

Title: Lived Experience of Climate Change and The Impact on Health and Health Inequalities: A systematic review of qualitative studies from the UK

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Abstract:

Climate change is one of the biggest threats to public health in the 21st century. To date little action has been undertaken globally to mitigate the risks of climate change. The aim of this systematic review is to synthesise the qualitative literature on people's and the health care systems' lived experiences of climate change with a focus on health and health inequalities. We employed a narrative synthesis approach utilising a chronological perspective to frame the results. Seven electronic databases were searched for eligible studies which included Academic Search Ultimate; CINAHL; Embase; MEDLINE; PsycINFO; PubMed; Scopus; and Web of Science. The primary outcomes were lived experiences of the health/health inequalities effects of climate change. We identified 473 original records and eight papers met the inclusion criteria. Study quality was assessed by the Critical Appraisal Skills Programme for qualitative research. Seven studies focused on extreme weather events related to climate change with six of these looking at flooding and one at heat waves. One study examined perceptions and practice of people working in public health to adapting to climate change. Overall the results show challenges with perceiving and identifying risks of climate change which impact on preparedness for extreme weather events. The social determinants of health such as gender, housing, and community cohesion impact on people's experience of climate change potentially exacerbating inequalities. Social capital and how widespread the extreme weather event was in the community impact on how people feel after the event and the rebuilding process. Trust in local government was also a key factor in shaping people's perception of recovery. These findings can be used to help frame the dialogue around climate change mitigation and adaptation to reduce the negative health and health inequality impacts.

Keywords: Climate Change; Health Inequalities; Mental Health; Public Health; Adaptation; Lived Experience; UK

1. Introduction

The environmental consequences of climate change such as increasing frequency and intensity of extreme weather events like droughts, floods, and heat waves are already affecting the health and well-being of individuals and communities worldwide [1-3]. These events increase the risk of poor physical and mental health as well as mortality [4]. There is also the indirect impact on health of climate change such as potential disruptions to the food system, rising zoonoses, and food-, water- and vector-borne diseases [5]. Climate change impacts on the social determinants of health including safe air and drinking water, food security, and secure housing [5, 6]. Globally, the direct

costs to health from extreme weather events related to climate change is projected to be between USD 2-4 billion by 2030 [5].

In 2022, it was 30 years since the signing of the UN framework convention on climate change in which countries agreed to stop human made climate change and the subsequent negative impacts of this on human health and well-being [1]. Since then, some countries have made progress towards reducing emissions. But the overall picture is one of little meaningful progress with global carbon dioxide emissions - including land use and fossil carbon dioxide - increasing by approximately 0.8% in 2022 [7]. Currently, only 6 countries have adapted legally binding net zero targets; these countries are Sweden, Denmark, Hungary, New Zealand, France, and the UK [8]. However, approximately 70 countries have set a non-binding net zero target including the biggest emitters such as China, the US, and the European Union. Regarding adaptation to the health impacts of climate change, a WHO survey in 2021 found that only 52% of countries have a national health and climate change plan that is operational [9].

Why is there a lack of action? Part of the problem stems from the complexity of the issue. Mitigation requires transformational changes to almost all areas of economies and societies: from energy generation, transportation, manufacturing, food production and consumption. Adaptation is also complex because of the multiple interacting uncertain consequences of climate change. Hence, the complexity of the causes and consequences of climate change and what can be done nationally, at the community level and individually may lead to inaction. Inaction may also stem from misinformation [10], powerful actors with protected interests, or because dealing with climate change represents a collective action problem [11] or an example of the tragedy of the commons [12].

In the UK, the Climate Change Act 2008 [13] enshrined in law a commitment to reduce greenhouse gas emissions by 100% of 1990 levels by 2050. All government departments need to consider the impact of their decisions on climate change when making policies but the two main departments

responsible for climate change at present are Department for Business, Energy and Industrial Strategy (mitigation and reducing emissions) and Department for Environment and Rural Affairs (developing National Adaptation Strategy to address risks) [14]. Although, this is set to change with the reorganisation of BEIS into three departments of Energy Security and Net Zero, Science Innovation & Technology and Business and Trade.

The role of local government in adaptation and mitigation is less clear, even though it is estimated that 82% of all emissions are within the scope of local government (local authorities) [15]. While approximately 80% of local authorities have declared a climate emergency and developed climate action plans [16], there are currently no formal structures or funding at the national level to support local authorities to implement their climate action plans. Furthermore, the Climate Change Committee assessed that overall levels of planning for adaptation within local authorities is still limited and mandatory reporting, public information, public engagement and targeted adaptation support for vulnerable groups are not yet widely available' [17]. Progress is all the more difficult for local authorities because many are working in a resource constrained environment because of a sustained period of cuts to their funding from central government with increasing demand for their statutory services such as social care pushing climate change down the agenda [18]. This may impact on their ability to implement policy that considers the health and health inequality consequences of climate change.

However, local authorities have direct responsibility for public health, housing, planning, environmental risks such as flooding, economic development and education skills delivery, and fostering partnership working between the local community, businesses, and third sector organisations to support the health and economic well-being of their local area. Thus, local government is well placed to play an important role in developing local solutions to climate change [19].

To achieve meaningful engagement in the climate change agenda at the community level, however, it is important to understand people's lived experiences of climate change. Qualitative evidence is valuable for uncovering overlooked experiences of the health/health inequality impacts of climate change and highlighting the unique and surprising ways in which individuals and communities may perceive and respond to the issues.

Much climate change policy can be considered as one-dimensional focussing largely on quantitative inputs such as the overall degree of emission cuts required. Lack of progress in reducing emissions to the extent required may stem from not taking account of the contextual details and personal stories found in qualitative research. Qualitative data of this type can be particularly useful at the local level for local authorities developing community and person-centred climate change and public health policy, as it may help them to build up a holistic perspective on system-wide impacts in a way that would be hard to reproduce using quantitative methodologies[20,21].

The aim of this systematic review is to synthesize the evidence on people's lived experience of the health/health inequality effects of climate change, including on public health planning and health systems and their capacity to deliver care from extreme weather associated with climate change in the UK. This qualitative evidence contributes vital knowledge on the lived experiences, which policymakers can use to design policies that deliver equitable and effective protection for communities during extreme weather events and assist with health care planning. This will help improve the development and implementation of climate change policy overcoming some of the barriers faced to date.

