Best practice and lessons for place-based initiatives responding to the health impacts of heatwaves in an urban context

Literature Review

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Contents

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1. Background to Hotspots Initiative

The Lord Mayor's Charitable Foundation's (LMCF) Hotspots Initiative supports place-based collaborations between health, social service and environmental organisations, with local government and emergency services in areas of Melbourne displaying high levels of socio-economic disadvantage and higher temperatures during heatwaves (based on the Monash Heat Vulnerability Index 2014).

In 2017–2018, the Foundation consulted with Emergency Management Victoria, Victorian Council of Social Services and the Department of Health and Human Services. A gap was identified in resourcing community health and social service organisations to work collaboratively with local government and emergency services to plan for, and respond to, extreme weather and natural disasters, with a focus on those most vulnerable during these events.

Projects that ran during the summers of 2018/2019 and 2019/2020, were led by: (i) community health organisation *IPC Health* (Brimbank); (ii) Primary Care Partnership *enliven* (Dandenong); and (iii) *cohealth* working in community housing (inner Melbourne). These projects have initiated cross-sector collaborations between community health and social services providers, local government, and emergency services organisations. The projects focus on identifying and reaching out to community members who are most at risk during extreme heat events, communicating heat health messages, increasing service capacity to respond to information, and co-designing local solutions. The program is in its second year.

1.1 This review

This document presents a review of best practice and learnings for place-based initiatives responding to the impacts of heatwaves in the urban context. The purpose of this review is to inform an effective and adaptable approach to the design and evaluation of programs and interventions to reduce heatwave impacts, particularly for the most vulnerable populations. Findings from this review have shaped the Hotspots evaluation co-designed by RMIT with Hotspots Initiative partners.

The review draws on both academic and grey literature, both in Australia and internationally, responding to the health impacts of heatwaves in an urban context. It examines international experiences of place-based programs with a focus on both their function and evaluation, including the evaluation approaches used. This integrative approach aims to ensure that this review and the resulting evaluation approach are informed by understandings of best practice in program development, implementation, and evaluation.

This review is structured around four key sections:

1. Key considerations for design and evaluation of initiatives responding to impacts of urban heat
2. Evaluating existing heat health plans
3. Key principles for designing and evaluation of initiatives
4. Conclusion and recommendations

2. Key considerations for design and evaluation of place-based initiatives responding to urban heat

The increasing severity and frequency of extreme heat events, driven by our changing climate, is part of a much larger web of intersectional social and environmental justice issues. Climate change overlays and exacerbates existing health and social inequalities, which in turn shape the capacities of differing social groups to adapt to changing climate conditions across urban and rural locations. Through increasing the incidence and intensity of extreme heat events, climate change will disproportionately affect the health of people who are already disadvantaged or socially marginalised (Bowen & Friel 2015).

Across the world, heat health response plans are being developed at state, regional, city and local/neighbourhood scales These plans focus on addressing the rise in recorded mortality and morbidity rates, including broader negative health impacts associated with heatwaves (Martinez et al. 2019). In general, the primary focus of these plans is to implement a systemic response that builds adaptive capacities of social groups and communities through reducing identified vulnerabilities and exposure to extreme heat and heatwaves (Bowen & Friel 2015). There is increased awareness of the complex, interrelated nature of vulnerabilities which can affect 'health, physical and mental well-being, financial situation, mobility, social relations, and access to basic services.' (Bolitho & Miller 2017, p. 683). Responses therefore, must, 'be equity-focused, and are necessarily multi-sectoral given that the majority of the health impacts will arise via other sectors, such as planning, water and agriculture' (Bowen & Friel 2015, p. 3). There is growing evidence that implementation of preventative heat health plans may decrease heat related illness and mortality (Martinez et al. 2019).

This review examines the literature exploring evaluative practices of heat health response programs. It does this in a bid to synthesise best practice approaches to such evaluations, with a recognition that community-based and social service organisations delivering programs such as Hotspots are situated within a broad heat health response ecosystem of stakeholders and actors. This section describes key aspects the literature suggests are important to consider when designing and evaluating a program such as Hotspots.

2.1 Defining heatwaves

The definition of a heatwave varies from country-to-country, region-to-region, and locality-to-locality, depending on the range of factors including community and individual experiences of heat and how people acclimatise to their local climate. How a heatwave is identified in Melbourne, will be different from how it is identified in Mildura, Sydney, Mumbai or London (Singh et al. 2019). To illustrate this, in 2009 Melbourne experienced one of the two worst heatwaves on record (3 consecutive days over 43); at the same time Mildura recorded 12 straight days over 40°C (Natural Capital Economics 2018). In this way, while the way to define a heatwave is fairly standard across localities, the identification of a heatwave is closely tied to geographic location.

International context: The Red Cross heatwave guide for cities (Singh et al. 2019), designed to aid city officials, and health and community services to prepare and avoid the worst impacts of heatwaves, suggests a clear formula for defining heatwaves which takes into account local context. These factors incorporate assessing a mixture of maximum daytime temperatures, night-time temperatures and the level of humidity relevant to the local climate. A threshold is determined by the point at which heat becomes dangerous enough to impact the health and livelihoods of people. These can be determined in conjunction with academic research, previous experiences and

practices, and health department records where a spike in mortality or morbidity rates (from hospital admissions and ambulance callouts) has occurred during heatwaves (Singh et al. 2019). Authors emphasise the importance of an ongoing dialogue between health departments, technical specialists and meteorologists on established localised heat threshold definitions in the context of both a changing climate and changing vulnerabilities, and to revise definitions when needed (Martinez et al. 2019 Singh et al. 2019). Perhaps due to the importance of local circumstance, there is currently no universal definition of a heatwave (Howarth et al. 2020).

Australia: In Australia, identifying a heatwave arises from collaborative efforts between federal and state health departments, the national Bureau of Meteorology (BOM) and other technical specialists who together contribute the factors and thresholds used in their measurement and impact. Given the place-based nature of experiences of heat, and the size of Australia, each state has its own HHP and system of alerts which can even differ across a state's districts.

Victoria: The Victorian Department of Health and Human Services (DHHS) identifies extreme heat events across two categories that distinguish between: (i) single days of extreme heat; and, (ii) prolonged heatwaves (i.e. consecutive days of extreme heat). Extreme heat has been defined as the point that 'the forecast average temperature on any day exceeds the predetermined heat health temperature threshold in a Victorian weather forecast district' (DHHS 2019a, p. 2). In contrast, heatwaves are understood as a period of three or more consecutive days of extreme heat.

