

Increasing the Reach and Effectiveness of Heat Risk Education and Warning Messaging:

**RECOMMENDATIONS FROM SAN DIEGO COUNTY,
CALIFORNIA, RESIDENTS**

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Executive Summary

Increasingly in different regions of the U.S., state and local governments are developing heat health warning systems and emergency preparedness plans to support the public in protecting against extreme heat. However, concern remains about the reach and effectiveness of these interventions in supporting protective action specifically among those individuals and communities most at risk. To elicit recommendations for increasing the reach and effectiveness of heat risk education and warning messaging, we conducted four focus groups with 43 individuals who represent, serve, and/or are part of potentially heat-susceptible communities in San Diego County, California. The focus groups were conducted during spring and summer 2021. Key recommendations from focus group participants include: (1) *diversify communication channels*, (2) *provide content that is specific, comprehensive, and accessible*, and (3) *conduct a formally coordinated heat risk education campaign*. These recommendations align with evidence-based support for successful hazard risk communication. They also highlight the need for input and feedback from potentially heat-susceptible communities in the planning and implementation of interventions meant specifically to support them in taking protective action. Here, we provide a detailed description of those recommendations so that consideration may be given to their implementation and evaluation in future work.



Introduction

Extreme heat is the deadliest weather or climate-related hazard in the U.S. (NWS 2019), and population exposure to extreme heat is projected to increase substantially as the climate warms (Rogers et al. 2021). There are numerous, often interconnected factors that influence susceptibility to extreme heat, including socioeconomics, age, occupation, physical disability, presence of preexisting conditions and comorbidities, and built environment (Gaskin et al. 2017; Gronlund et al. 2014; Schinasi et al. 2018; Son et al. 2019; Wilson 2020; Xiang et al. 2014). Because heat-related illness and mortality are often preventable by taking protective actions (Jay et al. 2021), successfully communicating heat risk to the public can be a highly effective way to save lives and limit associated negative costs (Price et al. 2018; Schifano et al. 2012).

Accordingly, state and local governments in different regions of the US are working to develop methods for communicating heat risk to the public, for example through heat health warning systems (HHWS) and emergency preparedness plans (Grundstein & Williams 2018; Weinberger et al. 2018). However, little is known about the reach and effectiveness of these interventions in supporting protective action specifically among those individuals and communities most at risk (Mayrhuber et al. 2018; Sampson et al. 2013).

Here, we share recommendations for increasing the reach and effectiveness of heat risk education and warning messaging from individuals who represent, serve, and/or are part of potentially heat-susceptible communities in San Diego County, California. The population and physical geography of San Diego County make it an ideal place to elicit these recommendations. San Diego County is populated by diverse urban and rural communities situated in varied climate zones, including coastal, mountain, and desert, with potential heat waves occurring throughout the year affecting different regions. Heat impacts are therefore varied across the county in time and space (Guirguis et al. 2018).

The recommendations were elicited during four focus groups, involving 43 participants, conducted virtually during spring and summer 2021. Key recommendations include: (1) *diversify communication channels*, (2) *provide content that is specific, comprehensive, and accessible*, and (3) *conduct a formally coordinated heat risk education campaign*. Following we present those recommendations and discuss their alignment with evidence-based support for successful hazard risk communication.



