

RESEARCH UNDERTAKEN IN QATAR TO GATHER THE EVIDENCE NEEDED TO ADDRESS OCCUPATIONAL HEAT STRESS

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RESEARCH OVERVIEW

over 5,500 work hours monitored

extensive
heat
mitigation

outdoor

53 road & civil workers

indoor

38 MEP workers

outdoor

34 agriculture workers

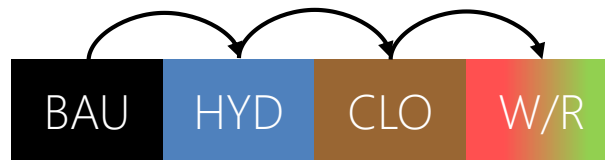
minimal
heat
mitigation

Night shift [00:00 – 11:00]

Evening shift [15:30 – 02:30]

Mid-day shift [06:00 – 17:00]

Morning shift [04:30 – 11:00]



data on physiology, health, labour, climate

RESEARCH OVERVIEW

Metabolic Rate

second by second time-motion analysis or real-time analysis

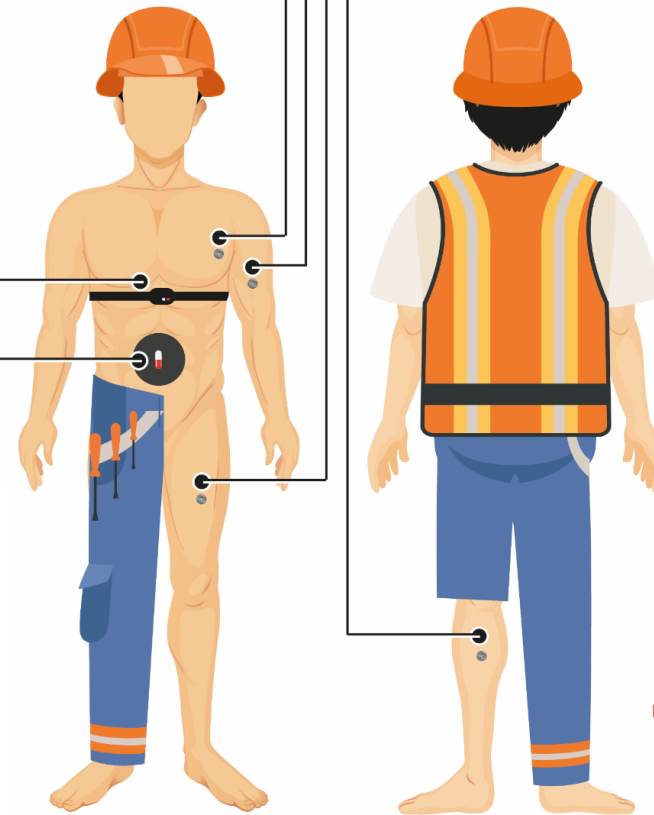


Heart Rate

beat by beat heart rate data using heart rate monitors

Core Temperature

continuous core temperature data using telemetric capsules



Mean Skin Temperature

continuous skin temperature from four sites using wireless thermistors

Occupational Heat Stress

continuous environmental data using a portable weather station

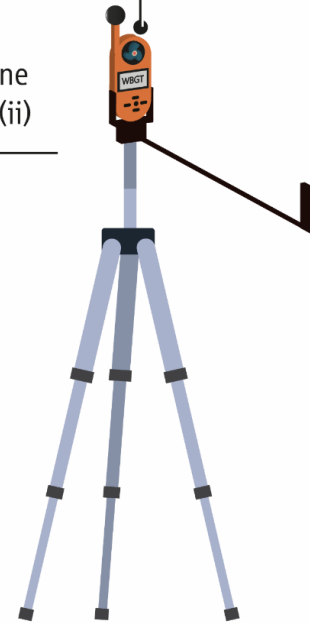
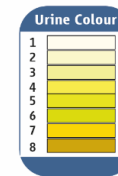
Hydration State

pre and post evaluation of urine specific gravity (i) and colour (ii)

i.



ii.