2. Methods

We completed the systematic review in accordance with the 2020 PRISMA statement and registered it with PROSPERO (CRD42022352491).

Seven electronic databases were searched for eligible studies: Academic Search Ultimate; CINAHL; Embase; MEDLINE; PsycINFO; PubMed; Scopus; Web of Science. was developed after scanning relevant literature for key terms. Searches took place during July 2022. The search terms for the different databased are presented in Appendix 1.

After the team agreed the search strategy, pilot searches were run to check the search strategy picked up key texts. Search terms were subsequently refined and this process was repeated until all key texts appeared. Search strategies such as truncations and proximity searches were used to maximise results. Results were restricted to papers concerning the UK, published within the last ten years (2012-2022) and to English language results only.

2.1. Inclusion/exclusion criteria

To be included, studies needed to be focussed on the health/health inequality effects of climate change or weather phenomena reliably attributable to climate change, and report qualitative data regarding lived experiences (first-hand experiences). This may include lived experience of the impacts of climate change on health systems, and their capacity to deliver care.

Papers included in data synthesis satisfied the following inclusion criteria:

- Report qualitative data concerning any form of physical or mental health impact linked by respondents to climate change or weather phenomena linked to climate change.
- English language.
- Published between 2012-2022.
- Report data collected in the UK.

Papers were excluded if they satisfied any of the following criteria:

- Reports only quantitative data.

- Reports data without the research participant having any direct experience of the health-related impacts of climate change.
- Report health/health inequalities data related to weather phenomena that cannot be reliably linked to climate change according to expert consensus as represented in the latest publications of the Intergovernmental Panel on Climate Change [22].
- Report impacts of climate change other than those concerning health and/or health inequalities.

The primary outcomes we sought to address were lived experiences (direct, first-hand experiences) of the health/health inequalities effects of climate change. This included data collected from interviews, focus groups, observations, journals, policy papers, or questionnaires with open-ended questions allowing the entry of free-text data.

We also extracted information on participant characteristics including age, gender, and factors related to socioeconomic status such as home ownership where available. If this information was missing or not reported we did not describe it in the results section.

Two reviewers (SD and HB) independently screened all papers according to the inclusion criteria above using the Rayyan online review platform. The two reviewers independently extracted the data, then compared data extracts, and agreed what would be extracted for each paper. The data extraction fields are presented in Appendix 2.

Quality Appraisal

We used the Critical Appraisal Skills Programme quality checklist for qualitative research. Both reviewers carried out the quality check on included papers and were in agreement that all papers were of sufficient quality to be included in the final synthesis.

Analysis:

We use a narrative synthesis to present the findings [23]. We follow extreme weather chronologically, starting with preparedness before an event, then findings from during and

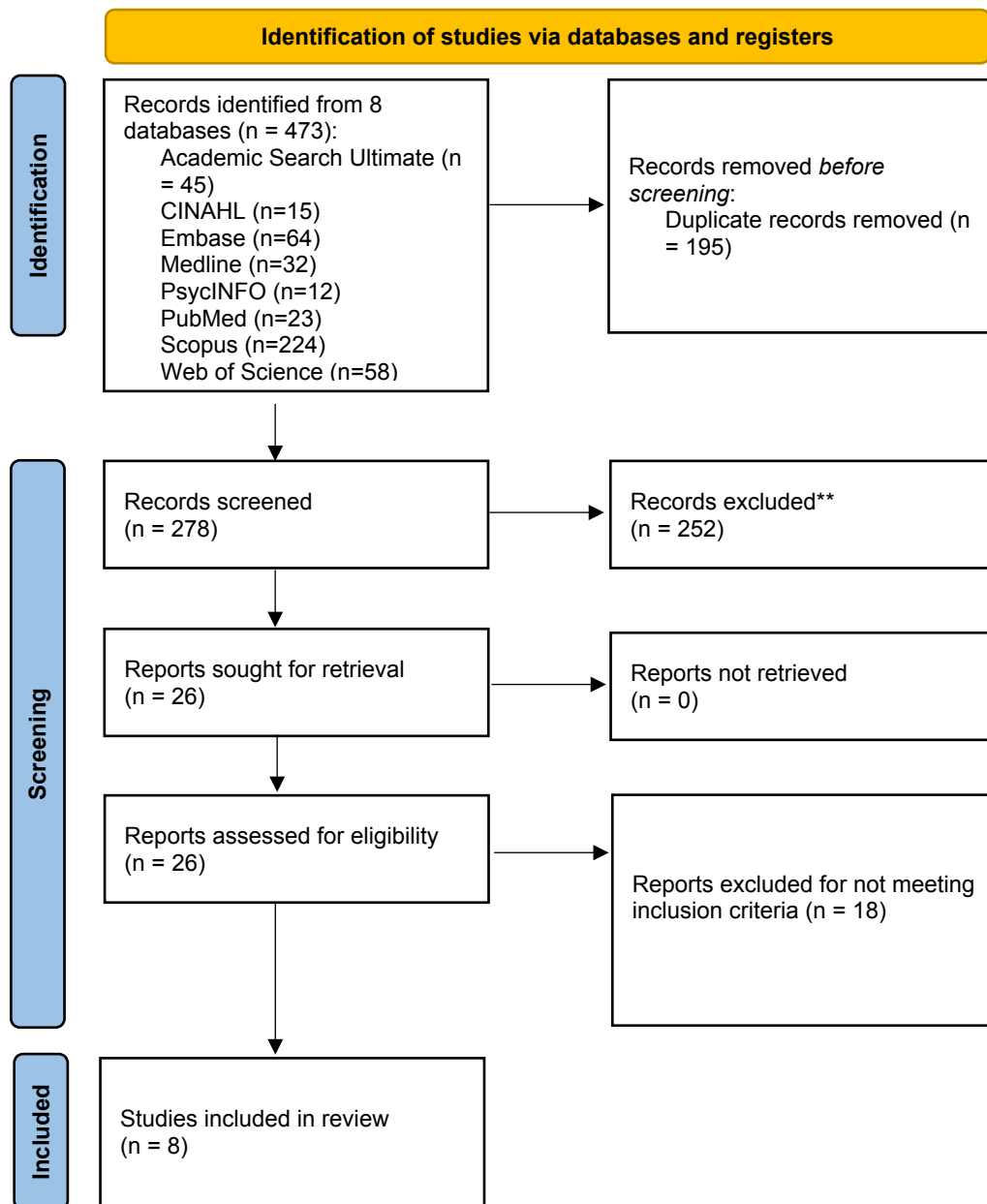
immediately after an extreme weather event, and finally investigating the literature focused on the medium to long term after the event to understand how these different time points impact on health and health inequalities.

