Chapter 4. Heat-related health information plans: communicating heat risk

Summary

The communication of adequate information and advice to stakeholders and the public, and their perception and uptake, are crucial to the effectiveness of an HHAP. This flow of communication, along with complementary bottom-up feedback, needs to be organized in a heat-related information plan.

The scientific evidence from the last decade suggests that the basic content of public health messages within HHAPs does not need to change substantially. Communication channels have changed radically in recent years, however, with a fast transition to web-based and mobile platforms. Most countries in the WHO European Region with an operational HHAP have embraced such channels for their communications. While that transition facilitates dissemination of and access to information among the general public, it also raises concerns about inequalities in access to information, since various groups who may be vulnerable to heat – such as elderly people and those with low socioeconomic status – may be comparatively excluded from such means of communication.

In addition, recent research has linked the frequently observed failure of messages to prompt protective action with a low risk perception of heat among the general public and vulnerable groups. To make heat–health messages more effective, better understanding is needed of risk perceptions and biases at the local level. On that basis, language and formats can be tweaked and HHAPs can better target their warnings and information to their various audiences.

Key messages

- Appropriate communication on heat and health risk to stakeholders and the public is crucial for prevention, as is their ability to respond.
- Messages and warnings work best when tailored to their intended audiences, ideally based on evidence of their actual vulnerability, risk perceptions and health behaviours.
- Heat risk communications and advice work best when grounded on factual evidence of the risk perception and attitudes to health protection of the local population.
- Health authorities can further sharpen the tailoring of their messaging by combining various sources of information about health vulnerability to heat.
- The scientific evidence behind commonly given heat–health advice needs to be evaluated.

- Countries have generally shifted their HHAP communications towards web-based and mobile technology platforms, and it is important that such transitions do not exclude vulnerable groups less familiar with such information technologies.
- The health risks of heat are systematically underestimated by the general public, vulnerable individuals and possibly health practitioners.

4.1 Introduction: heat risk communications

Effective communication of adequate information and advice to stakeholders and the public to enhance their ability to respond and protect themselves from the health effects of heat is arguably the most crucial element of prevention. Thus, adequate prevention is supported by the ability of HHAP administrators, implementers and policy-makers to deliver useful, timely, accessible, consistent and trustworthy information to their target audiences, and especially to high-risk populations.

The WHO Regional Office for Europe's guidance on HHAPs published in 2008 paid strong attention to communication, and the main principles enumerated there still stand (Matthies et al., 2008). In essence, these are that:

- communications and associated messaging need to be planned in advance;
- communication is a dialogue, whereby the ability of communicators to change behaviours is based on an understanding of the beliefs and concerns of the audience;
- trust is crucial to effective risk communication with the public, and needs to be built from the start through transparency and timeliness;
- all key stakeholders need to be able to communicate consistently.

Based on a two-way communication model, from the top down and from the bottom up, the 2008 WHO guidance recommends a heat-related information plan as a core element of an HHAP (Matthies et al., 2008). The plan should specify what is communicated, to whom, how and when.

Bottom-up communication content typically includes event reporting, counts or censuses of vulnerable groups, availability of resources such as cooling centres and transportation of vulnerable people, surveillance data, implementation problems and specific needs for assistance. This should be communicated in a context of coordination with the main implementers of the plans, key stakeholders and the media. Bottom-up information flow is covered further in Chapters 7 and 9.

Top-down (from HHAP managers) communication content typically includes the health risks of hot weather, roles and responsibilities for the actors of the plan, behavioural advice for groups at risk, and guidance for professionals and institutions. The plan creators should consider, among other things:

- the channels, timing and language of communication – these may vary between target audiences;
- the information relevant to each audience;
- the risk perception of target audiences.

The following sections summarize operationally relevant considerations for each of these areas.

4.2 Channels, timing and content of heat risk communications

4.2.1 Channels for heat risk communications

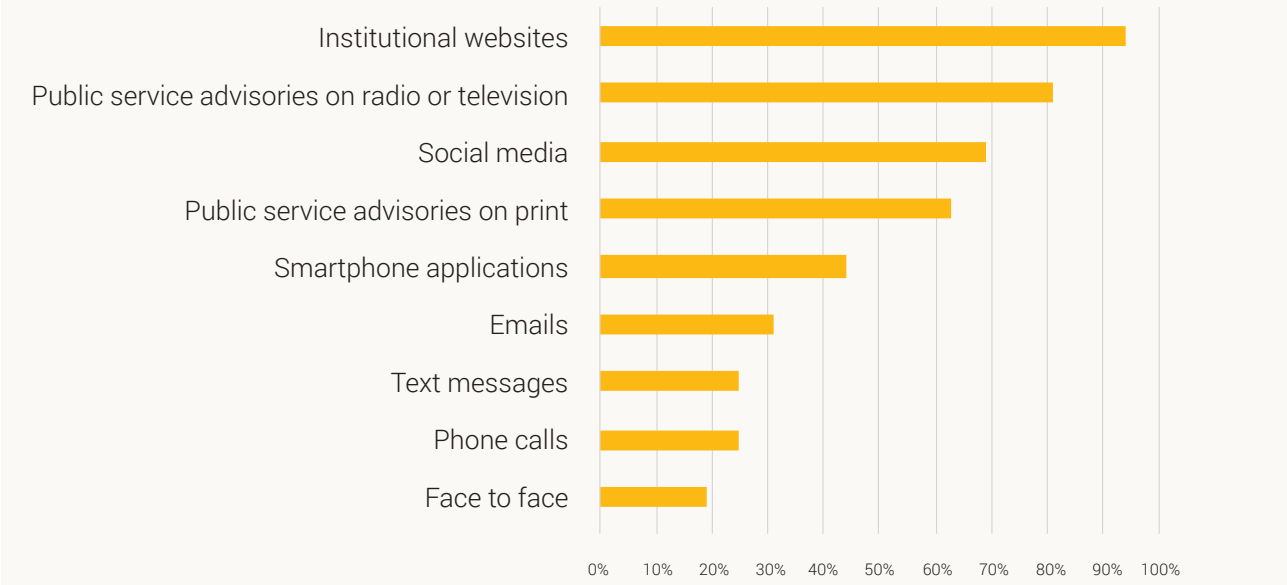
Against a theoretically optimal outreach to all at-risk populations and relevant audiences, the communication options for HHAP managers are largely dictated by the availability of resources. This limitation, however, is changing as technology advances and becomes more affordable in countries at various stages of economic development.

