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Storyline of a silent killer: Extreme heat and media communication

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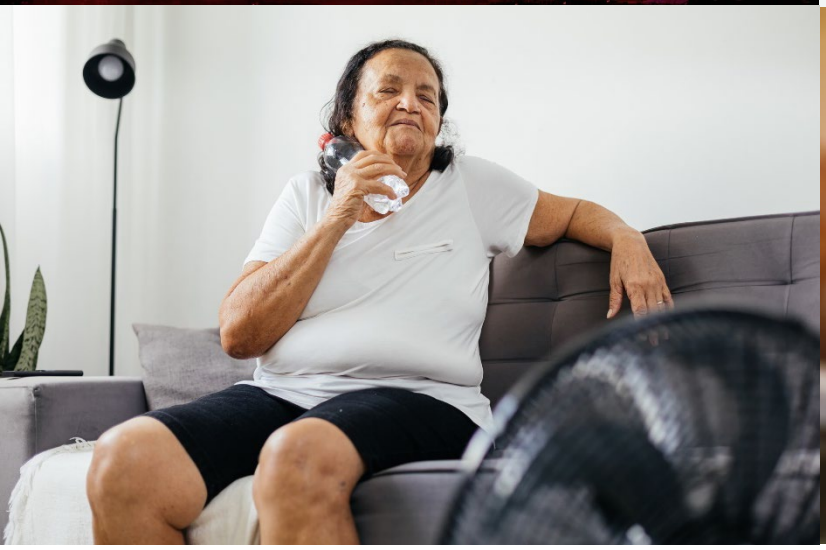
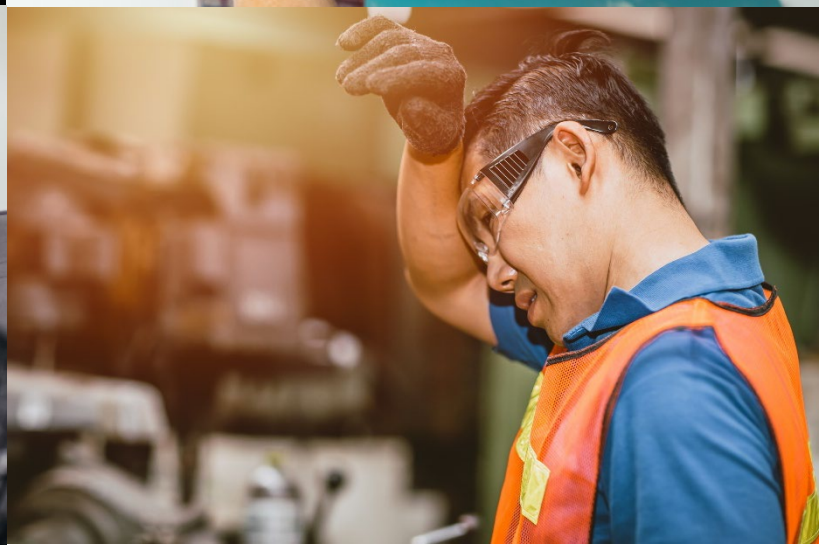

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Key messages

- Media professionals such as journalists, reporters, and editors can play pivotal roles in communicating about the risks of extreme heat events (EHEs).
- Key considerations for reporting on EHEs and their impacts include framing heat in the context of climate change, highlighting positive actions and solutions, acknowledging the inequitable impacts of heat on susceptible populations, and highlighting the indirect and potentially cascading impacts of heat.
- Practical recommendations include creating pre-season awareness, covering outdoor overnight and daytime heat, and focussing on the risks of heat in indoor settings.
- Media coverage should include images and text that convey heat health risks rather than recreational activities in the sun.
- Messages should focus on those who will be most affected by extreme heat, such as those without access to air conditioning, and positive actions people can take to protect themselves from extreme heat.
- Interview sources should provide a diversity of story context, local expert/researcher inputs, and a focus on early signs and symptoms of overheating rather than extreme cases of heatstroke.
- Media professionals and outlets should collaborate with public health and public safety to craft and distribute health-protective messages and general awareness about extreme heat prior to the heat season and in anticipation of EHEs.
- Additional consideration and direct collaboration will be needed during overlapping crises.

