



Heat Action Platform Technical Resource

Protecting Indoor and Outdoor Workers from Extreme Heat

ONEBILLIONRESILIENT.ORG/HEAT-ACTION-PLATFORM



Protecting Outdoor and Indoor Workers from Extreme Heat

This document is a practical resource on policies and regulations that protect outdoor and indoor workers from extreme heat. Its intended audience is local and national government officials and private sector employers who are responsible for the occupational health and safety of workers. The document can also be used by civil society organizations and unions that aim to advocate for legislation or regulatory change. It offers international examples of the types of policies that governments have implemented to protect people and industry from the worst impacts of heat, and how the effectiveness of these policies has been evaluated.



Background

- ☑ Governments and employers [are responsible](#) for ensuring occupational safety and health for all employees.
- ☑ Worker productivity [begins to fall](#) at temperatures above 24-26°C/75.2-78.8 °F. A worker operating at a moderate work rate loses about 50% of their work capacity at 33-34 °C/91.4-93.2 °F.
- ☑ When environmental heat increases, the body's ability to regulate core temperature [is compromised](#), which puts people at risk of heat stress, heat illness or death.
- ☑ Some of the factors which [contribute to heat strain](#) in the workplace are a) air temperature, b) high relative humidity which can reduce the body's ability to cool by sweating, c) radiant heat from natural and artificial heat sources and d) the amount of air movement, or wind, e) work rate, and f) the impact of personal protective equipment/clothing.
- ☑ People can experience a variety of [dangerous heat-related illnesses](#), including heat exhaustion, kidney injury or failure, and heat stroke. Heat can [compound with environmental factors](#) such as air pollution and chemical exposure contributing to an increase in adverse health effects, and also cause accidents due to interactions with heat-sensitive equipment and chemicals.
- ☑ Outdoor agriculture and construction workers [are most heavily impacted](#) by heat strain. The agricultural sector is projected to account for 60% of global working hours lost to heat stress in 2030.

Policy Triggers

Worker protection policies are often activated by a trigger, that is based on temperature or other measures of thermal comfort. These triggers can be outlined in an occupational heat standard set by a health or labor agency that mandates and monitors compliance by employers. Policies can be triggered by temperature measurements taken in the workplace, or by more general temperature forecasts or measurements for the geographic area where the workplace is located. Widely used [ways of measuring thermal comfort](#) are:

- **Wet bulb globe temperature (WBGT):** WBGT is a measure that accounts for the four major environmental heat factors — temperature, humidity, radiant heat, and wind. It is the preferred and most comprehensive method of workplace thermal comfort measurement.
- **Air temperature (dry bulb):** Standard thermometer measurements can be used as a proxy for thermal comfort, but they do not account for relative humidity and other important factors in heat stress and illness.
- **Heat index:** The heat index combines air temperature and relative humidity. It measures heat stress by evaluating how hot conditions feel at rest. The heat index does not account for the effects of wind, sunlight, radiant heat sources, or workload.

Heat Protection Policies and Regulations

Technical/ Infrastructural	Capacity Building /Educational	Regulatory Changes
<ul style="list-style-type: none"> 1 Access to water 2 Cooling centers/ cool-down areas 3 Adequate shade 4 Temperature regulation 5 Ventilation system 	<ul style="list-style-type: none"> 6 Acclimatization training 7 Personal protective equipment training 8 Awareness training 9 Addressing gender-spe- cific needs 	<ul style="list-style-type: none"> 10 Heat inspections 11 Reduced work hours 12 Paid work breaks /rest

