

Guidance on **Extreme Heat**

for Federal Agencies Operating Overseas and United States Government Implementing Partners

Extreme Heat is Adversely Affecting People's Lives

Heatwaves are among the deadliest weather-related hazards. According to the Sixth Assessment report from the Intergovernmental Panel on Climate Change, the occurrence of extreme heat events is unprecedented in the observed record and will grow. As climate change continues to intensify hazards that workers and communities face, extreme heat will increase stress on people's lives, their health, and infrastructure. In fact, global heat-related deaths of the elderly could quadruple by the middle of the century if action is not taken on climate change. The impact of extreme heat incidents can persist for years and affect a country and a community's ability to recover from other stressors.

Federal agencies operating overseas and United States Government (USG) implementing partners can reduce the negative impacts of heat on human health. They can also increase the resilience of their workforce and the communities that they operate in against extreme heat incidents through long-term planning, early warning systems, education, infrastructure improvements, humanitarian assistance considerations, and engaging country and community leaders.

A heatwave is an extended period of extreme heat, generally defined as temperatures being unusually higher than climatological normals for a given area and lasting two or more days. This is usually accompanied by higher humidities and warmer nighttime temperatures. Due to climate variability across regions, there is not one standard threshold of temperatures or other heat stress indicator (e.g. heat index) for defining extreme heat. Additionally, other factors affect heat stress and heat death in humans, animals, and infrastructure, or collectively "extreme heat risk". In addition to temperature, other parameters, such as humidity, wind speed, sun angle, and cloud cover must also be taken into account to understand the magnitude of and appropriately manage heat impacts. The integration of these factors is done through composite metrics, such as the wet bulb globe temperature (WBGT) and heat index according to NOAA). Agencies operating overseas and their implementing partners need to understand what constitutes extreme heat risk within their area to plan for and respond to extreme heat events. The impacts of extreme heat incidents can persist for years following an event and affect a country and a community's ability to recover from other stressors.

Extreme heat can pose significant risks to human health; energy grids; supply chains; water resources and water security; transportation; food security and agriculture and livestock systems; labor productivity; and contribute to migration; weaken other basic infrastructure systems and supply chains; and more. Vulnerable populations, including low-income households, children, pregnant and lactating women, the elderly, and people with pre-existing health conditions are the most at risk. Taking actions to protect vulnerable populations against preventable and premature death due to extreme heat is critical.

The UN Office for the Coordination of Humanitarian Affairs (OCHA) and the International Federation of Red Cross and Red Crescent Societies (IFRC) has determined:

“[t]here are also likely to be levels of extreme heat beyond which societies may find it practically impossible to deliver effective adaptation for all. On current trajectories, heatwaves could meet and exceed these physiological and social limits in the coming decades, including in regions such as the Sahel, and South and South-West Asia. . . Analysts project a 700 percent global increase in the number of urban poor people living in extreme-heat conditions by the 2050s. The largest increases are expected in West Africa and South-East Asia.”

The International Labor Organization (ILO) has found:

*“[h]eat stress is increasingly becoming an obstacle to economic activity. It reduces the ability of businesses to operate during the hottest hours. **By 2030 the equivalent of more than 2 percent of total working hours worldwide** is projected to be lost every year; either because it is too hot to work or because workers have to work at a slower pace. In Southern Asia and Western Africa the resulting productivity loss may even reach 5 percent. . . Adapting to these new and threatening conditions is costly.”*

Even in a scenario of limiting the increase in the average global temperature by the end of the century to 1.5°C above pre-industrial levels, the accumulated global financial loss due to heat stress is expected to reach US\$2.4 trillion by 2030. ILO determined that, “If nothing is done now to mitigate climate change, these costs will be much higher as global temperatures increase even further towards the end of the century.”

Heat exposure and vulnerability, and access to cooling measures, are fundamental environmental equity issues. The ILO has also found that “[e]xcessive heat levels aggravate inequality between rich and poor countries, and between population groups within the same country... Unfortunately, heat stress is often accompanied by other challenges as it is more prevalent in countries with decent work deficits, such as a lack of social protection and high rates of informality and working poverty.” There is an opportunity to develop win-win strategies that simultaneously reduce the causes and impacts of heat emergencies, as well as restore ecosystem functions, and bolster equitable access to heat reduction strategies for those most at-risk populations.