Introduction

According to the International Panel on Climate Change 2021 report, heatwaves, also known as extreme heat events (EHEs) are becoming more prolonged, frequent, and extreme due to climate change.[1] The unprecedented EHE in 2021 in British Columbia (BC), known as the 2021 Heat Dome, led to 619 heat-related deaths, and highlighted the need to protect populations in Canada from the increasing threat of extreme heat.[2] The BC Coroner's Service review of heat-related deaths in BC during the 2021 Heat Dome reported that 98% of the deaths occurred indoors, mostly in private residences without adequate indoor cooling. Sixty-seven percent of the decedents were 70 years of age or older, 90% were over age 60, more than 80% were listed on three or more chronic disease registries, and 56% lived alone.[2] This report highlighted that certain populations are particularly susceptible to heat-related injury and death. Bearing

in mind that all people who do not have access to safe temperatures in their homes are at risk of heat-related illnesses and death, **Box 1** defines populations who are at the most risk.[3]

Box 1. Populations that are highly susceptible to heat-related injury or death.

- People who do not have access to safe temperatures in their homes
- Older adults (60 years +)
- People who have mental illness or cognitive impairment
- People with chronic diseases
- People living alone or who are socially isolated
- People who have substance dependence or who use substances
- People with impaired or decreased mobility
- People using certain prescription medications
- People with poor physical fitness

Adapted from: National Collaborating Centre for Environmental Health. *Health checks during extreme heat events* (2022).[3]

Appropriate public preparation for EHEs is key for health protection. Preparation can be improved through better understanding of heat alerts, populations at risk, the signs and symptoms of heat-related illnesses, effective individual interventions, and when to seek medical care.[4,5] To protect health during EHEs, checking in with high-risk individuals multiple times daily is essential. Other effective interventions include finding ways to keep homes cool, for example using air conditioning, sleeping in the coolest room of the home, shutting windows/doors during the day, and opening when the outdoor temperature drops. Other important strategies are finding a cooler space if one is not available at home, such as a shopping centre or library, or finding ways to cool the body, like wearing a damp shawl/shirt, taking a cool bath/shower, or sleeping on damp sheets.[4]

Media professionals such as journalists, reporters, photojournalists and editors play important roles in conveying public health information during extreme weather events, such as EHEs.[6] Media coverage can influence the degree to which public audiences assess EHE risk and importance, based on how much attention the event receives and how it is framed by the media.[7,8] Given the importance of media coverage to prepare public audiences for EHEs, the NCCEH sought to review available guidance or information tailored to media professionals regarding effective communication about EHEs, heat health risk, and protective actions. This evidence brief presents a review of the practical guidance, recommendations, or best practices that are available to journalists and other media professionals. We also present evidence from studies on media communication during EHEs as well as more general guidance and information for journalists on climate change attribution and reporting.

Methodology

We identified literature through a search of EBSCOHost databases (including Medline, CINAHL, Academic Search Complete, ERIC, etc.), Google Scholar and Google search engines from March 2014 to March 2024. Variants and Boolean operator combinations were used with the search terms listed in **Appendix A.**

Results

Guidance and resources for media professionals on extreme heat event reporting

The most comprehensive resource identified in this review is a guidance brief from the Global Heat Health Information Network (GHHIN).[9] Established through a collaboration between the United Nations, the World Health Organization, and the World Meteorological Organization, GHHIN brings together international experts in heat and its health effects. The mission of the GHHIN is to facilitate the distribution of information on global heat health to the public, aiming to raise awareness and assist policymakers in protecting communities from the preventable health hazards posed by extreme heat in the context of a changing climate.