In line with heat definitions being place-based, the point at which the heat health threshold is reached differs slightly across Victoria from the 34 degrees Celsius in the Mallee, to 30 degrees in the southern part of the state, including Melbourne (DHHS 2019a). These locational differences were recognised in the first study to address the development of specific temperature thresholds for increased mortality across rural centres in Victoria (Loughnan, Nicholls, & Tapper 2010). As soon as temperatures are forecast to reach or exceed an area's heat health temperature threshold, up to three days before the conditions are due to begin, a heat-health alert system is activated by the Chief Health Officer in Victoria. This is set in motion through a 'subscription service which, although available to the public, is particularly targeted to departmental program areas, health services, local government, agency partners and service providers' (DHHS 2019a, p. 4). The alert details the upcoming heat event as well as reminds subscribers to follow their HHPs and actively monitor the local weather.

Isolated **days of extreme heat** can have negative impacts on the health and wellbeing of people who have been identified as vulnerable or at risk due to a range of structural and individual factors (explored in the next section). However, during **heatwaves,** the potential health and wellbeing effects experienced on a single hot day are compounded across the heatwave period. Heatwaves can also have impacts that may compromise critical infrastructure, facilities and services that communities and individuals may rely on for support during these periods (DHHS 2019a) such as public transport, power supply etc.

Recommendations

While extreme heat events or heatwaves are clearly defined in Victoria's HHP, individual's heat health thresholds and experiences of heat and climate will vary. Official definitions of a heat threshold need to be revised in an ongoing capacity to be in line with place-based experience as climate and culture changes.

2.2 Defining vulnerable populations

There is a growing consensus that climate change presents a 'major threat' to human health, health systems, and health inequities (Bowen & Friel 2015; Haines & Ebi 2019). Recognition of this is evidenced locally in the *Victorian public health and wellbeing plan 2019-2023* (DHHS 2019b) which includes climate change as one of its top 10 priorities (tackling climate change and its impact on health), and one of the four focus areas for public health in Victoria. It is clear is that the distribution of health impacts from climate change are uneven, with those considered 'most vulnerable', being most affected (DELWP 2016). A detailed list of people identified as vulnerable to extreme heat in Victoria is outlined in an appendix of the 2019 *Heat Health Plan for Victoria* (2019a), with the reminder that some individuals will fall into more than one at-risk group increasing their susceptibility. Identifying vulnerability is therefore a key part of climate related public health policies and associated interventions.

Health vulnerabilities: It has long been known that heatwaves cause serious health effects including increased levels of mortality and ongoing chronic stress (Bothillo & Miller 2017; DHHS 2019a; Martinez et al. 2019; Mayhruber et al. 2018), as well as more common health issues associated with heat such as dehydration, cramps, heatstroke, exhaustion and illness from food spoilage. However, being 'at risk' is not evenly experienced with certain subgroups within the community clearly identified as more vulnerable, such as the very young, the elderly, the chronically ill, those with disabilities, homeless, the socially isolated (including sometimes those who live alone) and outside workers (DHHS 2019a; Mayhruber et al. 2018). For those with pre-existing medical conditions (such as respiratory illnesses and diseases of the heart and kidney) these risks increase. As the Victorian HHP notes, these health vulnerabilities may be made worse through other consequences of heat such as bushfires (air quality, increased stress) and infrastructural issues such as power outages (i.e affecting air-conditioners, food storage and medical equipment) and disrupted public transport (also leading to an inability to access cooling spaces such as pools and shopping malls) (DHHS 2019a). These vulnerabilities increase across communities suffering systemic disadvantage, or where heat messaging needs to be translated; not only into local languages but the 'meaning behind the words – the cultural framework' (Hanson-Easey et al. 2018, p. 621)

Complicating generic vulnerability: Public health organisations are alert to the main vulnerability subgroups for the targeting of resources and information, however generic vulnerability categories can work to simplify the way vulnerability is targeted, considerably affecting climate change-related health outcomes. Identities (gender, ethnicity, sexual orientation, religion, socio-economic status) are multiple and overlapping. This intersectionality creates a broad and varied interplay of a range of structural and individual barriers, revealing more nuanced and diverse experiences of extreme heat events that cannot always be easily captured by a single prevention category (Benmarhnia et al. 2018). Several studies (Bolitho & Miller 2017; Mayrhuber et al. 2018) point to the importance of the 1995 heatwave in Chicago in 'challenging widely held assumptions about vulnerability and the reliance on simple social categories in explaining the uneven consequences of this 'natural' disaster' (Bolitho & Miller 2017, pp. 682–3).

While generic 'vulnerability' categories help to broadly identify who might be more at risk to extreme heat and heatwaves (and thereby who may require more tailored support and resources), it is also important not to assume just because people fall within such a category that they are 'automatically' vulnerable. It is crucial to critically evaluate and engage with how these communities are 'identified' and how they 'identify' with these categorisations. A study by Benmarhnia et al. (2018) evaluating the Montreal Heat Action plan, noted that vulnerable categories are usually applied without

consulting the communities and individuals they seek to identify. In interviews with people experiencing alcohol/drug addiction and people diagnosed with schizophrenia, the study revealed that respondents didn't necessarily identify with the vulnerability category applied to them. While some interviewees agreed they were vulnerable to some degree, they also acknowledged that other people within the community had significantly more risk and needs than they did. In other words, there was an awareness that everyone within with the community had varying degrees structural and individual factors that influenced the degree of vulnerability they experienced (Benmarhnia et al. 2018). Martinez et al. (2019) however caution that at times a low perception of vulnerability (possibly as a coping strategy) may mean that heat health messaging or information is not taken up. This suggests health and social services need to place more emphasis on engaging with an individual's specific social and cultural context, uncovering more nuanced and diverse factors that shape people's experiences of vulnerability and heatwaves.

Place specific vulnerability: Alongside the multiple systemic factors which effect, create and mitigate vulnerability to extreme heat, there is also a place specific dimension. Increasing research into the ways in which a city's *built* environment can contribute to the impacts of heat with the urban heat island (UHI) effect adding to community vulnerability during heatwaves (Heaviside, Macintyre, & Vardoulakis 2017; Mayhruber et al. 2018). Cities are generally warmer than surrounding suburban and rural areas as 'urban materials such as concrete and paving absorb energy from the sun during the day, and slowly release this energy into the air as heat, mostly at night time, which is when the temperature difference between urban and rural areas, and hence the UHI intensity, is usually largest' (Heaviside et al. 2017). However, increasing research into the relationship between urban greening spaces and its effect on the UHI effect (Motazedian, Coutts, & Tapper 2020; Sun et al. 2019), notes a clear socio economic inequity in the distribution of urban green places (Chamberlain et al. 2020; Heaviside et al. 2017) with poorer neighbourhoods and low-wage workplaces tending to have less proximity and access to green space and therefore greater heat exposure (Bolitho & Miller 2017).

