

From the G7 Health Communiqué to Action

Health and Climate: Heat Preparedness through Early Warning Systems

Final Report
29 November 2022

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This report has been prepared by the WMO - WHO Joint Office for Climate and Health in close coordination with the German Federal Ministry of Health in the context of Germany's G7 presidency and the health and climate event as part of the G7 Health Track. The report will serve as a contribution to the Global Heat Health Information Network (GHHIN).

Cover image: Montreal Urban Heat Island map, INSPQ / CERFO



Photo: Ian Taylor / Unsplash

Overview

The G7 event “From the G7 Health Communiqué to Action - Health and Climate: Heat Preparedness through Early Warning Systems” on 29 November 2022 recognized the importance of scaling up and enhancing Heat Health Warning Systems (HHWSs) and corresponding policy actions as key instruments for building resilience to climate variability and change in the health sector.

This report captures the expert discussions during the event on the state of implementation, opportunities, challenges and advances in protecting communities from increasing extreme heat. Its conclusions allow the G7 countries to learn from each other and share important lessons with the broader global community.

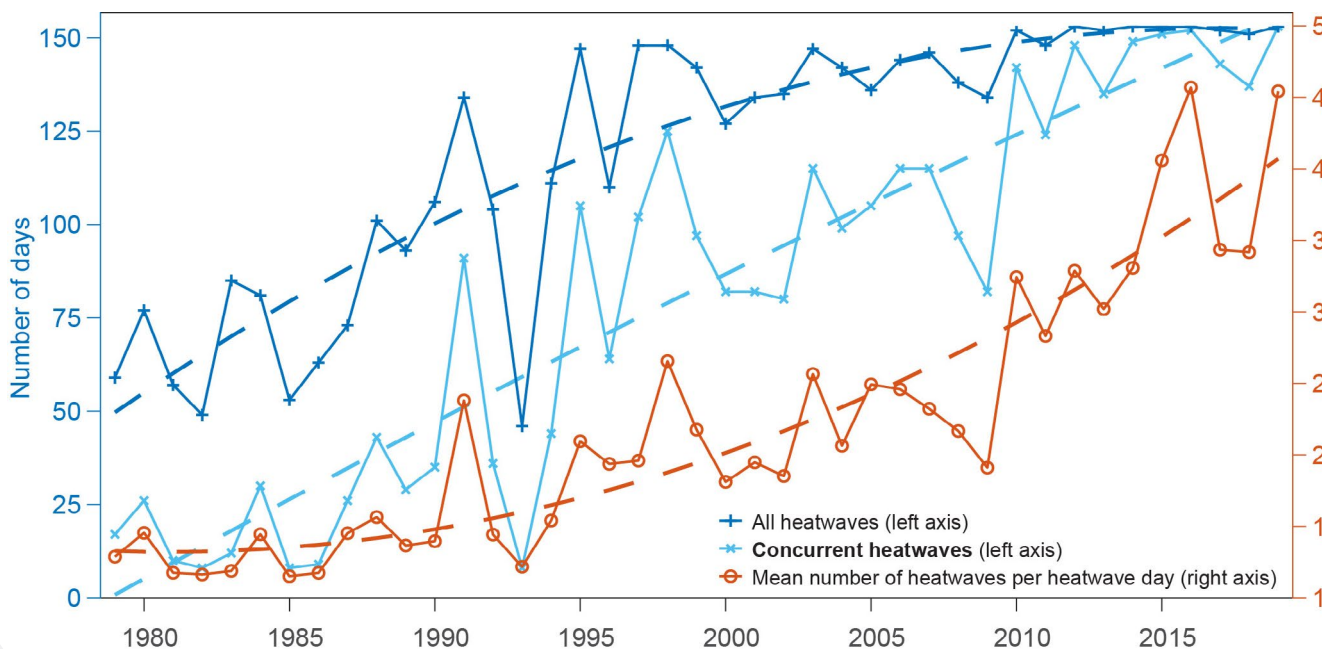


Figure 1: Data showing increasing trend of global concurrent heatwaves. Increasing numbers of concurrent heatwaves mean larger geographic and regional areas are simultaneously under extreme heat stress, not only exposing large populations to heatwaves, but placing regional food, energy, and water systems at risk. Source: Rogers et al, 2022

Rising health risks of extreme heat

Extreme heat is increasing worldwide at an unprecedented rate, with a six-fold increase of concurrent heatwaves since the 1980s¹ compounding the impacts of other natural hazards, such as drought, fire, smoke and flash flooding.