Agencies Operating Overseas and U.S. Government Implementing Partners Can and Should Prepare for Extreme Heat Risk Today

Preparing today for extreme heat can save lives, reduce spending on energy and post-disaster costs, and result in more resilient workers and communities. Below are specific actions federal agencies operating overseas and implementing partners can take to prepare their workforce and the country and community they operate in to withstand and respond to extreme temperatures.

These actions will support the objectives of the President's Emergency Plan for Adaptation and Resilience ([PREPARE](#)) that 20 Federal departments and agencies are implementing to support countries affected by climate impacts, such as extreme heat.

Additional resources and guidance on how to prepare for extreme heat temperatures can be found at the end of this document.

ACTION I: Make an Extreme Heat Action Plan

Management and Executive Officers overseas and U.S. government implementing partners in high heat risk countries should consider creating an **extreme heat response plan** in advance of extreme weather.

Creating plans to respond to extreme heat can save lives and increase community resilience. When considering developing an extreme heat response plan, Embassies, Missions, and partners are recommended to:

- **Build off of existing efforts.** Determine whether the city or region you are working in has a Heat Action Plan and coordinate on local responses. Heat Action Plan [City Case Studies](#) and [How-To Guides](#) are available to support you in designing your Heat Action Plan. If your region does not have a Heat Action Plan but is interested in creating one, the Red Cross or Red Crescent Society, as one potential partner, can work with city stakeholders to develop one.
- **Designate key staff.** Create a point of contact at the Embassy, Mission, or office for extreme heat response. Many cities are also beginning to appoint Chief Heat Officers to coordinate a whole-of-government response to extreme heat, including Freetown, Sierra Leone; Santiago, Chile; North Dhaka, Bangladesh. More information about Chief Heat Officers (CHO) is available [here](#). Consider coordinating with your region's CHO, if applicable. Many urban and rural jurisdictions manage extreme heat risks through their offices of emergency management, sustainability, or resilience.
- **Outline responses.** Different situations will require varying responses. An extreme heat response plan should designate certain actions to be done given specific heat index or WBGT thresholds. Ensure each action has a point of contact or office designated to carry out these steps during an extreme heat event. Such actions may include:
 - Notifying staff and family members using early warning systems (see Action 2).
 - Opening cooling centers that can provide shelter for individuals with limited access to cooling.
 - Limiting work hours for outdoor work during periods of extreme heat and/or making provisions for telework for eligible staff
 - Providing water, shade, and additional rest breaks for staff who must work when exposed to extreme heat.
- **Prepare for the future.** Teams should periodically review performance of heat adaptation actions from recent events and use information about events projected in the coming weeks or months to prepare. For instance, if seasonal forecasts show a projected increased risk of extreme heat in the next three months, teams should consider actions that can be taken within that time frame to improve adaptive responses.
- **Don't reinvent the wheel.** There are a wide range of resources available to help you craft your

plan. Review best practices resources to determine what components to include in your extreme heat response plan, including but not limited to:

- USAID [Summary of Relevant Policy Interventions](#)
- IFRC's [Heatwave Guide for Cities](#), developed with over international 25 partners
- IFRC's Hub for [Heat Action Day](#)
- [Heat.gov](#) is the web portal for the National Integrated Heat Health Information System (NIHHIS). The information can help improve capacity to reduce the health, economic, and infrastructural impacts of extreme heat.
- FEMA's [Ready Campaign Extreme Heat](#) and [#SummerReady](#) web pages have tips and resources individuals and communities can use to help keep people safe from extreme heat.
- **Map High-Heat Areas.** Consider working with local organizations to map urban-scale air temperatures in your community and take the results into consideration as you develop your heat action plan. The heat island effect causes urban areas, dominated by hard surfaces and lacking trees and green space, to be hotter than surrounding areas. Even within a city, air temperatures can vary by more than 20°F from one neighborhood to another neighborhood with more greenspace. For example, the National Oceanic and Atmospheric Administration (NOAA) is working with more than 70 U.S. cities and a growing number of international cities, to map their intra-urban air temperatures and humidity. City managers use this information to identify vulnerable neighborhoods to inform urban planning and new infrastructure, target services, and design outreach efforts. For example, in Freetown, Sierra Leone, Eugenia Kargbo, Africa's first ever heat officer, led a heat mapping campaign for the city in partnership with NOAA. On mapping campaign day, volunteers rode on motorcycles equipped with heat sensors on the handlebars. Volunteers also set up information booths throughout the city to raise public awareness of heat, its health impacts and inform people about what they could do to reduce harmful impacts. The city is also known for #FreetownTheTreeTown, a community tree growing program, co-designed with climate-vulnerable communities to plant one million trees in Freetown to provide shade to reduce extreme heat. The United States Department of Agriculture (USDA) has several resources to support [urban forestry](#) and [tools](#) to calculate cooling.

