. Your vision blurs. The sun feels like the barrel of a gun pointed at you. Plants look like they're crying. Birds vanish from the sky and take refuge in deep shade. Cars are untouchable. Colors fade. The air smells burned. You can imagine fire even before you see it.
>
> ▶ **Jeff Goodell**, Author "The Heat Will Kill You First"

Climate Change and Thermal Stress

Extreme Heat Becoming the New Normal

- 2023 was the hottest year ever (NASA 2024)
- May 2024 marked the 12th consecutive hottest month (Copernicus 2024)

Globally

2.41 billion workers

70 per cent of the working population

are exposed to excessive heat

This results in

22.85 million non-fatal injuries

and

18,970 deaths annually

Climate Change and Thermal Stress

In Africa, over **92% of workers** are exposed.

In the Arab States and Asia-Pacific, the figures are **above 70%**, well over the global average of 71%.

Europe and Central Asia have seen a 17.3% increase in heat exposure since 2000 — almost **twice** the global average.

In Africa and the Americas, **over 7% of all occupational injuries** are attributed to heat. And the problem is **escalating fast** with injury rates rising more than **30% in the Americas** since 2000.

Climate Change and Thermal Stress

US$361 billion
could be saved globally

if OSH measures to prevent occupational injuries related to excessive heat were implemented.

9/10

worker exposures to excessive heat occur **outside of a heatwave.**

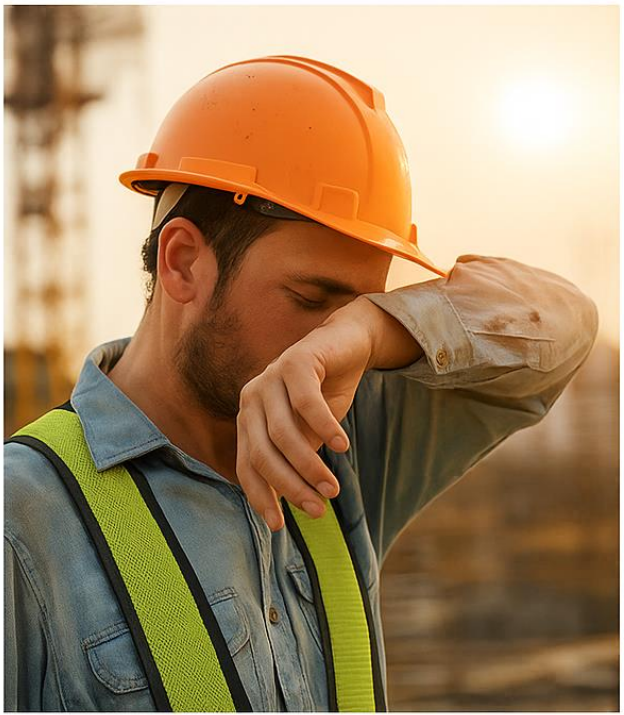
8/10

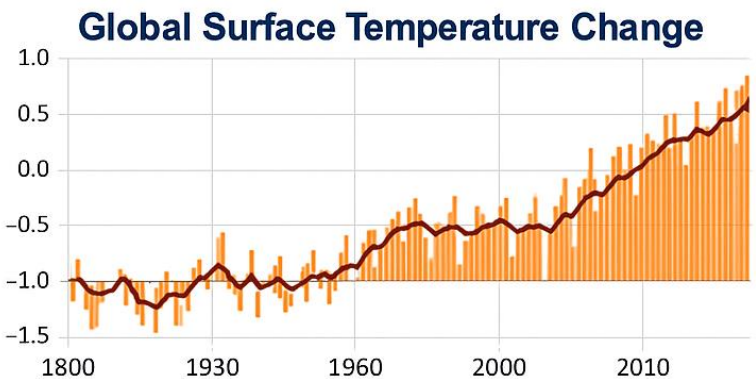
occupational injuries linked to excessive heat occur **outside of a heatwave.**

26.2
million

people living with **chronic kidney disease** attributable to heat stress worldwide.

