Effective heat action plans: research to interventions

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Abstract

Strengthening the links between research and interventions would mean new insights could be translated more quickly into actions to protect and promote population health. Doing so requires strong collaboration among funders, the research community, and stakeholders, to understand stakeholder needs, constraints, and opportunities, and to focus research questions so results are useful, usable, and used. Continuing increases in the frequency, intensity, and duration of heatwaves underscores the urgency of fostering two-way communications between researchers and those responsible for designing and implementing heat action plans, to ensure research is effectively targeted to further reduce heat-related morbidity and mortality in a changing climate.

This is a Viewpoint on Tarik Benmarhnia et al 2019 Environ. Res. Lett. 14 114006.

Hot temperatures and heatwaves are associated with excess morbidity and mortality (e.g. Guo et al 2017). Extreme heatwaves have been associated with hundreds to tens of thousands excess deaths (Pirard et al 2003, Shaposhnikov et al 2015). In addition to deaths, high ambient temperatures can increase emergency room visits, hospitalizations, preterm births, mental health issues, and other adverse health outcomes (e.g. Cheng et al 2019a, 2019b, Liss and Naumova 2019, Thompson et al 2018, Zhang et al 2017). While there is evidence in some locations that heatwave-related deaths declined over the past few decades (Arbuthnott et al 2016), at the same time there is concern that a changing climate, urbanization, and an aging population are likely to put many more people at risk over coming decades (Ebi et al 2018, Rohat et al 2019). Research is advancing understanding of exposure-response relationships and identifying groups particularly vulnerable to high temperatures.

In response, growing numbers of communities and states have implemented heat action plans to prepare for and manage the population health consequences of heatwaves, including developing early warning and response systems (McGregor et al 2015) that focus on the most vulnerable (Benmarhnia et al 2015). Evidence suggests these plans can reduce health risks through interventions to raise awareness and educate the public (e.g. Nitschke et al 2017), enhance surveillance and monitoring of impacts (e.g. Elliot et al 2014), provide access to cooling centers, and reduce urban heat islands through design and modifications to infrastructure (Hatvani-Kovacs et al 2016). However, evidence of success in reducing health outcomes is mixed (Hess et al 2018, Weinberger et al 2018).

Benmarhnia et al (2019) showed that setting thresholds for heat advisories based on local exposure-response relationships in New York City reduced the daily rates of heat-related illnesses. The authors took advantage of a natural experiment: a change in the heat threshold for the New York City (NYC) Emergency Plan. The NYC Health Department and NYC Office of Emergency Management relied on heat alerts from the National Weather Service to activate the local heat emergency plan for the period 2001–2007; these alerts were based on national criteria. An evaluation indicated the system was not preventing heat-related mortality (Weinberger et al 2018). In 2008, the NYC Office of Emergency Management lowered the threshold for triggering heat advisories based on local epidemiological studies (Ito et al 2018). The 40.6 °C threshold for one day was changed to a forecast maximum heat index of 37.8 °C for one day or more, or 35 °C for at least two consecutive days.

A wide range of activities are initiated when a heat alert is declared, from disseminating information to opening cooling centers (Benmarhnia et al 2019). A difference-in-differences method, coupled with a propensity-score matching, was used to evaluate the effectiveness of the threshold change. The lower threshold reduced heat-related hospitalizations among older adults.

This study illustrates not only that one-size-fits-all approaches are less effective than solutions designed (preferably co-designed) and implemented with local...
stakeholders, but also the importance of moving from research to intervention, and of thoroughly evaluating the effectiveness of any changes made. Expanding research into the health risks of hot temperatures and heatwaves is identifying opportunities to potentially increase the effectiveness of heatwave early warning and response systems. Examples include using information on population groups particularly sensitive to heat to develop tiered warnings, where warnings are issued to these groups a day or two in advance of a general alert (Hess and Ebi 2016); and providing messages, including text messages, tailored to the needs of particularly sensitive groups (McGregor et al. 2015). Modifications to heat action plans should be tested to ensure their efficacy before widespread implementation.

Further implementation-focused research is needed on how to most effectively communicate to the growing numbers of groups that are particularly vulnerable to hot temperatures and heatwaves. For example, what actionable information is needed by healthcare providers and pregnant women to reduce the risk of preterm birth? What regulations would be most effective to protect children when, for example, being transported on un-airconditioned buses or playing in playgrounds whose equipment absorbs heat? What thresholds should be established to protect school sports activities as temperatures continue to rise? Further, research is needed to identify what mechanisms would most effectively promote iterative risk management to protect and promote population health in a climate that will continue to change. Benmarhnia et al. (2019) provide a powerful approach to evaluating the effectiveness of such changes in established warning systems.

Data availability

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

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