The Intergovernmental Panel on Climate Change (IPCC) highlights with high confidence that climate change over the coming decades is projected to significantly increase population exposure to heatwaves, and consequently increase heat-related morbidity and mortality. Increasing temperature extremes are a growing health risk due to rapid urbanisation and demographic changes in countries with aging populations. Strong geographical differences in heat-related mortality are projected to emerge later this century, without additional adaptation.²

Heat related illness and deaths are preventable with appropriate action, however an estimated 489,000 people die from exposure to excessively hot conditions each year globally, with disparate geographical variations.³

Extreme heat also exacerbates a range of other health risks from increased transmission of food, vector and waterborne diseases, mental health manifestations, cardiovascular, respiratory, and renal conditions, and drives increasing health inequities. Extreme temperatures stress health system provision of ambulatory services, and complicate responses to other health emergencies, as witnessed worldwide during the COVID-19 pandemic.

Role of heat health warning systems and action plans

Strong partnerships, communication, and policy innovation are required to integrate the vast range of solutions which can help reduce extreme heat risks to populations across multiple time scales, other compounding hazards (e.g. air pollution, fire), myriad affected sectors (e.g. energy, agriculture), and jurisdictions.

The IPCC identifies Heat Action Plans (HHAPs) and HHWSs as adaptation options to anticipate and manage the societal risks of extreme heat.⁴

As a critical step toward adapting to climate variability and change, HHWSs and HHAPs have been developed and implemented using diverse approaches in all G7 countries. See the [background report](#) produced prior to the meeting for an overview of country HHWSs, HHAPs and challenges.

HHWSs are authoritative public weather advisories issued by designated alerting authorities, most often National Meteorological Services, in coordination with public health authorities.

HEAT HEALTH ACTION PLAN (HHAP)

HHAPs provide the coordination and operating framework for planning and implementing Heat Health Warning Systems.

HHAPs often specify mechanisms for interagency coordination with defined roles and responsibilities for extreme heat responses, preparedness strategies targeting public awareness and community outreach, capacity building among health care professionals, and a range of individual actions designed to reduce health risks from extreme heat, particularly for vulnerable populations.

HEAT HEALTH WARNING SYSTEM (HHWS)

HHWSs use climate and weather forecasts and predetermined trigger levels of heat stress to provide public advisory and initiate public health interventions designed to reduce health risks before, during, and after periods of extreme heat.

HHWSs are critical decision-tools commonly developed and managed jointly by designated public health professionals and meteorologists. HHWSs represent a key component of wider HHAPs guiding health and social service decision making and protocols for appropriate preparedness, prevention, and response action to extreme heat.

Challenges and opportunities identified by the expert panel

Extreme heat can trigger cascading hazards including drought, air quality, water scarcity, fire risk and utility service disruptions – presenting simultaneous multi-sectoral impact management challenges. Preparing for new levels of extreme heat and compounding climate threats requires early warning, and multi-hazard and adaptive heat action plans. The political desire for reduced impact on human health calls for a coordinated response from experts, multi-sectoral authorities, and communities to outline a roadmap for improved warnings, action plans and climate action.

The health impacts of heat are determined by many complex factors in addition to the intensity, duration, and frequency of heat exposure. These include where people live and personal vulnerability factors such as age and pre-existing health conditions, social, financial, and environmental conditions, and access to supporting infrastructure and services. The ability to map and understand community vulnerability enhances decision making and supports more effective local actions.

Poor housing design can produce high indoor temperature with lethal consequences. Reducing the risks of indoor overheating requires individual risk awareness, short-term personal adaptive behavioural decision support, protective housing and social policies, access to cool refuges and long-term restructuring of the urban environment and physical infrastructure.