Climate Change: A Global OSH Challenge





- Rising global temperatures
- More frequent and intense heatwaves
- Major impacts on outdoor workers

Climate Change: A Global OSH Challenge

- Outdoor workers disproportionately affected
  - direct sunlight for long periods
  - lack access to adequate cooling
  - hydration
  - rest facilities

Labourers work near the Burj Khalifa, the tallest tower in the world, in Dubai May 9, 2013. (File photo: Reuters)

Climate Change: A Global OSH Challenge

❑ Global Trends Impact

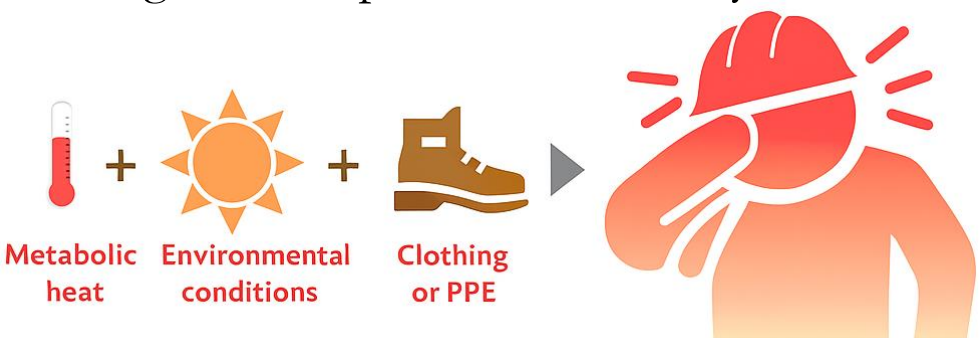
- Heat stress as one of the fastest-growing occupational safety and health risks

❑ Heat stress now classified as a major OSH risk (ILO, IPCC)

- Climate change is no longer an environmental problem alone
- Urgent occupational health challenge

What is Thermal Stress?

- Caused by metabolic heat, environmental conditions, and clothing/PPE
- Occurs when body can't regulate temperature effectively
- Leads to:
  → Heat cramps
  → Heat exhaustion
  → Heat stroke



- Risk increases with humidity, pre-existing conditions, and physical effort

Heat Index and WBGT – Measuring Thermal Stress

Heat Index

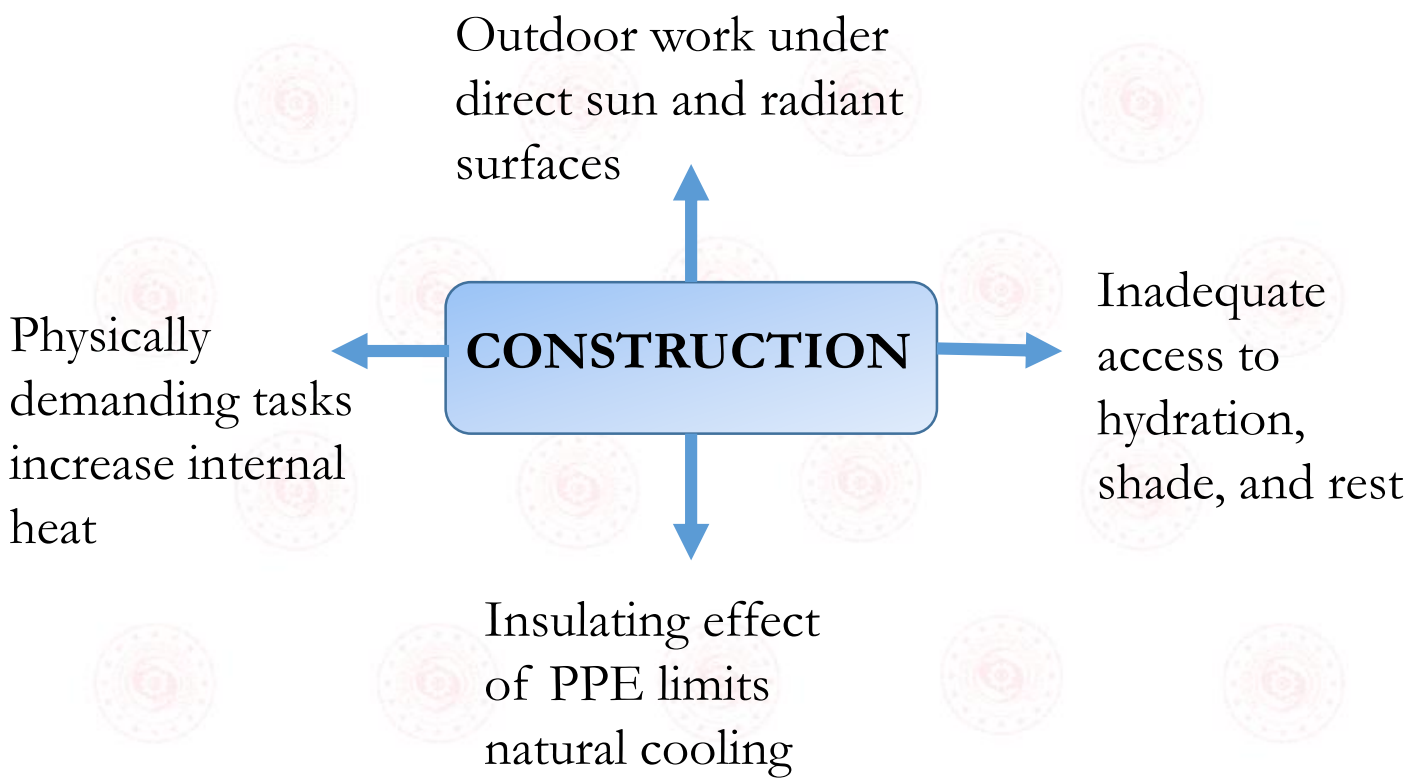
Also known as 'apparent temperature', the heat index measures how hot it feels by combining air temperature and relative humidity.

