

# Climate change and mental health: thematic assessment report

Appendix 2. Methodology: summary of findings



#### **Contents**

Introduction	3
Table 1. Pathways review statements	4
Climate change is impacting mental health and wellbeing	4
Climate change impacts the social and economic determinants of mental health and wellbeing	9
Some occupational populations are at heightened risk from the mental health and wellbeing impacts of climate change	13
4. Children and young people are at heightened risk from the mental health and wellbeing impacts of climate change	14
5. Those with pre-existing health difficulties are at heightened risk from the mental health ar wellbeing impacts of climate change	
6. The impact of climate change on mental health and wellbeing can be long lasting	17
7. Protective pathways can help to minimise or buffer mental health and wellbeing impacts from climate change	18
Table 2. Interventions review statements	19
Climate change is impacting mental health and wellbeing	19
Climate change impacts the social and economic determinants of mental health and wellbeing	20
3. Some occupational populations are at heightened risk from mental health and wellbeing impacts of climate change	21
4. Children and young people are at heightened risk from the mental health and wellbeing impacts of climate change	22
5. Those with pre-existing mental health conditions are at heightened risk from the mental health and wellbeing impacts of climate change	22
6. The impact of climate change on mental health and wellbeing can be long-lasting	23
7. Protective pathways can help to minimise or buffer mental health and wellbeing impacts from climate change	23
References	25
About the UK Health Security Agency	40

#### Introduction

The tables below provide additional information regarding the confidence assessment for each component. Numbers within the table correspond to numbers of statements within the main report text.

### **Table 1. Pathways review statements**

#### 1. Climate change is impacting mental health and wellbeing

Statement number	Summarised review finding	GRADE-CERQual assessment of confidence	Explanation of GRADE-CERQual assessment	References
1.1	Wellbeing is negatively impacted following floods	High confidence	Methodology: minor concerns Coherence: no or very minor concerns Adequacy: no or very minor concerns Relevance: no or very minor concerns	(1 to 34)
1.1	Wellbeing is negatively impacted following wildfires	High confidence	Methodology: minor concerns Coherence: no or very minor concerns Adequacy: minor concerns Relevance: minor concerns	(4, 15, 21, 24, 35 to 45)
1.1	Wellbeing is negatively impacted during droughts	Moderate confidence	Methodology: minor concerns Coherence: no or very minor concerns Adequacy: moderate concerns Relevance: no or very minor concerns	(31, 44, 46 to 49)
1.1	Mental health morbidity is negatively impacted following exposure to high temperatures	High confidence	Methodology: minor concerns Coherence: minor concerns Adequacy: minor concerns Relevance: minor concerns	(4, 21, 31, 50 to 63)

Statement number	Summarised review finding	GRADE-CERQual assessment of confidence	Explanation of GRADE-CERQual assessment	References
1.2	An overarching awareness of climate change is negatively impacting mental health and wellbeing, contributing to eco-anxiety	Moderate confidence	Methodology: moderate concerns Coherence: minor concerns Adequacy: no or very minor concerns Relevance: no or very minor concerns	(43, 53, 64 to 84)
1.2	An overarching awareness of climate change is negatively impacting mental health and wellbeing, contributing to solastalgia	Moderate confidence	Methodology: moderate concerns Coherence: no or very minor concerns Adequacy: minor concerns Relevance: moderate concerns	(4, 36, 43, 49, 80, 85 to 88)
1.3	There is considerable evidence demonstrating an increased risk of post-traumatic stress disorder (PTSD) following exposure to flooding	High confidence	Methodology: minor concerns Coherence: no or very minor concerns Adequacy: minor concerns Relevance: no or very minor concerns	(1 to 3, 5, 6, 10, 11, 13, 14, 17, 18, 29, 31, 33, 34, 36, 51, 53, 63, 66, 67, 90 to 98)
1.3	There is considerable evidence demonstrating an increased risk of PTSD following exposure to wildfires	Moderate confidence	Methodology: moderate concerns Coherence: no or very minor concerns Adequacy: minor concerns Relevance: minor concerns	(31, 35 to 45, 49, 63, 67, 72, 88)
1.4	There is considerable evidence demonstrating an increased risk of depression following exposure to flooding	High confidence	Methodology: minor concerns Coherence: no or very minor concerns Adequacy: minor concerns Relevance: no or very minor concerns	(1, 3, 6, 8, 10 to 14, 17, 18, 19, 26, 28 to 31, 33, 36, 53, 63, 94 to 102)

Statement number	Summarised review finding	GRADE-CERQual assessment of confidence	Explanation of GRADE-CERQual assessment	References
1.4	There is considerable evidence demonstrating an increased risk of depression following exposure to wildfires	Moderate confidence	Methodology: moderate concerns Coherence: no or very minor concerns Adequacy: minor concerns Relevance: minor concerns	(31, 35 to 40, 43, 44, 63, 72, 88)
1.5	There is considerable evidence demonstrating an increased risk of anxiety following exposure to flooding	High confidence	Methodology: minor concerns Coherence: no or very minor concerns Adequacy: minor concerns Relevance: no or very minor concerns	(2 to 6, 8 to 13, 17 to 19, 26, 28, 30, 31, 33, 51, 53, 63, 66, 92, 94 to 99, 101, 103 to 105)
1.5	There is considerable evidence demonstrating an increased risk of anxiety following exposure to wildfires	Moderate confidence	Methodology: moderate concerns Coherence: no or very minor concerns Adequacy: minor concerns Relevance: minor concerns	(31, 35, 36, 38 to 40, 44, 63, 88)
1.6	There is considerable evidence of negative mental health impacts due to drought including psychological distress, stress and in some cases anxiety and depression	High confidence	Methodology: minor concerns Coherence: no or very minor concerns Adequacy: minor concerns Relevance: minor concerns	(4, 13, 15, 31, 36, 44, 46, 47, 49, 52, 67, 72, 85, 87, 99, 106 to 110, 111 to 118)
1.7	Exposure to heat can lead to increases in mental health-related hospital attendance	Moderate confidence	Methodology: moderate concerns Coherence: minor concerns Adequacy: no or very minor concerns Relevance: minor concerns	(4, 31, 43, 51, 53, 56, 57, 61, 63, 66, 69, 87, 93, 106, 108, 119 to 123, 124 to 126)