This approach has many similarities to related literature such as chronological models of emergency management [24] and the process perspective on analysing crises [25]. Taking this type of approach has the advantage that it emphasises the way crises often involve distinct phases in which normal life is interrupted, and further stages in which actors interpret and process the new world they inhabit [25]. As we shall see as we synthesise the findings of included papers, such approaches reveal the different roles of actors at each distinct stage of the process, and the cascading consequences of events on subsequent stages of the process.

3. Results

We identified 473 potentially eligible studies. A total of 8 studies were identified that met the inclusion criteria. A description of included studies can be found in Table 1. There were 7 studies which considered extreme weather events from climate change. Of these, there were 6 studies that looked particularly at flooding and 1 focused on heat waves. One study focused on perceptions and practicalities of adaption to climate change by those working in public health. In four out of 8 of the studies the majority of participants were older adults [26,27,28,35] aged 64 or older which has implications for interpretation of the findings. Two of the studies [28,35] use the same sample. The PRISMA diagram is presented in Figure 1.

Figure 1: Prisma 2020 Flow Diagram

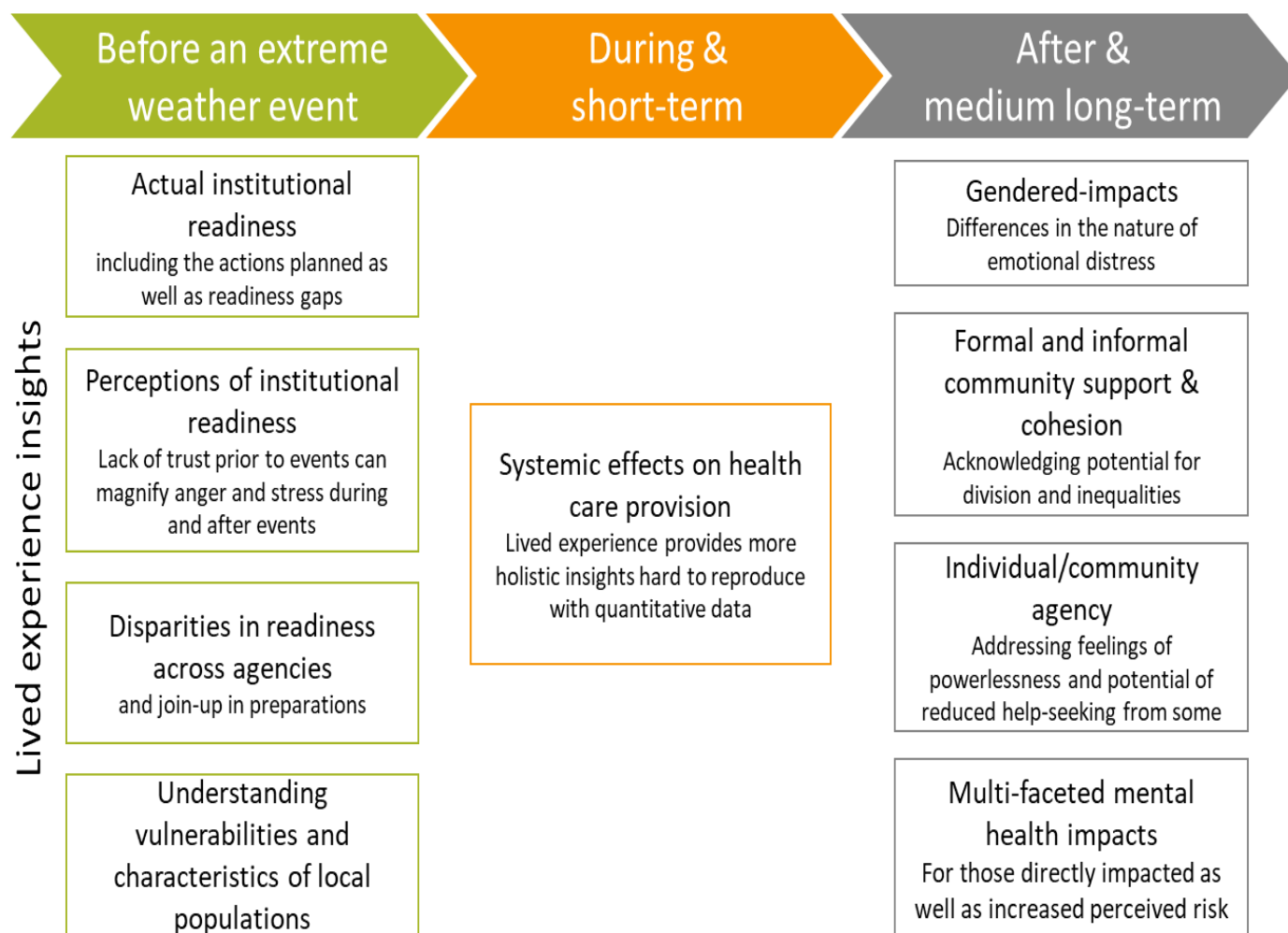


Findings are grouped as per in Figure 2. Before an extreme weather event occurs, there is the use and access of evidence to develop emergency plans including evidence on the health and health inequality dimension of emergencies. An important component of developing these plans is the pre-existing relationship with the community including trust and incorporating their opinions and needs

into emergency plans. The quality of preparedness also depends on the funding/resources available to all stakeholders in the community, and multi-agency working between all relevant local actors. Externally, area level characteristics such as the housing stock, risk of extreme weather events, population characteristics and vulnerabilities and infrastructure will influence how emergency plans are enacted and the resilience of communities when an extreme weather event occurs. During and immediately after an extreme weather event, actions and responses will influence health outcomes and inequalities in these outcomes. The effect of the extreme weather event on health will also be dependent upon local area characteristics including community cohesion and social capital, how well different actors work together to support the emergency response, and communication from key actors to the public. Health outcomes in the medium to long term will be influenced by institutional support, including future adaptations in the local community, community cohesion, individual agency, and ability to navigate repairs and rebuilding. These outcomes may differ depending on the social determinants of health.