For instance, a review by Koppe et al. (2004) highlighted that most existing heat–health warning systems in Europe at the time relied on issuing a passive warning through the mass media to the general public and/or a direct one to local public health agencies. This situation has changed significantly in the past 15 years. Now, many HHAPs use different channels for communication of heat warnings and relevant information, including the internet, mobile applications and social media. Most European heat–health warning systems provide plenty of information through their websites, mobile apps and social media (such as Twitter), although mass media such as television and radio still play a major role (Casanueva et al., 2019). Brochures, flyers and newsletters are still sent to hospitals, nursing facilities and GPs as common practice.

The results of WHO's 2019 survey of heat–health action planning from 16 HHAPs found that 75% had a fully implemented heat-related health information plan and 25% a partly implemented one. Moreover, when the respondents were asked to highlight what worked well in their respective systems, they mentioned communication and dissemination of warnings as one of the most effective aspects of the HHAP. Most HHAPs delivered advice to vulnerable groups on how to protect themselves from heat via institutional websites (over 90%), followed by public service advisories on radio or television (over 80%) and social media (almost 70%; mostly Facebook and Twitter) (Fig. 7).

HHAPs use a variety of approaches and systems for information dissemination. Box 4 summarizes one approach used in Italy.

Fig. 7. Channels through which advice is delivered to vulnerable groups



Box 4. Warning dissemination in the Italian HHAP

The Italian HHAP provides information on timeliness and targeted dissemination of warnings at the local level to allow all services to act in good time. It aims to raise awareness of heat risks and provide advice to the public, health care professionals, emergency services and local authorities. Various communication channels have been introduced to improve dissemination and ensure that the information needed to modulate prevention actions is accessible.

At the national level, warning bulletins for each city are available on the Ministry of Health website, via the mobile application "Caldo e Salute [Heat and Health]" (Ministry of Health, 2018) – which is freely available for mobile devices – and, during heat-waves, via the Ministry of Health Twitter account. The application also includes information on local prevention measures, referring to existing resources such as brochures and factsheets, local heat response plans, contact numbers and helplines and the national guidance document. A reference centre (civil protection, municipality, local health authority or other) is identified for each city, which is in charge of local dissemination of city-specific bulletins through the information network and via email. At the beginning of each summer a workshop is organized by the Ministry of Health to inform local stakeholders, giving updated information on the plan and new findings on prevention measures and vulnerable subgroups.

Information on health risks and prevention measures is also issued to the general public and at-risk subgroups through mass media communication campaigns, local authority websites and flyers. This happens at the beginning of the summer, but further specific advice may be disseminated during heat-waves. Additional elements of communication within the Italian HHAP include information delivered through telemonitoring by volunteers or social workers to elderly patients with social frailties, and capacity-building and awareness-raising for social and health workers, delivered via seminars/workshops, distribution of specific guidelines and meetings.

4.2.2 Timing of heat risk communications

Some heat-related information may not be delivered in relation to a specific heat risk episode, but rather in advance of the warm season, periodically during the season or in specific settings. Other communications may be packaged within warnings of impending heat events, whereby various audiences are made aware of potential or actual harm and what to do to protect themselves or others (Casanueva et al., 2019).

In terms of timing of the flow of information within the system and outside it, WHO's 2019 survey of heat–health action planning showed that the agency issuing the alert (generally the meteorological service) informed the agency leading the health response (generally a national public health agency) with an average lead time of four days. The heat risk communication itself was given to the public and to key stakeholders (hospitals, nursing homes) typically 1–3 days in advance.

4.2.3 Heat risk communication language and content

Warning messages delivered to the public are critically important in getting people to take appropriate action to protect themselves from heat. The WMO/WHO (2015) publication *Heatwaves and health: guidance on warning-system development* recommended taking the following into account when composing a risk communication:

- clear definition of the components of the message;
- simplicity of the message;
- personalization of the message and description of the actions required;
- prioritization of the order of importance of the information;
- use of plain language and illustrations for those who may have difficulty reading;
- inclusion of a statement of recommended action;
- ensuring that shortening of the message by broadcasters does not distort its meaning.

That such messages include recommended actions is especially important, since most health-protective behaviour has to come from individuals and families. A message that effectively describes a danger but offers no suggestions for protection tends to be denied or reinterpreted by recipients in ways that may increase the likelihood of harm or injury. Even taking all these factors into account, it is advisable to test messages on focus groups. The Red Cross/Red Crescent further suggested that a warning should address questions regarding timing, location, scale, impact probability and response (Singh et al., 2019).

The WMO/WHO 2015 guidance explored extensively the various factors to consider in communicating heat–health warnings. These include, among others, the decision to issue a warning, how to structure warning contents, the language adequate for each audience, criteria and thresholds for issuing warnings, how to disseminate them effectively, and coordination with users. No substantial body of recent relevant evidence exists for the WHO European Region that would justify re-exploring these factors in this publication.

Casanueva et al. (2019) noted that all information and warnings are issued in the local language of each responding country. Three countries (Hungary, Sweden and Switzerland) provide notifications in both the local language and English, and the HHAP in France also produces flyers and radio spots in English. Nevertheless, there is no indication that multilingual messaging is frequent, and this may be an important limitation – especially for countries that receive large inflows of tourists in summer (such as those in southern Europe). To this may be added the pockets of at-risk population groups who do not speak – or are not fully fluent in – the language of the country or region they live in. In various studies where it was assessed, knowledge of risks and responses was lower for foreigners, whether tourists (Cuesta et al., 2017) or migrant workers (Messeri et al., 2019). The lack of availability of HHAP information in languages other than the local one contrasts with other areas, in which public health has a long and fruitful history of risk communication through translated materials, visual displays and other means.

Hajat, O'Connor & Kosatsky (2010) evaluated the scientific evidence for commonly offered heat protection advice, and made recommendations about the optimum clinical and public health practice. The study concluded that the following actions are supported by scientific evidence:

- increasing fluid intake during periods of hot weather;
- ensuring that susceptible people stay in a cool or air-conditioned environment during periods of hot weather;
- wearing loose-fitting clothes and taking frequent showers or baths;
- reducing normal activity levels during hot weather, alongside improving awareness of the inherent risks of activity during hot weather, and the symptoms of heat exhaustion and heatstroke;
- physicians making pre-seasonal recommendations to patients taking drugs that may impede heat loss about how to monitor themselves.

Patients aged 65 years and over with chronic circulatory and respiratory conditions are at greater risk from heat than others. The evidence points to increased cardiovascular complications and heart

failure following a 1 °C increase in temperature (Bunker et al., 2016).

Advice not well supported by scientific evidence included: avoiding the use of electric fans; avoiding consumption of any type or amount of alcohol without distinction;[1] and avoiding consumption of even small amounts of caffeinated drinks because of possible diuretic effects. The level of evidence required for advice, the content of the advice itself and how it fits within local guidelines and regulations, however, are determined by the relevant authorities (Hajat, O'Connor & Kosatsky, 2010).