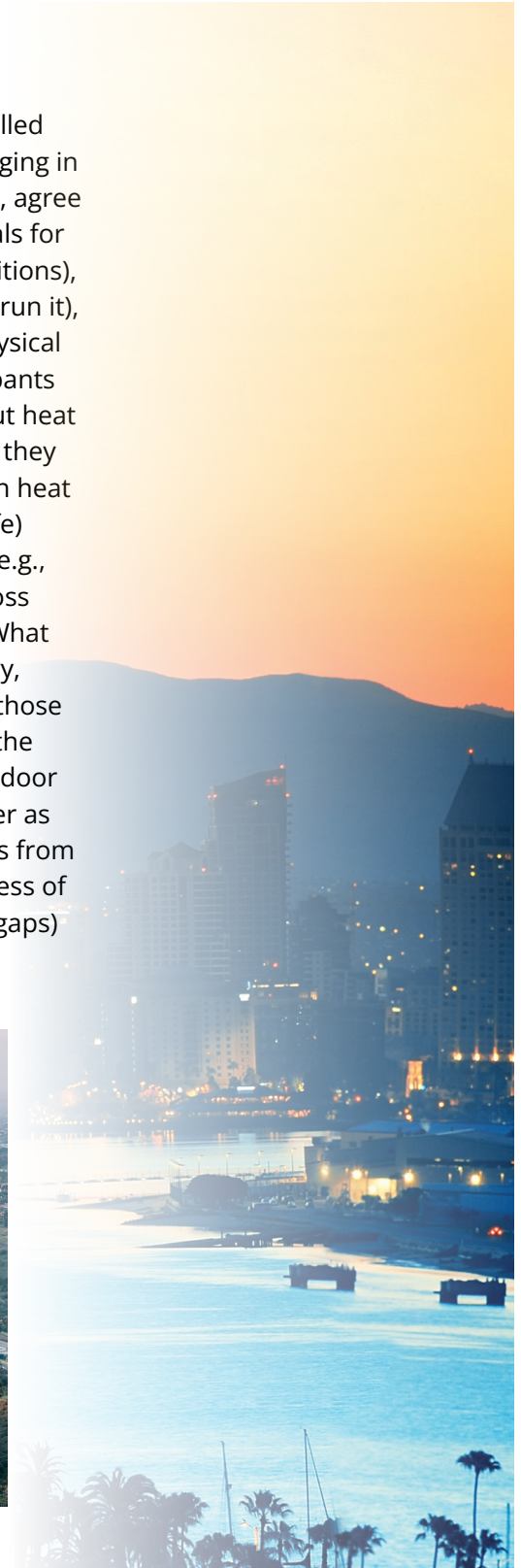
Methods

To elicit recommendations for increasing the reach and effectiveness of heat risk education and warning messaging, we conducted four virtual focus groups between March and June 2021 with individuals who represent, serve, and/or are part of potentially heat-susceptible communities in San Diego County. Each focus group included between five and 16 participants (n=43 total) recruited via email through County of San Diego Health and Human Services Agency and Office of Border Health partner networks. Participants included community leaders and advocates (n=12) as well as representatives of nonprofit and community-based organizations (n=12), county and city government agencies (n=8), healthcare professions (n=8), schools and universities (n=2), and a utility company (n=1). Guiding discussion questions included: (1) Is heat (as it relates to daytime and/or nighttime temperatures) a health concern in the communities you live in and/or serve (why/why not)? (2) What (if any) heat-health education and/or warning messaging programs exist in or reach those communities, and what is their effect (e.g., do they motivate protective action)? (3) What opportunities and barriers exist for local communities to protect against heat? (4) How can those opportunities be fostered and/or what is needed to overcome those barriers?

The focus group discussions were audio-recorded, and the recordings were transcribed. Following a grounded-theory approach, we inductively coded the transcripts to identify patterned themes (e.g., need for heat risk education) and corresponding recommendations (e.g., integrate heat risk education into school curricula) (Bernard 2017; Ryan 2003). The recommendations presented here should not be considered exhaustive or fully representative of the county. Rather, our intention in sharing them is to provide insight into opportunities and barriers for increasing the reach and effectiveness of heat risk education and warning messaging from local perspectives.

Results

Only a few of the total 43 participants were aware of or recalled having encountered heat risk education and warning messaging in San Diego County. The majority of participants did, however, agree that heat is a health concern, particularly for those individuals for whom demographic (e.g., age), health (e.g., underlying conditions), economic (e.g., houselessness, access to AC or the ability to run it), occupational (e.g., outdoor employment) and other (e.g., physical disability) factors may make them more susceptible. Participants also expressed a strong interest in becoming educated about heat risk and in being able to help educate others. Key questions they asked and suggested would be beneficial to address through heat risk education include: What constitutes “extreme” (or unsafe) heat and how might it vary for different population groups (e.g., considering age and prevalence of chronic disease) and across geographic areas (e.g., considering county microclimates)? What are the potential health impacts of heat, how might they vary, and how can they be mitigated? What are the symptoms of those health impacts, and how can they be recognized? What are the occupational safety rights regarding heat for indoor and outdoor workers, and do they vary according to the status of a worker as permanent, seasonal, or undocumented? Recommendations from participants about how to increase the reach and effectiveness of heat risk education (or to close the above-listed knowledge gaps) and warning messaging are described further in this report.