Key themes from these 8 studies are found in Appendix 3. Appendix 4 outlines key quotes from the 8 studies.

Figure 2: Conceptual Model of Findings



3.1. Before an Extreme Weather Event

Two included studies [26, 27] focussed on how institutional readiness to provide support during extreme weather events can shape people’s lived experiences of the events, for better or for worse. Butler et al. [27] found that ‘it is not only what support and intervention authorities deliver but how such support is enacted that ultimately affects mental health outcomes’. For example, they found that emergency evacuations can impact negatively on mental health, when no or little information is

provided in advance of the evacuation, leaving residents unprepared for the realities of evacuation, leading to anxiety and stress. Not knowing about evacuation centres also made some residents feel that they were left to cope on their own. Developing plans for effective and appropriate communication with residents when extreme weather hits can thus help shape people's lived experiences for the better. This can also include planning for residents to keep in touch and for the recruitment of local support workers that can step in and provide support when extreme weather events hit. An effective plan for how to enact those support structures when extreme weather hits, however, is important in shaping people's experiences for the better [27].

Institutional support for communities that face persistent flood risk and the way that support is delivered has also been found to shape and impact on mental health. Fothergill et al. [26] found living with a persistent flood risk to be a significant stressor that was made worse when local and national government failed to deliver the protection that the residents expected. They describe how a perceived failure of local and national government to deliver a flood alleviation scheme led to feelings of anger from residents when their homes were flooded, which in turn lowered their confidence and trust in institutions to provide support when it is most needed. People who had been flooded reported feeling uninformed and lacking preparedness for future events[27].

The adequacy of preparations made for extreme weather events depends in part on the risk perceptions of decision makers. This topic is explored in two papers [28, 29]. Negev and Kovats [29] data revealed public health officers perceive climate change as a significant risk to public health in the UK but have a stronger understanding of the short-term risks (0-5 years) than the long-term (15-50 years). These limitations in awareness are linked to gaps between national policies and local needs, with participants unaware of key national policy documents such as the National Adaptation Programme [30]. Other factors inhibiting effective adaptation were 'lack of long-term clarity, lack of public and political will, the short-term 4-5 years political cycle and other public health priorities'.

Inferring from their data, Negev and Kovats [29] proposed a solution of reframing the issues to focus on concepts such as 'community resilience', 'sustainability', and 'reducing inequalities'.

Landeg's [28] study of strategic decision makers (those within the County Emergency Centre or Public Health Consultants) and local health service managers show inconsistencies in the level of awareness of flooding resulting in disparities in preparedness. When comparing the strategic decision makers and health service managers, frontline services were found to be less aware of the risk of severe floods, while strategic professionals were better integrated into systems for sharing flood warnings, and therefore more prepared. These differences in perceived risk had serious consequences when an extreme weather event did occur, with one frontline professional commenting that '[flooding] *was worse than we expected ... the actual aftermath of patients wanting to be seen etc., was a lot more chaotic*'. Landeg et al [28] link this lack of preparation to failures of coordination and joining up of public sector agencies. A lack of partnership working may lead to inefficiencies or gaps in provision. An example given was difficulty in creating a list of vulnerable people to be shared between frontline responders and the Strategic Coordination Group.

3.2. Immediately Before, During and After Extreme Weather Events

During an extreme weather event both health care professionals and patients are faced with a disruption to services which may impact on the health of both groups. For health care professionals there will be the stress of the situation and for patients there will be a reduction or change in care. Effects of extreme weather on health service provision were shown in the Landeg et al. [28] study of flooding in Boston, Lincolnshire. One of many problems was travel disruptions causing staff shortages and difficulties for patients trying to access care. A variety of healthcare services were disrupted such as dialysis treatment, elective surgeries, outpatient clinics, dentistry, sexual health, GPs, and mental health services. A challenging situation developed in the local district hospital in which staff prepared for 'vertical evacuation (moving patients to a higher floor away from the area of danger) with clinicians undertaking evacuation triage of inpatients'. Other effects on the hospital

included delays to discharges to avoid patients returning to flooded or at-risk homes. In addition, ambulances had difficulty reaching patients and were rerouted to other hospitals. The effects of the disruption extended to most of the entire local health system as the following quote illustrates:

'If the nursing homes were going to be evacuated, where were we going to put those people because at that time, it was a time of winter pressures as well ... how would we maintain the acute trust services because if we put some of those into our community hospitals, then the community hospitals wouldn't be able to discharge, so it raised a lot of questions in terms of the whole system working. (local service manager 006).'

Despite significant disruptions, in the Landeg et al. [29] study point to how the shock of a severe weather event can create opportunities for improving resilience in that it may raise awareness of risk and lead to greater preparedness through highlighting weaknesses in local infrastructure and response systems [29].

Nobert and Pelling [26] as the only paper exploring people's lived experience of heat waves take a completely different view point. Discussing the 2013 heat wave of 2013, they find that older Londoners they speak to highlight the short-term nature of these events. This short-term nature of the event and their life experience means that they find it easy to adapt. They also mention since their time left on earth is short they are less concerned with climate change as it will not really affect them. They feel that spending money adapting to potential heat waves is a waste of resources.