Examples of heat-wave and COVID-19 communication in the WHO European Region are shown in Box 5.

4.2.4 Audiences for heat risk communications

Audience-tailored advice is generally better received than general advice in all risk communications. Based on the responses to WHO's 2019 survey of heat–health action planning, most national/federal public health agencies provide information tailored to specific vulnerable groups, including but not limited to elderly people, those exercising outdoors, carers (of children and adults) and workers. Evidence supports the notion that intensive preventive information targeted towards vulnerable populations improves protective behaviours (Nitschke et al., 2017).

The specific audiences listed in the 2008 WHO guidance and the 2011 associated supporting materials (Matthies et al., 2008; WHO Regional Office for Europe, 2011) are still relevant, as are the types of message and recommendation tailored to them (Table 5).

Another audience that should be considered and is not covered in WHO HHAP guidance is school managers and school-related communities – in particular on account of extreme heat episodes that may occur during the school season (such as in June or September). If sensible precautions are taken, children are unlikely to be adversely affected by hot conditions; however, teachers, assistants, school nurses and all child carers should look out for signs of heat stress, heat exhaustion and heatstroke (PHE, 2015).

A recent review (Casanueva et al., 2019) of heat–health warning systems (the weather-based alert component of HHAPs) analysed 16 systems and did not find significantly different types of information from those featured in Table 5. Within these categories, a plethora of advice is provided both generally and specifically to vulnerable groups. A comprehensive review of such advice is beyond the scope of this report, and partial inventories have been published elsewhere (Casanueva et al., 2019; Lowe, Ebi, & Forsberg, 2011).

Segmentation of audiences for targeted advice needs to be refined further than simply grouping for age or other factors shared by many: this approach may miss households who struggle with multiple and interlaced social vulnerabilities, including poor-quality housing, living in "hot spot" suburbs (urban heat islands caused by lack of vegetation), low socioeconomic status and health problems (Hanson-Easey et al., 2019). Segmentation of audiences for tailored messaging needs to be sharpened to afford those who are most vulnerable with much-needed support and information. To achieve this, additional sources such as census data on socioeconomic status and housing, and other information available to health authorities within the existing privacy regulatory environment should be used.

In addition to information for the public and vulnerable groups, HHAPs usually also deliver targeted advice, guidance and instructions to stakeholders in the plan, including doctors, nurses, pharmacists, nursing homes managers, health care

[1] Note: there is no safe level for drinking alcohol. For more information, refer to WHO guidelines and other materials (WHO, 2020).

Box 5. Heat-waves and COVID-19 communication in the WHO European Region

In addition to the COVID-19 pandemic, the year 2020 has seen some of the highest temperatures on record, both within the WHO European Region and globally (ECMWF, 2020). Even in the context of a pandemic, adequate media coverage of other public health risks – including high temperatures – is necessary to ensure the effectiveness of prevention. Warnings should integrate concomitant risk factors and information on response measures and adaptation amid the epidemic and heat (Martinez et al., 2020; Golechha & Panigrahy, 2020).

The WHO Regional Office for Europe has adjusted its regularly issued summertime advice to minimize the adverse health effects of hot weather, integrating it with advice on protection from COVID-19. It includes recommendations to spend 2–3 hours of the day in a cool place while respecting physical distance, and to protect oneself and others by washing hands regularly, wearing masks where necessary, coughing into a folded elbow and avoiding touching the face. The advice is summarized in a fact sheet (Fig. 8), available in 10 languages (WHO Regional Office for Europe, 2020), which was promoted by a broad communication and outreach campaign (GHHIN, 2020a). Medical and public health professionals were asked to be prepared to protect the public effectively from both COVID-19 and the health consequences of heat exposure (GHHIN, 2020b). Simultaneously, various countries in the WHO European Region reviewed their HHAPs in the light of the restrictions in place from the pandemic and its responses (Santé Publique France, 2020; PHE, 2020). Operational implications for the impacts of COVID-19 and related heat–health responses are explored further in Box 11 in Chapter 7.

Fig. 8. Health advice for hot weather during the COVID-19 outbreak

Source: WHO Regional Office for Europe (2020).

Table 5. Audiences and types of information set out in WHO guidance documents on heat and health

Audience	Type of information
General public	• How to keep the home cool • How to keep out of the heat • How to keep the body cool and hydrated • How to help others • What to do if you have a health problem • What to do when others feel unwell • How to protect your health from vegetation fires during heat-waves
Vulnerable groups[a]	• Practical tips for specific groups • First aid treatment • Important contact details for social and medical services
GPs and other medical professionals	• Risk factors for heat illness and mortality • Health conditions that greatly increase the risk of health effects from heat • Mild and moderate heat illnesses and their management • Management of life-threatening heatstroke • Adverse effects of medication during hot weather • Considerations regarding drinking advice during hot weather and heat-waves • Proactive preparation for heat-related illness and risks • Education, counselling and information for patients
Retirement and care home managers	• General public precautions • Reducing indoor temperatures and cooling • Monitoring and reducing residents' heat-related risks • Standards for occupational safety during heat-waves
Health authorities	• Protecting health from vegetation fires during heat-waves • Standards for occupational safety during heat-waves • Interventions in the built environment to protect health from heat • Communicating heat risks and prevention
Employers	• Standards for occupational safety during heat-waves
City planners	• Interventions in the built environment to protect health from heat

[a] *For more information on vulnerable groups see Chapter 6.*
Sources: Matthies et al. (2008); WHO Regional Office for Europe (2011); WMO & WHO (2015).

administrators, hospital managers, social services and schools. In some cases, instructions and guidance for these key stakeholders are compiled in a practical information package. The HHAP of the Netherlands (RIVM, 2015), for instance, maintains a "heat toolkit", with information and communication tools including frequently asked questions and answers, brochures and sample letters, among others. The plan comes into effect when a period of sustained heat is expected, meaning that it is necessary to take preventive health measures for vulnerable groups.

Several tools and packages are available on how to communicate about extreme heat. Alongside the relevant WHO materials cited above, the Health Canada (2011) toolkit and the Red Cross/ Red Crescent materials (Singh et al., 2019) are of particular note.

4.3 Heat risk awareness, perception and adaptive capacity

The relevant accounts of evidence since the publication of the 2008 WHO guidance (Matthies et al., 2008) have demonstrated clear indications of a disconnect between the actual hazard posed by heat-waves and high temperatures (measured by objective indicators such as attributable mortality) and the perceived risk thereof. Moreover, this disconnect is observed (although the evidence is still patchy) across the board, including among the general public, vulnerable individuals and health practitioners.