The broader context of climate change clearly indicates that dependancy on power-based, reactive cooling options such as air-conditioners to reduce building heat is unsustainable as these solutions increase energy consumption and emissions, and create pollution (production and life cycle) but the trend towards this form of cooling is growing exponentially (Howarth et al. 2019; Martinez et al. 2019). For at-risk populations reliance on air-conditioning can increase vulnerability due to high running costs and dependency on power at a time when electricity outages are more likely. In contrast passive cooling design for buildings, including use of solar panels, increased green spaces, and public local cooling centres would decrease urban vulnerability by lowering greenhouse gases and dependence on electricity (Heaviside et al. 2017; Martinez et al. 2019).

Agency, community connectedness, resilience and adaptive capacity: A community's overall vulnerability, as well as their resilience and adaptive capacity, will be partly shaped by their approach towards change. Resilience here 'is the capacity of a community to cope with disturbances or changes and to maintain adaptive behaviour…rather than going into survival mode, a resilient community can respond in positive creative ways that changes the basis of the community, enabling it to grow' (Bishop, Thoms & Mason 2015). This definition of resilience can also be applied to individuals. Factors such as agency, mobility and community connectedness are important to assess in determining the degree to which structural barriers will play a role in people's vulnerabilities. These aspects are all critical in determining people's capacity to adapt well to both extreme events and long-term changes (Blaikie et al. 2003; Kelman et al. 2016). Some people facing obstacles, such as poor-quality housing or urban environments with limited access to cooling spaces (i.e. no air-conditioner) or green spaces, can be constrained in their capacity to cope with and reduce exposure

to heat – both during an event and over the longer-term. Others with more agency, for example those who may have more mobility to access cooler environments and/or living in higher quality housing in terms of thermal comfort, may be more able to mediate the impacts and level of exposure to heatwaves (Loughnan et al. 2010; Singh et al. 2019). Connectedness within communities and the resulting social capital, has been shown to offer resilience against vulnerability and build adaptive capacity (Bishop, Thoms & Mason 2015; Hanson-Easey et al. 2018; Howarth et al. 2020; Loughnan et al. 2010), although in their study, Martinez et al. (2019) caution that, 'strong networks do not necessarily contribute to a more accurate heat risk perception and better self-protection' during a heat wave.

Recommendations

Programs such as Hotspots can identify and seek to address the acute symptoms of vulnerabilities to heat events. They can also provide insights into the more structural, socio-economic drivers of peoples' vulnerabilities, but overall it is the wider 'ecosystem' of health and human services, and other societal contributors that will influence peoples' vulnerabilities to events such as heatwaves.

It is important that initiatives like Hotspots consider how people's belonging to multiple 'categories' might contribute to their vulnerabilities. It is also an oversimplification to suggest that all people who may fit a 'vulnerable group' category are such, because people experience varying adaptive and coping capacities.

Another point for Hotspots, and similar projects to be aware of is that, while government departments and organisations utilise place-specific heatwave definitions as a basis for implementing their Heat Health Plans (HHPs), the application of extreme heat or heatwave concepts at the local level in Victoria needs to take into consideration the diversity of cultural groups across the state and their differing experiences of heat. These need to be reassessed after each heat season as sensitivity to heat can change as populations change.

Where possible, outreach services such as Hotspots need to collaborate with services that are working on cost-effective, climate warming, place-based solutions to place-based heat – such as urban design, including urban greening, passive design solutions, retrofitting and public cooling centres.

2.3 Role of day-to-day/season-to-season lived experience

While the physical health effects of heat are well documented in the literature, the 'social implications of extreme heat on people's everyday lives' are much less understood (Bolitho & Miller 2017, p. 682). The everyday, Nash et al. (2019) argue, is not 'merely the backdrop to repeated mundane forms of practice', but rather 'a space in which the cultural phenomenon of climate change both constitutes and is constituted by tacit everyday realities, identities and practices in cyclic relationship'. This focuses importance on accessing people's day-to-day understandings and experiences.

In their study on heatwaves in Melbourne, Bolitho and Miller (2017), argue that everyday inequalities are exacerbated over extended periods of hot weather in summer meaning seasonality is critical to factor in when considering the impacts of heat:

> inadequate living conditions disproportionately affect tenants in rental or public housing properties which may be inadequately fitted with cooling measures, such as fans, internal and external blinds, curtains, window locks, insect and security screens, and air conditioners. Insecure tenure may mean tenants are unable to negotiate improvements in housing quality. Government resource constraints make retrofitting public housing ever more unlikely. Poverty may mean people cannot afford to run air conditioners or they may run them to their

> financial detriment. In other circumstances, a fear of crime may prevent people from opening their windows and cooling their homes, especially at night (Bolitho & Miller 2017, p. 685).

The heterogeneity of heat events, combined with the heterogeneity of at-risk groups whose needs, resources and capacities vary from individual-to-individual, mean that these needs and resources will vary from heat season to heat season (Benmarhnia et al. 2018; Mayrhuber et al. 2018) and change over a season (such as for outdoor seasonal workers). Heat thresholds too may also be different *within* heat seasons and thresholds registered and adjusted accordingly in HHPs (Martinez et al. 2019). The seasonality of heat also highlights an issue with heat health communications and changing social behaviours. People can forget or be less conscious of the dangers of heat outside over the summer season. This is arguably heightened in countries where winters are colder such as the UK where Howarth et al. (2019) write people tend to be nostalgic about summer heat, their positive feelings blocking reception of preventative heatwave information and thus resilience building. In Victoria, the DHHS works outside of the summer season (both prior, to prepare, and after, to reflect on the summer and integrate lessons learnt) with other stakeholders such as government departments and emergency services in established campaign working groups (see Appendices 1 and 2).

Recommendations

Further studies and evaluations are needed that engage with the more complex individual day-to-day, and season-to-season experiences of heatwaves and engaging with health and social services to develop more socially and culturally appropriate understandings of heat health impacts and responses that can engage with the diversity of social inequalities. The strengths of the Hotspots Initiative lends itself to engaging with the emergent and continually evolving nature of health impacts of heatwaves as they are experienced season-to-season, group-to-group, and individual-to-individual within local communities.