3.3. Medium/Long Term-Role of Different Actors and How This May Contribute to Health Inequalities

In the medium to long term as outlined in Figure 2, individual and area level characteristics may magnify the health impacts of an extreme weather event. The negative impacts may affect certain groups disproportionately, increasing health inequalities. Inequalities in exposure to harms through climate change related weather events may be described as the state of being 'climatically-disadvantaged' [32], meaning to be 'disproportionately likely to experience emotional distress as a

result of environmental injustice'[32-34]. A form of this inequality is evident in research by du Bray [32] and Akerkar and Fordham [33] on the role of gender in flood events. Akerkar and Fordham [33] reported that men and women recovered equally well from an extreme weather event and mostly equally in mental health after the floods. Gender differences were found in subjective interpretations of the flood event: a higher percentage of women than men felt traumatised by the floods to a high extent. This difference in trauma levels was linked to differing perceptions of home between men and women. Such findings suggest that women bear higher mental stress than men in disasters. Women links the perceived trauma with their feeling of insecurity and lack of safety in their homes. The temporary loss of home and neighbourhood attachments were felt more intensively by women than men. An example of the trauma experienced by women due to the insecurity and loss of safety associated with flooding is the following quotation:

The horrible thing is I don't feel safe over here anymore ... you know what I mean ... In your house, you should be able to come in and feel safe, but I don't feel like that anymore ... there is a little bit at the back of my mind, where you think that if it has happened once, it can happen again, no matter what others say ...

Akerkar and Fordham [33] also noted that the differences in predictors for mental health recovery arise from the mobilisation of traditional notions of masculinity and femininity by flood-affected men and women.

du Bray [32] found that men and women use different language to refer to their emotions after flooding. Specifically, women tended to report being sad where men reported being angry. For the men in her study from London, this could include anger at the future being left for younger generations or the perception that policy and planning is short-sighted: "As a man in London indicated, "[It's] more personal, because I have a personal connection with agriculture. [I'm] very angry because the future is shortsighted." A woman's response in England exemplified sadness about the younger generations and the perception that their prospects may be inferior: "[I'm] sad

because I want the same opportunities available for future children as well". Men and women's use of differing emotional vocabularies to describe their experiences was rooted in their experience of differing vulnerabilities [33].

3.3.1. Formal and Informal Community Support in Extreme Weather Recovery

Community resilience and social capital are a key component in influencing people's mental health after an extreme weather event. Those who lack the support of their community may be at a higher risk of adverse mental health outcomes as they struggle to cope with the impacts of extreme weather while being isolated from their community. The role of the community in giving support to individuals, lifting their spirits, and nurturing their recovery is a common theme in four of the included studies [27, 28, 33, 35]. Each show how recoveries are influenced by the level of support individuals receive from their surrounding community. In detailing this, Butler et al [28] found two forms community support can take: 1) emotional support and bonding over common experiences, and 2) practical support such as 'offers of dinner to those whose homes had flooded'. A similar distinction is made by Walker-Springett et al [35], in their case separating formal and informal community support, with the former exemplified by 'donations from local businesses, volunteering, support centres' and the latter illustrated by the following quotation:

"I almost had to keep a diary of social engagements because people were saying "lunch?", "No, I'm going to lunch", "supper?", "er, oh lovely, I can do Thursday", which was wonderful and they'd say "Bring your washing" and these people just up the road, so people you knew, you got to know much, much better and a fantastic kindness shown by people, it really was lovely".

There is evidence of strengthened community bonds or social capital [36] in the aftermath of floods, with, for example, Walker-Springett et al [35] noting instances of research participants saying that community relations had strengthened such as the following quotations:

“In some respects you could even say the floods have been a positive thing, in building community feel and communication and stuff.” (Participant 26, flooded in home)

“a bit of a Blitz spirit thing, which can be quite bonding to a community, to face a common threat and to be ... the experience of neighbours helping one another is a good thing. There's an awful lot of goodwill was generated.”

“There were good bits which sounds awful in times of flooding but the community coherence stuff was just phenomenal, it really brought you, it re-engaged your faith in humanity actually”

While four included papers [27, 28, 33, 35] demonstrate a supportive role for community, both in the short and long term, Butler et al [28] cautioned that differences in the degree to which one is flooded, or in whether one is fully insured, can have 'more corrosive implications for community dynamics'. For example, one of their participants observed the following:

“I know there are friendships that used to be really strong, where you've got people who have been either side of one of the many divides, either insured/not insured, flooded/not flooded and something has driven a wedge between them and they're not actually the best of friends anymore because they can't cope with the change in circumstances that they've had to suffer”.

Divisions that emerge over these types of differences can worsen an 'already challenging situation with implications for mental health'. This underlines the need to cultivate strong community ties following an extreme event, and to try to avoid the perception that some sections of a community are being treated preferentially.

The findings above on community support and recovery after extreme weather event suggests that policies aimed at promoting strong community relations and forestalling the growth of sources of division, such as support for community forums, can have positive effects on health and health inequalities by reducing social isolation.

3.3.2. Agency, Self-efficacy, Control, and Institutional Support

An important dimension to people's long-term health after an extreme weather event is their sense of agency and self-efficacy to support recovery. This can be bolstered by appropriate institutional support and signposting. This was demonstrated in two papers [28,35]. These papers demonstrated an important synergy between the support one receives from institutions, and the agency and control one is able to exert over one's recovery. That is, the question of an individual's resilience and capacity to recover their health is not simply a matter of personal characteristics but the outcome of their access to services and the extent to which agencies enable individuals and communities to 'take action and... support themselves in times of crisis' [28]. Showing how emotional resilience intersects with community and institutional support, and personal identity, Butler et al [28] argued that policy and practice which enable individuals and communities to exercise agency and take control in times of crisis can improve 'psychological, emotional, and social resilience, alleviating some of the mental health burden and potentially facilitating better outcomes'. They [28] also noted that the extent to which individuals can mount a successful recovery is mediated by their willingness and ability to access services and institutional support.

Where institutional support is absent or inadequate, feelings of powerlessness and loss of agency can grow, and mental health symptoms can develop, when individuals feel a lack of control over the 'causes of the floods, the responses of different authorities to the floods, and the recovery process' [35]. When residents could not access the information they required from experts such as those in the Environment Agency, they turned to 'local experts' with lived experience of what flood management strategies worked for them' [35].

Another layer to the issue of whether individuals were willing and able to access help from agencies is the extent to which they feel they need additional support. This could take the form of self-identification as a self-reliant sort of person who did not need help, even when individuals had experienced a degree of trauma [28]. A quote illustrating this type of attitude is the following:

"I firmly believe that the best person to help you is yourself and your neighbours and your community and by helping each other, we do help ourselves, it makes me feel better to feel that we have got a plan, being a helpless victim, just makes it worse, it disempowers you from being able to do anything" [28].

While feelings of self-reliance may be a positive factor in many cases, the data presenting by Butler et al suggest these feelings can, in some cases, reduce help-seeking behaviours.