Statement number	Summarised review finding	GRADE-CERQual assessment of confidence	Explanation of GRADE-CERQual assessment	References
1.8	There is some evidence to demonstrate increased suicide risk for those who experience flooding	Very low confidence	Methodology: moderate concerns Coherence: serious concerns Adequacy: moderate concerns Relevance: moderate concerns	(5, 6, 11, 101, 108, 127 to 131)
1.8	There is some evidence to demonstrate increased suicide risk for those who experience drought	Low confidence	Methodology: moderate concerns Coherence: moderate concerns Adequacy: moderate concerns Relevance: moderate concerns	(13, 31, 36, 43, 46, 47, 49, 67, 72, 87, 99, 108, 110, 112, 113, 115, 118)
1.8	There is some evidence to demonstrate increased suicide risk for those who experience wildfires	Low confidence	Methodology: moderate concerns Coherence: no or very minor concerns Adequacy: serious concerns Relevance: minor concerns	(35, 40, 42)
1.8	There is some evidence to demonstrate increased suicide risk for those who experience heat events	Moderate confidence	Methodology: moderate concerns Coherence: moderate concerns Adequacy: minor concerns Relevance: minor concerns	(4, 31, 36, 43, 51, 53, 56, 61, 69, 87, 93, 108, 110, 124, 125, 128, 132 to 135, 136)
1.9	There is evidence suggesting potential increases in violent behaviour following wildfires	Moderate confidence	Methodology: minor concerns Coherence: minor concerns Adequacy: moderate concerns Relevance: minor concerns	(40, 48, 117)

Statement number	Summarised review finding	GRADE-CERQual assessment of confidence	Explanation of GRADE-CERQual assessment	References
1.9	There is evidence suggesting potential increases in violent behaviour following flooding	Low confidence	Methodology: moderate concerns Coherence: moderate concerns Adequacy: minor concerns Relevance: moderate concerns	(25 to 27, 48, 117, 127)
1.9	There is evidence suggesting potential increases in violent behaviour following heat events	Moderate confidence	Methodology: moderate concerns Coherence: minor concerns Adequacy: minor concerns Relevance: moderate concerns	(36, 43, 48, 51, 53, 69, 110, 117)
1.9	There is evidence suggesting potential increases in violent behaviour during drought	Moderate confidence	Methodology: moderate concerns Coherence: no or very minor concerns Adequacy: no or very minor concerns Relevance: minor concerns	(46, 48, 67, 87, 118)
1.10	There is evidence to suggest an increased risk of substance misuse following exposure to flooding	Moderate confidence	Methodology: moderate concerns Coherence: minor concerns Adequacy: moderate concerns Relevance: minor concerns	(6, 12, 25, 28, 29, 43, 63)
1.10	There is evidence to suggest an increased risk of substance misuse following exposure to wildfires	Moderate confidence	Methodology: moderate concerns Coherence: minor concerns Adequacy: minor concerns Relevance: minor concerns	(33, 35, 36, 38 to 40, 63, 88)

Statement number	Summarised review finding	GRADE-CERQual assessment of confidence	Explanation of GRADE-CERQual assessment	References
1.10	There is evidence to suggest an increased risk of substance misuse during droughts	Low confidence	Methodology: moderate concerns Coherence: minor concerns Adequacy: moderate concerns Relevance: moderate concerns	(49, 118)

## 2. Climate change impacts the social and economic determinants of mental health and wellbeing

Number	Summarised review finding	GRADE-CERQual assessment of confidence	Explanation of GRADE-CERQual assessment	References
2.1	Displacement from homes, evacuation and relocation are often linked to increased risk of negative mental health and wellbeing impacts from flooding	High confidence	Methodology: minor concerns Coherence: minor concerns Adequacy: minor concerns Relevance: no or very minor concerns	(2, 3, 5, 6, 11, 12, 17, 20, 28, 31, 32, 53, 95, 97, 98, 101, 105, 137, 138)
2.2	Disruptions to services from flooding can negatively impact mental health and wellbeing	Moderate confidence	Methodology: minor concerns Coherence: no or very minor concerns Adequacy: moderate concerns Relevance: minor concerns	(2, 3, 5, 6, 10, 13, 19, 30, 32, 36, 95, 97, 102, 103, 127)
2.2	Specifically, disruptions for vulnerable populations can lead to reduced	Moderate confidence	Methodology: moderate concerns Coherence: no or very minor concerns	(13, 15, 101, 103)

Number	Summarised review finding	GRADE-CERQual assessment of confidence	Explanation of GRADE-CERQual assessment	References
	wellbeing and increased risk of anxiety		Adequacy: moderate concerns Relevance: minor concerns	
2.3	Negative effects on both individual and community economic and social circumstances from flooding can impact mental health and wellbeing	High confidence	Methodology: minor concerns Coherence: no or very minor concerns Adequacy: minor concerns Relevance: no or very minor concerns	(1, 2, 28 to 32, 36, 66, 89, 91, 92, 3, 95 to 97, 101, 103 to 105, 137, 139, 5, 6, 9, 11, 16, 19, 26)
2.3	Negative effects on both individual and community economic and social circumstances from drought can impact mental health and wellbeing	High confidence	Methodology: minor concerns Coherence: no or very minor concerns Adequacy: minor concerns Relevance: minor concerns	(13, 15, 31, 36, 44, 46, 47, 49, 52, 67, 85, 87, 89, 99, 109, 113, 116 to 118)
2.4	The wellbeing and recovery time of people affected by flooding events is influenced by the response and communication by authorities, organisations, their community and contractors	High confidence	Methodology: minor concerns Coherence: no or very minor concerns Adequacy: minor concerns Relevance: no or very minor concerns	(1, 2, 5, 6, 9, 28, 32, 53, 84, 101, 103 to 105, 137, 138, 140)
2.5	Flooding can lead to an increase in demand for both formal and informal mental health resources and support	Moderate confidence	Methodology: moderate concerns Coherence: no or very minor concerns Adequacy: moderate concerns Relevance: no or very minor concerns	(2, 3, 5, 6, 9, 11, 27, 29, 32, 53, 101, 103, 108, 139, 141, 142)