ACTION 2: Use and Early Warning System for Your Workforce

According to the United Nations Office for the Coordination of Humanitarian Affairs (OCHA) and IFRC, heatwaves can be reliably forecast within a week in most places, and up to one month under certain conditions and in certain locations. Seasonal predictions (out to several months) are gaining in prominence, though not yet widely used. Early actions, especially those made on a multi-day or week timescale, are effective and relatively low cost. Nearly five billion people live in regions where forecasts are sufficiently reliable to support developing heat action plans, yet according to the World Meteorological Organization (WMO), heat warning services are provided to health decision makers in only half of the affected countries. However, the number of people covered is expected to increase rapidly by 2027 under the UN Secretary General's call for Early Warning for All.

- Establish clear thresholds for a heat advisory for your country or community, in collaboration with your country's [National Hydrological and Meteorological Service \(NHMS\)](#) and Ministry of Health or local Health Focal Point, based on specific heat stress indicators, such as heat index or Wet Bulb Globe Temperature (WBGT). Heat impacts are local, so the indicators should be relevant to your

geography, demography, and specific activity and sector of concern. Working with a NMHS or other authoritative source will help ensure data and forecasts are based on globally consistent methods reducing confusion and enabling early action. If health impact or other data are available, it is advisable to calibrate warning thresholds with expected impacts; if these data are unavailable, it is still prudent to establish a threshold for heat alerts based on extreme conditions relevant to climatological norms based on specific heat stress indicators, such as heat index or WBGT.

- As an example, the U.S National Weather Service issues a Heat Advisory when it expects heat index values to be 100-105°F for one or two days for the United States. Some cities issue advisories or alerts at a lower threshold. For example, Washington, D.C. activates its heat emergency plan when the heat index reaches 95°F.
- There are several instances of weather forecasting offices working with local public health partners to conduct studies analyzing temperature and/or heat index data and heat morbidity or mortality and from these studies have adjusted the local advisory and warning criteria accordingly.
- Federal agencies operating overseas and implementing partners should issue extreme heat early warning alerts to their workforces to ensure they are prepared for extreme heat and include actions your employees can take to decrease their risks. Determine if your host country issues watch and warning alerts for extreme temperatures similar to the National Weather Service in the United States. The most recent status of early warning systems in your country can be found on the WMO [Early Warning Systems for All Dashboard](#). To learn more about the types of watch and warning alerts for extreme heat, visit: [Heat Watch vs. Warning](#) (weather.gov). There are also several resources for heat warning systems for Europe you may want to review, including [European Metroalarm](#) and the [European Extreme Heat Risk Map](#).
- Identify sectors of highest risk workers and as well as staff who are highly susceptible to heat impacts including elders, disabled people, people with existing health conditions, and others to target outreach to ensure early warning alerts reach employees who work outside in remote and rural areas. According to the ILO, “occupational exposure to heat stress is highest in the agricultural and construction sectors because … the [work is] physical and the fact that it is carried out mainly outdoors. Furthermore, heat stress could entrench existing inequalities in the world of work, notably by worsening the working conditions of the many women working in agriculture, and of male workers on construction sites.”
- If necessary and available, identify cooling centers at Post and in your community near your workforce’s residences and notify your workforce and their families of their location. These locations should have a stable source of energy. If the existing USG and implementing partner’s facilities cannot provide adequate cooling, it may be appropriate to direct staff to religious centers, transit stations, and other community buildings that can sometimes shelter vulnerable people from extreme heat during extended episodes of extreme heat. Some communities refer to these centers to protect from temperature extremes as “resilience hubs.”
- For employees who work indoors, consider offering situational telework to your staff. If the process of commuting to/from the Embassy or Mission is likely to expose staff to extreme heat, a safer option

may be for leadership to authorize situational telework for eligible staff during periods of extreme heat. For employees who work outside, institute shade, cooling, and water breaks at regular intervals and purchase heat-related insurance for employees' pay on days that are too hot to work.