2.4 Communicating heatwaves

Disseminating effective heatwave information needs to address how those messages are communicated, delivered and how they may be received across a diverse community i.e. the ways in which different sectors of the community will access and interpret information and what the barriers to this may be (structural, language, trust etc.). As discussed above, the ways vulnerable communities are identified, mapped, and reached are crucial to consider in thinking critically about heatwave communication. Research on the role of social capital and social connectedness across cultural diversity and groups identified as vulnerable is important in understanding how this may aid heat health communication.

Cultural and diverse contexts and language: Effective heatwave communication needs to consider culturally and contextually specific and appropriate forms. In Australia, this involves recognition and learning from Aboriginal and Torres Strait Islander knowledge of country and climate (Arabena & Kingsley 2015), as well as continually building reciprocal and respectful relationships in health provision across all diverse communities, providing information in the numerous languages spoken in Victoria. Research by Hanson-Easey et al. (2018, p. 620) note that for some communities in Australia, especially those formed by new migrants, 'salient and targeted messaging that address their discrete cultural and communication needs are not presently accessible, or available.' This may also mean thinking about mediums other than written language for delivering health information (such as through music). Therefore, when considering the use of 'extreme heat' and 'heatwaves' in communications, these terms need to be translated into culturally, socially and contextually specific and appropriate forms. Hanson-Easey et al. (2018, p. 620) argue an 'interactive, dialogic approach

to developing and disseminating risk messages is required,'; an approach they contend will start to address the documented 'social disparities in natural hazards and disaster preparedness'.

Framing vulnerability, framing heat: Monitoring and mapping of groups understood to be vulnerable to heat, is increasingly being used by public health authorities as a means of heat health intervention (Mayrhuber et al. 2018). However, as discussed previously 'vulnerability' is a nuanced category and mapping criteria needs to find ways to reflect this. The effectiveness of this monitoring will be in part dependant on the levels of trust established between the community identified as vulnerable and formal institutions (banks, Centrelink, police, health care) and/or service providers (Hanson-Easey et al. 2018); the qualities of these relationships, and levels of community engagement and agency determining if the messaging will be effective. Causes of vulnerability, and associated institutional responses, are also based on how heat itself is framed:

> By appreciating the multiple ways heat is understood, opportunities for enhanced coordination between different actors and programs can be realised so as to better address vulnerability and the underpinning conditions of inequality. (Bolitho & Miller 2017)

While heat can be understood differently across cultures and lived experience, including viewing heat as positive or nonproblematic, extreme heat still presents risks and part of health messaging can be to frame heat as 'negative' and evoke unpleasant experiences like sunburn and service disruption (Howarth et al. 2019).

Timing: While relying on early warning systems (i.e. BOM or the DHHS) to declare extreme heat days or heatwaves *before* initiating local heat health responses makes sense, research by Bernard and McGeehin (2004) has urged more discretionary approaches and conservative criteria to be applied when announcing heat emergencies and implementing actions from HHPs. Surveying 18 municipality plans in America, Bernard and McGeehin (2004) found that public outreach occurred only when a heatwave was forthcoming or already underway leading the authors to conclude that a best practice approach includes using conservative criteria that communicates and implements prevention efforts as soon as high temperature are forecast, rather than waiting until they arrive. This is supported by Bolitho and Miller (2017) who argue prolonged periods of extreme heat can have severe impacts long before a heat event is recognised as an emergency and a heat wave is officially declared.

Recommendations

Hotspots teams and community partners need to be clear around the point at which they will escalate or deescalate their emergency heat health responses following conservative criteria rather than just following state warning systems. It would also be appropriate to define these criteria based on past experiences and practices, and in consultation with local communities. Partners will need to consider how these emergency heat health responses are presented to make sure they are tailored to the possible multiple cultural contexts of their vulnerable communities.

3. Heat health plans

As a framework and method of governance to address and respond to the increasing severity of heatwaves, their associated mortalities and health issues, heat health plans (HHPs) have been activated around the world. Several authors document how, a lack of preparedness for a severe European heatwave in 2003, prompted large scale public health prevention efforts (Howarth et al. 2019; Martinez et al. 2019). A guidance document by the WHO in 2008 outlined the core aspects of a HHP: (i) a coordinating body to coordinate collaborate between organisations and lead an emergency response if needed; (ii) an accurate heat warning alert system; (iii) communication plan of heat health information; (iv) reduction of indoor heat exposure; (v) care for vulnerable populations (identification, localisation and outreach); (vi) preparing health and social services (training, planning); (vii) urban planning to reduce heat and heat exposure; and (viii) monitoring heat related health evaluation of process and outcomes (Martinez et al. 2019). While this guidance has been revised and added to over the years through experience of increasing intensity of heat waves, these aspects remain the basis of HHPs.

Current evaluations of heat health initiatives, carried out globally, are still tentative (Hess et al. 2018; Mayrhuber et al. 2018; Nitschke et al. 2016) however there are reports of some successful uptake of heatwave intervention programs from the general population (Mayrhuber et al. 2018; Martinez et al. 2019; Price et al. 2018). While there are gaps, HHPs seem to be effective and low cost economically for large benefits (Martinez et al. 2019). Heat health programs primarily focus their measures on physical health indicators to inform the effectiveness of HHPs and initiatives, for example, reductions in heatwave-based mortality and morbidity rates (Mayrhuber et al. 2018). What has not been acknowledged or much explored in studies on HHPs are the limitations of using mortality and morbidity rates as a measurement for program effectiveness, as these only count cases of reported and recorded health incidents relating to heat. As highlighted in previous sections, a range of diverse structural and individual factors also play a role in declining mortality and morbidity rates, signifying that addressing external climatic factors alone is not effective enough at understanding the complexity of individual and community support needs during heatwaves. As these physical measurements have been used to inform resource and capacity building of health departments and the refinement of heat health warning systems, evaluating the implementation and reviewing the effectiveness of HHPs is very important. Just as important is to consider the role bottom-up, community-based health and social services and programs are playing and note the critical insights and local evidence these organisations could offer back to potentially reshape hat health planning and climate adaptation knowledge (Howarth et al. 2020).