Education and training of many diverse local actors is needed before and during the heat season. Health and front-line workers, media, meteorologists, and emergency management personnel across all levels of government managing impacted sectors such as schools, transport, power, and water utilities need heat-specific training and guidance. Targeted training campaigns can empower these groups to play their part in reducing the health impacts of heat, for example for media to effectively communicate risk; for medical professionals to reduce undesirable side-effects and physiological response to medications in vulnerable groups; and for employers to implement worker protection practices.

Public messaging needs to be consistent but continually reviewed and tailored by designated alerting authorities to improve awareness and effective response across all levels of government and civil society. In hot countries such as Israel,

mainstreaming and normalizing personal awareness and preparedness to extreme heat from early childhood has proven successful in preparing communities and lowering risk. In the UK, a shift from discrete warning levels to more dynamic and nuanced risk matrix data assists authorities to better coordinate and communicate health impacts.

Effective HHWSs necessitate trust between partners and the public. Strong and transparent evidence, monitoring, and data sharing requires close collaboration to build trust between data custodians and users. Co-branding and closely managed delivery of coordinated risk data to the community can improve community trust in health impact statistics and supporting meteorological information.

Extreme heat is an all-of-society adaptation and learning challenge. The complexity of interacting risk factors and the rapid rate at which they are increasing requires aggregation of experience and expertise, and investment in learning centres and exercises to accelerate learning, cooperation, and preparedness. Scenario exercises test and expose who is making decisions, where shared data can be accessed and where effective local action is needed most.

Expert panel: Key messages and good practice examples of Heat Health Warning Systems

Experts from the United Kingdom, France, United States and Germany highlighted the range of policy actions being taken at local and national levels. Good practice examples include:

It is crucial to ensure constant reassessment of changing hazards and vulnerability, and tailoring capacity and actions for vulnerable populations. For example, increasing hazards compounded by heat have put pressure on previously successful HHAPs across France. The country is redesigning its approach to better address concurrent natural hazards and compound exposures to drought, fire and COVID-19 that have affected agriculture, water, and energy security.

Impact-based forecasts and warnings that support effective decision-making requires frequent engagement across government stakeholders. Co-designed research is required to ensure meteorological services provide effective guidance for health and emergency service decision makers.

Public advisories and messages must be consistent. France has strong collaboration between health and meteorological agencies to coordinate public messaging and outreach services via multiple channels including TV, personalised SMS messages and social media. In 2022, SMS notifications were sent for the first time, to large populations of preregistered elderly, pregnant women, and families with small children.

Tracking the human impacts of heat in real-time is key.

In the UK and Germany, health’s surveillance systems work best when daily or real-time heat health impact data is shared, supporting partner impact-based services. In France, the heat health surveillance system is now being adapted to measure impacts of other concurrent and cascading hazards. Analysis and post-season mortality reports^{5,6} provide critical insights to how heat is impacting populations.