4.3.1 Awareness of risks and responses to heat among the general public

Most studies and reviews have concluded that public awareness of the risks of heat to health is relatively high in places that are periodically affected by hot spells. Bassil & Cole (2010) reviewed 14 studies from Canada, the United States and four European countries and found that awareness of the risks, as well as of recent heat warnings, was "nearly universal" in the general public. This awareness varied across a number of factors including age and ethnicity, however, and it was not clear that the results applied to vulnerable groups.

Knowledge among the general public about the risks and adequate responses to heat, as well as risk perception, seems to vary widely and to be to some extent location-dependent, even if risks are comparable. For example, Van Loenhout & Guha-Sapir (2016) found more knowledge about risks and protection in Brussels, Belgium, than in Amsterdam, Netherlands, and Cuesta et al. (2017) similarly found more knowledge and risk perception in Lisbon, Portugal, than in Madrid, Spain. The four locations have HHAPs in place and public knowledge about them was far from widespread (57% was the highest proportion of respondents familiar with the plan). The Cuesta et al. study showed that practical concepts used in approaches to extreme heat – such as knowledge of risk groups and protective measures – were widely recognized, whereas less than a third of respondents had knowledge about the existence of a national heat plan.

Awareness and knowledge of the risks of heat, however, do not equate to self-perception of being at risk or ensure that protective action will be taken. In fact, most studies show that while heat awareness and knowledge may be high among the general public, the perception of risks from heat is generally low. This is not only a phenomenon limited to the WHO European Region. A large survey in the United States (Howe et al., 2019) found risk perceptions that were widely disconnected from actual risks. For example, populations in warm climates tended to have higher heat risk perception, although populations in cooler climates might in fact be at higher risk because of lack of acclimatization and poorly adapted housing and infrastructure.

One significant predictor of heat risk perception seems to be age, though the direction of the association varies. While in Australia Akompab et al. (2013) found that older people had a higher risk perception of heat, Howe et al. (2019) found that older populations (thus at higher vulnerability) had lower risk perceptions than younger populations. This finding of lower risk perception by older populations has been observed in several settings, including France (Box 6), Germany (Beckmann & Hiete, 2020) and the United Kingdom (Abrahamson et al., 2009).

4.3.2 Understanding the risk signature of heat among vulnerable groups

The way people reason practically about specific risks is sometimes referred to as a "risk signature". This has often been found to be unconnected to the magnitude of the hazard: subjective perceptions of risk are often relatively unrelated to

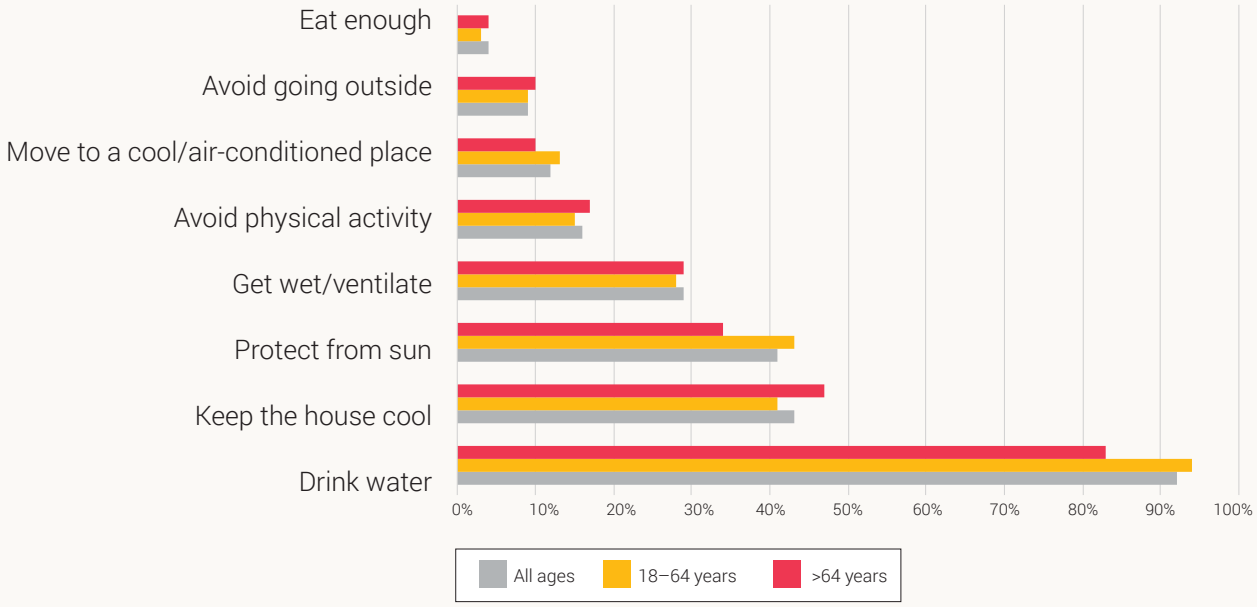
Box 6. Assessment of risk perception of heat, knowledge, practices and means of action in France

Since 2004 France has had a national heat-wave plan to protect the population, with a focus on the most vulnerable people. The plan is led by the Ministry of Health, and advice is widely distributed each summer among the population and local actors. At the local level, many stakeholders (such as department prefects, regional health agencies, cities, NGOs and health and social workers) are in charge of action in the field (Laaidi et al., 2019).

The efficiency of the HHAP relies on implementation of preventive measures by the population and stakeholders, and this depends on their risk perception, knowledge, practices and means of action. The national authorities therefore assessed such factors in two studies –among the population and among local stakeholders. In 2016, phone interviews were conducted among a sample of 2504 people aged over 18 years, with a focus on 935 people aged over 65 years. These revealed:

- low understanding of some of the health effects of heat, and their severity;
- a lack of knowledge about vulnerable groups beyond elderly people and infants;
- a very low self-perception of risk, even for elderly people – only 4% of people aged over 65 years thought that they were at high risk during a heat-wave;
- good knowledge of prevention attitudes and good follow-up of recommendations (Fig. 9).

Fig. 9. Proportions of the French population declaring that they adopt preventive measures during heat-waves



Among local stakeholders, a qualitative study was conducted in six French cities (Laon, Lyon, Nantes, Nice, Paris and Strasbourg), including small-group interviews among nurses, carers and workers in the homes of vulnerable people. Individual face-to-face interviews were also carried out with institutional (mayors, prefects, regional health agencies, local centres for social action and information) and other

Box 6 contd

stakeholders (emergency physicians, social associations for vulnerable people, child care centres, schools, day care centres). For most interviewees, the heat-wave plan provided a regulatory framework that helped to formalize practices, set up partnerships to act efficiently in emergency conditions and mobilize actors each summer.