The GHHIN guidance brief is tailored for the media, and is designed to improve the impact, effectiveness, and public value of extreme heat-related reporting. This resource is informed by experts in media communication of climate change risks, and work from organizations such as Covering Climate Now (CCN), and the World Weather Attribution (WWA). The document contains four key considerations, a list of groups at high-risk, practical recommendations, a list of additional reading, explanations of common jargon, and links to experts. The key recommendations in this guidance brief are to:

- Frame heat in the context of climate change
- Highlight actions and solutions, such as information on how to access cooling spaces or low-cost cooling techniques
- Give attention to the disproportionate impacts of extreme heat on at-risk populations (see Box 1)
- Portray the indirect impacts of EHEs in other areas, such as disease transmission, delivery of health service delivery, air quality, risk of wildfires and evacuation, etc.

The guide summarizes practical recommendations and steps that media professionals can take when covering extreme heat from a health perspective (**Table 1**). These include advice to conduct pre-season awareness coverage, adding a focus on nighttime temperatures and indoor settings, using more realistic

imagery of the dangerous impacts of extreme heat, using positive action imagery, and balancing the focus between acute EHEs and the more chronic impacts of heat exposure. The guide also recommends choosing a variety of contextual interviews for story perspectives and focussing on local experts and researchers.

Table 1. Global Heat Health Information Network (GHHIN) practical recommendations for reporting on extreme heat events and the health impacts of extreme heat

Area	Recommendation	Information
Timing	Create pre-season awareness	• Instead of waiting for an EHE to begin/end before publishing coverage, create awareness in advance — both seasonally and before a projected heat event.
Coverage	Cover both nighttime and daytime heat	• Instead of focussing only on high daytime temperatures, remind the audience that high overnight temperatures can lead to indoor overheating, which can be dangerous for those who don't have adequate cooling at home.
	Cover both indoor and outdoor settings	• Instead of focussing on heat only in outdoor settings, remember that indoors can be hotter than outdoors, and indoor overheating is deadly.
Imagery	Include realistic imagery instead of fun in the sun	• Instead of showing scenes of crowded beaches, swimming pools, or fountains, show people struggling in the heat, and its negative and dangerous impacts. Examples include school closures, train cancellations due to buckled lines, impacts on food production, overrun ambulance services and ER waiting rooms, wildfires and air pollution, and drought.
	Include positive action images	• Instead of only showing images of heat impacts, strike a balance by also showing positive actions to mitigate or manage risk, such as cooling centres, urban tree planting campaigns, home retrofitting grant initiatives, and community outreach programs that check on populations that have increased risk to heat-related illnesses.
Focus	Balance focus of chronic heat exposure and extreme heat events	• Instead of focussing only on EHEs, balance coverage between EHEs and chronic heat exposure and risk.
Interviews	Choose a variety of interview contexts for story diversity and relevance	• Instead of conducting interviews only in hospital settings, find people dealing with the impacts of heat in various settings and contexts. • Speak with farm workers, gig workers, care home residents, ambulance drivers, firefighters, and others.
	Refocus to the local expert and research context	• Instead of interviewing only those in national or international expert roles, connect with local experts and researchers and responsible authorities.
	Be strategic in areas with low acceptance of climate science or trust in the media	• Instead of asking sources directly about heat and climate change, ask questions about circumstantial factors that contribute to the community experience of extreme heat, such as whether people have air conditioning or somewhere else to cool off.

Area	Recommendation	Information
	Ask about symptoms, not diseases/disease events	• Instead of asking sources if they have experienced heat stroke or illness, ask sources if they have experienced heat-specific symptoms, such as feeling cramps while working outside, headaches, or dizziness.