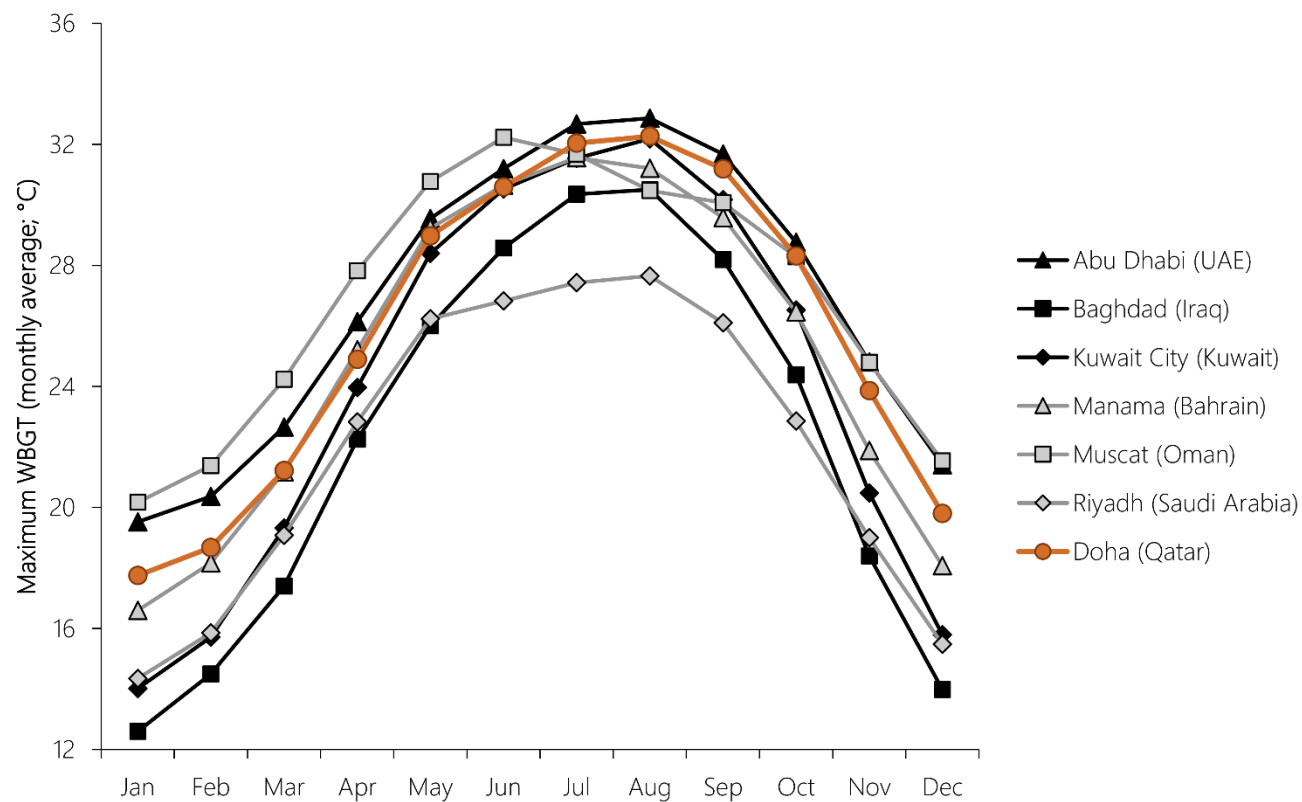


CURRENT CLIMATE DATA AND FUTURE PROJECTIONS

↳ Qatar is **one of the hottest areas** to work in the Gulf region

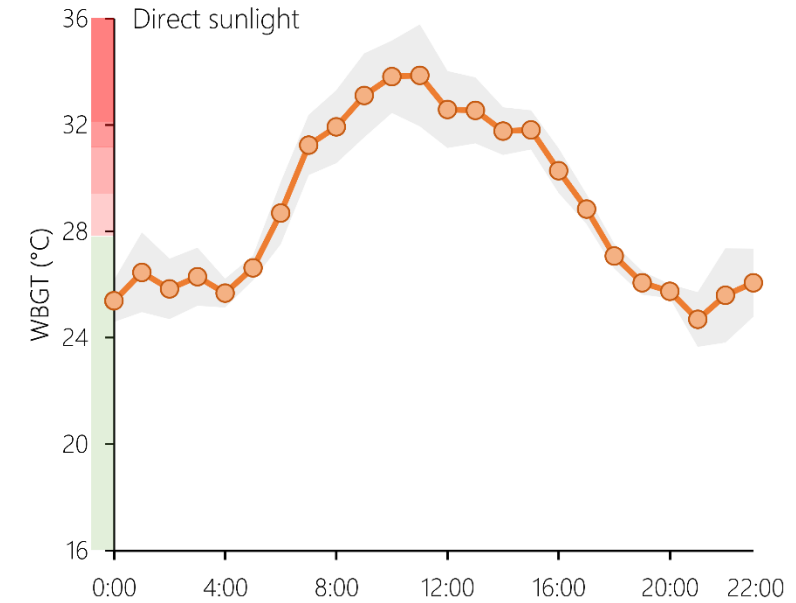
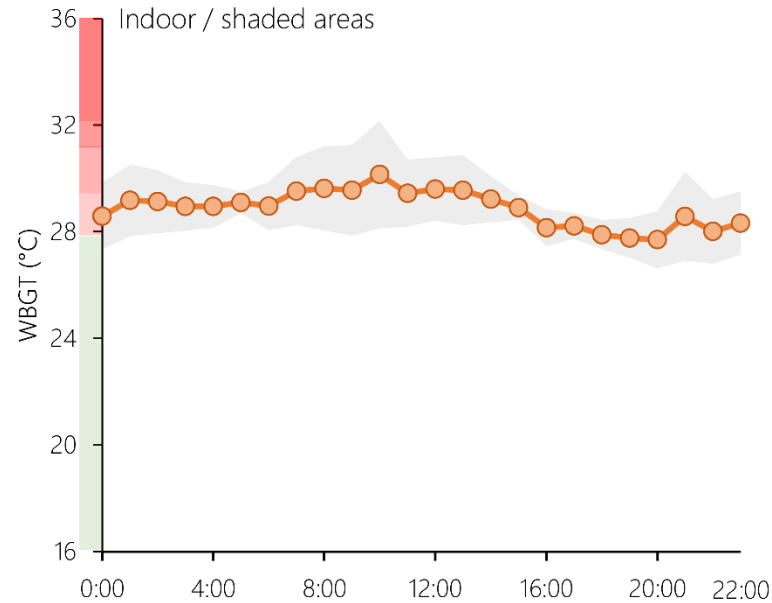
↳ When mitigation strategies are in place, occupational heat strain levels are **low**

– **comparable to or less dangerous** than those found in studies conducted in many other countries

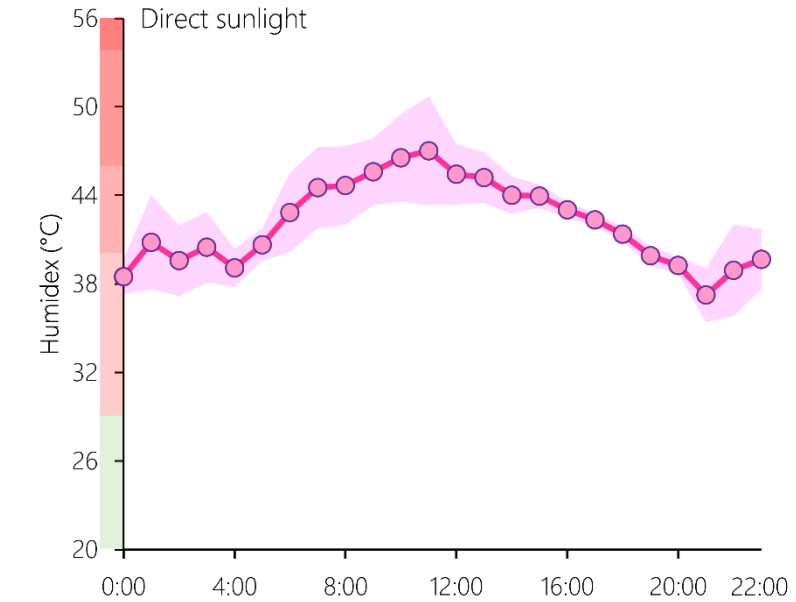
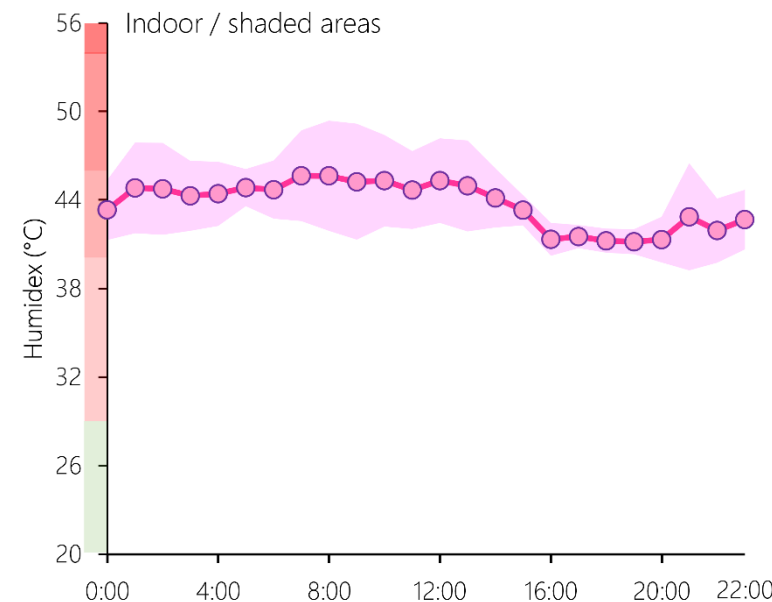


OCCUPATIONAL HEAT STRESS IS HIGH UNDER THE SUN

- Occupational heat stress is
 - **low** in indoor / shaded areas
 - **high** in areas under the sun during mid-day