3.3.3. Psychological Impacts - Self-Identity and Emotional Well-Being -

The mental health effects of extreme weather events may be profound, multi-faceted and long term. As with the distribution of the other adverse impacts of extreme weather events, the mental health effects are likely to be serious for working class communities and communities of colour [34]. Mental health impacts may take several forms including challenges to self-identity caused by flood events, and the need for research participants to revise their notions of self because of becoming less self-reliant [27]. Another form it may take is long-term feelings of insecurity associated with flood waters entering one's home, and the fear that accompanies the threat of further flooding:

"I found it [the flooding] hugely threatening and oppressive but also hugely dominating because everybody around here is going round with their shoulders hunched"[34].

"This is the frightening thing, there is absolutely no way, if it's going to come in then its gonna come in. And you have no control over it. That's the worst feeling, not to have control in a situation." [26].

Other emotional responses recorded by Fothergill et al refer to the worry, anxiety and stress felt by their participants about future flood risk. These feelings were present 'most of the time' for those living in areas of high risk. The following quote encapsulates the pervasive fear and anxiety of such situations:

I'm more worried about leaving it [the house], because my daughter said "oh just pack up and come to me." But that would make it worse, not being here is worse really—you don't want to be here, but not being here, not seeing what's happening is worse. So it's just constantly there". [26].

The threat of future flooding can even lead to great anxiety in those with no first-hand experience of flooding who lived-in high-risk areas [27]. For some, concerns about future extreme weather events can have long-lasting effects and morph into a 'sense of anticipation, almost waiting, for the next flood, impacting an individual's peace of mind and day-to-day well-being' [27]. Such is the level of anxiety that some of Fothergill et al's [27] participants had developed counteracting coping mechanisms such as checking weather forecast and water levels:

"I became a bit obsessed with river levels and things like that, I started to, kind of, look at this information that I'd never really paid any attention to ever before, because I think that's part of my way of dealing with something like that, is to learn about it so I can be a bit more prepared." [26].

Capturing longitudinal data, Walker-Springett et al [35] show how progress in longer term psychological recovery from flooding (twelve to fourteen months after flood waters receded) could be uneven, with perceptions of imminent risk slowly subsiding, and feelings of safety increasing, but negative perceptions of the person's home and surrounding area proving more persistent.

Mental health impacts were also noted at a systemic level by regional strategic decision makers and local service managers who observed an increased demand for psychological services in the area affected by flooding [29].

4. Discussion

The aim of our systematic review was to synthesise the evidence from the UK on people's lived experience including on health systems, and their capacity to deliver care from extreme weather associated with the health and health inequalities impacts of climate change. We identified 8 studies. The UK is at particular risk as an island nation to rising sea levels and is already experiencing

increasing frequency of extreme heat events [36]. The literature highlights a range of ways in which climate change is already having significant impacts on individuals' lived experiences of health and health inequalities in the UK.

When preparing for extreme weather events which are becoming more frequent because of climate change, we found evidence in the literature of failures of joining up working across agencies. There are some exemplars which could be followed such as Mexico whose 2015 Climate Change mid-Century Strategy which explicitly acknowledges the relationship between mitigation and health through high-level regulatory action linking air pollution control and climate change mitigation measures [37]. Lack of partnership working may increase the likelihood of negative health outcomes for the most vulnerable after an extreme weather event. This could be remedied by more systematic and accurate mapping of household and individual vulnerabilities, but also by taking into account the lived experiences of the local population, learning from what they identify as sources of vulnerability, risk and resilience in their locality. Effective system working between different organisations during the height of the Covid-19 pandemic highlighted how partnership working may be a valuable tool to improve population health and reduce health inequalities [39].

We found in the literature that during an extreme weather event there were challenges around communication, how to effectively deliver health care, and uncertainty about the event and where to find appropriate information. This lack of preparedness and difficulty with communication was also evident after Hurricane Sandy in the USA (the second largest tropical cyclone on record) [40]. If policymakers consider the lived experiences of local people and include the voices of those living in at-risk areas, including perceptions of the actions and inactions of institutions in shaping the damage to human infrastructure of extreme weather events, they will be better equipped to deliver person-centred policies that are tailored to local populations, leading to responses that deliver equitable and effective protection of every community during extreme weather events.

In the medium to long-term after an extreme weather event, we found in the literature that there were gender inequalities in perception of floods, anxiety and worry for future generations. This has also been found in the wider literature that women on average feel the risk of flooding more intensely than men but then outwardly do not necessarily act out these fears any differently than men [41-43]. Evidence regarding the relationship between agency and institutional support suggest it is valuable to nurture strong links between public sector agencies and households at each stage of a crisis, helping to reduce a sense of a loss of control on the part of individuals and households particularly for more vulnerable members of the community. Findings suggest for some there are negative long term mental health impacts of extreme weather events such as flooding [27, 28, 33, 35].

Our synthesis of the literature suggested that emergency policies need to consider the uncertainty and anxiety associated with these types of events, and to not neglect them in a favour of an exclusive emphasis on physical health and infrastructural recovery. This includes identifying and being sensitive to pre-existing vulnerabilities and grievances that may influence outcomes from extreme weather events. This may highlight inequalities to policy makers that they had not realised were present. Additionally, local policy should be considerate of community and intra-community dynamics and factor this into disaster planning. If policymakers act on such findings, they will be well placed to direct resources towards strengthening the institutional, community and interpersonal conditions needed for resilience. This resilience will aid in the recovery of individuals and communities affected by extreme weather events potentially reducing the financial and health costs of such events. Policy informed by lived experience will be stronger and more effective but will also be more supportive of every part of the local population and avoid feelings of powerlessness and loss of agency[44]. This will also promote equity and ensure policy responds to the specific needs and concerns of those who will be most affected by extreme weather events, meaning the most vulnerable parts of society are not left behind. In this case, part of the benefit of the qualitative data

is that it helps to build up a holistic and integrated perspective on system-wide impacts in a way that would be hard to reproduce using quantitative methodologies.