WBGT

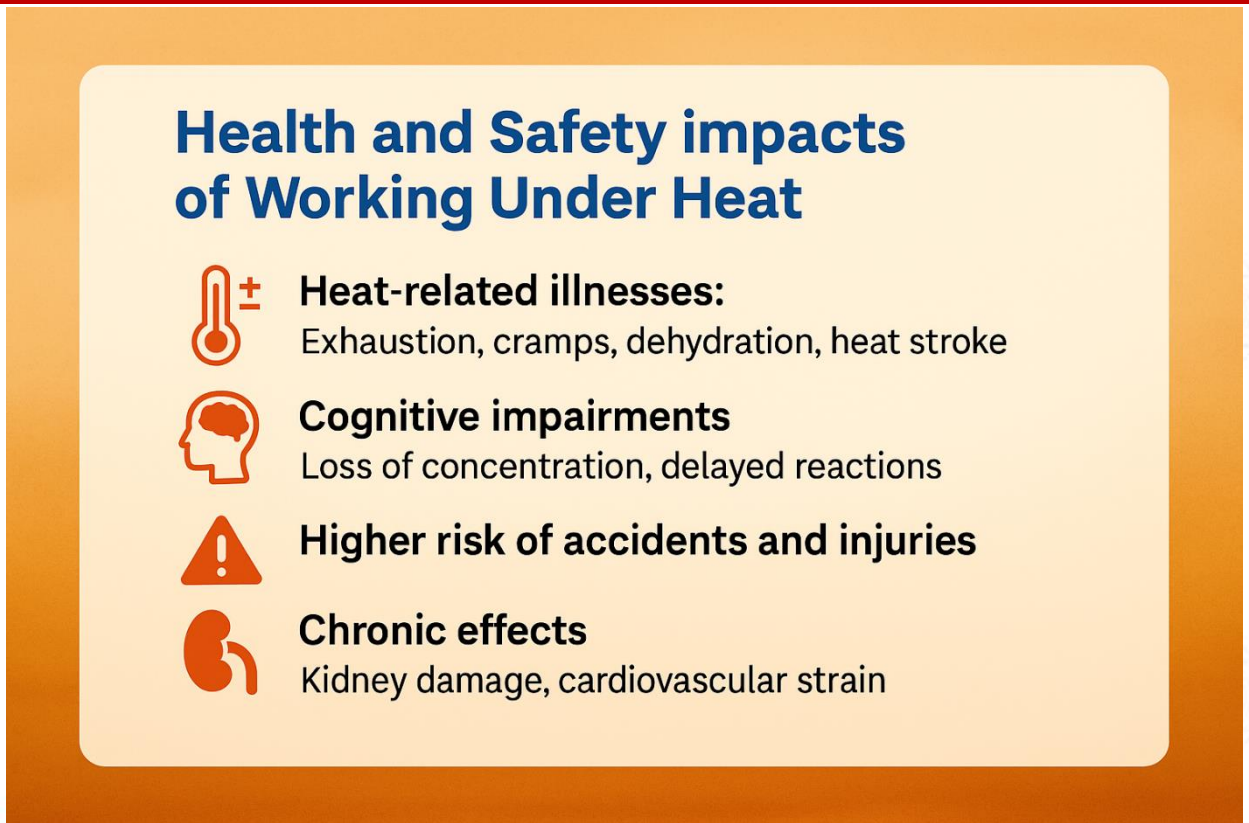
(Wet Bulb Globe Temperature)