- Humidex** does not fully reflect the difference between work performed in indoor / shaded areas versus under the sun



OCCUPATIONAL HEAT STRESS IS HIGH UNDER THE SUN

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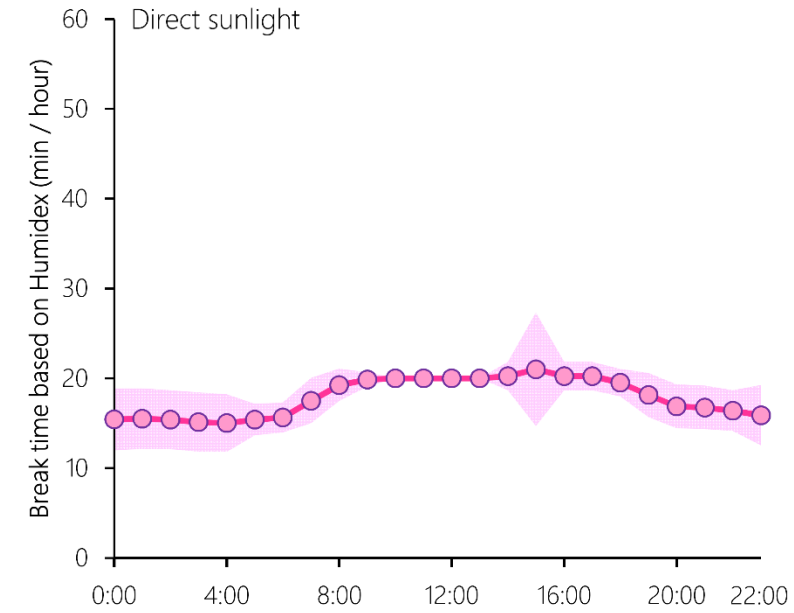
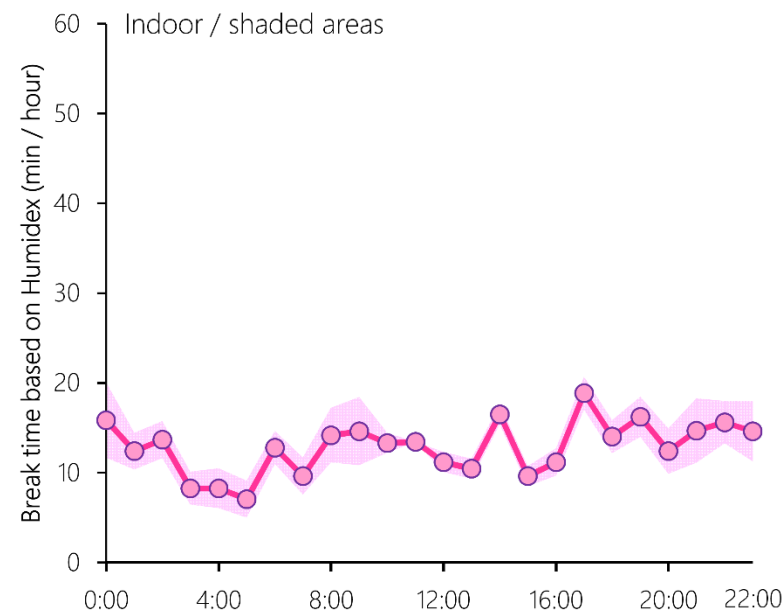
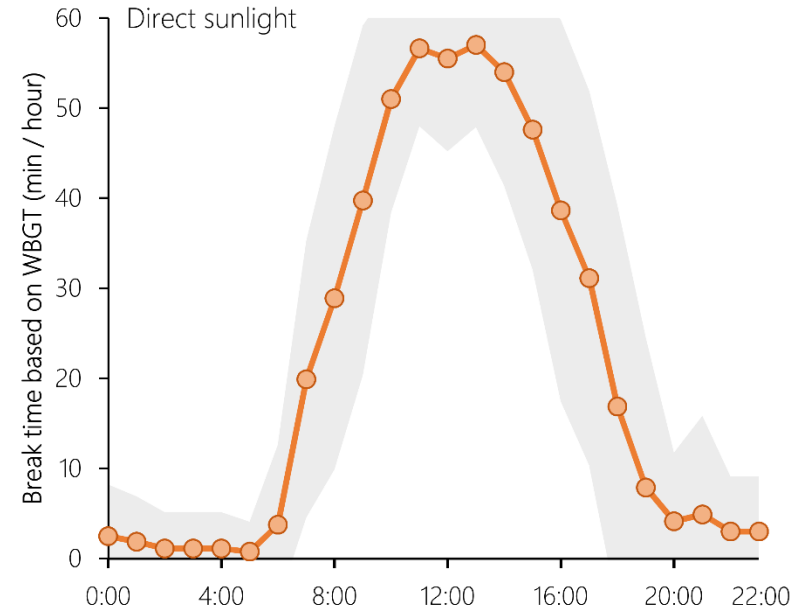
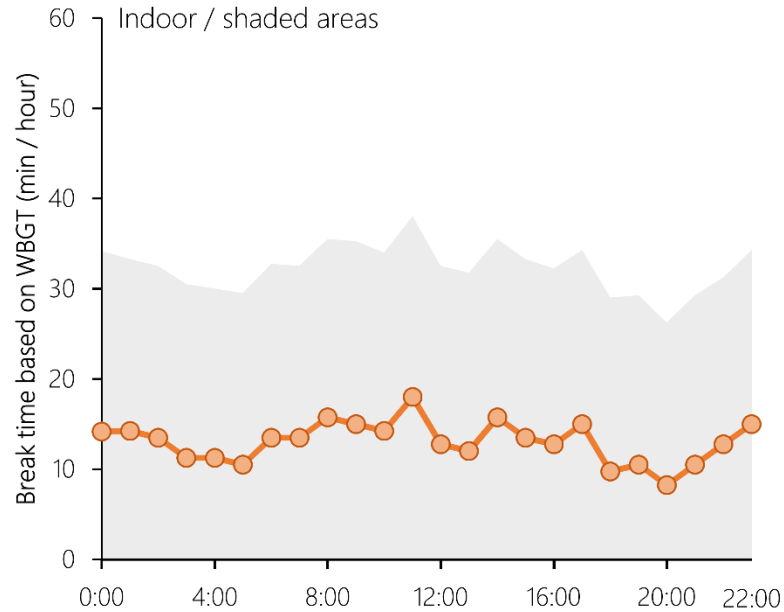
WBGT heat stress risk →	None (<27.8 °C)	Low (27.8 - 29.4 °C)	Moderate (29.5 - 31.0 °C)	High (31.1 - 32.1 °C)	Extreme (>32.1 °C)
Indoor / shaded areas	13 %	57 %	18 %	11 %	1 %
In direct sunlight	19 %	9 %	17 %	22 %	33 %

0-9 10-29 30-59 60-79 80-100

WORK-REST RATIOS

- Individuals working
 - in **indoor / shaded areas** can work continuously with average breaks of 15 min per hour
 - under the sun** between 10:00 and 15:00 are at high risk of occupational heat stress, based on WBGT

