



Protecting health from hot weather during the COVID-19 pandemic

Shumake-Guillemot, Joy; Amir, Sulfikar; Anwar, Nausheen; Arrighi, Julie; Böse-O'Reilly, Stephan; Brearley, Matt; Cross, Jamie; Daanen, Hein; de'Donato, Francesca; Eggen, Bernd

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TECHNICAL BRIEF

PROTECTING HEALTH FROM HOT WEATHER DURING THE COVID-19 PANDEMIC

COVID-19 amplifies the health risks of hot weather, presenting individuals and local decision-makers with new challenges on the optimal ways to stay safe from both hot weather and COVID-19. Communities around the world are facing unprecedented compound risks as the health and socio-economic impacts of the pandemic exacerbate already deadly heat risks.

The COVID-19 pandemic amplifies health risks for many people in hot weather. To reduce heat-related illness and loss of life authorities and communities should prepare for hot weather and heatwaves — in addition to managing COVID-19 — before extreme heat strikes.

The last five years (2015-2019) saw the hottest average temperatures ever recorded at a global scale, including more frequent, longer and hotter heatwaves on every inhabited continent. This year is also on track to be one of the hottest years on record and the same is true for the coming decade — consistent with climate change trends.

Authorities should expect and urgently prepare for hot weather and heatwaves, in addition to managing COVID-19. Common public health actions to reduce heat-related illness and death may need to be modified in locations where they are restricted, unavailable or in contradiction to public health measures to limit the transmission of COVID-19. These measures include: “leave hot apartments for public spaces”; “go to public air-conditioned locations such as cooling centers, shopping malls, and libraries”; “regularly check on vulnerable persons”; “use fans to cool rooms without air-conditioning”; and “seek urgent medical care if showing signs of heat stroke”.

Furthermore, hot weather conditions may complicate COVID-19 responses by increasing patient loads, and creating occupational health risks for health workers and responders.

This unprecedented situation highlights the need to clarify issues and decision-making options. This technical brief describes key considerations for decision-makers and practitioners on adapting existing plans, protocols and procedures for managing the risks of extreme heat during the COVID-19 pandemic. The accompanying Q&A series and checklists present further options, supporting evidence and resources to help all stakeholders and communities take informed action.

Amplified risks of hot weather and COVID-19

COVID-19 has amplified the risks of hot weather for some people. Many vulnerable groups are susceptible to both COVID-19 and heat stress ([see Q&A on population vulnerability](#)) including older people; those with pre-existing medical conditions; those with limited access to healthcare; and those living in crowded or poor quality housing conditions. Self-isolation increases heat-related illness and mortality risk at home – particularly of older people, individuals with disabilities, people with mental health issues unable to interpret or take appropriate protective measures, people in residential care facilities, and those without air conditioning.

People considered at risk in hot weather may be in even more precarious socio-economic conditions due to COVID-19. The economic impacts of the pandemic may have resulted in significant wage losses of vulnerable individuals, their caregivers and social networks, thus reducing access and options to use transport, communications, pay utility bills, have adequate nutrition and seek medical attention. These reductions in income are inequitably distributed, and those in low income jobs have been disproportionately affected. Low-income wage earners are both less likely to be able to work from home and more likely to be exposed to the virus in frontline service roles, such as driving buses and cleaning. While some community mobilization is increasing, social support networks have also been disrupted and hamper the ability of families and communities to support those in need.

Many at risk people are already more likely to overheat in hot weather, because they live in high density and poor quality housing, in locations with less green space and outdoor cooling options. They are less likely to be able to safely use what green space is available.

Worldwide, dense urban city centers with limited green-space amplify urban heat island effects and disproportionately experience some of the hottest local temperatures. In some countries, emerging evidence shows these same communities also have amongst the worst COVID-19 outcomes, due to their pre-existing exposures to air pollution and high rates of non-communicable diseases.

Informal urban settlements are particularly high-risk areas for both heat stress and COVID-19 transmission. People living in informal settlements during a heatwave will not be able to stay indoors due to the inability to cool their homes. Alternative safety measures may be needed to limit infection, such as providing safe outdoor areas, encouraging the use of face masks or coverings, increasing water points for hand washing, and disinfecting common areas such as communal water taps. ([See Q&A on informal settlements](#))

Key Terms

A **heatwave** is a prolonged period of unusually high temperatures that places an extraordinary amount of strain on humans and human support systems (transportation, energy, healthcare). There is no standard definition for a heatwave, but they are commonly defined by local authorities as the exceedance of a threshold (often some combination of temperature and humidity, solar exposure, wind, and sometimes considering eepidemiological impacts of those conditions) for a certain amount of time (often two or more days). Heat illness and death may also occur outside of heatwave periods, though such impacts are more pronounced during and immediately following a declared heatwave.