Unlike the heat index, WBGT is measured in direct sunlight and factors in wind speed, sun angle, and cloud cover in addition to air temperature and humidity.

Risk Factors in the Construction Sector



Health and Safety Impacts



Global Challenges in Addressing Heat Stress in Construction

- Lack of dedicated data on heat-related occupational illnesses
- Absence of legal thresholds for safe working temperatures
- Mandatory PPE often increases heat strain
- Limited awareness and resources in small-scale construction operations
- Insufficient climate-adapted OSH strategies

Legislative Framework and National Measures

- General OSH Law covers thermal risks implicitly
- Guidance documents issued by public institutions
- Site-specific risk assessments increasingly used
- No specific heat threshold in legislation

Global Policy Landscape on Heat Stress

- Only a few countries have specific legal thresholds for heat exposure (e.g. Qatar, China, USA)
- Most countries lack formal, enforceable standards on heat stress
- Legal requirements vary across regions and sectors
- ILO's review of 21 countries highlights
- significant policy gaps
- Greater alignment

and climate-adapted OSH frameworks are needed globally

National Legal Measures on Heat Stress – Selected Countries (ILO 2024)

ILO region	Country	Provisions						
		Exposure threshold*	Cool rest areas	Hydration	Rest / Breaks	Health checks	Education & Training	PPE
Africa	Algeria		X	X	X	X		X
	South Africa	X		X		X	X	
The Americas	Brazil	X						
	Chile	X	X	X	X	X	X	X
	Costa Rica	X	X	X		X	X	X
	Mexico					X	X	X

National Legal Measures on Heat Stress – Selected Countries (ILO 2024)

ILO region	Country	Exposure threshold*	Cool rest areas	Hydration	Rest / Breaks	Health checks	Education & Training	PPE
The Arab States	Bahrain						×	×
	Kuwait							
	Oman			×			×	
	Qatar	×	×	×		×	×	×
	Saudi Arabia	×		×	×	×	×	×
	United Arab Emirates			×	×		×	×

National Legal Measures on Heat Stress – Selected Countries (ILO 2024)

ILO region	Country	Heat stress assessment	
		Heat stress indicator	Safety threshold (work intensity / risk)
Africa	Mozambique*	Air temperature	33°C (mining operations only)
	South Africa	WBGT	30°C
The Americas	Brazil	WBGT	31.7-33.7°C (very low intensity work) 20.7-24.7°C (very high intensity work)**
	Chile	WBGT	32.2°C (low) 31.1°C (mod.) 30.0°C (high)
	Costa Rica	Heat Index and WBGT	<91 (low risk) 91-102 (mod. risk) 103-124 (high risk) ≥125 (extreme risk)
The Arab States	Qatar	WBGT	32.1°C
	Saudi Arabia	Heat Index	25-29°C (low risk) 30-38°C (mod. risk) 39-51°C (high risk)

National Legal Measures on Heat Stress – Selected Countries (ILO 2024)