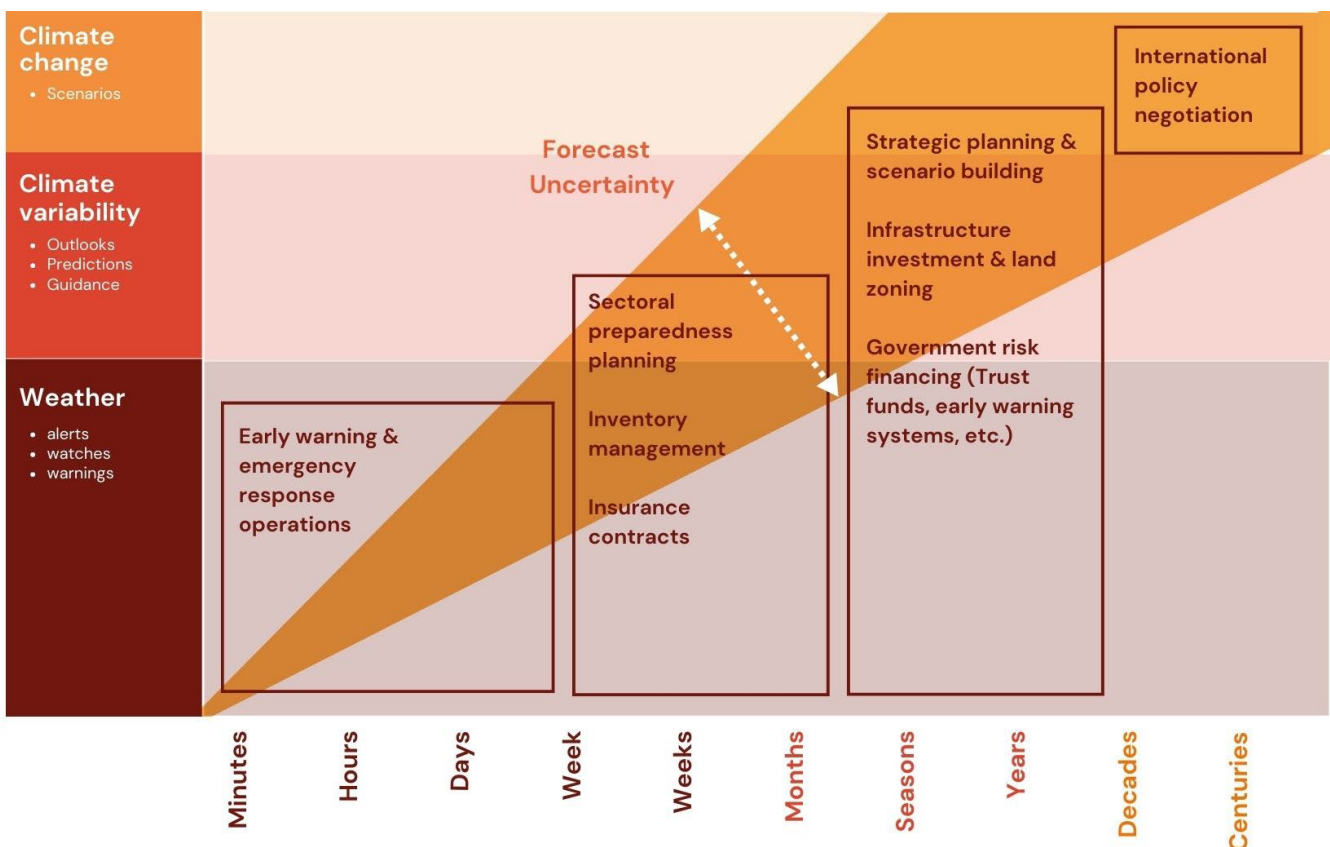
A broad coalition of partners across all levels of government, NGOs, business, and community groups can ensure the health sector is not alone in meeting the challenge of extreme heat. Cooperative data management, data sharing and HHAP readiness is essential. The maturity of a decision-making culture and effectiveness of HHAPs is a consequence of co-designed protocols, measures, and communications. Desktop exercises and stress testing of plans can help partners practice communications and data exchange on plausible impact scenarios. The United States launched a public-facing federal website (heat.gov) for sharing resources and collaboration across over a dozen federal agencies and multiple sectors.

Whole-of-government engagement is required to address heat risk. Local actors should be empowered to design solutions relevant for their communities. Local government leaders, such as mayors, can be effective partners to quickly provide coordination, deploy often inexpensive interventions, and provide capacity when designated responsibilities are assigned.

Heat risk should not only be managed during heatwaves (see figure 2). Probabilistic heat hazard guidance over much broader time scales (seasonal, multi-week, multi-day to real-time) has been used in the US and UK to provide partners and the community a more graduated hazard awareness with longer lead-time for more targeted adaptations. Risk matrices include category where colour codes advise of risk level.

Risk perception remains an important predictor of behaviour change. The UK is using questionnaires and polls to measure perceived risks, population engagement and actions taken during heat events. This information is used to make the warning system adaptive to community needs and strengthen trust and adoption of protective behaviours. The US is building capacity for individualised behavioural advice determined by pre-existing health conditions and access to health support.

Figure 2 Climate and weather information can be applied to early action decisions across timescales



Expert panel: How to prepare for an extreme heatwave, reflections on a simulated experience

The following observations and lessons learned emerged from the exercise:

When extreme heat scenarios are practiced with emergency management partners before the heat season, updated HHAPs are readily coordinated when the real event arrives.