Hot weather and **high ambient temperatures** in this document refer to any local temperatures (daytime or nighttime) which may or may not meet heatwave criteria as defined above, but which are hot enough to still cause heat illness and death, especially in at-risk populations.

At-risk populations are any population which experiences heightened vulnerability to warmer temperatures due to high exposure, social, physiological, or psychological vulnerability, or other factors such as the use of personal protective equipment (PPE) which can insulate and prevent cooling. Children, older adults, people taking medications which may affect thermoregulation, outdoor workers, athletes, and pregnant women are among those often considered at-risk.

Heat awareness, and keeping cool and hydrated at home is critical, especially for people who are unwell. Studies are not yet available on the interaction of the co-morbidities of COVID-19 infection and passive or exertional heat stress. However, since the majority of COVID-19 patients present with subclinical or mild symptoms that do not require hospitalization, the population of ill and homebound individuals should not be ignored, especially during hot weather. Patients at home or recovering may be unwell for several weeks and are likely to be sensitive to thermal discomfort and dehydration that may further aggravate their illness.

Populations vulnerable to both heat stress and COVID-19

- Older people (>65 years and especially >85years).
- People with underlying health conditions:
 - Cardiovascular disease
 - Pulmonary disease
 - Kidney disease
 - Diabetes / obesity
- Mental health issues (psychiatric disorders, depression)
- Essential workers who work outdoors during the hottest times of the day or who work in places that are not temperature controlled.
- Health workers and auxiliaries wearing personal protective equipment
- Pregnant women
- People living in nursing homes or long-term care facilities, especially without adequate cooling and ventilation.
- People who are marginalized and isolated (experiencing homelessness, migrants with language barriers, old people living alone) and those with low income or inadequate housing, including informal settlements.
- People on medication: some medication for the diseases listed above impair thermoregulation. The impact of treatment for COVID-19 is currently unknown but should be monitored to assess any additional vulnerability.
- People who are currently managing COVID-19 at home (i.e. febrile), or who have been recently discharged from hospital for treatment with COVID-19, which can be associated with acute kidney injury.

How does hot weather impact health?

Heat stress is a serious health threat. Extreme heat is a leading cause of weather-related death; can exacerbate underlying conditions including cardiovascular disease, diabetes, psychological distress, and asthma; and increases the risk of accidents and some infectious diseases. Every year, as temperatures rise across the world, so do the rates of visits to ambulatory care, excess all-cause mortality, and worker productivity losses.

Exposure to extreme heat has wide-ranging physiological and psychological impacts, with extreme exposures resulting in a cascade of heat illnesses, including increased body temperature (hyperthermia), heat exhaustion and heat stroke, organ damage and adverse pregnancy outcomes.

Heat gain in the human body is caused by a combination of external heat from the environment and internal body heat generated by physical activity. Heat can also affect health indirectly, by altering human behaviour, the capacity of health service delivery, the functioning of critical social infrastructure such as energy, transport and water, the transmission of vector-borne and food-borne diseases, and local air quality.

The scale and nature of the negative health impacts of heat depend on the timing, intensity and duration of a heat event, population susceptibility including acclimatization and pre-existing health status, and on how well-adapted buildings and behaviour are to the prevailing climate.

The precise threshold at which temperature represents a hazardous condition varies by region and over time, as well as by the health condition of the population. The health of vulnerable people often starts to decline sometimes far before hot conditions are considered a heatwave or extreme heat. The rapid onset of heat related illnesses often leaves little time to respond or seek medical attention, so awareness and preparedness is essential.

Crucial considerations for heat stress safety and COVID-19 prevention

Actions and issues for health services and systems

The capacity of health services and systems to prevent and manage heat stress may be compromised or unavailable, where medical and public health resources are focused on COVID-19. The physical distancing policies and restrictions on common-use spaces may have an unintended but significant bearing on the roll out of life-saving public health interventions to respond to hot weather. Communities that experience heatwaves and periods of hot weather are also very likely to face additional challenges in preventing, controlling and responding to COVID-19.