Number	Summarised review finding	GRADE-CERQual assessment of confidence	Explanation of GRADE-CERQual assessment	References
2.6	There is higher risk of mental health impacts from flooding for those with higher levels of deprivation	Moderate confidence	Methodology: moderate concerns Coherence: no or very minor concerns Adequacy: minor concerns Relevance: minor concerns	(6, 8, 11 to 13, 31, 43, 62, 87, 95, 101, 127, 130, 142)
2.6	There is higher risk of mental health impacts from flooding for those in inclusion health populations	Very low confidence	Methodology: serious concerns Coherence: no or very minor concerns Adequacy: moderate concerns Relevance: moderate concerns	(1, 11)
2.6	There is higher risk of mental health impacts from flooding for those from ethnic minority populations	Very low confidence	Methodology: moderate concerns Coherence: no or very minor concerns Adequacy: moderate concerns Relevance: serious concerns	(5, 11)
2.7	There are potential differences in psychological distress from flooding events for different population characteristics, including gender	Low confidence	Methodology: moderate concerns Coherence: moderate concerns Adequacy: moderate concerns Relevance: minor concerns	(5, 6, 28, 29, 34, 95, 96, 101, 127, 143)
2.7	There are potential differences in psychological distress from flooding events for different population characteristics, including older adults	Low confidence	Methodology: moderate concerns Coherence: moderate concerns Adequacy: moderate concerns Relevance: moderate concerns	(6, 11, 25, 28, 34, 53, 63, 87, 101, 103)

Number	Summarised review finding	GRADE-CERQual assessment of confidence	Explanation of GRADE-CERQual assessment	References
2.7	There are potential differences in psychological distress from flooding events for different population characteristics, including children	Moderate confidence	Methodology: moderate concerns Coherence: no or very minor concerns Adequacy: moderate concerns Relevance: minor concerns	(6, 11, 15, 16, 25, 26, 30, 31, 34, 43, 53, 66, 87, 105, 139, 140)
2.8	There is evidence for negative mental health impacts from food and water insecurity caused by climate change	High confidence	Methodology: minor concerns Coherence: minor concerns Adequacy: no or very minor concerns Relevance: minor concerns	(31, 36, 44, 46, 47, 49, 66, 87, 113, 118, 37)
2.9	Climate migrant populations may be at higher risk of negative mental health impacts	Very low confidence	Methodology: moderate concerns Coherence: no or very minor concerns Adequacy: minor concerns Relevance: serious concerns	(11, 26, 31, 43, 62, 66, 93, 110, 114, 144, 145)
2.10	There is some evidence to demonstrate increased mental health risks for people who are pregnant or have recently given birth	Moderate confidence	Methodology: minor concerns Coherence: minor concerns Adequacy: moderate concerns Relevance: moderate concerns	(36, 38, 62, 102, 140, 146 to 149)

### 3. Some occupational populations are at heightened risk from the mental health and wellbeing impacts of climate change

Number	Summarised review finding	GRADE-CERQual assessment of confidence	Explanation of GRADE-CERQual assessment	References
3.1	There is emerging evidence suggesting that some occupations (such as farmers, outdoor workers and front-line responders) are at increased risk from heat-related mental health impacts	Very low confidence	Methodology: moderate concerns Coherence: no or very minor concerns Adequacy: serious concerns Relevance: serious concerns	(52, 54, 59, 108)
3.2	There is considerable evidence for negative mental health and wellbeing impacts from drought, particularly within certain populations such as farming and rural communities, where livelihoods and ways of life are heavily connected to the land	High confidence	Methodology: minor concerns Coherence: no or very minor concerns Adequacy: no or very minor concerns Relevance: minor concerns	(4, 13, 15, 43, 46, 49, 52, 62, 87, 99, 109, 112, 118, 150)
3.3	There is evidence that certain occupational populations are at higher risk for negative mental health impacts from flooding such as response workers	Moderate confidence	Methodology: moderate concerns Coherence: minor concerns Adequacy: minor concerns Relevance: moderate concerns	(3, 21, 51, 93, 143, 151)

Number	Summarised review finding	GRADE-CERQual assessment of confidence	Explanation of GRADE-CERQual assessment	References
3.3	There is evidence that certain occupational populations are at higher risk for negative mental health impacts from flooding such as farmers and rural populations	Moderate confidence	Methodology: moderate concerns Coherence: no or very minor concerns Adequacy: minor concerns Relevance: moderate concerns	(1, 13, 26, 99, 109)
3.4	There is evidence suggesting wildfires can have negative mental health impacts on firefighters	High confidence	Methodology: minor concerns Coherence: no or very minor concerns Adequacy: no or very minor concerns Relevance: minor concerns	(31, 37, 38, 42, 45)
3.5	There is suggestive evidence that those who work in voluntary roles may be at higher risk compared to response professions	Low confidence	Methodology: moderate concerns Coherence: minor concerns Adequacy: moderate concerns Relevance: moderate concerns	(143, 151)

### 4. Children and young people are at heightened risk from the mental health and wellbeing impacts of climate change

Number		GRADE-CERQual assessment of confidence	Explanation of GRADE-CERQual assessment	References
4.1	Evidence of the negative impacts of an awareness of climate change are	High confidence	Methodology: minor concerns Coherence: no or very minor concerns	(53, 64 to 66, 69 to 72, 75 to 79,