Local stakeholders tended to downplay the risks, not least because of the reduced availability of staff and hospital/shelter beds in summer. They also felt that it was difficult to tailor general prevention to specific needs (for example, people with certain diseases cannot drink a lot) or to convince vulnerable groups to change behaviours. Local stakeholders provided practical recommendations, including better targeting of specific populations at risk; simplification of materials for actors in the field; reinforcement of human resources in hospitals, homeless shelters and nursing homes during warm seasons; and reinforcing collaborations between actors at the local level (Laaidi et al., 2018).

their actual probabilities (Song & Schwarz, 2009). Most often, risk perceptions are determined by a complex combination of media accounts, everyday experience and overall risk aversion patterns, along with several other variables such as sex, age and ethnicity.

Risk psychologists and communicators know that the two factors that most often influence perception of a risk are familiarity and dread (Slovic, 2010). Familiarity refers (in lay terms) to how frequently one is exposed to a certain concept, not to actual knowledge of it. It is related to whether a risk is observable, its effect is immediate, and one knows when one is exposed. Dread refers to subjective characteristics of a risk, such as being seen as "uncontrollable, catastrophic, hard to prevent, fatal, inequitable, threatening to future generations, not easily reduced, increasing, involuntary, and threatening to the person evaluating the risk" (Steul-Fischer & Heideker, 2015). Much as with alcoholic drinks, heat is a familiar and low-dread risk; both are systematically underestimated. Moreover, the evidence shows that positive feelings about hot summers may undermine the willingness of vulnerable populations to protect themselves against heat, and even that the language used in warnings may in fact evoke positive feelings towards hazardous heat (Bruine de Bruin et al., 2016; Lefevre et al., 2015). Risk communications cannot motivate action without an understanding of the emotions elicited by a risk, and risk-related emotions are rarely affected by statistics (Slovic & Ball, 2011). Adequate heat risk communications should tackle the familiarity, low-dread factor and misleading positive feelings about extreme heat proactively.

In relation to the risk signature of heat, comprehensive studies of the risk perception of climate change show that the general public in several (mostly high-income) countries does not associate climate change with health risks (Akerlof et al., 2010; Berger, Lindemann & Böl, 2019). Moreover, there is clearly a significant distance between the perception of the global severity of climate change and the perception of the personal threat derived from it (Sun & Han, 2018). Unlike with heat, however, populations vulnerable to climate change do perceive themselves at a higher risk from it (Akerlof et al., 2015; Lee et al., 2015). Thus, the notion of linking climate change and heat risk communications could be considered on a case-by-case basis.

Effective risk communications about heat should be based on a factual understanding of the knowledge, attitudes and behaviour of high-risk groups and their carers, as well as their understanding of the risks associated with heat-waves, the responses needed,

and their experience of actual heat-wave measures (WMO & WHO, 2015). This understanding can only be acquired through qualitative research, including questionnaires, focus groups, face-to-face or remote interviews and other validated quantifiable methods. Moreover, heat–health recommendations may require customization beyond mere translation in order to amplify their reach and effectiveness; such a need was observed in the Russian Federation (Smirnova et al., 2015) and is probably present in several other countries in the WHO European Region.

Several studies have shown relatively low perception of risk from heat by those most vulnerable to it (Abrahamson et al., 2009; Bittner & Stößel, 2012; Akompab et al., 2013; Van Loenhout & Guha-Sapir, 2016; Cuesta et al., 2017; Howe et al., 2019). This pattern is not universal; some vulnerable groups – such as people with chronic heart and lung disease risk illness – have been found to have greater risk perception and to act accordingly (Kosatsky et al., 2009). The low self-perception of risk among various vulnerable groups, including elderly people and those in poor health, observed in Europe and elsewhere is, however, of particular concern. It highlights the possibility that while plans and alert systems may raise awareness, they may not be able to prompt self-protective actions.

The notion that vulnerable groups may not consider themselves at risk matters a great deal for public health action to prevent heat-related health impacts. The theories of health promotion and behaviour suggest that those most likely to adopt such measures are also those who feel most threatened. Moreover, awareness does not necessarily equate with perceived threat, as the study in Box 6 shows. In addition, further barriers to effective protection from this low risk perception exist for vulnerable groups. Most notably, the cost of engaging in protective measures against heat – such as the energy costs of air-conditioning – is among the obstacles that prevent the population from taking action (Van Loenhout, Rodriguez-Llanes & Guha-Sapir, 2016).

Researchers have analysed the factors influencing risk perception of heat and the adoption of protective behaviours systematically and found them to be highly context-specific. For instance, in Portugal a survey revealed better practices to protect against heat among those who had obtained information on time (Carvalho et al., 2014). The results observed in France (Bassil & Cole, 2010) showed an association during heat alerts between higher level of change in practice and awareness and practices among the public. In Lisbon, Portugal, and Madrid, Spain, locals were significantly more knowledgeable about certain extreme heat-related risk groups than foreigners, despite having lower educational levels. This could be explained by their being more exposed to local media and better targeted by local campaign messages (Cuesta et al., 2017). Having strong networks (relatives, friends and neighbours) does not necessarily contribute to more accurate risk perception and better self-protection (Abrahamson et al., 2009; Wolf et al., 2010). Other factors, such as higher education or greater income, may be more associated with efficient health-protective behaviours (Akompab et al., 2013).

Understanding the psychology of people's reactions to and beliefs about weather is important in efforts to make heat risk communications more effective. A study in the United Kingdom (Lefevre et al., 2015) found that positive associations with warm weather made heat warnings less effective. A study of large urban settings in the United States found while that vulnerable populations often recognized heat's potential health threats, they relied on experiences of having lived in or visited warmer climates as a heat-protective factor. The institutions responsible need to identify policies that promote safety during heat-waves and hot weather, and that welcome vulnerable individuals to cool places, including ones that may not be official cooling centres (such as libraries and parks) (Sampson et al., 2013).

Recent research reinforces the importance of social processes in enhancing or limiting resilience measures towards climate change adaptation.

The need for social responses requires policy interventions with more effective communication to ensure behavioural change and better resilience to climate risks (Howarth et al., 2019). These processes influence the uptake of protective behaviours, some of which can be targeted by education and outreach. For instance, social norm campaigns to increase the acceptability of free use of cool spaces such as banks or supermarkets without purchasing anything were found useful in Japan (Martinez et al., 2011; Boeckmann, 2016).

Feelings of self-efficacy among those addressed by heat–health behaviour change advice may also need to be strengthened. Heat education campaigns could profit from strong theoretical frameworks grounded in behaviour change theory (Lorencatto et al., 2013; Michie et al., 2011; 2013), as used in other behaviour change interventions such as smoking cessation or increasing physical activity (Jepson et al., 2010).