Public fear of seeking healthcare during COVID-19 may result in preventable heat-related deaths. The fear of infection is reported in several countries to delay seeking health care for non-COVID-19 related issues even when critically needed. This perception and behavior could result in preventable deaths of vulnerable persons who are sheltering in place without adequate cooling and not leaving for cooler conditions or health care. In areas affected by high death tolls due to COVID-19, a severe heat event could result in mass casualties and high mortuary demand.

Heat stress can present a range of symptoms that mimic early COVID-19 symptoms, including headache, exhaustion, raised body temperature, excessive sweating, and body cramps. Self-recognition of heat stress is sometimes difficult. Differential diagnosis between heat illness and COVID-19 is critical to facilitate accurate testing, diagnosis and treatment, and prevent contraindications of treatment. During hot periods, ambulatory, emergency, and medical staff should be alert to potential cases of hyperthermia, and aware of how to distinguish between fever caused by infection and hyperthermia from exposure to hot conditions. ([See Q&A fever vs. heat stress](#))

The COVID-19 pandemic has resulted in large numbers of healthcare workers, as well as social support auxiliaries, caregivers, civil protection workers and others, being required to wear additional personal protective equipment (PPE) in order to safely treat and interact with patients.

Wearing PPE and working in inadequately cooled conditions for long periods of time increases risk of heat stress for healthcare workers and other first responders. ([See Q&A on preventing heat stress while wearing PPE](#))

Prolonged exposure to heat is not only detrimental to workers' health but also affects their cognitive capacity, productivity and wellbeing. The response to the COVID-19 pandemic is expected to be protracted, and excess physical and mental stress on healthcare workers is already being reported worldwide. It is necessary to ensure that healthcare and other essential workers are protected both from infection and heat stress so that they can continue to perform their duties effectively throughout the crisis. ([See checklist for general practitioners and Q&A on protecting health workers from heat stress](#))

Heat health action plan elements

- Inter-sectoral coordination
- Heat-health early warning and alert systems
- Communications and public outreach
- Reduction in indoor heat exposure
- Special care for vulnerable people
- Preparedness of the health and social care system
- Long-term urban planning
- Real-time surveillance
- Evaluation

[Heat-health action plans.WHO, 2008
<http://www.euro.who.int/en/publications/abstracts/heathealth-action-plans>](http://www.euro.who.int/en/publications/abstracts/heathealth-action-plans)

Actions and issues in the community

All heat-related illnesses and deaths are preventable. Reducing the number of people developing heat illness will help lower the burden of hospital admissions during the warm summer months. While many local authorities already have multi-hazard preparedness measures in place, the combination of a novel biological hazard (COVID-19) with person-to-person transmission at pandemic scale, on top of the hazards of hot weather, will present unique situations that may not have been adequately considered in existing heat action plans.

Local authorities should discuss the risks of heat and how to prepare before hot weather arrives. Prevention plans to reduce the health impacts of heat, generically known as **Heat Health Action Plans (WHO, 2008) should be immediately reviewed and modified in light of local COVID-19 context.** These inter-sectoral plans are executed at the federal, national, subnational and local levels they typically comprise a series of interventions, including heat warning systems, advice and information on keeping safe from heat, specific outreach and care for vulnerable population groups, surveillance of heat-related mortality and illnesses, and local interventions to reduce heat exposure through cooling centers and cool recreational areas. Many components will need to be modified where impacted by COVID-19 infection control and prevention measures. Appropriate local guidance should be issued to reduce ad-hoc decision-making and confusion. ([See checklist for Heat Health Action Plan managers on considerations to modify heat action plans during COVID-19](#))

Outreach and communication about heat stress during the COVID-19 pandemic is even more important. Lives can be saved when people are aware of the risk and can recognize signs of heat stress, know what actions to take to cool down, and are able to seek medical care if needed. During times of heightened public fear and uncertainty, recognizing risk perceptions and managing fears in the community is critical. Communication efforts that provide **reliable and actionable** information on how to self-protect from both heat stress and COVID-19, while addressing misinformation that may be circulating, are critical for residents to know what their options are and what behaviours they should practice. Using trusted sources and varied channels of communication (by television, radio,

social media, and newspapers) for COVID-19, can also help inform residents on what to do in hot weather. Increased remote services such as tele-health, community phone trees and telephone hotlines that check on people who are vulnerable on a regular basis during hot weather and heatwaves has shown to be an effective way to reach those at risk. ([See Q&A on Communications and outreach](#))

Mobilizing social services and community partners to reach people at risk of heat stress can save lives. Social services such as government departments providing services for the ageing, child and family services, homelessness, substance abuse, services for people living with disabilities and other social safety net programmes should be mobilized and supported to help provide information, and meet the increased needs of at risk groups. Community-based associations and clubs, non-governmental organizations and religious groups can be strong allies in reaching and supporting vulnerable community members. ([See Q&A on social services](#))