Number	Summarised review finding	GRADE-CERQual assessment of confidence	Explanation of GRADE-CERQual assessment	References
	greatest among younger populations		Adequacy: no or very minor concerns Relevance: no or very minor concerns	82, 152, 153)
4.2	There is evidence to suggest how climate change is communicated to children and young people can contribute to negative mental health and wellbeing impacts	Moderate confidence	Methodology: no or very minor concerns Coherence: moderate concerns Adequacy: moderate concerns Relevance: no or very minor concerns	(53, 70, 71, 75, 76, 82, 84, 152)
4.3	There is increased risk of negative mental health impacts for children in response to parental reactions to climate-related events	Moderate confidence	Methodology: moderate concerns Coherence: no or very minor concerns Adequacy: minor concerns Relevance: minor concerns	(6, 25, 62, 66, 78, 84, 90, 139, 140, 154)

### 5. Those with pre-existing health difficulties are at heightened risk from the mental health and wellbeing impacts of climate change

Number	Summarised review finding	GRADE-CERQual assessment of confidence	Explanation of GRADE-CERQual assessment	References
5.1	There is considerable evidence that heat exposure increases the risk of mortality (excluding suicide) for those with mental health conditions	High confidence	Methodology: minor concerns Coherence: minor concerns Adequacy: no or very minor concerns Relevance: no or very minor concerns	(4, 43, 53, 55, 56, 63, 93, 108, 119, 122, 125)

Number	Summarised review finding	GRADE-CERQual assessment of confidence	Explanation of GRADE-CERQual assessment	References
5.2	There is increased risk from heat for individuals with pre-existing mental health conditions	Moderate confidence	Methodology: minor concerns Coherence: moderate concerns Adequacy: minor concerns Relevance: minor concerns	(43, 53, 55 to 57, 60, 63, 125)
5.2	There is increased risk from heat for individuals affected by schizophrenia	High confidence	Methodology: minor concerns Coherence: minor concerns Adequacy: minor concerns Relevance: minor concerns	(4, 36, 43, 53, 55, 56, 60, 63, 87, 108, 121, 122, 125)
5.2	There is increased risk from heat for individuals affected by cognitive conditions such as Alzheimer's or dementia	High confidence	Methodology: minor concerns Coherence: no or very minor concerns Adequacy: minor concerns Relevance: minor concerns	(4, 31, 43, 53, 56, 60, 63, 108, 120 to 123, 125, 126)
5.3	There is evidence that some populations are at higher risk for negative mental health impacts from flooding, including those with preexisting health conditions and disabilities	High confidence	Methodology: minor concerns Coherence: no or very minor concerns Adequacy: no or very minor concerns Relevance: no or very minor concerns	(1, 6, 8, 11, 15, 17, 25, 29, 34, 43, 63, 95, 102, 130, 139)
5.4	People with pre-existing mental health conditions or with a history of trauma are particularly at risk from the mental health impacts of wildfires	Moderate confidence	Methodology: moderate concerns Coherence: minor concerns Adequacy: moderate concerns Relevance: minor concerns	(35, 37, 40, 43, 44, 63)

Number	Summarised review finding	GRADE-CERQual assessment of confidence	Explanation of GRADE-CERQual assessment	References
5.5	Heat events increase the risk of additional health impacts for people taking certain medications for mental health conditions	Moderate confidence	Methodology: moderate concerns Coherence: no or very minor concerns Adequacy: moderate concerns Relevance: minor concerns	(4, 43, 113, 122, 126)

### 6. The impact of climate change on mental health and wellbeing can be long lasting

Number	Summarised review finding	GRADE-CERQual assessment of confidence	Explanation of GRADE-CERQual assessment	References
6.1	Mental health and wellbeing impacts from climate-related events can be long-lasting and even persist for years after a wildfire	High confidence	Methodology: minor concerns Coherence: no or very minor concerns Adequacy: minor concerns Relevance: minor concerns	(15, 31, 35, 36, 38, 39, 41 to 45, 88)
6.1	Mental health and wellbeing impacts from climate-related events can be long-lasting and even persist for years after a flood	High confidence	Methodology: minor concerns Coherence: no or very minor concerns Adequacy: minor concerns Relevance: no or very minor concerns	(1 to 8, 11, 16, 19, 22, 24, 25, 30 to 32, 43, 66, 92, 93, 94, 97, 100, 104, 105, 130, 141)

## 7. Protective pathways can help to minimise or buffer mental health and wellbeing impacts from climate change

Number	Summarised review finding	GRADE-CERQual assessment of confidence	Explanation of GRADE-CERQual assessment	References
7.1	Engagement in environmental action presents opportunities to alleviate climate-related distress and promote wellbeing	High confidence	Methodology: no or very minor concerns Coherence: no or very minor concerns Adequacy: no or very minor concerns Relevance: minor concerns	(43, 64, 65, 71, 72, 74, 80, 81, 84, 85, 152)
7.2	Climate change mitigation or adaptation actions can have positive mental health co-benefits	Moderate confidence	Methodology: minor concerns Coherence: no or very minor concerns Adequacy: moderate concerns Relevance: no or very minor concerns	(84, 138, 155 to 157)
7.3	Individual and community resilience and preparedness can help to minimise the impact of climate-related hazards on mental health and wellbeing	High confidence	Methodology: minor concerns Coherence: no or very minor concerns Adequacy: minor concerns Relevance: no or very minor concerns	(1, 2, 4, 5, 9, 12, 15, 25, 31, 32, 41, 62, 84, 101, 103, 104, 137 to 140, 144, 146, 150, 154, 158 to 162)

#### **Table 2. Interventions review statements**

#### 1. Climate change is impacting mental health and wellbeing

Number	Summarised Review Finding	GRADE-CERQual assessment of confidence	Explanation of GRADE-CERQual assessment	References
1.11	Clinical interventions can improve mental health and wellbeing in relation to climate change	High confidence	Methodology: minor concerns Coherence: no or very minor concerns Adequacy: no or very minor concerns Relevance: minor concerns	(129, 163, 172, 164 to 171)
1.12	Digital interventions (web-, app-, and text-based) can be beneficial for mental health and wellbeing in response to climate change	High confidence	Methodology: moderate concerns Coherence: no or very minor concerns Adequacy: no or very minor concerns Relevance: no or very minor concerns	(166, 168 to 170, 173 to 175)
1.13	In rural communities affected by extreme weather events, evidence suggests that individual or groupbased clinical and psychosocial interventions may improve mental health outcomes	Moderate confidence	Methodology: moderate concerns Coherence: no or very minor concerns Adequacy: minor concerns Relevance: no or very minor concerns	(164, 165, 168, 172, 176)