5. Implications for Policy and Future Research

To enable the inclusion of lived experience in the development of emergency plans for extreme weather events, community consultation and support can be used, paying particular attention to the voices of those most affected and those liable to be marginalised from the usual processes. This reaching out to communities could itself be used to build trust and collect additional evidence for policy making. Future policy-relevant research in this area could use participatory research methodologies to co-produce research findings that are relevant to research participants, and true to their lived experiences, ensuring findings are useful to local communities.

Another crucial consideration for researchers is the risk that extreme weather events may worsen existing inequalities, and, in the process, reduce the resilience of those who are least prepared for future events. Clearly, if each weather event tends to reinforce existing health inequalities, and extreme weather events become more common due to advancing climate change, there is a risk of a downward spiral of inequality setting in, with disadvantaged communities becoming increasingly vulnerable to the negative impacts of extreme weather events over time. Research into the broad theme of health inequalities and climate change is therefore essential, as well as further work on the specific forms of inequality uncovered in this review such as gender inequalities in flood impacts and inequalities of access to community support.

That there is so little literature of this nature for the UK is of concern. The literature addresses a very narrow subset of the climate changes that will be experienced by the UK's population, and at present does not provide a systematic coverage of actors that influence and experience the health outcomes of climate-related extreme weather events. Hence, we call for a focus on research that

delivers these lived experience insights, as they become more common, to aid our learning and preparedness and secure more favourable health outcomes in the face of this major challenge.

More research is needed with younger people to understand the mental health impacts of climate change and how this impact on health and health inequalities. Their voice is missing from the research we identified. The majority of research has focused on flooding as heat waves become more frequent it is important to understand how this impacts on health and health inequalities.

6. Strengths and weaknesses

A weakness of our approach is the limited scope of it being a small-scale, UK only review. However, this is also a strength in the sense that the qualitative data provides a narrow but rich interpretation of the specific situation in the UK. Another weakness of our approach is that participants in included studies tend to be drawn from an unrepresentative subset of the population who are older homeowners.

The strengths of the review included that we used a comprehensive search strategy, searching 7 databases. Another strength is the policy relevance of our findings because we have shown that the type of local and highly contextual data collected in the review can be valuable for local authorities seeking to understand health risks from climate change in their area. The value of this type of data can be easily overlooked by larger scale risk prediction tools that base forecasts on factors such as topography or climate. Thus, we have shown the value of a particular way of studying health risks from climate change and provided valuable insight in an under-researched area of critical importance.

7. Conclusion

The literature summarised in this review provides compelling reasons to incorporate the lived experiences of those affected by extreme weather events into policy. The themes discussed demonstrate the complex and nuanced ways in which climate change and extreme weather events impact the health and well-being of individuals and communities, highlighting the need for person-centred and community-focused policies. The themes discussed might be best thought of as a web of interconnected factors that each intersect in the lives of those affected, shaping their experiences. It follows that policymakers and researchers should consider these factors in a holistic way that is responsive to the needs of the population and its constituent communities. It is precisely for this purpose that qualitative data comes into its own, offering a detailed, holistic and well-rounded view of the situation in a given area. Better long-term policies, especially at the local level, will be facilitated by giving voice to lived experiences of the public through in-depth qualitative

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Competing Interest:

The authors report no competing interests

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Table 1: Description of Included Studies

Publication Details	Aims and Objectives	Context/Setting	Weather phenomena	Health/health inequality impact	Sampling Approach, Sampling Size, & Participant Characteristics
Negev, M., & Kovats, R. S. (2016). Climate change adaptation in the reorganized UK public health system: a view from local government. <i>Public health</i> , 134, 102-104.	Map and analyse the perceptions and practicalities of climate change adaptation in the public health sector in England at the regional and local level.	Public Health England centres Local authorities	Climate change	Not specifically mentioned. Risk to health in general	Interviewees were randomly selected, with geographical bias to the South East of England (urban & rural) to enable face-to-face interviews. In addition, consultations were carried out with four senior professionals in the public health system, whose role is related directly to climate change and adaptation. Eight in-depth interviews were conducted. four with directors of PHE centres (DPHEC) and four with Directors of Public Health (DPH) at Local Authorities.
Landeg, O., Whitman, G., Walker-Springett, K., Butler, C., Bone, A., & Kovats, S. (2019). Coastal flooding and frontline health care services: challenges for flood risk resilience in the English health care system. <i>Journal of health services research & policy</i> , 24(4), 219-228.	This study aimed to assess the health care system impacts associated with the December 2013 east coast storm surge and subsequent flooding in Boston, a port town in Lincolnshire	Boston, a port town in Lincolnshire. Health and public health settings	Flooding	Determining vulnerability to the health impacts of flooding is complex. Difficulties in defining the term 'vulnerability' and different institutional practices for formatting data hindered information sharing and the compilation of a comprehensive list of vulnerable individuals. 'Hidden' populations (such as (unregistered) migrant workers) and those with English as a second language challenged effective communication of flood risks.	Snowball sampling was used to ensure the study had participants across a broad range of expertise. A strategy to determine the appropriateness of the sample size broadly in line with the concept of saturation was applied, with suggested individuals/services being invited and interviewed until no new themes or issues emerged. A total of 18 semistructured interviews were conducted, 7 face-to-face and 11 via telephone