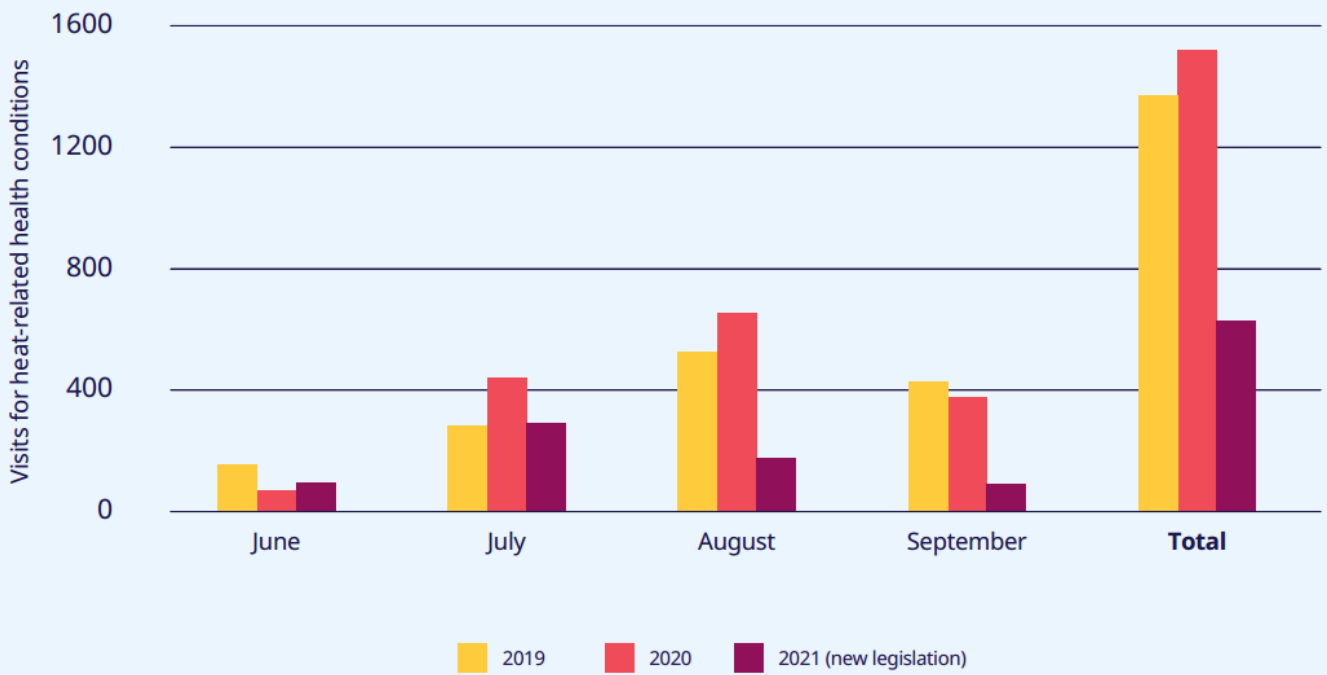
ILO region	Country	Heat stress assessment	
		Heat stress indicator	Safety threshold (work intensity / risk)
Asia and the Pacific	China	Air temperature	37-39°C (high risk) >39°C (extreme risk)
	India	Wet Bulb Temperature	30°C
	Japan	WBGT	33.0°C (sedentary) 30.0°C (low) 28.0°C (mod.) 26.0°C (high) 25.0°C (very high)
	Singapore	WBGT	32°C (mod. risk) 33°C (high risk)
Asia and the Pacific	Thailand	WBGT	34.0°C (low) 32.0°C (mod.) 30.0°C (very high)
	Vietnam*	Air temperature (indoor only)	34°C (light) 32°C (medium) 30°C (heavy)

Best Practices from the GCC (Gulf Cooperation Council)