Policy Implementation Case Studies

Policy	Kind of Workers:		Examples
	Indoor	Outdoor	
1. Ensuring access to water facilities	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<ul style="list-style-type: none"> California’s Title on Heat Illness Prevention in Outdoor Places of Employment ensure employees’ access to potable water. The ‘Workers Need Project’ in Bangalore, India reached over 12,000 workers with improved water facilities over 3 years. Canada’s Sun Safety at Work Laws require federal workplaces to provide potable water for drinking, washing and food preparation.
2. Providing access to cooling centers/ cool-down areas		<input checked="" type="checkbox"/>	<ul style="list-style-type: none"> In the UAE, the Abu Dhabi Police and municipality set up a cooling center for over 20,000 industrial workers. In the US, California’s Department of Industrial Relations created regulation requiring employers to maintain cool-down areas close to where employees are working. The Red Cross operated community cooling centers and cooling buses with a focus on reaching street vendors in Hanoi, Vietnam.
3. Ensuring adequate covered space for shade	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<ul style="list-style-type: none"> Costa Rica’s Occupational Health Council created regulations requiring employers to provide shade to outdoor workers. In the US, Oregon’s Occupational Safety and Health Administration Heat Illness Prevention Regulations requires workplaces to provide shade when temperatures in the workplace exceed 26.6 °C/80 °F. Safework Australia provides practical guidance on engineering controls, such as shade, that employers can use to prevent heat risk.
4. Installing a temperature regulating system	<input checked="" type="checkbox"/>		<ul style="list-style-type: none"> India’s Factories Act of 1948 contains provisions on the maintenance of appropriate temperatures through cooling systems in work environments. The US Occupational Safety and Health Administration (OSHA) provides guidance on cooling engineering systems for workplaces. India’s Heat Protect project included the installation of energy efficient HVLS fans and cool roofs.
5. Ventilation system for increased air flow	<input checked="" type="checkbox"/>		<ul style="list-style-type: none"> China’s Guangdong Province’s 2011 labor protection measures require employers to keep facilities well ventilated. In the US, Minnesota’s Administrative Rules require employers to set up air circulation systems in indoor work environments. South Africa’s Environmental Regulation for Workplaces require employers to ventilate workplaces to adhere to certain standards.

Policy	Kind of Workers: Indoor Outdoor	Examples
6. Providing acclimatization training for extreme heat conditions	<input type="checkbox"/> <input checked="" type="checkbox"/>	<ul style="list-style-type: none"> Under Singapore’s Workplace Health and Safety regulations, employers must acclimatize newly assigned workers to hot working conditions for up to 14 days. US OSHA provides guidance on supporting new employees in the acclimatization process. South Africa’s 1987 Environmental Regulation for Workplaces requires employers to ensure employees’ acclimatization to hot working environments.
7. Providing training in protective gear	<input type="checkbox"/> <input checked="" type="checkbox"/>	<ul style="list-style-type: none"> In the US, California’s Dept. of Industrial Relations provides guidance on best practices for work clothing and personal protective equipment. Ireland’s Health and Safety Authority provides guidance for employers and outdoor workers on sun protection. Mozambique’s occupational safety and health regulatory framework requires employers to provide protective equipment and training whenever necessary.
8. Providing training on heat health hazards	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<ul style="list-style-type: none"> In the US, Colorado’s Department of Labor and Employment’s Agricultural Labor Conditions Rules include requirements for heat safety training. China’s Guangdong Province’s 2011 labor protection measures require employers to educate employees on heatstroke prevention and first aid.
9. Addressing gender-specific needs	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<ul style="list-style-type: none"> In the US, the Pregnant Workers’ Fairness Act will require employers to provide accommodations such as water breaks and rest breaks for pregnant people. The International Labor Organization lays out standards for maternity protection, which highlight the unique needs of pregnant workers.
10. Heat inspections to enforce mandated standards	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<ul style="list-style-type: none"> In the US, California’s OSHA inspectors routinely conduct workplace inspections to ensure adherence to the prescribed heat standard. Qatar’s Ministry of Labour’s inspection teams started conducting field visits in 2022 to ensure compliance with heat stress regulations. Mexico’s Social Security Institute has carried out thousands of industrial hygiene evaluations to assess physical and chemical agents that may affect occupational health and safety.
11. Reduced work hours or midday work bans	<input type="checkbox"/> <input checked="" type="checkbox"/>	<ul style="list-style-type: none"> Ahmedabad, India’s Heat Action Plan includes clauses on reducing laborers’ working hours during times of extreme heat. Several countries in the Middle East region, including Bahrain, Saudi Arabia and Qatar adopted mid-day work ban policies. US OSHA provides guidance on modifying work schedules for new workers.
12. Paid work breaks and times to rest	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<ul style="list-style-type: none"> In the US, Oregon’s OSHA rules require employers to provide increased paid breaks at 26.6 °C/80 °F and 32.2 °C /90 °F. Qatar’s 2021 ministerial legislation requires all work to stop if the WGBT rises beyond 32.1 °C/ 89.7 °F in a particular workplace. Several provinces in China are required to pay employees high temperature allowances when working above certain temperatures.