Heat–health behavioural guidance should also be grounded on an accurate understanding of motivations behind risky behaviours (Ban et al., 2019) and possibly risk denial as a coping strategy (Bittner & Stößel, 2012). Ideally, understanding of specific risk signatures should be derived from the processes of monitoring and evaluating HHAPs (WMO & WHO, 2015), ensuring that the perspectives of vulnerable groups are adequately integrated into the system (Mayrhuber et al., 2018).

4.3.3 Risk perception among health practitioners

There are indications that the risk perception of heat among health care providers themselves may be significantly lower than it should be, given the objective risks faced by their patients (Abrahamson & Raine, 2009; Herrmann & Sauerborn, 2018). A lack of awareness of heat warnings among health professionals, including nurses in care homes, has been reported (Bittner & Stößel, 2012). Research has also found gaps in knowledge (Ibrahim et al., 2012; Valois et al., 2016) and a lack of awareness of existing heat–health plans among hospital front-line staff (Boyson, Taylor & Page, 2014).

While the evidence is limited, an unrealistically low risk perception, lack of awareness or gaps in knowledge about heat risks or plans by practitioners could severely hinder the implementation and effectiveness of HHAPs. The reasons are clear: for some of those most vulnerable to heat (such as older, socially isolated patients), visits to the GP may be a rare instance of social interaction. Moreover, GPs are arguably the most trusted source of health advice and a key element of HHAP advice dissemination. Effective dissemination of heat-related health advice is simply unfeasible without the full assistance of health care professionals. This highlights the need for engagement of medical associations and other relevant bodies in disseminating the relevant information and offering capacity-building opportunities, as well as provision of adequate resources for such involvement.

4.4 Conclusions

A well developed heat-related information plan remains a central piece of any effective HHAP. The main target audiences, types of message and principles of risk communication outlined in earlier WHO guidance remain relevant (Matthies et al., 2008; WHO Regional Office for Europe, 2011; WMO/WHO, 2015). The scientific evidence base of commonly used specific information in advice and warnings should, however, be evaluated systematically. Evidence from the last decade shows generally good awareness but a low risk perception of heat by the general public, vulnerable groups and possibly health care providers. Psychological mechanisms and the familiarity and low-dread factor of heat may hinder the effectiveness of heat risk communications.

The survey results confirmed generalized use of web-based and mobile-based technologies for information dissemination, which were not widespread at the time of the 2008 WHO guidance. It is therefore crucial to gain better research-based understanding of the knowledge, attitudes and behaviour of high-risk groups and their carers when designing information and communication campaigns. Such improved understanding, adapted and customized to local settings and audiences, should inform heat-related health information plans.

References[2]

Abrahamson V, Raine R (2009). Health and social care responses to the Department of Health heatwave plan. J Public Health (Oxf). 31(4):478–89. doi:10.1093/pubmed/fdp059.

Abrahamson V, Wolf J, Lorenzoni I, Fenn B, Kovats S, Wilkinson P et al. (2009). Perceptions of heatwave risks to health: interview-based study of older people in London and Norwich, UK. J Public Health (Oxf). 31(1):119–26. doi:10.1093/pubmed/fdn102.

Akerlof K, Debono R, Berry P, Leiserowitz A, Roser-Renouf C, Clarke KL et al. (2010). Public perceptions of climate change as a human health risk: surveys of the United States, Canada and Malta. Int J Environ Res Public Health. 7(6):2559–606. doi:10.3390/ijerph7062559.

Akerlof KL, Delamater PL, Boules CR, Upperman CR, Mitchell CS (2015). Vulnerable populations perceive their health as at risk from climate change. Int J Environ Res Public Health. 12(12):15419–33. doi:10.3390/ijerph121214994.

Akompab D, Bi P, Williams S, Grant J, Walker I, Augoustinos M et al. (2013). Heat waves and climate change: applying the health belief model to identify predictors of risk perception and adaptive behaviours in Adelaide, Australia. Int J Environ Res Public Health. 10(6):2164–84. doi:10.3390/ijerph10062164.

Ban J, Wang R, Liu X, Li T, Jiang C, Shi W et al. (2019). Health-risk perception and its mediating effect on protective behavioral adaptation to heat waves. Environ Res. 172:27–33. doi:10.1016/j.envres.2019.01.006.

Bassil KL, Cole DC (2010). Effectiveness of public health interventions in reducing morbidity and mortality during heat episodes: a structured review. Int J Environ Res Public Health. 7(3):991–1001. doi:10.3390/ijerph7030991.

Beckmann SK, Hiete M (2020). Predictors associated with health-related heat risk perception of urban citizens in Germany. Int J Environ Res Public Health. 17(3):874. doi:10.3390/ijerph17030874.

Berger N, Lindemann AK, Böl GF (2019). [Public perception of climate change and implications for risk communication]. Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz. 62(5):612–19. doi:10.1007/s00103-019-02930-0.

Bittner MI, Stößel U (2012). Zur gesundheitlichen risikowahrnehmung von hitzewellen: Ergebnisse einer qualitativen interviewstudie mit älteren menschen und ihren pflegepersonen in Freiburg [Perceptions of heatwave risks to health: results of an qualitative interview study with older people and their carers in Freiburg, Germany]. GMS Psychosoc Med. 9:Doc05. doi:10.3205/psm000083.

Boeckmann M (2016). Exploring the health context: a qualitative study of local heat and climate change adaptation in Japan. Geoforum. 73:1–5. doi:10.1016/J.GEOFORUM.2016.04.006.

Boyson C, Taylor S, Page L (2014). The national heatwave plan – a brief evaluation of issues for frontline health staff. PLoS Curr. 6. doi:10.1371/currents.dis.aa63b5ff4cdaf47f1dc6bf44921afe93.

Bruine de Bruin W, Lefevre CE, Taylor AL, Dessai S, Fischhoff B, Kovats S (2016). Promoting protection against a threat that evokes positive affect: the case of heat waves in the United Kingdom. J Exp Psychol Appl. 22(3):261–71. doi:10.1037/xap0000083.

Bunker A, Wildenhain J, Vandenbergh A, Henschke N, Rocklöv J, Hajat S et al. (2016). Effects of air temperature on climate-sensitive mortality and morbidity outcomes in the elderly; a systematic review and meta-analysis of epidemiological evidence. EBioMedicine. 6: 258–68. doi:10.1016/j.ebiom.2016.02.034.

[2] All URLs accessed 9–10 September 2020.

Carvalho A, Schmidt L, Santos FD, Delicado A (2014). Climate change research and policy in Portugal. Wiley Interdiscip Rev Clim Change. 5(2):199–217. doi:10.1002/wcc.258.