ACTION 3: Educate Your Workforce on The Warning Signs and Symptoms of Heat-related Illness

The World Health Organization and the WMO anticipate billions of people are at risk of preventable death and illness from extreme heat. Heat stress is the leading cause of weather-related death and can exacerbate underlying illnesses, including cardiovascular disease, diabetes, psychological distress, and asthma, and increase the risk of accidents and infectious disease. According to the WMO, extreme heat causes among the greatest mortality of all extreme weather, with vulnerable populations most at risk. However, the impacts are underestimated and heat-related mortality could be 30 times higher than what is currently recorded.

Federal agencies that operate internationally and U.S. Government Implementing Partners should educate their workforce on the warning signs and symptoms of heat-related illness and strategies to reduce their risk. The:

- National Integrated Heat Health Information System has resources and infographics for this on [Heat.gov](#).
- [Global Heat-Health Information Network \(GHHIN\)](#) provides several resources on the health effects of extreme heat, the populations that are the most vulnerable to exposure to extreme heat, and [recommendations](#) on how to keep cool.
- Centers for Disease Control and Prevention (CDC) also has [resources](#) to learn the symptoms and what to do if you or a co-worker shows signs of having a heat-related illness. Additionally, a CDC [Gateway to Health Communication](#) provides guidance on communicating health risks during extreme temperature events.
- Occupational Safety and Health Administration (OSHA) provides information for employers and workers on heat illness prevention and heat exposure.
- Environmental Protection Agency (EPA) created the “[Let's Talk About Heat](#)” resource hub, which includes examples of innovative and diverse outreach strategies from across the United States to help planners and communicators connect with at-risk communities that lack access to traditional communication methods.

While many of these resources provide examples from the U.S., the solutions they contain can be applied to USG and partner operations internationally

ACTION 4: Plan for and Adapt Infrastructure to Future Conditions

Infrastructure built today will likely be in place decades from now. The U.S. Government strongly encourages using the latest natural hazard-resistant codes, specifications, and standards when constructing new buildings

and repairing or altering existing buildings, including for federal agencies that operate internationally. Building codes address extreme heat risks by providing insulation and window requirements for the building envelope, which includes the roof/ceiling, wall, and floor assembly. In general, tightly built, well-insulated buildings with good windows help maintain livable temperatures longer, allowing residents to shelter-in-place during disasters, power outages, and extreme heat incidents. However, during prolonged heatwaves with intermittent power outages, insulated buildings can also become ovens. For multi-day heatwaves, care must be taken to monitor internal temperatures, drink water, and prepare to move to a cooling center. The FEMA [Building Codes Adoption Playbook For Authorities Having Jurisdiction](#) provides general information on the importance of building codes, steps to adopt and enforce them, information on FEMA grants, and references to additional resources.