Seasonal awareness campaigns should be launched as the heat season starts. When the campaign is launched the seasonal outlook temperature products provide probabilistic guidance on where and when the risk of an extreme event is likely. Performance of policy settings in the previous season are presented, along with formal adoption of new HHAP policy initiatives for improved local actions.

Published statistics on heatwave illness and death should be presented to media and implementers of HHAPs to reinforce the need for action. The evidence and updated HHAPs guide where and when resources are deployed and is published as authoritative reference for coordination of government and community actions.

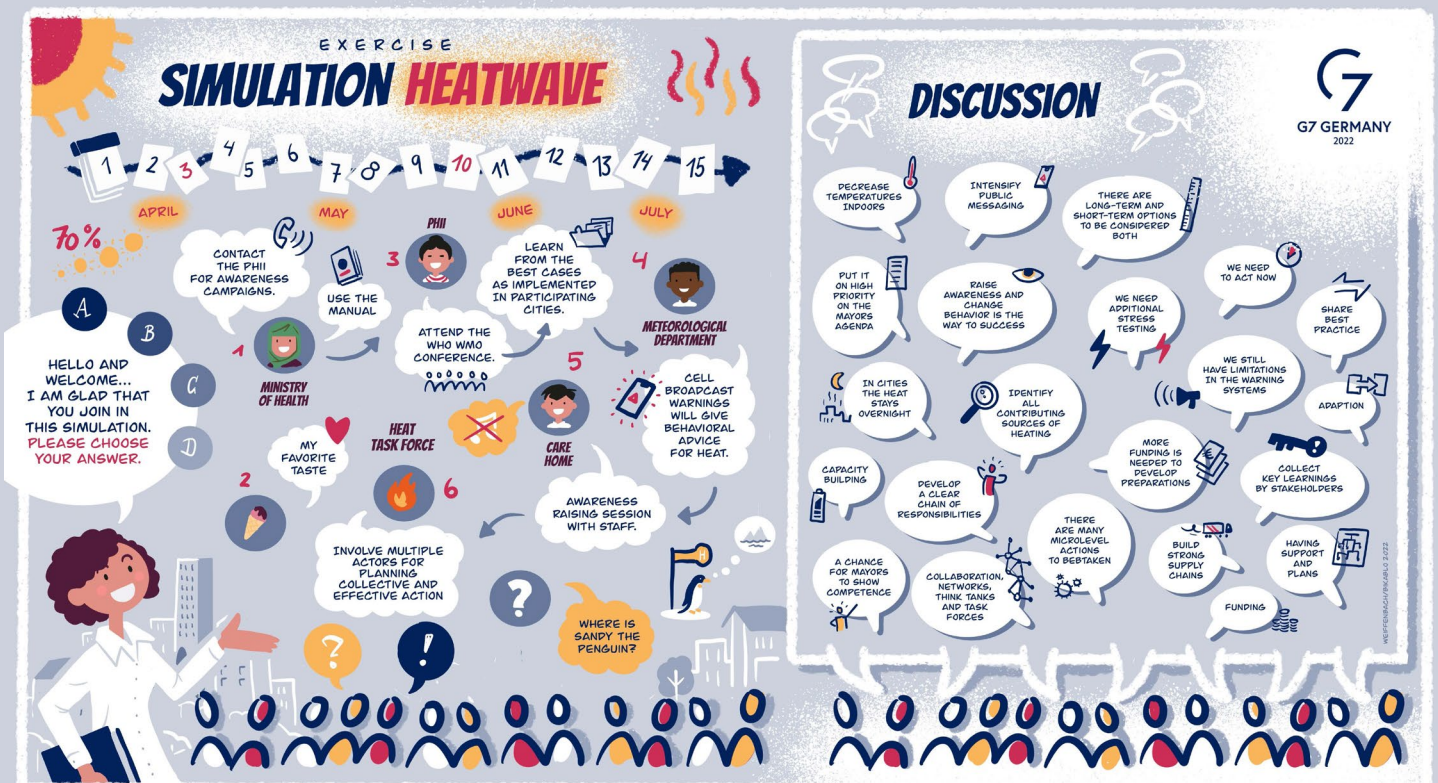
Highly charged media coverage of a high impact extreme heatwave should be anticipated. Media attention often acts as tipping points for political response in positive and negative ways. Capacity to contextualise expected human health impacts in the developing extreme heatwave against historical events is critical to protect the reputation of warning authorities. Media partners need to be prepared for sustained engagement, underpinned by authoritative data and consistent messaging for appropriate adaptive behaviour.