Adapted from: Global Heat Health Information Network (GHHIN) Reporting on heatwaves and the health impacts of heat. Geneva, Switzerland: World Health Organization and the World Meteorological Organization, 2023.[9] **Abbreviations:** EHE, extreme heat event; ER, emergency room

Several sources of guidance for journalists on heat-health communication have been produced by Covering Climate Now (CCN). CCN is a not-for-profit organization that supports, educates, and brings together journalists and newsrooms to create accurate and engaging coverage on the climate crisis. CCN published a guide containing resources for reporting on who is most at risk from extreme heat, signs and symptoms of heat-related illness, what can be done to protect health during and after an EHE, and links to sample imagery.[10] The CCN also launched a newsletter in June 2024, with its first edition focussed on extreme heat as a public health issue and presents reporting tips, story examples, and other resources.[11]

Through a webinar in 2023, CCN communicated several key points that media professionals can use to cover the human health impacts of extreme heat.[12] This resource highlights the importance of communicating about the inequities related to the human health impacts of extreme heat, and how journalists can use health outcome data to emphasize these disparities and the overall severity of EHEs.

In a subsequent article, CCN provides advice to journalists about how to prepare for the 2024 heat season.[13] This resource provides additional advice encouraging journalists to commit to covering extreme heat in ways that bring accountability to local, regional, and national governments. This could involve delving into the responses of cities to a previous year's heat events and exploring whether measures have been implemented to ensure residents' safety during future heat events. Further, CCN recommends that journalists consider communicating the connections between climate change, extreme heat, and storms as they unfold.

Further support for heat health communication is provided by The Science Media Centre of Canada (SMCC), an organization dedicated to helping journalists cover stories with scientific content. In 2017, the SMCC produced a resource that provides information on key people at risk, how communities are responding to extreme heat, the context for addressing urban heat island effects, and an example of the notification and warning process from Environment and Climate Change Canada (ECCC) to public health units and community partners.[14]

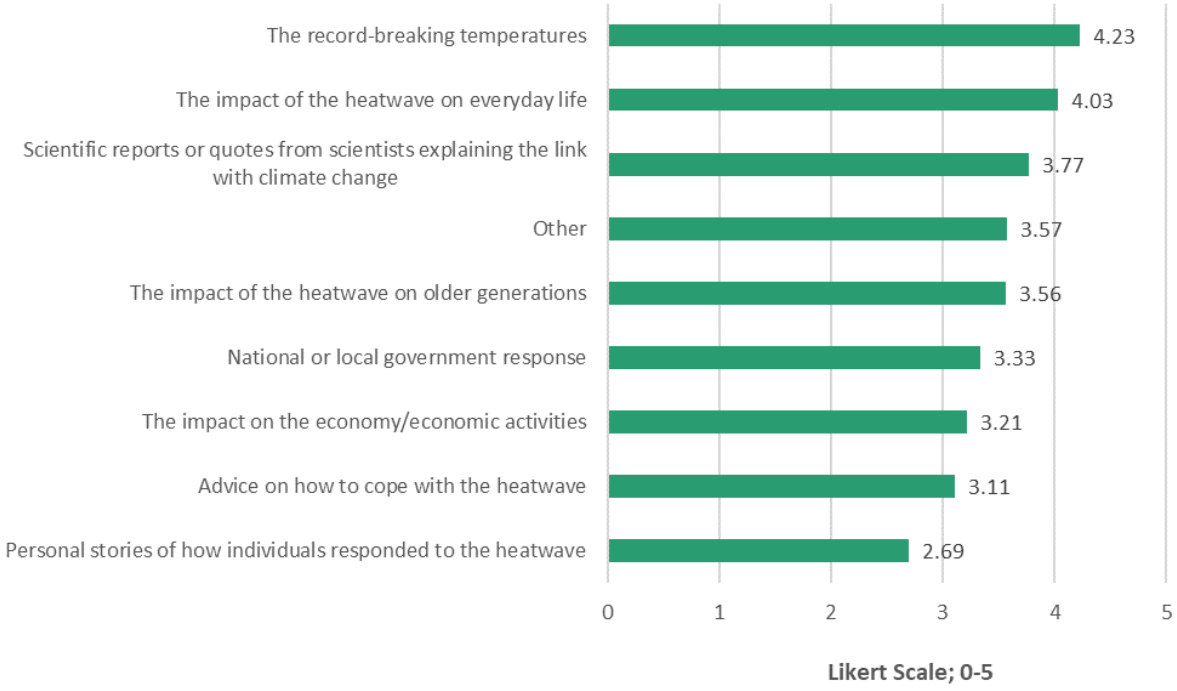
Studies on media communication during extreme heat events