Casanueva A, Burgstall A, Kotlarski S, Messeri A, Morabito M, Flouris AD et al. (2019). Overview of existing heat–health warning systems in Europe. Int J Environ Res Public Health. 2019;16(15):2657. doi:10.3390/ijerph16152657.

Cuesta JG, Van Loenhout JAF, Colaço MD, Guha-Sapir D (2017). General population knowledge about extreme heat: A cross-sectional survey in Lisbon and Madrid. Int J Environ Res Public Health. 14(2):122. doi:10.3390/ijerph14020122.

ECMWF (2020). Surface air temperature for June 2020. Reading: European Centre for Medium-Range Weather Forecasts (https://climate.copernicus.eu/surface-air-temperature-june-2020).

GHHIN (2020a). WHO Euro webinar: preparing for hot weather during the COVID-19 outbreak. Geneva: Global Heat Health Information Network (https://ghhin.org/events/who-euro-webinar-preparing-for-hot-weather-during-the-covid-19-outbreak/).

GHHIN (2020b). Technical brief: protecting health from hot weather during the COVID-19 pandemic. Geneva: Global Heat Health Information Network (https://ghhin.org/resources/technical-brief-protecting-health-from-hot-weather-during-the-covid-19-pandemic-2/).

Golechha M, Panigrahy RK (2020). COVID-19 and heatwaves: a double whammy for Indian cities. Lancet Planet Health. 4(8):e315-6. doi:10.1016/S2542-5196(20)30170-4.

Hajat S, O'Connor M, Kosatsky T (2010). Health effects of hot weather: from awareness of risk factors to effective health protection. Lancet. 375(9717):856–63. doi:10.1016/S0140-6736(09)61711-6.

Hanson-Easey DS, Hansen DA, Williams DS, Bi PP (2019). Communicating about heatwaves: risk perception, message fatigue, and threat normalization. Adelaide: University of Adelaide (https://adelaide.figshare.com/articles/Communicating_about_heatwaves_Risk_perception_message_fatigue_and_threat_normalization/7618403).

Health Canada (2011). Communicating the health risks of extreme heat events: toolkit for public health and emergency management officials. Ottawa: Health Canada (https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/climate-change-health/communicating-health-risks-extreme-heat-events-toolkit-public-health-emergency-management-officials-health-canada-2011.html).

Herrmann A, Sauerborn R (2018). General practitioners' perceptions of heat health impacts on the elderly in the face of climate change-a qualitative study in Baden-Württemberg, Germany. Int J Environ Res Public Health.15(5):843. doi:10.3390/ijerph15050843.

Howarth C, Kantenbacher J, Guida K, Roberts T, Rohse M (2019). Improving resilience to hot weather in the UK: the role of communication, behaviour and social insights in policy interventions. Environ Sci Policy. 94:258–61. doi:10.1016/j.envsci.2019.01.008

Howe PD, Marlon JR, Wang X, Leiserowitz A (2019). Public perceptions of the health risks of extreme heat across US states, counties, and neighborhoods. Proc Natl Acad Sci U S A. 116(14):6743–8. doi:10.1073/pnas.1813145116.

Ibrahim JE, McInnes JA, Andrianopoulos N, Evans S (2012). Minimising harm from heatwaves: a survey of awareness, knowledge, and practices of health professionals and care providers in Victoria, Australia. Int J Public Health. 57(2):297–304. doi:10.1007/s00038-011-0243-y.

Jepson RG, Harris FM, Platt S, Tannahill C, Marmot M, Mezoff J et al. (2010). The effectiveness of interventions to change six health behaviours: a review of reviews. BMC Public Health. 10(1):538. doi:10.1186/1471-2458-10-538.

Koppe C, Kovats S, Jendritzky G, Menne B (2004). Heat waves: risks and responses. Copenhagen: WHO Regional Office for Europe (https://www.euro.who.int/en/publications/abstracts/heat-waves-risks-and-responses).

Kosatsky T, Dufresne J, Richard L, Renouf A Giannetti, N, Bourbeau J et al. (2009). Heat awareness and response among Montreal residents with chronic cardiac and pulmonary disease. Can J Public Health. 100(3):237–40. doi:10.1007/BF03405548.

Laaidi K, Pascal M, Léon C, Beaudeau P (2018). Réduire les impacts de la chaleur dans un contexte de changement climatique [Reducing the impacts of hot weather in a context of climate change]. Soins. 63(823):28–30. doi:10.1016/j.soin.2018.01.005.

Laaidi K, Perrey C, Léon C, Mazzoni M, Beaudeau P (2019). Connaissances et comportements des Français face à la canicule [Knowledge and behaviour of the French in the face of heat-waves]. La Santé en Action. 448:47–8 (https://www.santepubliquefrance.fr/determinants-

de-sante/climat/fortes-chaleurs-canicule/documents/article/connaissances-et-comportements-des-francais-face-a-la-canicule).

Lee TM, Markowitz EM, Howe PD, Ko CY, Leiserowitz AA (2015). Predictors of public climate change awareness and risk perception around the world. Nat Clim Chang. 5(11):1014–20. doi:10.1038/nclimate2728.

Lefevre CE, Bruine de Bruin W, Taylor AL, Dessai S, Kovats S, Fischhoff B (2015). Heat protection behaviors and positive affect about heat during the 2013 heat wave in the United Kingdom. Soc Sci Med. 128:282–9. doi:10.1016/j.socscimed.2015.01.029.

Lorencatto F, West R, Seymour N, Michie S (2013). Developing a method for specifying the components of behavior change interventions in practice: the example of smoking cessation. J Consult Clin Psychol. 81(3):528–44. doi:10.1037/a0032106.

Lowe D, Ebi KL, Forsberg B (2011). Heatwave early warning systems and adaptation advice to reduce human health consequences of heatwaves. Int J Environ Res Public Health. 8(12):4623–48. doi:10.3390/ijerph8124623.

Matthies F, Bickler G, Cardeñosa N, Hales S, editors (2008). Heat–health action plans. Copenhagen: WHO Regional Office for Europe (https://www.euro.who.int/en/publications/abstracts/heathealth-action-plans).

Martinez G, Imai C, Masumo K (2011). Local heat stroke prevention plans in Japan: characteristics and elements for public health adaptation to climate change. Int J Environ Res Public Health. 8(12):4563–81. doi:10.3390/ijerph8124563.

Martinez GS, Linares C, de'Donato F, Diaz J (2020). Protect the vulnerable from extreme heat during the COVID-19 pandemic. Environ Res. 187:109684. doi:10.1016/J.ENVRES.2020.109684.

Mayrhuber EAS, Dückers MLA, Wallner P, Arnberger A, Allex B, Wiesböck L et al. (2018). Vulnerability to heatwaves and implications for public health interventions – a scoping review. Environ Res. 166:42–54. doi:10.1016/j.envres.2018.05.021.