- Humidex** recommendations for work-rest ratios are not a safe measure



OCCUPATIONAL HEAT STRESS IS HIGH DURING THE DAY

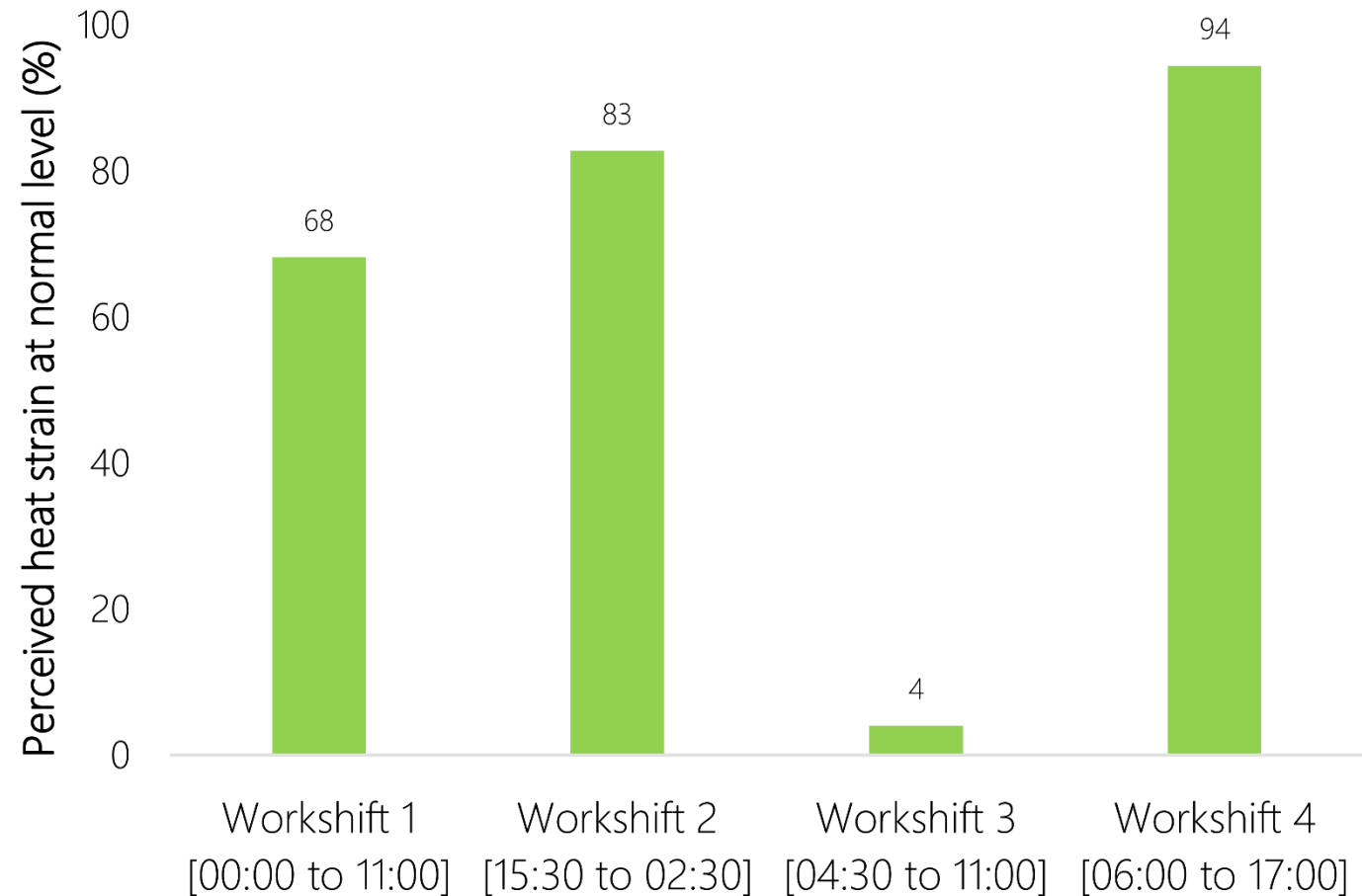
← Those **working during the night** experience limited occupational heat stress

WBGT heat stress risk →	None (<27.8 °C)	Low (27.8 - 29.4 °C)	Moderate (29.5 - 31.0 °C)	High (31.1 - 32.1 °C)	Extreme (>32.1 °C)
Day (04:54 - 18:25)	17 %	23 %	29 %	13 %	18 %
Night (18:26 - 04:53)	80 %	16 %	4 %	0 %	0 %

0-9 10-29 30-59 60-79 80-100

PERCEIVED OCCUPATIONAL HEAT STRAIN IS HIGH AT NIGHT

- ↳ ...however, there are risks related to workers getting **insufficient sleep**
- ↳ Construction workers **felt safer** when working from 15:30 to 02:30
 - this work shift offered the **optimum combination** of low occupational heat stress and limited risk of sleep deprivation



MANY WORKERS HAVE LOW HEAT TOLERANCE

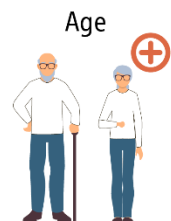
← Most workers are **lean men in their early 30s** – the most heat-resilient part of the population. However, **one-third** of them still experience symptoms or suffer from conditions that increase their likelihood of experiencing heat illness when working under occupational heat stress

	Construction workers	Agriculture workers	All workers tested
Do you have a history of...			
Urinary lithiasis (kidney stones)	0 %	0 %	0 %
High cholesterol	2 %	0 %	2 %
Diabetes mellitus	2 %	3 %	2 %
Hypertension	3 %	6 %	4 %
While working in a hot environment, have you ever experienced...			
Heat stroke	3 %	0 %	2 %
Heat exhaustion	5 %	15 %	8 %
Dizziness, confusion or fainting	1 %	26 %	8 %
Wheezing	2 %	0 %	2 %
Occurrence of symptoms			
Workers negative in all symptoms	79 %	50 %	71 %
Workers positive in one symptom	21 %	35 %	25 %
Workers positive in two symptoms	0 %	15 %	4 %

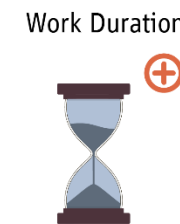
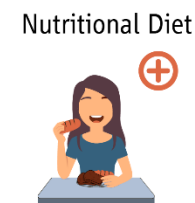
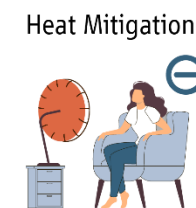
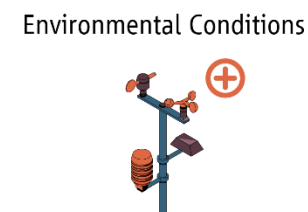
FACTORS AFFECTING WORK IN THE HEAT