### 2. Climate change impacts the social and economic determinants of mental health and wellbeing

Number	Summarised review finding	GRADE-CERQual assessment of confidence	Explanation of GRADE-CERQual assessment	References
2.11	There is evidence that opportunistic mental health symptom screening integrated into routine post-disaster contacts, coupled with immediate triaging and referral to services can lead to mental health improvements	Very low confidence	Methodology: moderate concerns Coherence: no or very minor concerns Adequacy: serious concerns Relevance: no or very minor concerns	(164, 177, 178)
2.12	Economic evidence suggests that climate-related interventions may lead to health cost savings and mental health benefits	Moderate confidence	Methodology: moderate concerns Coherence: no or very minor concerns Adequacy: moderate concerns Relevance: minor concerns	(177, 179, 180)
2.13	Early evidence suggests that programmes delivered by trained lay people can improve mental health and wellbeing, suggesting they may help extend mental health support where specialist resources are limited	Low confidence	Methodology: moderate concerns Coherence: no or very minor concerns Adequacy: serious concerns Relevance: no or very minor concerns	(165, 181)

### 3. Some occupational populations are at heightened risk from mental health and wellbeing impacts of climate change

Number	Summarised review finding	GRADE-CERQual assessment of confidence	Explanation of GRADE-CERQual assessment	References
3.6	Support for individuals responding to climate-related events is associated with improved mental health and wellbeing outcomes	Low confidence	Methodology: minor concerns Coherence: minor concerns Adequacy: serious concerns Relevance: no or very minor concerns	(163, 182)
3.7	Emerging evidence suggests that digital psychoeducational interventions co-designed with farmers are acceptable and may help strengthen coping and resilience to climate change impacts	Low confidence	Methodology: minor concerns Coherence: no or very minor concerns Adequacy: serious concerns Relevance: minor concerns	(168, 183)

### 4. Children and young people are at heightened risk from the mental health and wellbeing impacts of climate change

Number	Summarised review finding	GRADE-CERQual assessment of confidence	Explanation of GRADE-CERQual assessment	References
4.4	There is evidence that school- or clinic-based cognitive behavioural programmes after extreme weather events may reduce PTSD, anxiety, depression or functional impairment in children	Moderate confidence	Methodology: minor concerns Coherence: minor concerns Adequacy: moderate concerns Relevance: minor concerns	(164, 167, 172)

### 5. Those with pre-existing mental health conditions are at heightened risk from the mental health and wellbeing impacts of climate change

Number	Summarised review finding	GRADE-CERQual assessment of confidence	Explanation of GRADE-CERQual assessment	References
5.6	Evidence indicates that climate- related mental health interventions are beneficial for those who have pre- existing mental health conditions  Moderate confidence	Moderate confidence	Methodology: moderate concerns Coherence: minor concerns Adequacy: moderate concerns	(129, 173, 174, 178)
			Relevance: moderate concerns	

#### 6. The impact of climate change on mental health and wellbeing can be longlasting

There are no identified studies currently detailing interventions.

### 7. Protective pathways can help to minimise or buffer mental health and wellbeing impacts from climate change

Number	Summarised review finding	GRADE-CERQual assessment of confidence	Explanation of GRADE-CERQual assessment	References
7.4	Evidence indicates that adaptation measures may be associated with cobenefits for mental health and wellbeing	Moderate confidence	Methodology: moderate concerns Coherence: minor concerns Adequacy: moderate concerns Relevance: minor concerns	(179, 184, 185)
7.5	There is emerging evidence that engagement with nature and alternative practices can support wellbeing and resilience	Low confidence	Methodology: serious concerns Coherence: no or very minor concerns Adequacy: moderate concerns Relevance: minor concerns	(181, 184, 185)
7.6	There is evidence that educational interventions which aim to improve climate literacy and teach coping strategies may be beneficial for mental health and wellbeing and additionally raise awareness around	Very low confidence	Methodology: minor concerns Coherence: serious concerns Adequacy: moderate concerns Relevance: no or very minor concerns	(176, 186, 187)

Number	Summarised review finding	GRADE-CERQual assessment of confidence	Explanation of GRADE-CERQual assessment	References
	the mental health impacts from climate change			
7.7	There is evidence that group-based and community interventions can improve mental health and wellbeing by providing a space to build resilience and develop a sense of agency	Moderate confidence	Methodology: moderate concerns Coherence: no or very minor concerns Adequacy: minor concerns Relevance: no or very minor concerns	(176, 181, 182, 184, 188)