Country	Legislation code (Ministerial decision)	Prohibited work hours		Thermal Stress Indicator used for guidance	Additional information
		Period of enforcement	Hours daily		
Bahrain	No. 3 (2013)	July 1 to August 31	12:00 – 16:00	---	Work timetable must be translated and clearly visible. Workers in oil and gas industry as well as emergency maintenance are exempt.
Kuwait	No. 535 (2015)	June 1 to August 31	11:00 – 16:00	---	Workers in oil and gas industry as well as workers in closed-in vehicles/structures are exempt.
Oman	No. 286 (2008) No. 322 (2011)	June 1 to August 31	12:30 – 15:30	---	Includes provisions for cool drinking water as well as air-conditioned shaded resting areas and transportation
Qatar	No. 17 (2021)	June 1 to September 15	10:00 – 15:30	WBGT	Includes requirements for risk assessment and annual health check-ups as well as provisions for training workers and OSH staff, drinking water, shaded rest areas, and personal protective equipment. Includes workers' right to remove themselves from high heat stress situations. Work stops if WBGT exceeds 32.1°C.
Saudi Arabia	No. 3337 (2014)	June 15 to September 15	12:00 – 15:00	Heat Index	A supplementary guide provided by the Ministry includes requirements for risk assessment and provisions for worker training, personal protective equipment, health checks, gradual adaptation to full-time work, as well as breaks and water based on Heat Index. Workers in closed-in vehicles/structures, shaded areas, or remote areas where no shade is available are exempt.
United Arab Emirates	No. 401 (2015)	June 15 to September 15	12:30 – 15:00	---	Includes requirement for 8-hour maximum daily work shift; additional hours will be considered overtime and include extra pay. Includes provisions for protective equipment, cold drinking water, additional salts/lemon, industrial cooling solutions, sunshade. Work timetable must be translated and clearly visible.

Qatar's Evidence-Based Action Against Heat Stress

Total number of initial patient visits to Qatar Red Crescent clinics for heat-related illnesses before (2019 and 2020) and after (2021) the adoption of Ministerial Decision No.17



Mitigating Heat Risks in Construction

Plan & Forecast

Use weather forecasts and heat index tools to adjust work schedules.

Provide Shade & Ventilation

Install shaded rest areas and cooling stations onsite.

Work/Rest Cycles

Schedule frequent breaks during peak heat hours

Hydration

Ensure cool water and electrolyte drinks are always available.

Protective Clothing & Equipment

Encourage breathable, UV- resistant PPE.

Heat Stress Monitoring

Use wearable sensors or mobile apps for neat alerts.

Ensuring Adequate Hydration

- Access to potable water at all times, including remote areas
- Individual water bottles for each worker
- Begin the workday well-hydrated (500 ml with electrolytes ~1 hour before work
- Drink approximately **1 cup (200 ml) every 15–20 minutes**
- Salt intake for those who sweat heavily (consultation required for at-risk individuals)
- Cooling options: Ice slurry, crushed ice, cold drinks during breaks

WBGT	Low-intensity work	Moderate-intensity work	High-intensity work
25.0-28.0	0.35	0.55	0.65
28.0-29.4	0.40	0.55	0.70
29.5-30.9	0.40	0.60	0.75
31.0-32.4	0.45	0.65	0.80
≥32.5	0.50	0.70	0.85

Sanitary Facilities & Hydration Self-Monitoring

Lack of toilets and washrooms leads workers — especially women to **avoid drinking enough water**

Cooling actions (e.g., splashing water) are also avoided without proper facilities

This increases **dehydration risk** and exposure to heat stress

A simple tool like a **urine color chart**, placed in toilets, helps workers monitor hydration.

Future Strategies for Tackling Heat Stress

1) Strengthen Prevention & Control
Update outdated regulations and embed proactive heat stress measures in OSH policies.

2) Integrate OSH into Heat Action Plans
Recognize excessive heat as an OSH hazard and place workers at the center of public health strategies.

3) Protect Workers Beyond Heatwaves
Ensure protective measures are applied during all periods of excessive heat, not only extreme events.

4) Develop Sector-Specific Strategies
Tailor solutions for the construction sector

Future Strategies for Tackling Heat Stress

5) Embed Heat Stress in OSH Management Systems

Make heat risk assessments and worker input mandatory at workplace level.

6) Promote Simple & Affordable Solutions

Encourage hydration, shaded rest areas, schedule adjustments, and acclimatization programmes.

7) Ensure Social Dialogue

Strengthen collective bargaining and empower worker representation in heat-related OSH policy.

8) Foster International & Cross-Sector Cooperation

Promote coordination between labour, health, environment, and climate ministries, and global actors.

Thank you very much!

Seyithan CICIK / Labour Expert
E-mail: seyithan.cicik@csgb.gov.tr

isggmmedya

Directorate General of OSH