← History of heat illness +

Inter-individual



Intra-individual



OCCUPATIONAL HEAT STRAIN LEVELS RECORDED

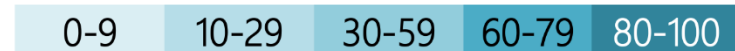
- ↪ Average **core body temperature was at normal levels** (37.3 °C) during work
- ↪ However, **one-in-three workers experienced hyperthermia** (core body temperature ≥ 38 °C)
 - can be very risky if it occurs for prolonged periods

Work shifts currently in place			Piloted work shift	TOTAL
Work shift 1: 00:00 to 11:00 (construction)	Work shift 2: 15:30 to 02:30 (construction)	Work shift 3: 04:30 to 11:00 (agriculture)	Work shift 4: 06:00 to 17:00 (construction)	
42 %	41 %	39 %	11 %	33 %

OCCUPATIONAL HEAT STRAIN LEVELS RECORDED

- ↳ The amount of time the core body temperature exceeded the safe limit of 38 °C was **very short**
 - 0 to 3 % in construction work site (depending on work shift)
 - 8 % in agriculture work site

Strategy	Hyperthermia levels based on core temperature			
	Normothermia (36.5 - 37.4 °C)	Borderline hyperthermia (37.4 - 37.9 °C)	Hyperthermia (38.0 - 38.4 °C)	Elevated hyperthermia (≥38.5 °C)
BAU	60 %	35 %	5 %	0 %
HYD	71 %	27 %	2 %	0 %
CLO	60 %	38 %	3 %	0 %
W-R	63 %	35 %	2 %	0 %



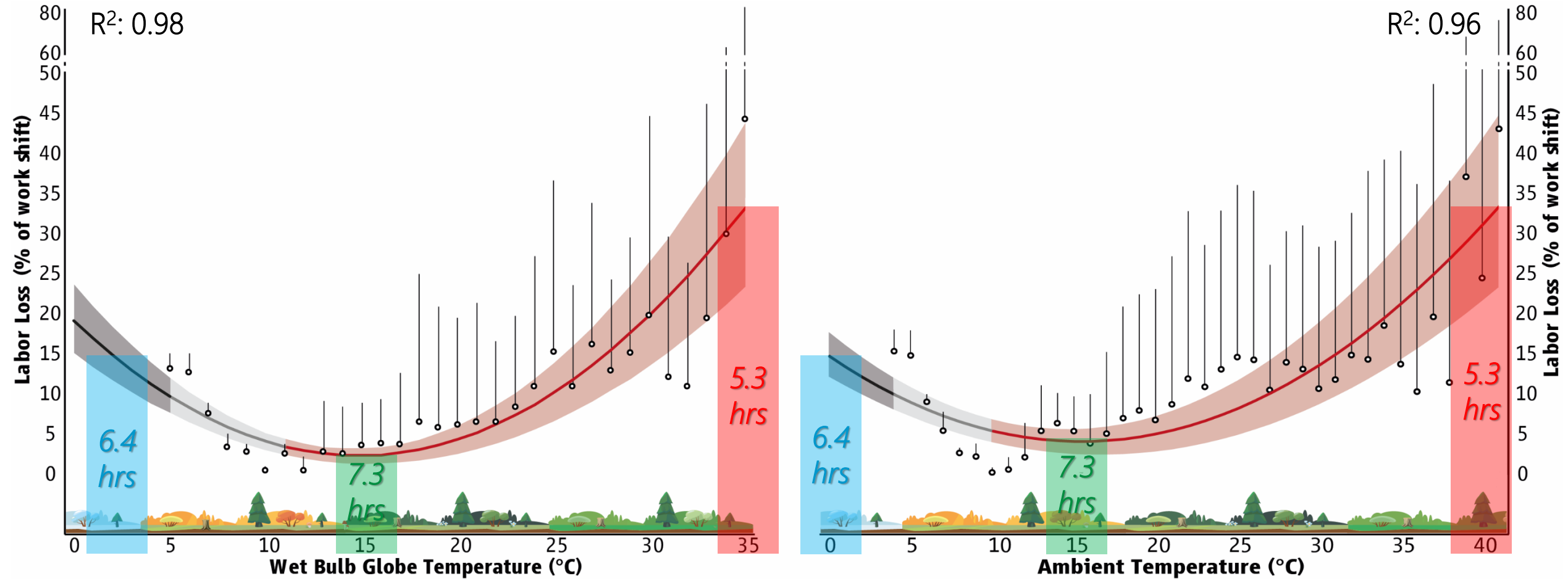
LABOUR EFFORT RECORDED

Workers performed their job at a **low pace** during all work shifts **due to high heat stress**

		Work effort levels			
		Work break (0 W / m ²)	Low-intensity work (0.1 - 1.4 W / m ²)	Moderate-intensity work (1.5 - 15.4 W / m ²)	High-intensity work (>15.4 W / m ²)
Currently in place work shifts	Work shift 1: 00:00 - 11:00 (construction)	61 %	32 %	5 %	1 %
	Work shift 2: 15:30 - 02:30 (construction)	62 %	31 %	5 %	1 %
	Work shift 3: 04:30 - 11:00 (agriculture)	23 %	67 %	10 %	0 %
Piloted shift	Work shift 4: 06:00 - 17:00 (construction)	42 %	40 %	18 %	0 %

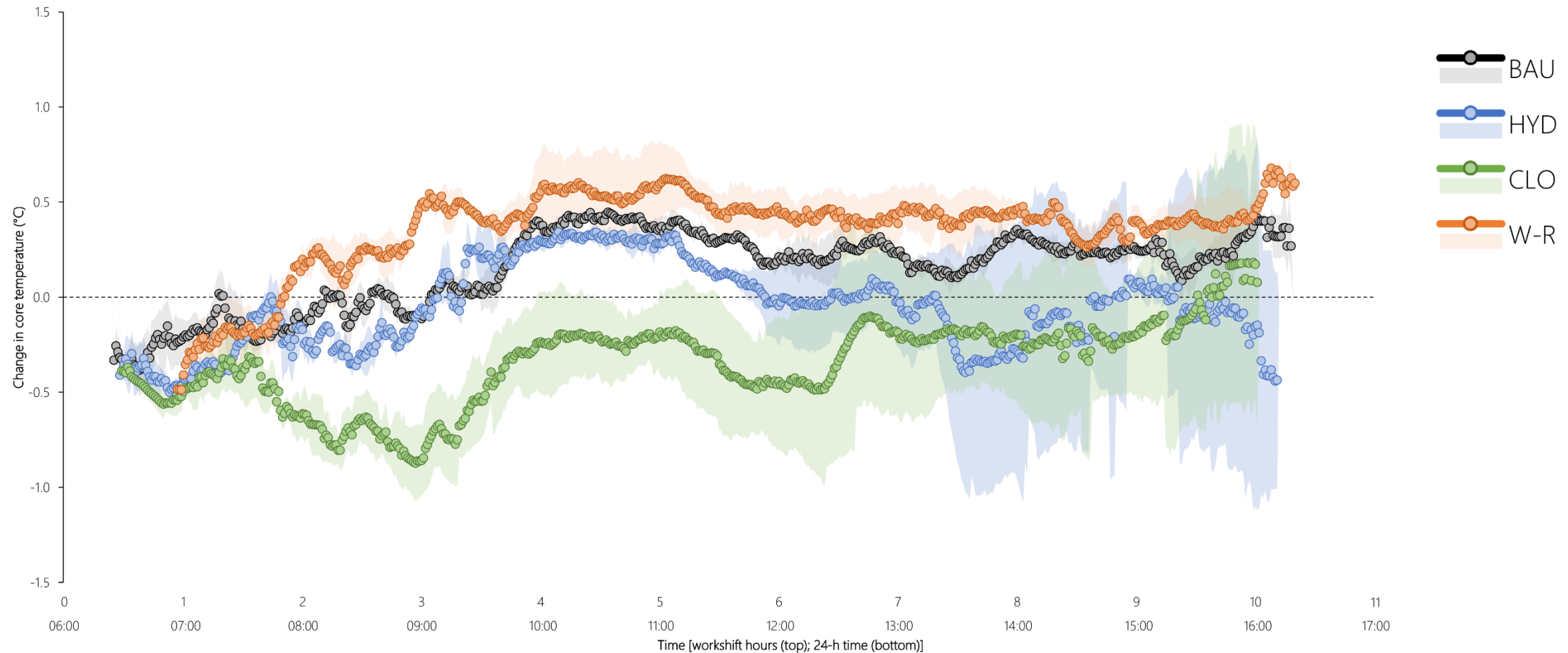
ADDRESSING HEAT STRESS IMPROVES PRODUCTIVITY (international data)