Pre-season awareness, communication, and messaging

There were approximately 70,000 excess deaths reported during the EHE that affected most of Europe in the summer 2003, peaking during the month of August. In France alone, 14,729 cumulative excess deaths were reported between August 1st and 20th, 2003, compared with equivalent periods in 2000–2002, representing a 55% mortality increase.[15] Analysis of media coverage during the 2003 EHE in France showed that story topics on extreme heat impacts focussed predominantly on economic, ecological, and recreational impacts compared with coverage on the heat health risks to people.[16] The lack of health-relevant media coverage demonstrated that neither the media nor public health organizations were prepared to advise the public and those most at-risk on how to protect their health. The main recommendation related to the study findings was that increased collaboration between media and public health officials was necessary to avoid similar devastating EHE crises in future.

In late June and late July 2019, there were two distinct EHEs that affected European nations (referred to henceforth as the 2019 European EHEs), most notably Belgium, France, Germany, Luxembourg, the Netherlands, and the United Kingdom (UK).[17] Studies on the 2019 European EHEs have also described how the dangers and health risks were not widely reported by the media.[6,18] Through a survey of attitudes, motivations, and role perceptions following these EHEs, "record breaking temperatures" was reported by journalists as the most important aspect they should cover. This is a common trend across media coverage of EHEs, which can be a distraction from other important topics, such as health risks and health protection.[19] The journalists also stated it was important to report about heat impacts on older generations, but this did not translate to actual coverage during the event (**Figure 1**).[6,18,20]

Figure 1. Aspects considered important by journalists to include in coverage of the 2019 European extreme heat events (EHEs). The Likert scale ranges from 0 (not important) to 5 (very important), and the bars show mean values for 39 journalists interviewed.



Adapted from: Strauss 2022 Reporting on the 2019 European EHEs and climate change: journalists' attitudes, motivations and role perceptions.[20]

Other studies on media communications during EHEs provide further key findings (**Table 2**), most of which are similar to the recommendations from guidance in the GHHIN and CNN resources.

Table 2. Key study conclusions regarding media reporting on extreme heat events (EHEs)

Context	Specific action for media professionals and outlets/agencies
Pre-season awareness, and heat health protective messaging during an EHE	• Media professionals and outlets should collaborate with public health and safety to craft and distribute health-protective messages and general awareness about extreme heat, prior to the heat season and in anticipation of EHEs.[19] • Local media outlets and journalists should expect that public health officials will offer guidance and pre-prepared messages on extreme heat events, heat health information, and effective health-protective measures to assist heat-vulnerable populations before, during, and after EHEs.[19] • The media can play a role in communicating workplace safety information to the public, such as appropriate heat mitigation strategies using clothing, shade, and adjusted water delivery practices.[21] • News media may play an important role in disseminating public warnings, specifically targeting those experiencing homelessness during EHEs.[22]
Imagery	• Media creators, including image collection curators, photojournalists, and editors, should question the use of images and visual portrayals in media content on extreme heat and collaborate with public health to create imagery that is more accountable and inclusive.[18] • Media partners, government bodies, and public health agencies need to prioritize using images that align with evidence-based health messages when disseminating heat preparedness information.[23]
Overlapping crises	• Media partners should proactively and directly collaborate with health authorities to ensure news coverage of public health messaging is effective, timely, and appropriately prioritized to protect health during overlapping crises.[24]
Climate change attribution	• Journalists are very interested in extreme event attribution (EEA); therefore, workshop-style outreach by scientists may help journalists to better understand EEA studies, and potentially facilitate accurate and timely reporting on EEAs.[20]