3.1 Evaluating heat health plans

While the literature identifies there is growing evidence that heat related health impacts including mortality may be decreasing in some areas possibly due preventative heat health plans (Martinez et al. 2019) comparisons between heat health plans to assess best practice are challenging for many reasons. Firstly, as several international reviews identify, the design, scope, timeframes and reach of heat health response services and activities vary significantly from one study to another (Martinez et al. 2019; Mayrhuber et al. 2018; Toloo et al. 2013). Due to this diversity across response activities and services, each addressing differing cultural, social and economic factors, the authors of these studies could not infer which measures were more effective than others. For example, plans operate at different levels (national, regional or local) meaning in some areas HHPs may be restrained in their reach by governance at another level, while other places may benefit by being covered by several HHPs (Martinez et al. 2019). Yardley, Sigal and Kenny's (2011) review, also highlight the differing resources and capacities available across heat health projects. This means as Mayrhuber

et al. (2018) note, contextual and structural factors, including individual and community needs, and associated goals for interventions, can vary significantly from location-to-location. For all these reasons, comparing the effectiveness of heat health response actions is complicated.

Despite these difficulties, a number of key aspects in HHPs are recommended for evaluation by Martinez et al. (2019) although, like all authors, they emphasis more research is urgently needed. Some of their key suggestions are:

- **Governance:** Due to all the factors which make comparisons difficult at present the literature does not point to 'the most effective… governance design', generally any HHP evaluations focus on mortality rates rather than overall governance. They note academic literature suggests, 'that governance arrangements favoring local involvement in implementation, including better stakeholder engagement, contribute to reaching out more effectively to vulnerable groups'. They emphasis the role local government could play advising that heat plans could 'tap into the large potential of local volunteering structures, community capacity and in-depth knowledge of local needs. Inviting these stakeholders to the table early on in the design of [HHPs] and before implementation could highlight gaps or barriers to effective communication or outreach strategies'.
- **Cost effect technologies:** While forecasting technology is already part of heat health planning and heat alerts, new understandings gained from technological advances (such as in remote sensing) the research focus in this area needs to be reflected in reviews of HHPs to enable the most accurate predictions. As many people have smart phones using these to provide people with locally customised apps or 'personalized heat risk assessments' with 'real-time risk maps, the location of nearby cooling centers, or a group categorization of risk for the user or relatives'.
- **Address diverse populations:** While there are difficulties engaging diverse and vulnerable populations their voices need to be recognised and integrated into the system (A point made by Mayruber et al. 2018). Also need targeted education and outreach (i.e. increase acceptability of free cool space) based on other successful public health campaigns,
- **Better monitoring and evaluation** of processes and outcomes – more studies to assess the implementation and reach of HHPs as to how they affect health statistics but also new methodologies are needed.
- **Be dynamic, reflective, flexible:** Adaptation measures and prevention efforts in HHP need to stay reflective and be continually reevaluated as temperature thresholds can change over time along with community vulnerability (Martinez et al. 2019).

Recommendations

Studies evaluating HHPs highlight the diversity of factors which must be taken into account when reviewing response plans. This has important implications for the Hotspots program as it emphasises the necessity of incorporating complexity (not reducing it). Hotspots is well placed to coordinate and collaborate in updating state HHPs.

Given the emphasis in HHP's on measurable physical outcomes of heat, Hotspots could have a role to play in offering insights and collecting information and communicating to government the complexity of individual and community support needs during heatwaves. This acknowledges the importance community level health and social services in informing capacity building of health departments.

3.2 Role of health and social outreach services in heat health plans

The important role of health and social outreach services has long been emphasised in climate change adaptation literature (Bowen & Friel 2015). However, within the heat health plan context – evaluations of community-based health and social outreach programs is lacking (Martinez et al. 2019; Mayrhuber et al. 2018). The broad range of community and individual experiences of heatwaves, create diverse factors that can influence the effectiveness and outcomes of heat health response services and activities. These variable factors add another layer of complexity when attempting to evaluate heat health response initiatives, and determining the extent to which activating these responses have influenced health and social inequality outcomes across communities and for individual residents.

Through literature reviews, Mayrhuber et al. (2018) and Bernard and McGeehin (2004) describe a range of public outreach actions initiated around the world at a localised level i.e. in cities across Germany, Italy, Canada and US These actions feature a different mix of health and social services used to both detect risk and protective factors, and to implement outreach and intervention programs in support of communities and individuals at risk and include actions such as home visits or phone calls by health workers (such as GPS, social workers or volunteers) to those identified as vulnerable, evacuation to nominated cooler locations and particular attention to those who are homeless (Mayrhuber et al. 2018) (See Table 1).

Table 1: List of outreach services currently recorded globally

Method to access at-risk communities and individuals	Location	Study
Voluntary registration systems where vulnerable people can register themselves (Paris; Kassel)	France, Germany	i.e. Mees et al. 2015
Registration system through health records (hospital admissions, GPs, social workers and those people over 65. Dedicated phone line for high risk individuals that is linked to a network of health and social services and monitored by GPs (Rome).	Italy	i.e. Michelozzi et al. 2010)
Modelling tool with indicators of heat exposure and adaptive capacity (Toronto); identification and registration of at-risk people through health departments, door to door surveys (Montreal)	Canada	i.e. Mees et al. 2015
Outreach services include list of most vulnerable kept updated and linked in with the postal service (if no mail is collected for a few days a community organisation is alerted), likewise with doormen (New York); home visits by service providers and identification of those who can't be moved (Detroit); individuals identified for homebased outreach through agencies and NGOs. This works through a buddy system with at-risk individuals visited by community volunteers; a heat hotline activates visits from nurses (Philadelphia)	US	i.e. White-Newsome et al. 2014 Mees et al. 2015
Heat information given to at-risk people registered on a warning list. Outreach services include, home visits to elderly during periods of heat	Japan	Martinez et al 2011

Adapted from literature review of Mayrhuber et al. (2018)

Experimentation with the different types of outreach programs and services mentioned above illustrate an awareness of place-based heat health initiatives being used in attempts to reach and engage more effectively with at-risk individuals and communities. However, the effectiveness or usefulness of these different outreach programs has not been explored. As noted in each study,

more research is needed to understand the effectiveness of and what is being learnt from health and social services (Bernard and McGeehin 2004; Mayrhuber et al. 2018). In addition, the levels of social trust in communities (as mentioned in sections above) will determine how engaged people may be with institutional HHPs.

Recommendations

As much of the research on heat health planning reflects a top-down perspective, there is an opportunity for Hotspots to improve the effectiveness of the state health approach with information and experience gathered from the community level ensuring HHPs include culturally appropriate and current local understandings of heat.