#### References

- 1. Alderman K, Turner LR, Tong S (2012). 'Floods and human health: a systematic review' Environment International: volume 47, pages 37 to 47
- 2. Carroll B, Morbey H, Balogh R, Araoz G (2009). '<u>Flooded homes, broken bonds, the meaning of home, psychological processes and their impact on psychological health in a disaster' Health and Place: volume 15, pages 540 to 547</u>
- 3. Carroll B, Balogh R, Morbey H, Araoz G (2010). '<u>Health and social impacts of a flood disaster: responding to needs and implications for practice</u>' Disasters: volume 34, pages 1,045 to 1,063
- 4. Charlson F, Ali S, Benmarhnia T, Pearl M, Massazza A, Augustinavicius J, and others (2021). 'Climate change and mental health: a scoping review' International Journal of Environmental Health Research: volume 18, page 4,486
- Cruz J, White PCL, Bell A, Coventry PA (2020). '<u>Effect of extreme weather events on</u>
   <u>mental health: a narrative synthesis and meta-analysis for the UK</u>' International Journal of
   Environmental Research and Public Health: volume 17, page 8,581
- 6. Fernandez A, Black J, Jones M, Wilson L, Salvador-Carulla L, Astell-Burt T, and others (2015). 'Flooding and mental health: a systematic mapping review' PLoS One: volume 10, page e0119929
- 7. Fewtrell L, Kay D (2008). 'An attempt to quantify the health impacts of flooding in the UK using an urban case study' Public Health: volume 122, pages 446 to 451
- 8. Flores AB, Sullivan JA, Yu Y, Friedrich HK (2024). 'Health disparities in the aftermath of flood events: a review of physical and mental health outcomes with methodological considerations in the USA' Current Environmental Health Reports: volume 11, pages 238 to 254
- 9. Fothergill LJ, Disney AS, Wilson EE (2021). '<u>A qualitative exploration of the psychological impacts of living with the uncertainty of persistent flood risk</u>' Public Health: volume 198, pages 141 to 145
- 10. French CE, Waite TD, Armstrong B, Rubin GJ, Beck CR, Oliver I (2019). 'Impact of repeat flooding on mental health and health-related quality of life: a cross-sectional analysis of the English National Study of Flooding and Health' BMJ Open: volume 9, page e031562
- 11. Hajat S, Ebi KL, Kovats RS, Menne B, Edwards S, Haines A (2005). '<u>The human health consequences of flooding in Europe: a review</u>' In: Kirch W, Bertollini R, Menne B, editors. Extreme Weather Events and Public Health Responses
- 12. Lamond JE, Joseph RD, Proverbs DG (2015). 'An exploration of factors affecting the long term psychological impact and deterioration of mental health in flooded households' Environmental Research: volume 140, page 325 to 334
- 13. Lee GW, Vine K, Atkinson AR, Tong M, Longman J, Barratt A, and others (2023).

  'Impacts of climate change on health and health services in northern New South Wales,

  Australia: a rapid review' International Journal of Environmental Research and Public

  Health: volume 20, page 6,285

- 14. Leyva EWA, Beaman A, Davidson PM (2017). '<u>Health impact of climate change in older people: an integrative review and implications for nursing</u>' Journal of Nursing Scholarship: volume 49, pages 670 to 678
- 15. Lindsay S, Hsu S, Ragunathan S, Lindsay J (2023). '<u>The impact of climate change related extreme weather events on people with pre-existing disabilities and chronic conditions: a scoping review</u>' Disability and Rehabilitation: volume 45, page 4,338
- 16. Lock S, Rubin GJ, Rogers MB, Amlôt R, Williams R (2012). 'Secondary stressors and extreme events and disasters: a systematic review of primary research from 2010-2011' PLoS Currents: volume 4, page ecurrents.dis.a9b76fed1b2dd5c5bfcfc13c87a2f24f
- 17. Mason V, Andrews H, Upton D (2010). '<u>The psychological impact of exposure to floods</u>' Psychology, Health and Medicine: volume 15, pages 61 to 73
- 18. Graham H, White P, Cotton J, McManus S (2020). 'Flood- and weather-damaged homes and mental health: an analysis using England's mental health survey' International Journal of Environmental Research and Public Health: volume 74, page A56
- 19. Mulchandani R, Smith M, Armstrong B, Beck CR, Oliver I (2019). 'Effect of insurance-related factors on the association between flooding and mental health outcomes' International Journal of Environmental Research and Public Health: volume 16, page 1,174
- 20. Reacher M, McKenzie K, Lane C, Nichols T, Kedge I, Iversen A, and others (2004).

  'Health impacts of flooding in Lewes: a comparison of reported gastrointestinal and other illness and mental health in flooded and non-flooded households' Communicable Disease and Public Health: volume 7, pages 39 to 46
- 21. Rifkin DI, Long MW, Perry MJ (2018). 'Climate change and sleep: a systematic review of the literature and conceptual framework' Sleep Medicine Reviews: volume 42, pages 3 to 9
- 22. Robin C, Beck C, Armstrong B, Waite TD, Rubin GJ, Oliver I (2020). 'Impact of flooding on health-related quality of life in England: results from the National Study of Flooding and Health' European Journal of Public Health: volume 30, pages 942 to 948
- 23. Schmitt LHM, Graham HM, White PCL (2016). '<u>Economic evaluations of the health</u> impacts of weather-related extreme events: a scoping review' International Journal of Environmental Research and Public Health: volume 13, page 1,105
- 24. Spencer G, Thompson J (2024). 'Children and young people's perspectives on disasters mental health, agency and vulnerability: a scoping review' International Journal of Disaster Risk Reductions: volume 108, page 104,495
- 25. Stanke C, Murray V, Amlôt R, Nurse J, Williams R (2012). '<u>The effects of flooding on mental health: outcomes and recommendations from a review of the literature</u>' PLoS Currents: volume 4, page e4f9f1fa9c3cae
- 26. Stephenson J, Vaganay M, Cameron R, Joseph P (2014). '<u>The long-term health impacts</u> of repeated flood events' WIT Transactions on Ecology and the Environment: volume 184, pages 201 to 212
- 27. Stone K, Blinn N, Spencer R (2022). 'Mental health impacts of climate change on women: a scoping review' Current Environmental Health Reports: volume 9, page 228 to 243