Abbreviations: EEA, extreme event attribution; EHE, extreme heat event

A recent systematic review of Canadian media coverage during the 2021 Heat Dome examined how health impacts were addressed.[19] The review identified significant deficiencies in the communication of the health impacts of extreme heat, populations most at risk, and how to mitigate the health impacts.[19] Notably, narratives tended to prioritize sensational elements such as record-breaking temperatures and impacts to infrastructure rather than human health implications. Only 13% of media articles focussed on populations who are at highest risk of heat-related illnesses. The review found that there was a lack of pre-season reporting, suggesting a deficiency in pre-emptive public health awareness campaigns. Rural areas were also notably underrepresented in media discourse, compared with urban centres. The study authors concluded by calling on public health officials to aid local media outlets and journalists by offering guidance and pre-prepared messages on extreme heat events, heat health information, and effective health-protective measures to assist heat-vulnerable populations before, during, and after EHEs. In addition, collaboration is key to crafting and disseminating the messages, so health and media professionals should work together as partners prior to the heat season and in anticipation of expected EHEs.

Workplace safety is also important to consider during an EHE. The 2021 Heat Dome significantly impacted the health and safety of multiple occupational groups in BC, ranging from work disruptions and schedule changes to adjustments in work practices and reports of heat-related illnesses.[21] To address this, during an EHE, the media can play a role in communicating workplace safety information to the public, such as appropriate heat mitigation strategies like wearing adapted clothing that promotes cooling, seeking shade, and adjusting water-delivery practices.

Individuals experiencing homelessness are an at-risk population during EHS. However, during the 2021 Heat Dome in BC, there were very few deaths among people experiencing homelessness (n = 3, 0.5%), despite the region having one of the highest homelessness rates in Canada.[2] This was the impetus for a case study that identified Canadian news media that specifically included public warnings about the heat risks for people experiencing homelessness.[22] This kind of media messaging and grassroots initiatives tailored to support homeless individuals during the 2021 Heat Dome may have played a role in lessening the adverse effects of heat on this population.

Imagery

Imagery is an important journalistic and reporting tool to explain and frame the context of an article, making it memorable and emotive.[25,26] Content and visual discourse analyses of news coverage of the 2019 European EHEs in France, Germany, the Netherlands, and the UK (245 images and associated articles), found that many visuals associated with the articles were positively framed, in contrast to the article text.[18] The most common choice of image was of people having fun in or by water, thereby framing heat events as "fun in the sun." In most cases where the images were chosen to represent the heat health risks, people were not included. The authors called on those involved in media creation, including collection curators, photojournalists, and editors, to question the use of images and visual portrayals in media content on extreme heat. They suggested that collaboration could help to create media discourse that is more accountable and inclusive of the people who are affected the most. Notably, these findings were supported by climate experts in a media report analyzing "sunny coverage" of UK EHEs.[27] In the Guardian report, experts asserted that the sunny and dry weather conditions observed in the UK during the EHEs were frequently depicted as positive events, often featuring images of individuals sunbathing, playing in fountains, or consuming ice cream, thereby framing these conditions as celebratory.

A recent content analysis of 845 images published in association with Canadian media articles during the 2021 Heat Dome showed that just 16% (n = 133) portrayed the heat as dangerous.[23] Of these images, only 46% (n = 61) portrayed human suffering, and only 4% (n = 5) portrayed heat as an indoor danger compared with 96% (n = 840) portraying it as an outdoor danger. The images also lacked representation of people most at risk from the EHE, such as older adults. Depiction of actions to the reduce the risks of indoor heat were also underrepresented, with only 4% (n = 33) showing air conditioning, fan use indoors, or other cool indoor spaces. This analysis also found a mismatch between images used, the danger faced by people most at risk from extreme heat, and evidence-based approaches to protect health indoors. The

study authors concluded by urging government bodies, public health agencies, and media partners to prioritize using images that align with evidence-based health messages when disseminating heat preparedness and response information.