3.3 Victoria's heat health plan

The *Heat Health Plan for Victoria,* released in 2019, recognises extreme heat as 'one of the most significant natural hazards facing Victorians' (DHHS 2019a). It notes that despite this, collaborative actions across government departments, community organisations and individuals can effectively reduce its impact and this it is a 'shared responsibility'. The HHP outlines the definitions of extreme heat and heat waves, notes the most common health and infrastructure impacts, the heat health alert system, and discusses communication with key stakeholders, including targeting of preparedness messaging to those most at risk. Local governments will form their own place-based plans for extreme heat in accordance with the State HHP. Table 2 outlines the objectives and actions contained in the Victorian HHP. These are further detailed in Appendices 1 and 2. The Victorian HHP works in conjunction with other State emergency responses.

Table 2: Heat Health Plan for Victoria 2019: Objective and Actions

Objectives	Action	Communication
• Protect health of Victorian community from heat-related harm. • Outline preparedness and response activities for local government and the health and human services sectors to reduce the impact of extreme heat on the Victorian community.	• **Empowerment**: empower Victorian community to prepare for/respond to extreme heat, particularly those most at risk, their carers, family and service providers. • **Partnerships**: develop strong cross-sector partnerships through sharing good practice, extreme heat information, research and health advice to promote an informed and collective approach to preparing for and responding to extreme heat. • **Coordination**: ensure health impacts of extreme heat are considered and responded to as part of coordinated approach to Victoria's emergency management arrangements for extreme heat.	'Survive the Heat' campaign. (radio messaging, social media and digital messaging, community service announcements, media stories and stakeholder advocacy). Other Government departments, emergency services and agencies provide summer messages including: Never Leave Kids in Cars, Fire Ready and Water Safety.

Heat Health Plan for Victorians (2019a, p 1)

The Victorian HHP appears in line with the recommendations from the literature recognising the need for cross-sector collaborative planning and co-design of messaging; for localised responses, recognition and reaching out to vulnerable communities; and that processes and messages need to be reviewed after each heat season (see Appendices 1&2). While this follows the evidence from the literature, the DHHS claim that, 'heat health information is accessible for all Victorians' is something that will be become apparent over future summer seasons. There is a strong focus on the most vulnerable Victorians but not much detailed information as to how these communities are contacted

or the nuances of understanding complex vulnerability and attitudes to heat. Heat messaging will be delivered in multiple languages, but there is no clear information as to how CALD communities will be appropriately contacted, trust gained and dialogue established. For example, over the 2020 COVID pandemic lockdown in Victoria, despite the DHHS having information in over 57 languages and a commitment to information reaching all Victorians, there have been many reported issues of mistranslations, inaccessibility of information and lack of trust in government messaging, highlighting the need for CALD communities to be involved in the co-design of health messaging (Renaldi & Fang 2020). This illustrates the difficulty in providing health information to a diverse community like Victoria, and the importance of working with local community leaders as partners in health service delivery and through this process, continually evaluating and reviewing procedures for best practice.

Recommendations

Given Hotspots level of community engagement and experience reviewing community understandings of heat, the Initiative is ideally placed to critique and offer feedback to the state HHP. The Hotspots place-based, cross-sector approach offers a good model for developing partnerships to strengthen the capacity to empower and coordinate communities in different parts of Victoria as required by the Victorian HHP.

4. Design and evaluation of heat health initiatives: Community-based health and outreach programs

In general, emergency management has responded to the climatic crisis with formalised approaches such as heatwave declarations. However, climate change impacts are *place-based* and 'a one-size-fits all approach does not adequately address the diversity of needs, values, impacts, and issues that a changing climate will bring' (DELWP 2020). Top down programs primarily focus their measures on physical health indicators to inform the effectiveness of HHPs and initiatives, for example, reductions in heatwave-based mortality and morbidity rates (Mayrhuber et al. 2018). These measurements have been used mainly to inform resource and capacity building of health departments and the refinement of heat health warning systems without any insight into the role bottom-up, community-based health and social services and programs might be playing.

Community affiliated organisations need to be at the forefront of relationships and implementing intervention programs as these organisations are best placed to identify and tailor programs to at-risk communities and individual's needs (Benmarhnia et al. 2018; Mallon and Hamilton 2015). Active community outreach programs, such as *enliven*, have worked to build 'local climate change adaptation capacity by developing and trialing adaptation tools, shifting action from emergency responses to an anticipatory or proactive approach, and enhancing community resilience' (Rance et al. 2013, p. 3). The *enliven* Climate Change Adaptation Audit Tool 'developed to assist health and social service organisations self-assess their level of adaptation to climate change with a particular focus on extreme weather events' (Rance et al. 2013, p. 6), is one example of how dialogue and climate change awareness raising can take place within health and social services at the community level. Partnerships need to be built between the community and service providers at the local level so that social factors and issues relevant to the community and currently overlooked or misunderstood, may be included in heat health response strategies and tailored to meet local needs (Martinez et al. 2019; Yardley et al. 2011). Evidence informed, people centred practice (Bowen & Friel 2015) will ensure an accountability back to communities, and through this help build local resilience and adaptive capacity.

This review has gathered findings across various sources of academic and grey literature to be used in designing an effective and informed approach towards evaluations of programs and interventions to reduce the health impacts of heatwaves on vulnerable populations.

4.1 Best practice for design and evaluation of initiatives

Principles	Program Design and Evaluation
Best practice interventions in line with research	**Design:** Be guided by research-based collection and synthesis of key community intervention program principles, frameworks and program design templates used globally. Through observing and tracking research, a trend towards best practice may be detected. As literature suggests, interventions are always place-based and comparisons challenging. **Evaluation:** Current local community health service approaches need to be continually crosschecked against research so as to compare and understand, how other existing practices have attempted to approach the complexity and integration across sectors, organisations and communities. A learning-based evaluation would draw from best practice to regularly inform and reflect on program design.
Understanding vulnerability	**Design:** A key indication of best practice is identifying the effectiveness of reaching more isolated individuals within identified at-risk groups. This approach needs to be located in the research on the complex, interrelated nature of vulnerabilities, be across