Prepare government ministries for increased public engagement. Coordinated policy on climate action and long-term adaptation, will need to be available to address demand for structural and policy investments in low-carbon housing, transport, green space, and cooling options.

Support local leadership (e.g., mayors) implement local actions under their HHAPs in response to activation triggers. Designated responsible officers coordinate resources and information to implement local action.

Simulation exercise

Experts from scientific institutions, international and regional organisations and national ministries reflected on decisions made by all participants in the simulated heatwave response.



Tour de table:

Heatwave priorities for G7/G20 in the coming years

Representatives from each of the G7⁷ countries provided updates and upcoming plans for strengthening action on extreme heat and health in their country. Indian representatives made a contribution, noting India's 2023 presidency of the G20. Please refer to the [background report](#) for more information on the heat health warning systems in each country.

Canada

The Government of Canada has released for final comment Canada's first National Adaptation Strategy (to be finalized in the coming months). The Strategy presents a whole-of-society approach to advancing adaptation in Canada, including goals, objectives and targets.

Alongside the Strategy, the Government of Canada Adaptation Action Plan was released. The Plan details actions being taken by the Government of Canada to help achieve the goals, objectives, and targets included in the National Adaptation Strategy. The Government of Canada Adaptation Action Plan announced an investment of up to \$30 million (CAD) over five years to expand Health Canada's extreme heat programming in order to better protect Canadians from the health impacts of extreme heat. Health Canada will work with partners and stakeholders to address knowledge gaps, develop guidance and support actions that protect Canadians from the health impacts of extreme heat, particularly extreme indoor heat – the leading cause of heat-related death in Canada.

The Government of Canada Adaptation Action Plan announced a further investment of up to \$13 million (CAD) over five years to renew and expand Health Canada's HealthADAPT Program. This investment will enable Health Canada to take further action to build climate-resilient and low carbon health systems and to protect Canadians from the health impacts of climate change. Health Canada will continue to collaborate with international partners, including by working with the Global Heat Health Information Network, and partners across the G7.

EU

The European Commission supports members states through funding, e.g., the EU Horizon Framework Programme.⁸ The EU Mission on Climate Change Adaptation supports at least 150 European regions and communities with seed funding for the period of 2021-23. Under the European Adaptation Strategy, the European Climate and Health Observatory⁹ has been launched to enable public authorities to better anticipate and prevent climate related threats. The European Early Warning Response System¹⁰ has been strengthened since the Covid-19 Pandemic and a new regulations series will be launched later this month providing a stronger and more comprehensive data framework for the EU to prepare and respond to serious cross-boarder health threats and emergencies.

France

Representatives highlighted the need for better prevention and coordination to face the growing risk of heatwaves. They advocated for increased political and collective responses, and better communication among partners. They suggested that multi-timescale and intersectoral approaches are needed to engage a wide range of actors and include diverse actions. In France, the Ministry of Health works in close collaboration with the Ministry of Environment and the Ministry of Education for the prevention and preparedness of heatwaves. They stressed building trust between national authorities and the public is fundamental for effective heat protection.

Germany

Representatives reflected on discussions, noting everyone present is working intensively on this urgent issue, and recognized excellent approaches already exist. Many effective options and tools are available that can be used and adapted to specific countries.

In Germany, the responsibility for extreme weather events including heatwaves rests at the federal state level, municipalities and different institutions indicating that this is a complex system. The Ministry of Health can only increase the resilience of individuals by publishing recommendations, and strengthening networks through supported dialogue. In terms of lessons learned, representatives indicated they plan to promote collaboration between the providers of Heat Health Warning Systems and Public Health Services.

The Warning Systems are an essential basis for the public health authorities, clinics, and care homes to initiate protective measures and trigger behavioural changes. This format for exchange should be continued, potentially under the Global Heat Health Information Network (GHHIN) or in collaboration with the World Meteorological Organization (WMO). They concluded that we need to start early to prepare for the next summer season, network with stakeholders across sectors, integrate warning systems in smart ways and increase effective communication.