- 28. Tapsell SM, Tunstall SM (2008). "I wish I'd never heard of Banbury": the relationship between 'place' and the health impacts from flooding' Health and Place: volume 14, pages 133 to 154
- 29. Tunstall S, Tapsell S, Green C, Floyd P, George C (2006). '<u>The health effects of flooding: social research results from England and Wales</u>' Journal of Water and Health: volume 4, pages 365 to 380
- 30. Twiddy M, Trump B, Ramsden S (2022). '<u>Understanding the long-term impact of flooding on the wellbeing of residents: a mixed methods study</u>' PLoS One: volume 17, page e0274890
- 31. Walinski A (2023). '<u>The effects of climate change on mental health</u>' Deutsches Arzteblatt International: volume 120, pages 117 to 124
- 32. Walker-Springett K, Butler C, Adger WN (2017). 'Wellbeing in the aftermath of floods' Health and Place: volume 43, pages 66 to 74
- 33. Weilnhammer V, Schmid J, Mittermeier I, Schreiber F, Jiang L, Pastuhovic V, and others (2021). 'Extreme weather events in Europe and their health consequences a systematic review' International Journal of Hygiene and Environmental Health: volume 233, page 113,688
- 34. Zhong S, Yang L, Toloo S, Wang Z, Tong S, Sun X, and others (2018). '<u>The long-term physical and psychological health impacts of flooding: a systematic mapping</u>' Science of The Total Environment: volume 626, pages 165 to 194
- 35. Adu MK, Agyapong B, Agyapong VIO (2023). 'Children's psychological reactions to wildfires: a review of recent literature' Current Psychiatry Reports: volume 25, pages 603 to 616
- 36. Cianconi P, Betrò S, Janiri L (2020). '<u>The impact of climate change on mental health: a systematic descriptive review</u>' Frontiers in Psychiatry: volume 11, page 74
- 37. Eisenman DP, Galway LP (2022). '<u>The mental health and well-being effects of wildfire smoke: a scoping review</u>' BMC Public Health: volume 22, page 2,274
- 38. Finlay SE, Moffat A, Gazzard R, Baker D, Murray V (2012). '<u>Health impacts of wildfires</u>' PLoS Currents: volume 4, page e4f959951cce2c
- 39. Gao Y, Huang W, Yu P, Xu R, Yang Z, Gasevic D, and others (2023). 'Long-term impacts of non-occupational wildfire exposure on human health: a systematic review' Huang W, editor. Environmental Pollution: volume 320, page 121,041
- 40. Grant E, Runkle JD (2022). 'Long-term health effects of wildfire exposure: a scoping review' Journal of Climate Change and Health: volume 6, page 100,110
- 41. Isaac F, Toukhsati SR, di Benedetto M, Kennedy GA (2021). '<u>A systemic review of the impact of wildfires on sleep disturbances</u>' International Journal of Environmental Research and Public Health: volume 18, page 10,152
- 42. Koopmans E, Cornish K, Fyfe TM, Bailey K, Pelletier CA (2022). '<u>Health risks and mitigation strategies from occupational exposure to wildland fire: a scoping review</u>' Journal of Occupational Medicine and Toxicology: volume 17, page 2
- 43. Lawrance EL, Thompson R, Newberry Le Vay J, Page L, Jennings N (2022). 'The impact

- of climate change on mental health and emotional wellbeing: a narrative review of current evidence, and its implications' International Review of Psychiatry: volume 34, pages 443 to 498
- 44. Varshney K, Makleff S, Krishna RN, Romero L, Willems J, Wickes R, and others (2023). 'Mental health of vulnerable groups experiencing a drought or bushfire: a systematic review' Global Mental Health: volume 10, page e24
- 45. Zhang Y, Workman A, Russell MA, Williamson M, Pan H, Reifels L (2022). '<u>The long-term impact of bushfires on the mental health of Australians: a systematic review and meta-analysis</u>' European Journal of Psychotraumatology: volume 13, page 2,087,980
- 46. Bryan K, Ward S, Roberts L, White MP, Landeg O, Taylor T, and others (2020). 'The health and well-being effects of drought: assessing multi-stakeholder perspectives through narratives from the UK' Climatic Change: volume 163, page 2,073 to 2,095
- 47. Choudhary N, Brewis A, Beresford M, Workman C, Wutich A (2022). 'Water, economic systems, and mental health: a review of theorized relationships' CABI Reviews: volume 17, pages 1 to 10
- 48. Logie CH, Toccalino D, MacKenzie F, Hasham A, Narasimhan M, Donkers H, and others (2024). 'Associations between climate change-related factors and sexual health: a scoping review' Global Public Health: volume 19, page 2,299,718
- 49. Yusa A, Berry P, Cheng JJ, Ogden N, Bonsal B, Stewart R, and others (2015). 'Climate change, drought and human health in Canada' International Journal of Environmental Research and Public Health: volume 12, pages 8,359 to 8,412
- 50. Chevance G, Minor K, Vielma C, Campi E, O'Callaghan-Gordo C, Basagaña X, and others (2024). 'A systematic review of ambient heat and sleep in a warming climate' Sleep Medicine Reviews: volume 75, page 101,915
- 51. Cianconi P, Hanife B, Hirsch D, Janiri L (2023). '<u>Is climate change affecting mental health of urban populations?</u>' Current Opinion in Psychology: volume 36, pages 213 to 218
- 52. Daghagh Yazd S, Wheeler SA, Zuo A (2019). 'Key risk factors affecting farmers' mental health: a systematic review' International Journal of Environmental Research and Public Health: volume 16, page 4,849
- 53. Gebhardt N, van Bronswijk K, Bunz M, Müller T, Niessen P, Nikendei C (2023). 'Scoping review of climate change and mental health in Germany direct and indirect impacts, vulnerable groups, resilience factors' Journal of Health Monitoring: volume 8, page 122
- 54. Karthick S, Kermanshachi S, Pamidimukkala A, Namian M (2023). '<u>A review of construction workforce health challenges and strategies in extreme weather conditions</u>' International Journal of Occupational Safety and Ergonomics: volume 29, pages 773 to 784
- 55. Li D, Zhang Y, Li X, Zhang K, Lu Y, Brown RD (2023). 'Climatic and meteorological exposure and mental and behavioral health: a systematic review and meta-analysis' Science of the Total Environment: volume 892, page 164,435
- 56. Liu J, Varghese BM, Hansen A, Xiang J, Zhang Y, Dear K, and others (2021). '<u>Is there an</u> association between hot weather and poor mental health outcomes? A systematic review