	heat health data such as mortality data, hospitalisation, ambulance callout data, and involve ongoing engagement with identified at-risk groups. **Evaluation:** Ongoing engagement to re-evaluate the accuracy of vulnerability categories ensuring at-risk individuals and communities feel they are being correctly identified and appropriately resourced. A developmental approach to evaluation could capture changing understandings and experiences of vulnerability.
Communication	**Design:** Disseminating effective heatwave information needs to address all aspects detailed in this review including: (i) how heatwaves are defined and identified; (ii) critical reflection on how vulnerable communities are identified and accessed; and (iii) how daily and seasonal experiences of heat are understood and addressed. This not only involves the quality of communication between community services and communities themselves, but also between these community organisations and government departments. **Evaluation:** Reviewing to check messaging is reaching diverse communities. Collecting community feedback is crucial to integrate diverse voices in ongoing design of heat communications.
Data collection techniques and methodologies	**Design:** Due to the place-based nature of community health programs, project designs and evaluations might benefit from being learning based and experimental with a reflective approach toward understanding 'vulnerability' and effective interventions. This opens up opportunities for collecting information in innovative and inclusive ways such as person-centered journey mapping exercises throughout heatwave periods. Exercises such as these, are designed with a view to understanding how individual and community experiences and associated senses of wellbeing are impacted during heatwaves. **Evaluation:** Review literature for new methodologies in particular to find innovative ways to collect and integrate the lived experiences of culturally diverse and vulnerable communities. Assess whether collection techniques can also work/are appropriate as heat and climate networking, resilience building, education opportunities. Capturing process and outcomes data can inform learning and reflection throughout the programs and experience/effectiveness of interventions.
Climate adaptation and community resilience	**Design**: The changing climate is experienced very differently across metropolitan Melbourne, regional centres and rural areas. Strategies and responses need to be tailored to place-based contexts and support community capacity building. Heat health may be a good way to engage a variety of stakeholders to work collaboratively around the issues raised by a changing climate. Cooling solutions need to be understood within a context where the aim is to reduce energy consumption and emissions. A more collaborative approach between health service workers, urban designers, asset managers and planners can work on more sustainable solutions such as passive design for buildings, public cooling spaces, urban greening and housing retrofits and upgrades. **Evaluation:** Review evidence and opportunities for cross-sectorial interventions and advocacy across health heat projects and more broadly climate change responses. Review definitions of extreme heat, and that strategies and responses are reflective of the different perspectives, experiences and meanings coexisting within a place. Potential to capture understanding, gaps and needs across different sectors to inform capacity building efforts and coordinated interventions.
Learning framework	**Design:** Programs designed and tailored to place and context are necessarily learning-based and experimental. Establishing a monitoring and evaluation framework as an integrated part of the program will capture learning effectively and regular periods of review and reflection will ensure continuous improvement. **Evaluation:** Evidence-based response and management: community-based health services evaluation can provide evidence to inform improved heat health response and management. Based on lived experience, the role of periodic deep dives into peoples' day-to-day experiences offers contextual insights to provide more effective support for communities and individuals. Evaluations that are learning based and developmental are recommended.

5. Conclusion

As this review identifies, under a warming climate the impacts of heatwaves on the health of the community are leading to a range of government and community service sector responses and proactive measures that share an emphasis on the importance of responding to locality. It is now widely understood that vulnerability is complex and determined by social determinants of health (including economic, environmental and political factors), already unevenly distributed in communities, meaning climate change (or maladaptive actions) can exacerbate these vulnerabilities (Bowen et al. 2012). Community cohesion, social support, independence, access to information and health services, education, financial situation, personal agency, mobility and lived environment can all affect people's experience of vulnerability and resilience to heat. The literature suggests key aspects of HHP success are local governance; cost-effective, up to date technologies; respectful engagement with diverse populations; inclusion of local voices and expertise in co-design; ongoing reviewing of acclimatisation and adaptation through heat messaging; and climate sensitive urban planning and design. Overall, there is a need for program design to ensure that evaluation processes are learning based and integrated within community health programs to enable them to be reflexive, dynamic, tailored to place, climate sensitive and equity-focused to reduce the health impacts of heatwaves and contribute to community resilience and adaptive capacity.

5.1 Recommendations for Hotspots: Lessons from the literature

Recommendation 1: Defining heatwaves

While extreme heat events or heatwaves are clearly defined in Victoria's HHP, individual's heat health thresholds and experiences of heat and climate will vary. Official definitions of a heat threshold need to be revised in an ongoing capacity to be in line with place-based experience as climate and culture changes. The point at which HHPs will escalate or deescalate emergency heat health responses can be defined and refined and from on-going consultation with local communities about their past and present experiences, and reviewing of their needs. Alerts need to be deployed in time for proactive measures to be taken.

Recommendation 2: Defining vulnerable populations

Programs such as Hotspots can identify and seek to address the acute symptoms of vulnerabilities to heat events. They can also provide insights into the more structural, socio-economic drivers of peoples' vulnerabilities, but overall it is the wider 'ecosystem' of health and human services, and other societal contributors that will influence peoples' vulnerabilities to events such as heatwaves.

It is important that initiatives like Hotspots consider how people's belonging to multiple 'categories' might contribute to their vulnerabilities. It is also an oversimplification to suggest that all people who may fit a 'vulnerable group' category are such, because people experience varying adaptive and coping capacities.

Another point for Hotspots, and similar projects to be aware of is that, while government departments and organisations utilise place-specific heatwave definitions as a basis for implementing their Heat Health Plans (HHPs), the application of extreme heat or heatwave concepts at the local level in Victoria needs to take into consideration the diversity of cultural groups across the state and their differing experiences of heat. These need to be reassessed after each heat season as sensitivity to heat can change as populations change.

Where possible outreach services such as Hotspots need to collaborate with services that are working on cost-effective, climate warming, place-based solutions to place-based heat – such as

urban design, including urban greening, passive design solutions, retrofitting and public cooling centres.

Recommendation 3: Understanding day-to-day/season-to-season experiences

Further studies and evaluations are needed that engage with the more complex individual day-to-day, and season-to-season experiences of heatwaves and engaging with health and social services to develop more socially and culturally appropriate understandings of heat health impacts and responses that can engage with the diversity of social inequalities. The strengths of the Hotspots Initiative lends itself to engaging with the emergent and continually evolving nature of health impacts of heatwaves as they are experienced season-to-season, group-to-group, and individual-to-individual within local communities.

Recommendation 4: Communicating heatwaves

Hotspots teams and community partners need to be clear around the point at which they will escalate or deescalate their emergency heat health responses following conservative criteria rather than just following state warning systems. It would also be appropriate to define these criteria based on past experiences and practices, and in consultation with local communities. Partners will need to consider how these emergency heat health responses are presented to make sure they are tailored to the possible multiple cultural contexts of their vulnerable communities.