work during an 8-hour shift



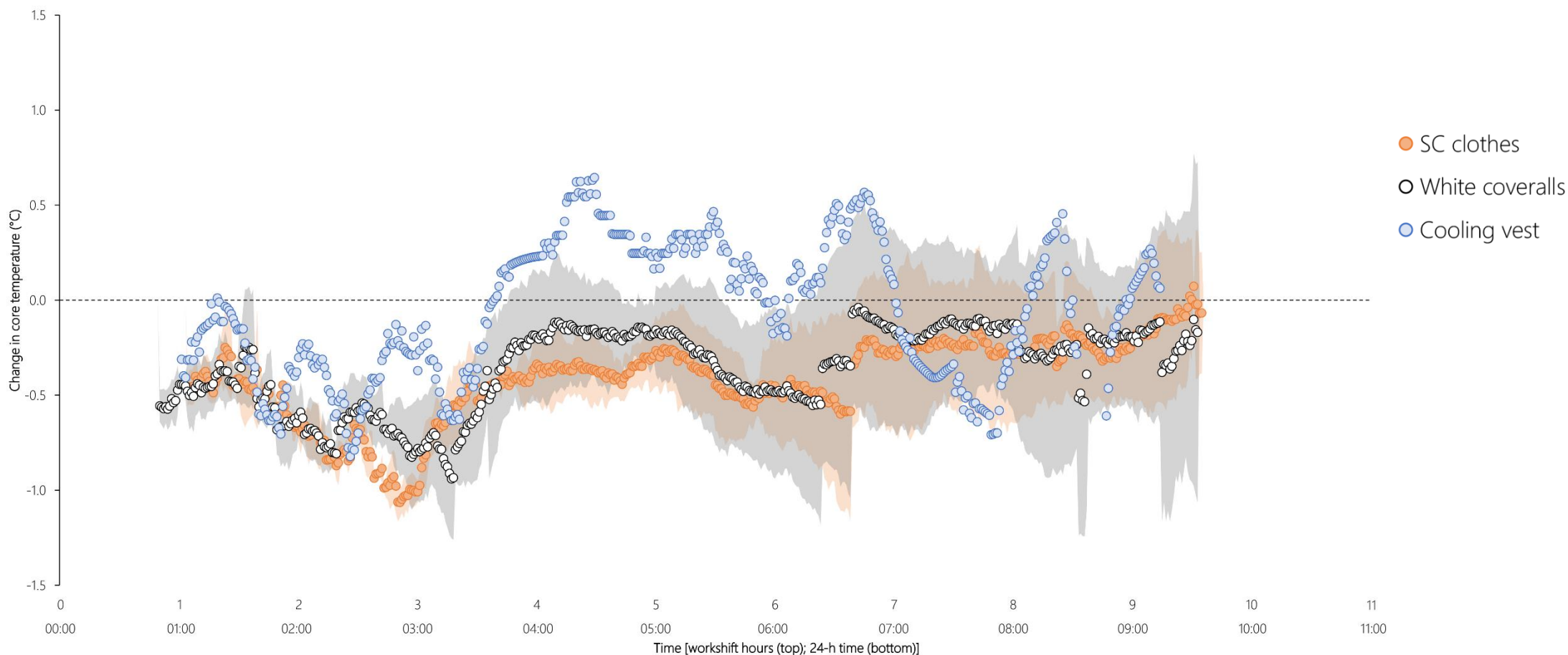
OCCUPATIONAL HEAT STRAIN: COMPARING STRATEGIES

← When all relevant factors were considered, **clothing and hydration** were the **most effective** strategies to mitigate occupational heat strain



OCCUPATIONAL HEAT STRAIN: CLOTHING STRATEGIES

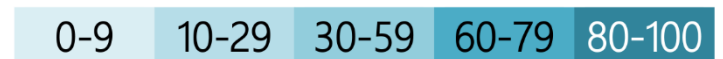
↳ ...and the most effective clothing strategies to mitigate occupational heat strain were the **white coveralls** and the **clothes designed by the SC**



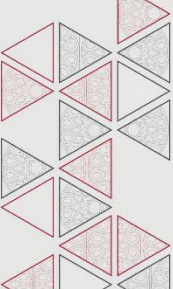

OCCURRENCE OF DEHYDRATION

- ↪ One-third of workers were **dehydrated** at the start of the work shift and this **increased** during the course of the shift to 41 %
- ↪ Dehydration was
 - **frequent** in the **agriculture** work site
 - **less frequent** in the **construction** work site

	Work shifts currently in place						Piloted work shift		TOTAL	
	Work shift 1: 00:00 to 11:00 (construction)		Work shift 2: 15:30 to 02:30 (construction)		Work shift 3: 04:30 to 11:00 (agriculture)		Work shift 4: 06:00 to 17:00 (construction)			
	Start	End	Start	End	Start	End	Start	End	Start	End
BAU	15 %	19 %	10 %	7 %	56 %	79 %	6 %	6 %	30 %	41 %
HYD	7 %	4 %	16 %	10 %	55 %	53 %	6 %	0 %	23 %	19 %



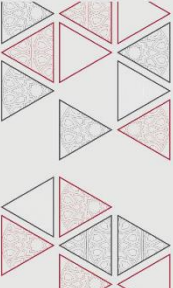
UPDATED LEGISLATION ADOPTED IN MAY 2021

May 2021
Heat Stress
Legislation in Qatar

A GUIDE FOR EMPLOYERS

Ministry of Administrative Development,
Labour and Social Affairs (ADLSA)



Unofficial Translation

Decision of the Minister of Administrative Development, Labour and Social Affairs No. (17) for the year 2021 specifying measures to protect workers from heat stress

The Minister of Administrative Development, Labour and Social Affairs,

After perusal of the Labour Law promulgated by Law No. 14 of 2004 and its amending laws, Emir Decision No. 29 of 1996 on the decisions of the Council of Ministers and submitted to the Emir for approval and issuance;

Minister of Civil Service Affairs and Housing Decision No. 16 of 2007 specifying working hours in outdoor places during summer time;

And on the adoption by the Council of Ministers of this Draft Law during its regular meeting (40) of 2020 held on 21/10/2020

Decided the following:

Article (1)

In the implementation of the provisions of this decision, the following words shall have the respective meaning assigned to them unless the context requires otherwise:

Heat Stress: occurs when the body fails to maintain its normal temperature in response to physical effort made while exposed to high temperatures combined with humidity. This may occur under direct sunlight, in shaded areas or indoor and could lead to illness due to the malfunction of the parts in charge of regulating body temperature, resulting in a number of health problems.