Recommendation 1

DIVERSIFY COMMUNICATION CHANNELS

To increase the reach of heat risk education and warning messaging, participants recommended *diversifying communication channels*. Specifically, they recommended that those agencies already engaged in heat risk education and warning messaging, like the National Weather Service (NWS) and county and local governments, explore opportunities to further their reach through collaboration with existing networks of organizations and individuals that have high levels of social capital, cultural competence, and trust with potentially heat-susceptible groups.

Suggested networks include those comprising nonprofit and community-based organizations, neighborhood schools, peer-trainer and health outreach and engagement (e.g., promotores/as) programs, and community and religious leaders among other trusted messengers. Participants explained that many of the organizations and individuals within these networks can provide opportunities for the direct integration particularly of heat risk education into established information and communication programs. This includes general information programs, like those linking neighborhood schools to parents and families. It also includes health information programs, like those linking clinics and health outreach and engagement professionals (e.g., promotores/as) to farmworker and migrant communities.

Participants explained that heat risk education could be integrated into these programs by having subject matter experts educate community members directly, with translational and other (e.g., cultural competency) support from the organizations/individuals facilitating the interaction. It could also be integrated by having subject matter experts train health outreach and engagement professionals as well as other trusted messengers in heat risk education, equipping them to disseminate information within local communities and to train others to do the same. They suggested that the focus of heat risk education should be to (1) address the above-listed and other potential knowledge gaps, and (2) connect people to available information (e.g., [Extreme Heat](#)), resources (e.g., [Cool Zones](#)), and HHWS (e.g., [NWS San Diego](#)).

To reach at-risk populations that may not currently be served through existing information programs, participants explained that there are other options. For example, one participant commented that some health organizations partner with food pantries to host health fairs, noting that similar opportunities could be facilitated around the topic of heat.



Recommendation 2

PROVIDE CONTENT THAT IS SPECIFIC, COMPREHENSIVE, AND ACCESSIBLE

To increase the effectiveness of heat risk education and warning messaging, participants recommended that *the content be as specific, comprehensive, and accessible* as possible. Regarding *specificity*, they suggested that education and messaging include locally defined metrics to make clear which populations and/or geographic areas may be most susceptible to heat risk and why, and to be explicit about the potential health impacts (and their symptoms) to at-risk populations and/or in specific geographic areas. Related to *comprehensiveness*, they suggested that education and messaging provide clear recommended actions for mitigating those health impacts, including at individual, household, and community levels. Lastly, with respect to *accessibility*, they suggested that education and messaging be made available in different languages and formats (e.g., storytelling and short video) to ensure information equity, and that it be culturally competent (e.g., clarifies misconceptions and dispels myths) to enhance uptake. Participants also noted that as the effectiveness of heat risk education and warning messaging increases, so will the likelihood that community members share it, helping to further its reach.



Recommendation 3

CONDUCT A FORMALLY COORDINATED HEAT RISK EDUCATION CAMPAIGN



Some participants, especially those who work in health professions, shared the perspective that public health is often approached reactively and focused more on detection than it is on prevention. They therefore advocated for a *proactive approach to heat risk education and warning messaging coordinated through a formal, ongoing campaign*. This campaign would comprise three main activities, including: (1) in winter/spring, creation of training opportunities for key organizations and individuals to become educated about heat risk and integrated into existing communication channels (see Recommendation 1); (2) in spring/early summer, utilization of the expanded communication channels to offer heat risk education to potentially heat-susceptible groups (see Recommendations 1 and 2); and (3) in summer, continued heat risk education to reinforce the availability of information (e.g., [Extreme Heat](#)) and resources (e.g., [Cool Zones](#)) and to remind

people to connect to HHWS (e.g., [NWS San Diego](#)).