Messeri A, Morabito M, Bonafede M, Bugani M, Levi M, Baldasseroni A et al. (2019). Heat stress perception among native and migrant workers in Italian industries – case studies from the construction and agricultural sectors. Int J Environ Res Public Health. 16(7):1090. doi:10.3390/ijerph16071090.

Michie S, Hyder N, Walia A, West R (2011). Development of a taxonomy of behaviour change techniques used in individual behavioural support for smoking cessation. Addict Behav. 36(4):315–19. doi:10.1016/j.addbeh.2010.11.016.

Michie S, Richardson M, Johnston M, Abraham C, Francis J, Hardeman W et al. (2013). The behavior change technique taxonomy (v1) of 93 hierarchically clustered techniques: building an international consensus for the reporting of behavior change interventions. Ann Behav Med. 46(1):81–95. doi:10.1007/s12160-013-9486-6.

Ministry of Health (2018). App Caldo e Salute [Heat and Health app]. In: Ondate di calore [Heat waves] [website]. Rome: Ministry of Health (http://www.salute.gov.it/portale/caldo/dettaglioContenutiCaldo.jsp?lingua=italiano&id=4965&area=emergenzaCaldo&menu=app).

Nitschke M, Krackowizer A, Hansen AL, Bi P, Tucker GR (2017). Heat health messages: a randomized controlled trial of a preventative messages tool in the older population of south Australia. Int J Environ Res Public Health. 14(9):992. doi:10.3390/ijerph14090992.

PHE (2015). Looking after children and those in early years settings during heatwaves: guidance for teachers and professionals. London: Public Health England (https://www.gov.uk/government/publications/heatwave-plan-for-england).

PHE (2020). Heatwave plan for England [website]. London: Public Health England (https://www.gov.uk/government/publications/heatwave-plan-for-england).

RIVM (2015). Nationaal Hitteplan : versie 2015 [National heat plan: version 2015]. Bilthoven: National Institute for Public Health and the Environment (https://www.rivm.nl/publicaties/nationaal-hitteplan-versie-2015).

Sampson NR, Gronlund CJ, Buxton MA, Catalano L, White-Newsome JL, Conlon KC et al. (2013). Staying cool in a changing climate: reaching vulnerable populations during heat events. Glob Environ Change. 23(2):475–84. doi:10.1016/j.gloenvcha.2012.12.011.

Santé Publique France (2020). Canicule et Covid-19: état des connaissances sur les mesures de prevention [Heatwave and Covid-19: the state of knowledge on preventive measures]. Saint-Maurice: Santé Publique France (https://www.santepubliquefrance.fr/les-actualites/2020/canicule-et-covid-19-etat-des-connaissances-sur-les-mesures-de-prevention).

Singh R, Arrighi J, Jjemba E, Strachan K, Spires M, Kadihasanoglu A (2019). Heatwave guide for cities. Geneva: Red Cross/Red Crescent Climate Centre (https://media.ifrc.org/ifrc/wp-content/uploads/

sites/5/2020/11/2019_RCCC-Heatwave-Guide-for-Cities_ONLINE-copy.pdf).

Slovic P (2010). The psychology of risk. Saúde Soc. 19(4):731–7. doi:10.1590/S0104-12902010000400002.

Slovic P, Ball DJ (2011). The feeling of risk: new perspectives on risk perception. Energy Environ. 22(6):835–6. doi:10.1260/0958-305X.22.6.835.

Smirnova MDS, Svirida ONS, Vicenya MVV, Mikhailov GVM, Ageev FTA (2015). [The effectiveness of Russian public health recommendations for Sanogennykh behavior in the heatwave]. Kardiologiia. 55(5):66–71. doi:10.18565/cardio.2015.5.66-71.

Song H, Schwarz N (2009). If it's difficult to pronounce, it must be risky. Psychol Sci. 20(2):135–8. doi:10.1111/j.1467-9280.2009.02267.x.

Steul-Fischer M, Heideker S (2015). The effect of familiarity and dread on health risk perception. In: Wen EW, Zhang M. AP – Asia-Pacific advances in consumer research, volume 11. Duluth, MN: Association for Consumer Research: 32–7 (https://www.acrwebsite.org/volumes/1018828/volumes/ap11/AP-11).

Sun Y, Han Z (2018). Climate change risk perception in Taiwan: correlation with individual and societal factors. Int J Environ Res Public Health. 15(1):91. doi:10.3390/ijerph15010091.

Valois P, Blouin P, Ouellet C, Renaud JS, Bélanger D, Gosselin P (2016). The health impacts of climate change: a continuing medical education needs assessment framework. J Contin Educ Health Prof. 36(3):218–25. doi:10.1097/CEH.0000000000000084.

Van Loenhout JAF, Guha-Sapir D (2016). How resilient is the general population to heatwaves? A knowledge survey from the ENHANCE project in Brussels and Amsterdam. BMC Res Notes. 9(1):1–5. doi:10.1186/s13104-016-2305-y.

Van Loenhout JAF, Rodriguez-Llanes JM, Guha-Sapir D (2016). Stakeholders' perception on national heatwave plans and their local implementation in Belgium and the Netherlands. Int J Environ Res Public Health. 13(11):1120. doi:10.3390/ijerph13111120.

WHO (2020). Q&A – How can I drink alcohol safely? In: World Health Organization [website]. Geneva: World Health Organization (https://www.euro.who.int/en/health-topics/disease-prevention/alcohol-use/data-and-statistics/q-and-a-how-can-i-drink-alcohol-safely).

WHO Regional Office for Europe (2011). Public health advice on preventing health effects of heat: new and updated information for different audiences. Copenhagen: WHO Regional Office for Europe (https://www.euro.who.int/en/health-topics/environment-and-health/Climate-change/publications/2011/public-health-advice-on-preventing-health-effects-of-heat.-new-and-updated-information-for-different-audiences).

WHO Regional Office for Europe (2020). Health advice for hot weather during the COVID-19 outbreak. Copenhagen: WHO Regional Office for Europe (https://www.euro.who.int/en/health-topics/environment-and-health/Climate-change/publications/2020/health-advice-for-hot-weather-during-the-covid-19-outbreak-produced-by-whoeurope).

WMO, WHO (2015). Heatwaves and health: guidance on warning-system development. Geneva: World Meteorological Organization (https://www.who.int/globalchange/publications/heatwaves-health-guidance/en/).

Wolf J, Adger WN, Lorenzoni I, Abrahamson V, Raine R (2010). Social capital, individual responses to heat waves and climate change adaptation: an empirical study of two UK cities. Global Environ Chang. 20(1):44–52. doi:10.1016/j.gloenvcha.2009.09.004.