Workplaces: places where workers need to be or go to by reason of their work.

Outdoor workplaces: workplaces where workers are exposed to weather conditions such as solar radiation, heat and humidity.

Shaded and ventilated workplaces: covers outdoor workplaces where there is a sufficient and suitable system of artificial ventilation, where workers are not exposed to solar radiation, and where there is no exposure to heat from operating machines.

Wet Bulb Globe Temperature (WBGT) index: A system used to assess the ambient temperature of a work environment. It measures the combined proportional effect of dry bulb temperature (DB), globe temperature (GT) and wet bulb (WB), using specific devices.

Heat Stress Index: the WBGT temperature announced by the Ministry or recorded by the company in the workplace using approved WBGT devices.

1

Heat Stress is dangerous, but it can be managed!

FAQs for workers



If you perform physical work in a hot environment, your body may overheat. This can be dangerous.

In May 2021, the Ministry of Administrative Development, Labour and Social Affairs (ADLSA) introduced a new Ministerial Decision to protect workers during the hottest months of the year, particularly outdoor workers who are exposed to the heat, humidity and the sun.

1. What are the new prohibited working hours?

From 1 June to 15 September, work cannot be performed in outdoor workplaces between 10 am and 3:30 pm. Outdoor workplaces are those in which workers are exposed to weather conditions: the heat, humidity and the sun.

2. Is any outdoor work allowed during these hours?

Workers cannot work outdoors when they are exposed to weather conditions (heat, solar radiation, humidity and heat).

3. Is it safe to work before 10am or after 3pm during the summer?

Yes, it can be safe, provided that your employer has adopted certain control measures and that you also do your part by taking precautions. Drink enough water and take breaks whenever you need to. Set up a "buddy system" with your colleagues so that you can look out for each other. You must tell your supervisor or colleagues if you feel unwell and stop working.

4. Is it safe to work at night?

Night shifts can reduce the risk of heat stress. But be careful! High temperatures and humidity can still pose a risk. Drink enough water and take rests when needed. Moreover, night shifts can have a negative effect on your safety and health if you do not get enough sleep. Showing up to work tired can lead to mistakes, and can put you and your colleagues in danger.

5. How much water should I be drinking?

Drinking enough water is one of the best ways to protect yourself from heat stress. There is a simple way to check if you are drinking enough - check the colour of your urine! Pale is good, and dark is a warning sign!

It is important to remember to drink water before and after going to work. Many workers show up at work already dehydrated. When you are working outdoors, you should drink 2-3 glasses of water before starting work. Then, during the day, you should drink 3 glasses of water per hour. During the night, keep hydrated by drinking sufficient water to quench your thirst.

You may be advised to add some salt to your water. You should discuss this with safety and medical professionals as it depends on your personal situation.

Heat Stress is dangerous, but it can be managed!

FAQs for employers



1. What is heat stress?

When a person performs hard physical work, the body produces high amounts of heat which must be released to the environment to maintain a stable body temperature. It does this mainly by producing sweat on the skin so that it can be evaporated, and by sending more blood to areas that are cooler, such as the skin, the arms, and the legs. If the person is performing work in a hot environment, it is a lot more difficult to get rid of the heat that is being produced internally. If the body cannot get rid of excess heat, its core temperature rises and the heart rate increases. As the body continues to store heat, the person begins to lose concentration and has difficulty focusing on a task, may become irritable or sick, and often loses the desire to drink water. The next stage is most often fainting and even death if the person is not rapidly cooled down.

2. Can heat-related illnesses be prevented?

Yes! The best ways to reduce the risk of heat-related illnesses include work practices such as allowing slip-sliding of work, drinking water often, wearing appropriate clothing, making the work environment cooler through air conditioning and ventilation, providing shaded rest areas and performing regular health check-ups.

3. Is the employer responsible for protecting the health of workers?

Yes! Employers are responsible for providing healthy and safe workplaces. Employers should identify hazards and take measures to remedy problems before they cause an accident or disease. Employers should include all prevention actions in their risk assessment. (Labour Law, Articles 99 to 107 and Ministerial Decision No. 17 of 2021, Article 4)

4. When is work in outdoor workplaces prohibited?

Work cannot be performed in outdoor workplaces where workers are exposed to weather conditions, such as solar radiation, humidity and heat) from 10 am to 3:30 pm. (Ministerial Decision No. 17 of 2021, Article 2)

5. How is "outdoor workplace" defined?

Outdoor workplaces are defined as workplaces where workers are exposed to weather conditions (such as solar radiation, humidity and heat). (Ministerial Decision No. 17 of 2021, Article 1)