Climate change attribution

During the 2019 European EHEs, content analysis of media coverage in France, Germany, the Netherlands, and the UK showed that only about 11% of articles mentioned any link to climate change.[6] This is despite a reported uptick of mentions of climate change in global media coverage of EHEs between 2013 and 2018.[28] The survey of journalists' attitudes motivations and role perceptions regarding reporting on EHEs found there was a notable lack of knowledge on extreme event attribution studies among survey participants.[20] Nevertheless, journalists interviewed reported a strong desire to cover the link between climate change and the probability of extreme weather events such as EHEs (**Figure 1**).

Some media services have specialized reporters for climate change-related coverage; however, this study reported there were fewer specialized reporters compared with generalist reporters covering EHEs. When it comes to climate change attribution, journalists most frequently relied on and quoted primary sources such as meteorologists, authors of scientific reports, scientists, and scientific reports. In addition, journalists reported perceiving their role as educators rather than advocates, and do not report having substantial time and resource constraints imposed on them to produce their extreme heat-related media products. The study authors concluded that presenting the strengths and limitations of climate models through workshops could potentially facilitate accurate and timely reporting on climate change attribution.[20]

Overlapping crises

Another paper on the 2021 Heat Dome explored its confluence with the COVID-19 pandemic in Canadian media-based public health communication, and found there were many conflicting health messages, potentially confusing the public about appropriate health precautions.[24] The study results suggest that the COVID-19 pandemic might have exacerbated the health impacts of the 2021 Heat Dome, given pandemic-related public health measures such as social distancing could have discouraged individuals from taking necessary heat precautions, such as accessing a centre or seeking timely healthcare. This highlights the importance of consistent public health messaging and unified heat health guidance when facing simultaneous EHEs and other public health crises. The study authors called for health authorities and professionals within health and public safety systems to collaborate proactively and directly with the media, ensuring that public health messaging in news coverage is effective, timely, and appropriately prioritized during overlapping crises.

Guidance and resources for media professionals on climate change reporting and attribution

Guidance consistently recommends that media professionals cover climate change attribution in articles about EHEs, except in contexts where there is minimal acceptance of climate science or trust in the media.[9,20,29] There are several recent guides and resources for journalists and other media professionals focussed on climate change reporting and attribution that may be useful for covering EHEs (**Table 3**).[29-31]

One example is provided by World Weather Attribution (WWA), a not-for-profit initiative that works with scientists to quantify how climate change influences the intensity and likelihood of an extreme weather event.[29] WWA uses weather observations and computer modelling, immediately after an event, to draw its conclusions and inform decisions and actions that improve community and national resiliency in response to extreme weather events. The WWA 2022 guide discusses how to present accurate information to audiences regarding the impact of climate change on the rising occurrences of extreme events, while avoiding both overemphasis and underrepresentation of the connection.[29] Regarding EHEs, WWA asserts that the 2021 Heat Dome in Western Canada and US, and the Siberian EHE of 2020, would have been impossible without human-caused climate change. The likelihood of deadly hot and humid events in northern India and Pakistan in 2015, as well as events in China, Argentina, all over Europe and North America, North and Central Africa, Australasia, and Southeast Asia, were all made dramatically more likely by climate change. The guidance also notes that EHEs over a large geographic area or over a long timeframe have a stronger direct connection to anthropogenic climate change.

Additional guidance and resources for media professionals on climate change reporting and from organizations such as European Broadcasting Union, CCN, Climate Central, International Journalists' Network, Reuters Institute, Society for Environmental Journalists, and International Press Institute are summarized below (**Table 3**).