Limited access to residential air conditioning is a major concern for many, particularly if sheltering in place during hot weather. This includes resource-poor families, older people, those in informal settlements and housing, as well as those in affluent regions where commercial or residential air conditioning is not common. **Low-cost and low-tech options and behaviours to keep your home and body cool without air conditioning can be lifesaving.** ([See Q&A on low-tech cooling options](#))

Cooling centres remain essential services for many in the community to access to cooler temperatures. Additional measures for cooling centres to reduce the risks of COVID-19, may need to consider how to ensure physical distancing, increase hygiene and disinfection measures, provide face masks and public service notices on COVID-19, follow contact tracing protocols, and separate facilities for individuals displaying symptoms of infection. ([See Q&A on cooling centres](#))

High-occupancy publicly-accessed commercial facilities such as stores, hotels, schools, shopping malls, restaurants, office buildings, etc. generally operate on centralized and 'closed-system' climate control and ventilation systems. **Air conditioning**

and ventilation systems that are well-maintained and operated should not increase the risk of virus transmission. However, the use of fans for air circulation in collective spaces should be avoided when several people are present in this space. Steps to increase outdoor air exchange and minimize air blowing from one person directly at another should be taken to reduce the potential spread of any airborne or aerosolized viruses. ([See Q&A on Air conditioning and ventilation](#))

Public parks, beaches, swimming pools and splash parks provide essential outdoor cool spaces for residents. Chlorine, salt, and solar radiation all help kill the virus in the environment. However, local authorities will need to judge how to open and ensure the safe use of outdoor public spaces for cooling. Physical distancing and hygiene in public facilities and cleanliness of changing rooms and other common areas, limiting access to high-touch surfaces (such as playgrounds, gym equipment and water fountains), and increased communication and signage are important measures. ([See Q&A on outdoor cool spaces](#))

Heatwaves and high temperatures can be predicted in advance and effectively inform public advisory and action. The national meteorological services and those coordinating the Heat Health Action Plan (if in place) should work to increase coordination across relevant agencies and partners to provide as much advance notice of high temperatures as possible. The language of advisories should reflect the seriousness of the threat of a heatwave, consider the compound risk factors of the pandemic and a heatwave, and provide actionable heat health messages for at risk groups which are feasible and aligned with local public health messages on COVID-19.

Climate, weather and environmental conditions and COVID-19

Following rapid global spread, facilitated by global travel and trade and high transmissibility, COVID-19 is now a pandemic disease. Rates of community transmission are largely driven by individual behavior and hygiene, and are heavily influenced by the physical distancing measures in place in many countries around the world. Environmental conditions such as humidity, temperature, and UV radiation exposure likely play a limited role in determining where and when COVID-19 transmission occurs. ([See Q&A on weather and seasonality](#))

Weather conditions are one of many factors that may exacerbate and introduce additional challenges for individuals, health workers, health facilities and communities in the management of COVID-19. Where hot weather or heatwaves occur, increased pressure on health and social services is likely, risks of heat stress for essential staff increases, and worsened health outcomes for COVID-19 patients is possible.

Air pollution has not yet been determined to play a role in the transmission of COVID-19; however, **people in areas of higher pollution are known to be at greater risk of having respiratory and heart diseases.** Those with prior long-term exposure to high levels of air pollution may now be facing the combined effect of increased vulnerability to heat stress, in addition to increased vulnerability to the more severe symptoms of a COVID-19 infection.

Higher ambient temperatures, solar intensity and weak wind conditions also contribute to the formation of photochemical smog, including the formation of ambient ozone – a highly oxidative pollutant. Human exposure to ambient ozone and extended heat conditions can exacerbate cardiopulmonary disease. Whether the combined exposure to heat and ozone could also aggravate COVID-19 symptoms and prognosis is not yet been fully established. ([See Q&A on ozone, extreme heat and COVID-19](#))

Conclusions

In the face of compound risks from hot weather conditions and COVID-19, it will be essential to issue strong awareness-raising communications, coupled with increased coordination, creativity and flexibility from decision-makers.

Communities should be prepared to update and review communications and heat action plans, and make periodic changes to these plans as the situation changes.

Where heat action plans may not exist, consider putting one in place. In these unprecedented circumstances, strategic and collaborative actions can significantly enhance community and health system resilience to prevent avoidable illness and death from hot weather during the COVID-19 pandemic.