Recommendation 5: Supporting heat health planning

Studies evaluating HHPs highlight the diversity of factors which must be taken into account when reviewing response plans. This has important implications for the Hotspots program as it emphasises the necessity of incorporating complexity (not reducing it). Hotspots is well placed to coordinate and collaborate in updating state HHPs.

Given the emphasis in HHP's on measurable physical outcomes of heat, Hotspots could have a role to play in offering insights and collecting information and communicating to government the complexity of individual and community support needs during heatwaves. This acknowledges the importance community level health and social services in informing capacity building of health departments.

Recommendation 6: Improving heat health planning

As much of the research on heat health planning reflects a top-down perspective, there is an opportunity for Hotspots to improve the effectiveness of the state health approach with information and experience gathered from the community level ensuring HHPs include culturally appropriate and current local understandings of heat.

Recommendation 7: Strengthening partnerships

Given Hotspots level of community engagement and experience reviewing community understandings of heat, the Initiative is ideally placed to critique and offer feedback to the state HHP.

The Hotspots place-based, cross-sector approach offers a good model for developing partnerships to strengthen the capacity to empower and coordinate communities in different parts of Victoria.

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7. Appendices

Appendix 1

Table 3: Actions of the Department of Health and Human Services, Victoria before, during and after extreme heat

Outcome achieved	Prior to summer	Within three days of forecast extreme heat	During an extreme heat event	After an extreme heat event
Empowering Victorian communities	Support heat health planning at the community level to protect all Victorians, particularly those most at risk. Incorporate heat health messages into existing departmental programs that provide services to those most at risk. Prepare community heat health messages and the department's communication strategy to help identify heat health risks and mitigation actions. Undertake preparedness activities to support public housing tenants including releasing tips to stay cool as part of the 'Keeping in Touch' program for participating public housing tenants who are 75 years of age or older.[1]	Issue heat health messages through digital platforms and radio in line with the *Heat health communication strategy*. Consider issuing emergency advertising in consideration of the current forecast.	Issue media releases or hold interviews or press conferences with the Chief Health Officer, Ambulance Victoria and Emergency Management Commissioner to explain the event and how to protect health. Issue heat health messages through digital platforms and radio in line with the *Heat health communication strategy*.	Consider regional and state-level recovery activities and community messaging in line with the *Heat health communication strategy*.
Sector partnerships	Host regional seasonal preparedness and engagement forums to highlight seasonal preparedness arrangements for extreme heat. Identify and prepare 'Cooler Places'[2] for public housing tenants where possible. Identify established and develop networks to connect and engage with Aboriginal and culturally diverse communities. Provide local government, health and community service providers and community organisations with access to heat health communication resources. Participate in heat health and emergency preparedness forums to promote heat health planning, preparedness and response. Provide emergency management preparedness and response guidance	Issue a heat health alert when the heat health temperature threshold is reached or exceeded in a weather forecast district.	Actively monitor impacts through partnerships with Ambulance Victoria, NURSE-ON-CALL and the Real-time Health Emergency Monitoring System. Enact emergency management plans for services managed by the department.	

[1] The Keeping in Touch program is offered to tenants living alone who are aged 75 years of age or older. Registered tenants receive additional calls during heatwave periods to check on their welfare and provide details of the Cooler Places across the state.

[2] The Cooler Places program involves more than 100 public housing community facilities across Victoria operating as Cooler Places upon the declaration of a heat health alert. These Cooler Places are air-conditioned 'drop in' centres open to all public housing tenants and residents seeking relief from extreme temperatures.

Outcome achieved	Prior to summer	Within three days of forecast extreme heat	During an extreme heat event	After an extreme heat event
	to health and human service providers.			

From Heat Health Plan for Victorians (DHHS, 2019a, pp. .9-10)

Appendix 2

Table 4: Recommended actions for local government before, during and after extreme heat

Outcome achieved	Prior to summer	Within three days of forecast extreme heat	During an extreme heat event	After an extreme heat event
Empowering Victorian communities	Review organisational heat health plans and other plans containing heat health-related actions. Update individual heat health plans for clients and vulnerable-client lists. Talk with clients, family and carers about subscribing to receive heat health alerts. Develop or review the *Heat health communication strategy*. Order and display heat health communication material in council venues and distribute to clients. Consider long-term planning opportunities to reduce the impacts of extreme heat.	Provide consistent heat health messages during client visits and telephone calls. Ensure appropriate staffing levels and consider staff and client safety in extreme heat. Ensure staff engaging with the public are aware of council activities to support and protect Victorians from extreme heat. Instigate consistent community messages through local media or other communication channels. Update council websites and social media pages with heat health information or messaging from the mayor or CEO. Restock heat health communication materials and distribute to clients, where appropriate.	Reschedule any non-essential events, meetings and services to another day or to a cooler part of the day. Increase community messaging through local media and standard communication channels.	Actively engage with clients about how they are recovering from the heat and identify and respond to any new or emerging needs.
Partnerships	Engage with key stakeholders and community members to raise awareness about the risks of extreme heat. Engage staff across council to identify opportunities to promote heat health and enhance activities to respond to extreme heat. Identify established and informal networks to connect and engage with Aboriginal and culturally diverse communities.	Encourage local services, clubs and organisations to reschedule services or major events during the period of extreme heat.	Encourage local services, clubs and organisations to share heat health-related information through local networks.	Actively encourage local service providers to engage with clients about how they are recovering from the heat and identify and respond to any new or emerging needs.

Outcome achieved	Prior to summer	Within three days of forecast extreme heat	During an extreme heat event	After an extreme heat event
Coordination	Review and update the heat health plan and other relevant heat plans, including Municipal emergency management plans, business continuity plans. Ensure all relevant service areas of local government are subscribed to receive heat health alerts. Identify relevant information sources for residents who may be at risk of extreme heat in heat health planning. Participate in exercises and forums to discuss and improve individual and collective responses to extreme heat.	Take action in accordance with heat health plans or other plans containing heat-related actions such as business or service continuity plans, emergency management plans and occupational health and safety plans. Monitor local weather conditions on the Bureau of Meteorology's website.	Undertake council activities in the relevant heat health or emergency management plan as required.	Consider undertaking local recovery activities as required. Consider and implement lessons learnt.

From Heat Health Plan for Victorians (DHHS 2019a, pp. 11-14)