- Federal agencies that operate internationally, and Implementing Partners should consider how that physical and natural infrastructure will fare in extreme heat, and consult the latest building codes and standards when building new and modifying existing infrastructure. The International Code Council provides a [Resilience Toolkit](#) to drive resilience in building codes. In addition, NOAA and the American Society of Civil Engineers (ASCE) are partnering to bring NOAA's best available science and expertise on our changing climate into the next generation of ASCE codes, standards and manuals of practice for designing, constructing and maintaining climate-resilient and sustainable infrastructure. Thus far, NOAA and ASCE have signed an memorandum of understanding, held technical workshops that led to a summary report (focused on extreme heat risks, intense rainfall, changes in winds (not including tornados), and coastal hazards), and are working to update the ASCE 7-28 code that addresses minimum design loads for buildings and other infrastructure. With NOAA's support, the PREPARE infrastructure working group is building on this collaboration to facilitate using these nationally developed standards to make decisions on infrastructure internationally.
- Where applicable, in line with Regional Security Officer guidance, implement measures to reduce heat exposure in your buildings and complexes in line with CDC [recommendations](#), including:
 - **Expanding green space**, for example, planting trees. Trees and vegetation (e.g., bushes, shrubs, and tall grasses) lower surface and air temperatures by providing stormwater catchment and groundwater recharge, increased shade coverage, and cooling through evaporation and transpiration, also called evapotranspiration. Trees and vegetation are most useful as a heat mitigation strategy when planted in strategic locations around buildings or to shade pavement in parking lots and on streets. More information on using trees and vegetation to reduce cooling is available from the [EPA](#) and [Lawrence Berkeley National Laboratory](#).
 - **Installing cool roofs and walls.** Conventional roofs can reach temperatures of 150°F or more on a sunny summer afternoon. Cool roofs reflect more sunlight than a conventional roof and lowers the temperature of the building. Under the same conditions a reflective roof could stay more than 50°F (28 °C) cooler. The United States Department of Energy (DOE) provides a vast number of options on effective cool roofs [here](#). The Global Cool Cities Alliance also provides a [Cool Roofs and Cool Pavements Toolkit](#) with links to a host of resources across the world .
 - **Installing energy efficiency cooling systems.** According to the International Energy Agency, approximately five percent of households in sub-Saharan Africa are equipped with an air-conditioning unit, less than 20 percent in India and Indonesia, and approximately 30

percent in Mexico and Brazil. More information on types of cooling systems to consider is available from [Lawrence Berkeley National Laboratory](#), which provides a summary of energy efficient cooling technologies that campuses or staff could consider to avoid increasing carbon emissions even as we try to deal with rising temperatures.

- **Using projections of future conditions to prepare today.** Ensure leaders and decision makers are using available climate information from trusted sources to make investments that will help communities respond to and reduce the effects of extreme heat. Visit the World Bank's [Climate Change Knowledge Portal](#), which has country specific climate projections for temperature. USAID created a New global [Famine Early Warning Systems Network \(FEWS NET\) Interactive Heat Exposure Projections Map](#) to help policy makers, donors, and other stakeholders better understand and plan for extreme heat and its implications in particular countries. Users will be able to identify a population's extreme heat exposure as experienced in the recent past (2000-2017 average) and projected in 2050 to understand the evolution and scale of extreme heat threats by mid-century.

ACTION 5: Consider the Effects of Extreme Heat on Humanitarian Assistance

Extreme heat increasingly contributes to devastating outcomes that require humanitarian assistance. Extreme daily temperatures pose serious health threats such as heat stroke and exhaustion, especially when combined with high levels of humidity. High temperatures can also adversely impact livelihoods and survival, contributing to increased humanitarian need for people already highly vulnerable due to the humanitarian context. It also increases the rate of food and medicine spoilage without energy/cooling and significantly increases the need for water in areas where water scarcity is often already occurring. Extreme heat also poses serious challenges to global food security and the livelihoods of rural households' dependent on agricultural production.

Droughts can trigger plant diseases while increasing water stress which severely affects agricultural yields and decreases crop productivity. Fluctuations in crop yields can indirectly affect livestock productivity especially in rainfed systems where extreme heat poses a threat to feed crop and forage, water availability, animal and milk production and livestock mortality. Developing local capacity on heatwave monitoring and forecasting to develop warnings and enable early action can help to reduce the detrimental impact of extreme heat events. Additionally, adaptation approaches that help limit the impact of heat extremes where possible can also lessen negative impacts to lives and livelihoods, as identified in Action 4.

For example, in its Climate Strategy, USAID prioritizes “nature-based solutions (as) essential to limiting global temperature increase to 1.5 degrees Celsius and adapting to climate change” by reducing greenhouse gas (GHG) emissions and carbon banking by protecting, restoring, and integrating “forests, peatlands, and other ecosystems that absorb and store large amounts of carbon, reduce disaster risk, and support livelihoods, food and water security, and health,” including heat-related emergencies ([USAID, 2022](#)). This includes working across sectors and clusters to integrate climate-smart, nature-based solutions at landscape scales (e.g., watersheds) within refugee, internally displaced persons and other humanitarian settlement contexts, to support:

- reducing heat islands;
- reducing risks to other natural hazards; mitigating heat-related displacement and conflict; and,

- proactively anticipating and responding to reduced access to water, sanitation and hygiene, education and livelihoods, related to long-term temperature stresses, and the heatwave shocks, that impact these populations.