Addition Resources

[Heat and COVID-19 Q&A Series](#)

Global Heat Health Information Network (2020)

[WHO Country & Technical Guidance - Coronavirus disease \(COVID-19\)](#)

WHO (2020)

[Health advice for hot weather during the COVID-19 outbreak](#)

WHO (2020)

[Public health advice on preventing health effects of heat](#)

WHO (2011)

[Heatwaves and Health: Guidance on Warning-System Development](#)

WHO / WMO (2015)

[Heatwave Guide for Cities](#)

Red Cross Red Crescent Climate Centre (2019)

About this brief

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Lead author: Joy Shumake-Guillemot, WHO / WMO Joint Office for Climate and Health

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About the Global Heat Health Information Network: The Global Heat Health Information Network is an independent, voluntary, and member-driven forum of scientists, practitioners, and policy makers focused on improving capacity to protect populations from the avoidable health risks of extreme heat in a changing climate. The solution-based network promotes the sharing of resources and information, encourages collaborative learning and partnership building between members, and seeks to enhance technical and science based decision tools to better manage heat risks. The initiative is led by the Joint World Health Organization and World Meteorological Organization Office for Climate and Health, and the United States National Oceanic and Atmospheric Administration (NOAA) Climate Program Office.

www.ghhn.org

Contributing authors

Joy Shumake-Guillemot (Dr.PH), World Health Organization - World Meteorological Organization Joint Office for Climate and Health

Sulfikar Amir (PhD), Nanyang Technological University (Singapore)

Nausheen Anwar (Prof), Institute of Business Administration (Pakistan)

Julie Arrighi (MA), Red Cross Red Crescent Climate Centre

Stephan Böse-O'Reilly (M.D., MPH), Ludwig Maximilians University

Matt Brearley (PhD), National Critical Care and Trauma Response Centre and Thermal Hyperformance Pty Ltd, Australia

Jamie Cross (PhD), University of Edinburgh

Hein Daanen (PhD), Vrije Universiteit Amsterdam

Francesca de'Donato (PhD), Department of Epidemiology Lazio Regional Health Service

Bernd Eggen (PhD)

Andreas Flouris (PhD), University of Thessaly and University of Ottawa

Nicola Gerrett (PhD), Vrije Universiteit Amsterdam

Werner Hagens (PhD), Dutch National Institute of Public Health and the Environment (RIVM)

Dr. Alina Herrmann (Dr.Med), Universitätsklinikum Heidelberg

Maud Huynen (PhD) Maastricht Sustainability Institute (MSI).

Hunter Jones (MES), National Oceanic and Atmospheric Administration

Ladd Keith (PhD), University of Arizona

Aalok Khandekar (PhD), Indian Institute of Technology Hyderabad

Jason Lee (PhD, FACSMT), National University of Singapore

Rachel Lowe (PhD), London School of Hygiene & Tropical Medicine

Franziska Matthies-Wiesler (PhD), Helmholtz Centre Munich

Marie Morelle (Prof), University Paris 1 Panthéon Sorbonne

Nathan Morris (PhD), University of Copenhagen

Claudia Di Napoli (PhD), University of Reading

Anindrya Nastiti (PhD), Institut Teknologi Bandung, Indonesia.

Ian Norton (MD), Respond Global Health

Lars Nybo (PhD), University of Copenhagen

Elsbeth Oppermann (PhD), Ludwig Maximilians University

Roop Singh (MA), Red Cross Red Crescent Climate Centre

Lesliam Quirós-Alcalá (PhD), Johns Hopkins Bloomberg School of Public Health and University of Maryland

Anouk Roeling (MSc), City of The Hague

Ana M. Rule (PhD) Johns Hopkins Bloomberg School of Public Health

Gerardo Sanchez Martinez, (PhD), University of Denmark

Joris van Loenhout (PhD), UCLouvain

Peter Van den Hazel (MD, PhD), environmental health physician

Kirsten Vanderplanken (PhD), UCLouvain

Benjamin Zaitchik (PhD) Johns Hopkins University

Reviewers

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Jörn Rittweger, University of Cologne

Shubhayu Saha, US Centers for Disease Control and Prevention

Paul Schramm, US Centers for Disease Control and Prevention

Ross Thompson, Public Health England

Vidhya Venugopal, Sri Ramachandra University

Regina Vetter, C40 Cool Cities Network

Jon Williams, US Centers for Disease Control and Prevention

Benjamin Zaitchik (PhD), Johns Hopkins University

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