<p>Du Bray, M. V. (2017). <i>Cross-Cultural Approaches to Understanding the Emotional Geographies of Climate</i>. Arizona State University.</p>	<p>To explore the inequitable distribution of emotional responses to climate change in four island nations and the environmental justice implications and men's and women's emotional responses to climate change. Also, to analyze the dimensions of emotional expression between genders and to recognize patterns in the ways that men and women express emotions during open-ended interviews</p>	<p>USA; Fiji; Cyprus; new Zealand; UK</p>	<p>Climate change</p>	<p>Respondents in London face a different set of exposures than respondents in the other three sites. As a water rich environment and financial center set back from the coast, England has the highest adaptive capacity; however, due to its location on the Thames, London is sensitive to flooding risk. Additionally, the city may become a destination for climate refugees due to its temperate climate and robust economy</p>	<p>Field sites for this year's research were selected based on biophysical vulnerability to climate change and the similarities and differences therein. Additional field sites were selected based on presence of ethnographic experts to assist with the data collection. Chapter 4-5 - 272 respondents. 'with a minimum sample of forty respondents (68 in the Fiji site; 40 in the Cyprus site; 86 in the New Zealand site; 78 in the London site)'</p>
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<p>Akerkar, S., & Fordham, M. (2017). Gender, place and mental health recovery in disasters: Addressing issues of equality and difference. <i>International journal of disaster risk reduction</i>, 23, 218-230.</p>	<p>The main research questions for the study were: How have floods affected the mental health of men and women? How have place-based social constructs and beliefs affected mental health outcomes of flood affected men and women?</p>	<p>Tewkesbury floods of 2007. An estimated 810 properties were affected by flooding in Tewkesbury, with the centre of town being completely cut off [41]. Fifteen hundred buildings were flooded in Tewkesbury by both flash and fluvial flooding , and Morpeth floods of 2008- Overall the flood caused direct damage to 1012 properties, including 913 residential properties of which 615 were 'severely affected'. Many people were displaced and the economic damages were probably the greatest ever experienced in Morpeth</p>	<p>Flooding</p>	<p>Inequalities by the social determinants of health (e.g. gender) Mental health</p>	<p>A survey questionnaire was administered to randomly sampled 136 flood affected persons in Tewkesbury in January 2009. In Morpeth, a randomly selected sample of 236 flooded households was interviewed. Tewkesbury: 60 men and 76 women. Morpeth: 90 men and 146 women.</p>
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<p>Butler, C., Walker-Springett, K., & Adger, W. N. (2018). Narratives of recovery after floods: Mental health, institutions, and intervention. <i>Social Science & Medicine</i>, 216, 67-73.</p>	<p>This study examines the processes of individuals' recovery from flood events, focusing on the role of interaction with agencies in the trajectories of mental health journeys</p>	<p>In the winter of 2013/14, the UK experienced a prolonged wet and stormy winter, resulting in widespread flooding. One of the worst affected areas was Somerset in Southwest England, which experienced severe prolonged flooding with approximately 280 homes and 65 km² of agricultural land being inundated for a period of twelve weeks or more.</p>	<p>Flooding</p>	<p>Mental health</p>	<p>Recruitment of participants was initiated through the delivery of information packs to a random selection of households across differently flood-affected villages within the Somerset area. Participants were self-selected: they expressed interest after initial information dissemination by contacting the research team. In order to capture the range of experiences resulting from the flood, recruitment continued until we had participants who had been affected in different ways. For example, those who had been directly flooded (i.e. with water entering their homes, land or business) and those who had been indirectly affected (e.g. having difficulties getting to work). For the purposes of this paper we focus on those that were flooded within their homes to give insights relevant to this particular group. 9 (including two couples). Socio-demographic data collected from the qualitative interview participants shows that gender was approximately even across the sample. Two thirds of the sample were aged 64 or over, and most owned or privately rented their homes.</p>
<p>Fothergill, L. J., Disney, A. S., & Wilson, E. E. (2021). A qualitative exploration of the psychological impacts of living with the uncertainty of persistent flood risk. <i>Public Health</i>, 198, 141-145.</p>	<p>The aim of this study was to generate insight into individual experiences of living with persistent flood risk, how it affects psychological well-being, and the forms of support deemed appropriate to mitigate psychological risks</p>	<p>The study was conducted in Lowdham, Nottinghamshire. Lowdham is a mid-size village with historic pluvial and fluvial flooding and persistent flood risk. Approximately 200 houses are at risk of flooding in Lowdham. There have been at least six major flooding incidents since 1999 and four from June 2019, with the most recent incident in February 2020.</p>	<p>Flood-risk</p>	<p>Mental health</p>	<p>To explore the concept of living with persistent flood risk, sampling was stratified by personal flood experience, where participants who lived in the flood risk areas of the village and who had not previously experienced personal flood disruption were invited to participate, alongside flood victims. This approach was taken to better understand the impacts of living in a high flood risk area to all residents, not just residents with a personal history of property flooding. 40 participants were interviewed. Age (years) 35-44: 5 ; 45-54: 6; 55-64: 11; >65+: 18</p>

Walker-Springett, K., Butler, C., & Adger, W. N. (2017). Wellbeing in the aftermath of floods. <i>Health & place</i> , 43, 66-74.	This study analyses the diverse processes that explain changes in wellbeing for those experiencing flooding. It identifies key pathways to wellbeing outcomes that concern perceptions of lack of agency, dislocation from home, and disrupted futures inducing negative impacts, with offsetting positive effects through community networks and interactions.	Winter of 2013/14: The county of Somerset in the South-West of England and the town of Boston on the East coast of England were two of the locations that experienced severe flood events.	Flooding	Well-being-is taken to encapsulate mental health issues (such as stress and anxiety) as well as wider dimensions of emotional distress, happiness, and life satisfaction (e.g. MacDonald et al., 2015). We use a conception of wellbeing that includes individual elements as well as relational dimensions of value that give meaning to lived experiences in order to interpret and examine the processes that influence outcomes (Atkinson, 2002).	Recruitment of participants was initiated though the delivery of information packs to a random selection of households across differently affected villages within the Somerset Levels and Moors. Participants were self-selected: they expressed interest after initial information dissemination by contacting the research team. In order to fully capture the range of experiences resulting from the winter flood events, recruitment continued until we had participants who had experienced a range of flooding impacts, for example directly flooded (i.e. with water entering their homes, land or business) and those who had been indirectly affected (e.g. having difficulties getting to work). Two thirds of the sample were aged 64 or over with just over half of participants being retired, and most owned or privately rented their homes
Nobert, S., & Pelling, M. (2017). What can adaptation to climate-related hazards tell us about the politics of time making? Exploring durations and temporal disjunctures through the 2013 London heat wave. <i>Geoforum</i> , 85, 122-130.	The paper argues that intellectual and political lenses serving the analysis of adaptation to climate change-related risks and disasters have led us to a state of temporal friction whereby the belief in a need to, and the urge to, embrace the fast-forward and accelerating futures of climate change have separated us from other temporal experiences/relations that shape and affect our relationships to hazards and risks (Hassan, 2009, Rosa, 2010, Rosa, 2013).	The London Boroughs of Islington, Waltham Forest and the City of London during and after the 2013 heat wave	Heat wave	Coping with heat (temporal aspects of)	Unclear: n=30 Elderly people (68–95 years old) and carers