Monitoring & Evaluation of Policy Interventions

While many basic labor protections have been in place for decades, specific policies regarding heat and health are rarely evaluated to determine whether they have successfully protected workers' health. The table below lists examples where monitoring and evaluation has been conducted to assess the effectiveness of protection measures:

Policy Intervention Example	Evaluation Methodology	Results and Conclusions
<p><u>The Adelante initiative</u></p> <ul style="list-style-type: none"> The Adelante Initiative, in collaboration with the largest sugar mill in Nicaragua, provided over 2,000 field workers with liquids, rest periods, shade and tools. The intervention also prioritized women workers' access to safe sanitation. 	<p>Site visits and qualitative evaluation</p> <ul style="list-style-type: none"> The study evaluated the impact of the intervention on reducing heat stress and workload without affecting productivity. It entailed random repeated visits to the worksite, as well as interviews and focus group discussions with the workers. 	<p>Positive correlation with kidney problems</p> <ul style="list-style-type: none"> The study found that higher heat stress and workloads were associated with kidney injury. The intervention was able to mitigate declines in kidney function for lower workloads, though it was not able to prevent incident kidney injury among the job categories with the highest workloads.
<p><u>Canada's Sun Safety program</u></p> <ul style="list-style-type: none"> Canada's Sun Safety Program is an integrated sun and heat safety program for multiple workplaces. It supports workplaces in assessing their exposure risks, implementing control strategies that build on their existing programs, and embedding the controls into their existing occupational health and safety system. 	<p>Mixed methods</p> <ul style="list-style-type: none"> 2-year cross-case analysis of 13 workplaces across 4 provinces in Canada. Mixed methods including interviews, focus groups, surveys, site observations and UV assessment, to measure changes in the workplace policies, procedures and practices due to the program. 	<p>Integration of research, policy, and practice</p> <ul style="list-style-type: none"> While the paper only covers the methodology behind the design of the study, it provides an overview of the ways evidence-based workplace intervention evaluation can be conducted.
<p><u>Saudi Arabia's midday work ban</u></p> <ul style="list-style-type: none"> In 2010, the Saudi Ministry of Labor and Social Development enacted a regulation that bans outdoor work from 12 pm to 3 pm during the summer. 	<p>Walkthrough surveys & monitoring</p> <ul style="list-style-type: none"> Evaluators collected quantitative and qualitative data through onsite walkthrough surveys at 10 residential construction sites. They monitored work activities, conditions, and environmental parameters at selected locations across 81 days. 	<p>Dangerous conditions and ineffectiveness of the ban</p> <ul style="list-style-type: none"> The workers were working under extremely high heat stress exposure, with almost no preventative measures in place. The midday ban had limited effectiveness in preventing this heat stress risk, since the highest heat exposure was during the morning.
<p><u>India's Workers' Need project</u></p> <ul style="list-style-type: none"> The non-profit WaterAid and H&M India undertook this three-year project in Bangalore, India, from 2014-2017. The project supplied 14 factories and 15 schools with improved water and sanitation facilities. 	<p>Surveys & stakeholder engagement</p> <ul style="list-style-type: none"> A baseline survey was conducted at the start of the program followed by a midterm evaluation after implementation. The implementing organizations worked directly with the factory management to audit the improvement in facilities. 	<p>Positive shift in workers' practices</p> <ul style="list-style-type: none"> Isolating the impact of the program on a factory level wasn't possible for specific outcomes such as productivity, number of sick days etc. The midterm evaluation suggested a positive change in workers' practices relating to water and sanitation.