Participants emphasized the importance of this campaign being a coordinated effort among participating organizations and individuals to ensure consistency in education and messaging. They explained that consistency is important for building trust in the information and in creating a single, unified “voice” about heat risk that resonates more strongly with the public than does potential misinformation. Of concern was that some groups may otherwise learn about heat risk from unofficial sources, like on social media, especially if only those are communicating in their language. Lastly, participants recommended that the activities be repeated annually or biennially so that new, interested organizations and/or individuals can be trained and integrated into communication channels and so that public education is enhanced over a longer timeframe.

Barriers to Heat Risk Communication and Mitigation

Participants also acknowledged that there are serious challenges to increasing the reach and effectiveness of heat risk education and warning messaging. They noted barriers to communication like unfamiliarity with or difficulty using communication technologies (e.g., emergency preparedness apps and social media), limited English language proficiency and/or literacy, and lack of access to the internet (or inability to access the internet) and cellphones, and poor cellphone reception. They also noted barriers to mitigation like lack of air conditioning (or financial preclusion of its use), insurance, medical care, legal status (e.g., inhibiting workers from requesting breaks and seeking medical attention), livable wages (e.g., resulting in economic incentive to not take breaks), adequate public transportation (e.g., to get to cooling centers), green spaces, and shade.

Given these challenges, participants advocated for heat risk education to be directed not only toward at-risk groups but also toward decisionmakers. Specifically, they stressed the need for a comprehensive approach to addressing heat risk that combines public education with firm policy action. This policy action would be directed toward: (1) reducing the socioeconomic and other disparities that result in barriers to heat risk communication and mitigation, and (2) creating a more thermally adapted built environment. Participants expressed concern that without this policy action, increasing heat risk education and warning messaging could become counterproductive, possibly discouraging those individuals, families, and communities that can do little to respond.

Discussion

Despite only a few participants recalling having encountered heat risk education and warning messaging in San Diego County, these do exist. For example, county and local government agency websites address several of the key questions identified by participants, including causes of heat-related illness, populations

at risk, symptoms and recommended protective actions, how to help others, and where and how to access cooling centers using no-cost transportation (e.g., [County of San Diego Health and Human Services Agency: Extreme Heat](#)). Further, the NWS San Diego Office disseminates heat risk information over its partner network and to the public via social media by issuing heat warnings/advisories. Applying participant recommendations in San Diego County and/or other high heat regions could help people become more aware of and benefit from existing heat risk education and warning messaging. This is particularly the case as the recommendations align with documented good practice in hazard risk communication, as discussed below.

The recommendation from participants to diversify communication channels and integrate heat risk education and warning messaging into existing information programs aligns with the increasing valorization of interaction and dialogue in hazard risk communication for its potential to produce positive results (Arvai 2014; Hanson-Easey et al. 2018; Spoel and Barriault 2011). For example, in South Australia, neighborhood schools that have integrated hazard risk education into the curriculum, and additionally shared it with families, are now a primary information

resource for immigrant and refugee communities (Hanson-Easey et al. 2018). In another example, in the Los Angeles metropolitan area, the UCLA Labor Occupation Safety and Health Program (LOSH) developed a peer-trainer course for promotores/as on workplace heat risk (Hanson-Easey et al. 2018). The course was based on popular education principles and methodology (Wallerstein & Bernstein 1988) and involved extensive interaction and dialogue to ensure that it was relevant to and built on local experience (Riley et al. 2012). In total, 159 peer trainers representing 70 community organizations participated in the course and together provided heat risk education to thousands of potentially at-risk individuals (Riley et al. 2012).



Discussion

Continued



The recommendation from participants to make education and messaging content specific, comprehensive, and accessible also aligns with documented good practice in hazard risk communication. For example, research has shown that when population, geographic/location, and temporal specificity are present in hazard risk communication, people are more likely to seek additional information and take preparatory or protective action (Lambrecht et al. 2019; Lindell & Perry 2012; Mileti & Peek 2000). Research has also shown that comprehensive hazard risk communication that helps people understand their susceptibility and corresponding mitigation needs, in addition to how they can address those needs, increases the likelihood that they will do so (Lane et al. 2014; Nitschke et al. 2017). Regarding accessibility, the communication of information in multiple languages and formats is key (Knowlton et al. 2014; Lowe et al. 2011). Not only do people learn and remember more through the combined use of text and visuals (as opposed to text alone) (Dunlap & Lowenthal 2016; Lazard & Atkinson 2015), but there is a well-documented relationship between inequities in information access and inequities in health outcomes (Sellnow et al. 2008; Perez-Lu 2018). It is also important for hazard risk communication to be culturally competent, meaning that it is informed by understanding of the social and cultural influences that act on public beliefs and behaviors. As participants suggested and research