Table 3. Guidance and information for journalists on climate change reporting and attribution

Organization	Guidance and information available
World Weather Attribution (2022)	• A guide to assist journalists to effectively cover extreme weather events within the framework of climate change.[29]
European Broadcasting Union (2023)	• A resource focussed on climate change attribution and engaging public audiences, featuring questions and answers with key communication experts. The report highlights six successful case studies of climate change journalism.[30]
Covering Climate Now (2024, 2023)	• Climate change reporting 101 (2024): a guide that helps journalists to improve their knowledge on climate change and include climate into their reporting.[32] • A best practices resource (2023) for climate journalism and 13 recommendations to maximize impact of reporting. Making the link between climate change and extreme heat events, droughts, storms, and sea-level rise is a high-priority practice.[33] • A companion resource (2023) details tips and examples for journalists to make the connection between extreme weather events and climate change.[34]
Climate Central (2024)	• An attribution tool to help journalists communicate on how much more likely climate change is causing EHEs.[35] • The 2024 Summer Package for US reporters contains customizable graphics [36]
International Journalists' Network (2022)	• A resource detailing strategies for dynamic climate change reporting including generating an all-of newsroom approach, engaging climate change deniers and skeptics, and advice on using resources for climate reporting.[37]
Reuters Institute (2023)	• A series of essays from the Oxford Climate Journalism Network on how to improve climate journalism.[38]
Society of Environmental Journalists (2020)	• Contains a list of resources of scientific information on climate science for journalists.[31]
International Press Institute (2024)	• A report based on interviews with 40 environmental and climate journalists in 21 countries around the Americas, Europe, Africa, and Asia, which details the dangers that climate and environmental journalists face through their work on climate change. The resource also includes strategies to combat such attacks/pressure, including collaboration, safety approaches, and legal mechanisms.[39]
Re.Climate™ (2023)	• A resource on climate change and media-coverage with recommendations for communicators regarding wildfires and extreme weather.[40]

Summary

Media professionals play pivotal roles in communicating about EHEs, their health effects, and effective health protection. Key guidance and evidence-based suggestions are available for media professionals on heat health risk communication before and during an EHE. The GHHIN guidance brief is tailored for media, and is designed to improve the impact, effectiveness, and public value of extreme heat-related reporting. Its key recommendations are to frame heat in the context of climate change, highlight actions and solutions, and give attention to the inequitable, indirect, and cascading impacts of extreme heat. Specific recommendations include creating pre-season awareness, covering overnight and daytime heat, and focussing on indoor temperatures in addition to outdoor temperatures. Images and text should convey the true risks of EHEs, focus on the most susceptible populations, and communicate about protective actions, rather than simply showing people recreating in the sun. Studies on media communication propose that strengthened cooperation between media professionals and public health experts holds promise for improving public health outcomes during EHEs. Overlapping crises especially require a proactive and direct collaborative approach between media and public health partners. In conclusion, improved approaches to communication by media professionals and enhanced collaboration between media and public health professionals has the potential to better protect public health during EHEs.

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Appendix A

*C*ombination*s* of the search terms below in **Table 4** were used in the literature search.

Table 4. Search terms used in the literature review

Source	Information
Issue/Focus	(“extreme heat” OR “hot weather” OR “heat exposure” OR “heat day” OR “heat dome” OR “heat event” OR “extreme weather” OR “heat alert” OR “heat adaptation” OR “heat wave” OR heatwave OR “heat stroke” OR “temperature extreme” OR “extreme temperature” OR “extreme event” OR "weather event" OR "weather extreme" OR emergency OR “ambient temperature”) (TI TITLE)
Exposure	(communication OR communicate OR communicating OR message OR messaging OR media OR news OR facebook OR "social media" OR internet OR television OR radio OR awareness OR public OR broadcasting OR alert OR notifying OR notification OR guidance OR guidelines OR advice OR “heat protection” OR “heat protective” OR guide OR kit OR toolkit OR toolbox OR "best practice" OR tips OR communique) (TI TITLE)
Outcome	(evaluate OR evaluation OR effective OR effectiveness OR impact OR reduction OR reduce OR assist OR help OR improvement OR improve OR mitigate OR adapt OR adaptation OR preparedness OR strategy OR strategies OR mitigation OR resilience OR resilient OR resiliency OR mitigating OR response OR "public health response") (TI TITLE)
Geography	Not specified
Language	English

Abbreviations: TI, title

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