In addition, agencies that operate internationally and implementing partners should consider developing an informed, nuanced approach to risks from heatwave shocks and long-term rising temperatures to ensure humanitarian operations:

- Have the technological, technical and strategic capacity to access, interpret, understand and take action utilizing climate and weather information services (including Early Warning Systems, short- and long-term forecasts, among others), enabling overseas agencies, implementing partners and frontline communities to better anticipate, mitigate and respond to heatwaves;
- Are climate-smart, and are designed to proactively and responsively adapt programs, strategies and response plans to long-term increases in temperatures, and the associated impacts of increased heat on humanitarian sectors and outcomes; and
- Leverage risk-informed, multi-sector assessments that include identifying the populations (e.g., marginalized groups, livelihood groups) most at-risk to the impacts from heatwaves, and long-term extreme heat.

The IFRC has several resources on humanitarian assistance and heatwaves, including:

- [City heat wave guide for Red Cross Red Crescent branches](#)
- [Extreme Heat: Preparing for Heatwaves of the Future](#)

ACTION 6: Engage with Country and Community Leadership on Solutions to Extreme Heat

In addition to the physical infrastructure improvements that can be made at USG and partner facilities internationally, there are many cost-effective solutions that host countries, cities, and communities can implement to mitigate the risk of extreme heat.

- Agencies that work internationally and implementing partners are encouraged to meet with stakeholders to discuss solutions to extreme heat. These stakeholders include but are not limited to national and local government offices, community members (particularly from vulnerable groups), civil society organizations, as well as community and nongovernmental leaders. USAID and IFRC have developed the resources listed below to help decision makers protect communities and workers from extreme heat. Leaders in Federal Agencies that operate internationally and Missions and implementing partners are encouraged to reach out to globalheatactionday@usaid.gov with questions.
 - [Strategic Urban Planning to Decrease Heat Risks](#)
 - [Inside the Heatwave: What Cities Should Do](#)
 - [Working Together: The City's Heat Team](#)

Resources to Support Preparedness Efforts

The following resources provide additional information to support community preparedness for extreme heat.

Extreme Heat

United States Government

- [Extreme Heat | Ready.gov](#)
- [HEAT.gov](#)
- [Be prepared for extreme heat \(ready.gov\)](#)
- [Extreme Heat | Community Preparedness \(fema.gov\)](#)
- [Heat is a Silent Killer: Extreme Heat Preparedness \(fema.gov\)](#)
- [A Guide for Alerts and Warnings \(ready.gov\)](#)
- [Who is at risk to extreme heat | HEAT.gov - National Integrated Heat Health Information System](#)
- [USAID Heat Waves and Human Health Emerging Evidence and Experience to Inform Risk Management in a Warming World \(usaid.gov\)](#)
- [Heat and Urban Environmental Issues: Quick Guides for Air Pollution, Water Quality and Solid Waste Management \(usaid.gov\)](#)
- [Centers for Disease Control and Prevention](#)
- [Finding the Signal: Harnessing Artificial Intelligence and Advanced Analytics at the Intersection of Climate and Global Health](#)
- [www.airnow.gov](#)
- [USAID's Youth Mappers Initiative](#)
- [NASA Earth Data](#)

IFRC

- [Heatwave Guide For Cities](#)
- [Heat Action Day](#)

World Health Organization

- [Heatwaves and health: guidance on warning-system development](#)
- [Mass casualty management systems : strategies and guidelines for building health sector capacity](#)
- [Communicating risk in public health emergencies: a WHO guideline for emergency risk communication \(ERC\) policy and practice](#)
- [Protecting maternal, newborn and child health from the impacts of climate change: call for action](#)

World Meteorological Organization

- [Global Heat Health Information Network \(GHHIN\) Heatwaves](#)
- [Considerations regarding the Naming of Heatwaves](#)
- [Heatwaves \(wmo.int\)](#)
- [Considerations regarding the Naming of Heatwaves](#)

International Labor Organization

- [Working on a WARMER planet The impact of heat stress on labour productivity and decent work](#)