has shown, cultural competence in hazard risk communication is critical to bridging social, cultural, and/or linguistic differences, and relatedly, to building trust (Slobodin & Cohen 2020; Wilson & Tiefenbacher 2012).

Heat risk education and warning messaging campaigns like that recommended by participants already exist in some locations, often as one component within government heat adaptation plans (Casanueva et al. 2019). One example is the “Beat the Heat: don’t forget your drink” mass communication campaign in the Riverina-Murray region of New South Wales, Australia. This campaign was designed to educate the public about heat risk mitigation through brief information sessions and sound-bytes delivered through radio and television and in unpaid community newspaper announcements. An evaluation of the campaign found that 63% of the public surveyed reported hearing or seeing heat warnings, 54% indicated that they had modified their behavior, and 25% even recalled the slogan (“Beat the Heat”). Given that increased heat risk education is often cited as critical to influencing behavior (Boeckmann 2016; Casanueva et al. 2019), it is suggested that campaigns be repeated at the beginning of every summer or otherwise ongoing until the public adopts protective action as a matter of course (Kovats & Hajat 2008; Oakman et al. 2010). Engagement in social media-based heat messaging is greatest early in the heat season (Lambrecht et al. 2021). This further implies campaigns would benefit from an “early and often” approach to capture the largest audience at a time when heat acclimation has just begun and the population is more susceptible to heat impacts. The need for consistent and unified messaging that resonates with different audiences may present a challenge but is becoming an increasingly critical component of public health campaigns (Bekalu et al. 2021; Cole & Murphy 2014).



Finally, barriers to heat risk communication and mitigation are well documented (Mayrhuber et al. 2018; White-Newsome et al. 2014), and their persistence as noted by participants highlights the need for progress toward eliminating them. Governments can employ a range of strategies for doing so, including implementation of policies to protect outdoor and indoor workers, development of programs to make indoor cooling and energy more physically and financially accessible, and commitment to thermally adapted development and land-use planning (Keith et al. 2021). Where government action is lacking, popular education (and/or similar approaches) has been employed at times to facilitate the conditions (or capacity-building) for people who have historically lacked power to expand and apply their knowledge to reduce or eliminate inequities related to heat risk (Riley et al. 2012). For example, the UCLA LOSH Program (mentioned previously) took this approach in the peer-trainer course developed for promotores/as on workplace heat (Riley et al. 2012). Specifically, the peer-trainer course included activities for trainees to build the confidence and skills needed for promotores/as to take individual and collective action in the communities they served (Riley et al. 2012).



Conclusion

We conducted focus groups with individuals who represent, serve, and/or are part of potentially heat-susceptible communities in San Diego County to elicit recommendations for increasing the reach and effectiveness of heat risk education and warning messaging. Those recommendations include: *(1) diversify communication channels, (2) provide content that is specific, comprehensive, and accessible, and (3) conduct a formally coordinated heat risk education campaign.* Participants also emphasized the importance of firm policy action to overcome barriers to heat risk communication and mitigation, and to create a more thermally adapted built environment. They stressed that this policy action is necessary for increasing climate equity and ensuring that heat-susceptible groups can apply the education and warning messaging received.

Recommendations from participants align with evidence-based support for successful hazard risk communication. Applying them in highly susceptible regions to heat extremes like San Diego County could help increase the reach and effectiveness of existing heat risk education and warning messaging. Should they be applied, they should also be evaluated to ensure that they meet the intended objectives. In the meantime, and as demonstrated here, the value and importance of receiving input and feedback from potentially heat-susceptible communities in the planning and implementation of interventions meant specifically to support them in taking protective action should not be overlooked. Their involvement is more important than ever as heat extremes and population exposure continue to increase with ongoing urbanization and a warming climate.

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