Japan

Representatives observed this event demonstrated the importance of a whole of government approach, both vertically from national to local level and horizontally across different parts of government. In particular, national and local level coordination needs to be strengthened. They recommended similar simulations should be conducted at local level to enhance understanding of heatstroke risks and responses. Awareness among the elderly, as one of the most heat vulnerable groups, urgently needs to be increased and protective measures from extreme heat effectively communicated. They noted that it is particularly important to better prepare the emergency transportation system during heatwaves. Ongoing interdisciplinary dialogue and sharing of key learnings will be needed.

United Kingdom

Reflections from the discussions highlighted that actions need to be locally led and heat health alerts should be communicated from national governments to local actors. It is especially important that the social care system is adequately prepared to protect vulnerable populations.

Building cross-governmental relationships and speaking to other government ministries, including the Cabinet Office and departments answering for local government actions, will be key to scaling up new plans. The development of the Health National Adaptation Program will ensure longer-term heat protection measures and plans will be emphasized.

Next year the UK will publish the first single adverse weather and health plan combining the existing heatwave and cold weather plans for England to improve resilience in health and care centres but also raise awareness of actions for the public and health care workers. They highlighted that G7 countries could continue working together to share expertise and knowledge, research initiatives and supporting information to direct political attention to adaptation and resilience policies for extreme heat.

United States

Working across sectors is critical as well as effective pre-planning. The National Integrated Heat Health Information System¹¹ (NIHHIS) has been launched by NOAA and CDC involving several other agencies. A strategic plan is currently being developed and reviewed internally which determines many related activities. They are also conducting scenario planning to bring the communities and cities together at local levels. [Urban heat island citizen science mapping campaigns](#) aim for both outreach and communication messages and offering the communities some useful tools.

In the US, a lot of work focuses on [indicators](#), which might be a useful area for future collaboration. As part of Heat.gov, [seasonal outlooks](#) are currently being tested to be made more actionable. To continue sharing of lessons learned and good practices, representatives suggested NIHHIS could host a future learning event for G7 and other countries, similar to the [2015 Chicago Workshop on Developing Climate Information Systems for Heat Health Early Warning](#).

India

The India Meteorological Department and the National Disaster Management Authority (NDMA) lead India's efforts to prepare for and respond to heatwaves. [23 of India's 28 states are prone to heatwaves and working to develop heat action plans](#).

The National Program on Climate Change and Human Health identified several heat vulnerable states which are being supported by the program. Intersectoral and inter-ministerial collaboration and support is needed for successful heat protection.

One of India's main objectives is to improve communication and raise awareness among stakeholders and the public. Representatives highlighted that this platform is very important to share and learn from each other identifying critical next steps. This forum format should be continued, strengthening collaboration, and sharing knowledge and technology.



Future actions and outlook

As the world continues to warm due to climate change and experience more frequent, intense, and complex extreme heat, rapid investment in climate action and adapting society and governments are paramount.

Participants highlighted the need to:

- **Raise awareness** among policy makers of the impending impacts of extreme heat on health systems, and the immediate need to adjust practices and infrastructure to be resilient to future climate. Participants reiterated how investments in heat warning systems and plans save lives. These instruments serve national targets and priorities, climate adaptation and civil protection, as well as commitments to the UN Framework Convention on Climate Change and Sendai process for Disaster Risk Reduction.
- **Refine existing heat warning systems** to support health policy and programming needs. They need to provide longer lead-times, address multi-hazard risks, and capitalize on multisectoral information through integrated holistic information systems that address multiple time scales.
- **Invest in science and innovation**, cooperation and learning, and efforts to incentivize community empowerment to amplify readiness for extreme heat. Mechanisms to share data, experiences, guidance, governance, good practices, and innovations are critical.
- **Share and learn across countries.** The wealth of knowledge and experience within the G7 can be valuable in supporting other heat impacted countries. Participants requested opportunities to continue sharing and learning across countries in 2023 through similar forums and mechanisms such as the [Global Heat Health Information Network](#) and [Anticipation Hub](#).



Photo: First Global Forum on Heat and Health, GHIN. Robbie Parks 2018

Notes and references

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