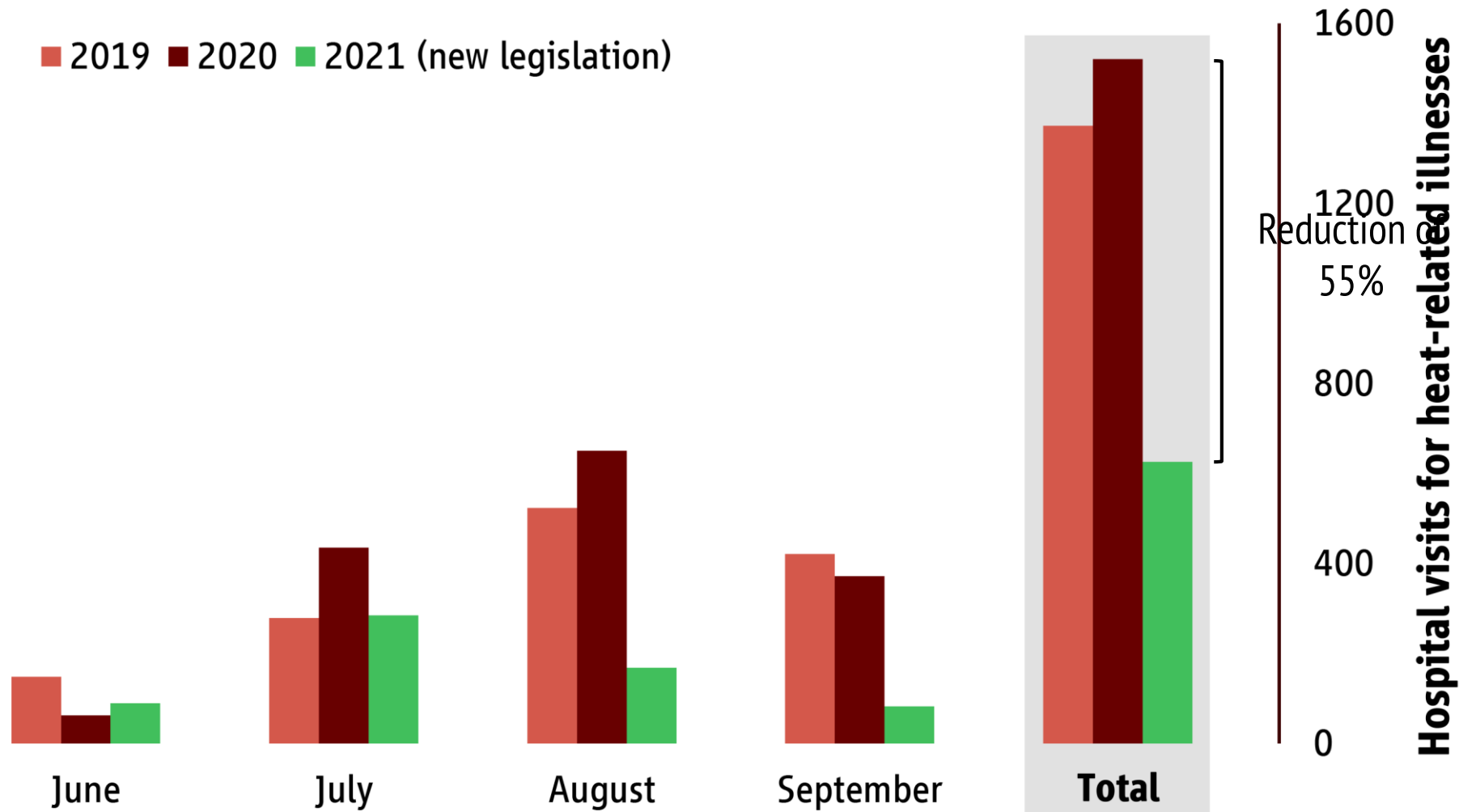
6. Can work be performed in a shaded and ventilated workplace that is outdoors?

Yes! If work is performed exclusively in shaded and ventilated workplaces, work can be performed outdoors, provided that the wet-bulb globe temperature (WBGT) index, used to assess the level of occupational heat stress, is below 27.1 °C.

7. How are "shaded and ventilated workplaces" defined?

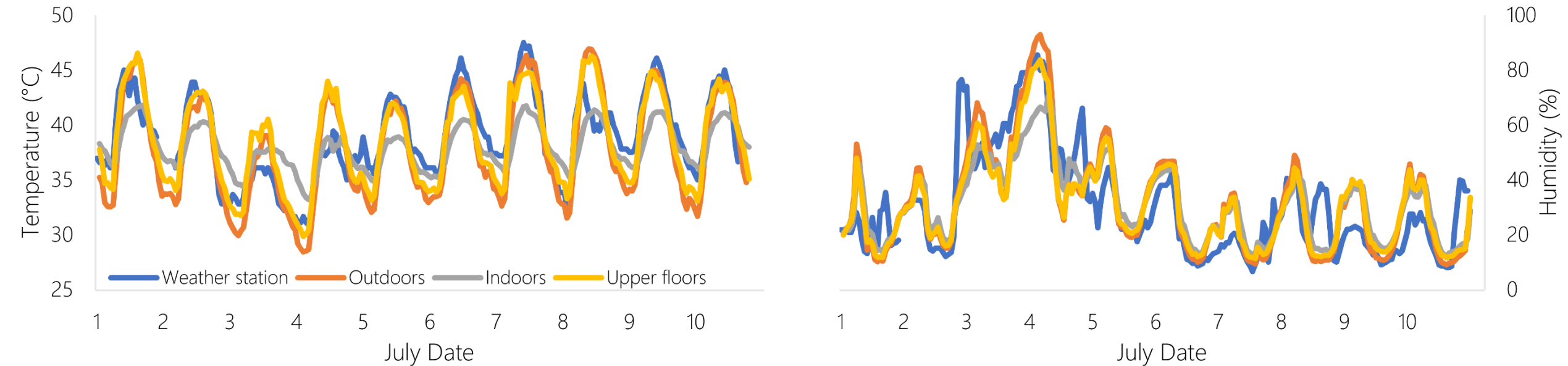
These cover outdoor workplaces where there is a sufficient and suitable system of artificial ventilation (fans and/or air-conditioning), where workers are not exposed to solar radiation, or where there is no exposure to heat from operating machines and other sources. (Ministerial Decision No. 17 of 2021, Article 1)

UPDATED LEGISLATION REDUCES HOSPITAL VISITS



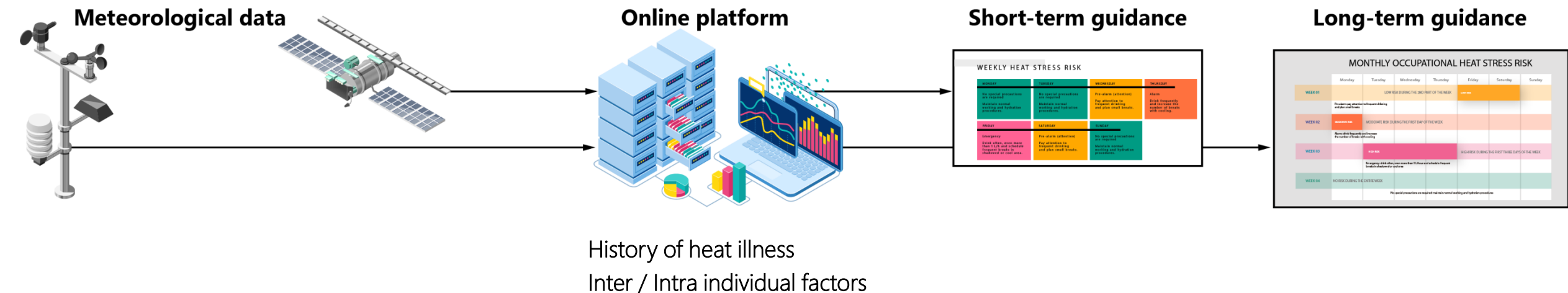
WEATHER STATION DATA REFLECT WORKING CONDITIONS

↳ There were **insignificant differences** between the data from local measurements at work sites and the closest weather stations



PLATFORM FOR WORKER / EMPLOYER / STAKEHOLDER GUIDANCE

↳ An online platform / smartphone application using AI / machine learning can effectively protect workers and provide guidance to employers and stakeholders



RESEARCH UNDERTAKEN IN QATAR TO GATHER THE EVIDENCE NEEDED TO ADDRESS OCCUPATIONAL HEAT STRESS

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