- and meta-analysis' Environment International: volume 153, page 106,533
- 57. Rony MKK, Alamgir HM (2023). '<u>High temperatures on mental health: recognizing the association and the need for proactive strategies-a perspective</u>' Health Science Reports: volume 6, page e1,729
- 58. Savu A (2023). 'Temperature highs, climate change salience, and Eco-anxiety: early evidence from the 2022 United Kingdom heatwave' Applied Economics Letters: volume 32, pages 87 to 94
- 59. Tetzlaff EJ, Cassan C, Goulet N, Gorman M, Hogya B, Kenny GP (2024). "Breaking down in tears, soaked in sweat, and sick from the heat": Media-based composite narratives of first responders working during the 2021 Heat Dome' American Journal of Industrial Medicine: volume 67, pages 442 to 452
- 60. Tham S, Thompson R, Landeg O, Murray KA, Waite T (2020). 'Indoor temperature and health: a global systematic review' Public Health: volume 179, pages 9 to 17
- 61. Thompson R, Lawrance EL, Roberts LF, Grailey K, Ashrafian H, Maheswaran H, and others (2023). 'Ambient temperature and mental health: a systematic review and meta-analysis' The Lancet Planetary Health: volume 7, pages e580 to e589
- 62. White BP, Breakey S, Brown MJ, Smith JR, Tarbet A, Nicholas PK, and others (2023). 'Mental health impacts of climate change among vulnerable populations globally: an integrative review' Annals of Global Health: volume 89, page 66
- 63. Woodland L, Ratwatte P, Phalkey R, Gillingham EL (2023). 'Investigating the health impacts of climate change among people with pre-existing mental health problems: a scoping review' International Journal of Environmental Research and Public Health: volume 20, page 5,563
- 64. Boluda-Verdú I, Senent-Valero M, Casas-Escolano M, Matijasevich A, Pastor-Valero M (2022). 'Fear for the future: eco-anxiety and health implications, a systematic review' Journal of Environmental Psychology: volume 84, page 101,904
- 65. Brophy H, Olson J, Paul P (2023). '<u>Eco-anxiety in youth: an integrative literature review</u>' International Journal of Mental Health Nursing: volume 32, pages 633 to 661
- 66. Clemens V, von Hirschhausen E, Fegert JM (2022). 'Report of the Intergovernmental Panel on Climate Change: implications for the mental health policy of children and adolescents in Europe-a scoping review' European Child and Adolescent Psychiatry: volume 31, pages 701 to 713
- 67. Crane K, Li L, Subramanian P, Rovit E, Liu J (2022). 'Climate change and mental health: a review of empirical evidence, mechanisms and implications' Atmosphere: volume 13, page 2,096
- 68. Croasdale K, Grailey K, Jennings N, Mole J, Lawrance EL (2023). 'Planning for the perfect storm: Perceptions of UK mental health professionals on the increasing impacts of climate change on their service users' Journal of Climate Change and Health: volume 13, page 100,253
- 69. Filippini T, Paduano S, Veneri F, Barbolini G, Fiore G, Vinceti M (2024). '<u>Adverse human</u> health effects of climate change: an update' Annali di Igiene: volume 36, pages 281 to

291

- 70. Hickman C, Marks E, Pihkala P, Clayton S, Lewandowski ER, Mayall EE, and others (2021). 'Climate anxiety in children and young people and their beliefs about government responses to climate change: a global survey' Lancet Planetary Health: volume 5, page e863
- 71. Kankawale SM, Niedzwiedz CL (2023). '<u>Eco-anxiety among children and young people:</u> systematic review of social, political, and geographical determinants' medRxiv: page 2023.12.19.23300198
- 72. Koder J, Dunk J, Rhodes P (2023). 'Climate distress: a review of current psychological research and practice' Sustainability: volume 15, page 8,115
- 73. Kõlves K, Shaw-Williams D, Krishnamoorthy S, Mathieu S, Zhong LR, Ganapathy A, and others (2023). '<u>Eco-emotions and suicidal ideation and behaviour: a systematic literature review</u>' medRxiv: page 2023.12.15.23300020
- 74. Lawrance EL, Jennings N, Kioupi V, Thompson R, Diffey J, Vercammen A (2022).

  'Psychological responses, mental health, and sense of agency for the dual challenges of climate change and the COVID-19 pandemic in young people in the UK: an online survey study' Lancet Planetary Health: volume 6, page e726 to e738
- 75. Leger-Goodes T, Malboeuf-Hurtubise C, Mastine T, Généreux M, Paradis PO, Camden C (2022). 'Eco-anxiety in children: a scoping review of the mental health impacts of the awareness of climate change' Frontiers in Psychiatry: volume 13, page 872,544
- 76. Martin G, Reilly K, Everitt H, Gilliland JA (2022). '<u>The impact of climate change awareness</u> on children's mental well-being and negative emotions a scoping review' Child and Adolescent Mental Health: volume 27, pages 59 to 72
- 77. Martin G, Cosma A, Roswell T, Anderson M, Treble M, Leslie K, and others (2023).

  'Measuring negative emotional responses to climate change among young people in survey research: a systematic review' Social Science and Medicine: volume 329, page 116,008
- 78. Proulx K, Daelmans B, Baltag V, Banati P (2024). 'Climate change impacts on child and adolescent health and well-being: a narrative review' Journal of Global Health: volume 14, page 04061
- 79. Ramadan R, Randell A, Lavoie S, Gao CX, Manrique PC, Anderson R, and others (2023). 'Empirical evidence for climate concerns, negative emotions and climate-related mental ill-health in young people: a scoping review' Early Intervention in Psychiatry: volume 17, page 537
- 80. Soutar C, Wand APF (2022). '<u>Understanding the spectrum of anxiety responses to climate change: a systematic review of the qualitative literature</u>' International Journal of Environmental Research and Public Health: volume 19, page 990
- 81. Vercammen A, Oswald T, Lawrance E (2023). 'Psycho-social factors associated with climate distress, hope and behavioural intentions in young UK residents' PLoS Global Public Health: volume 3, page e0001938
- 82. Whitmarsh L, Player L, Jiongco A, James M, Williams M, Marks E, and others (2022).

- '<u>Climate anxiety: what predicts it and how is it related to climate action?</u>' Journal of Environmental Psychology: . volume 83, page 101,866
- 83. Gago T, Sargisson RJ, Milfont TL (2024). '<u>A meta-analysis on the relationship between climate anxiety and wellbeing</u>' Journal of Environmental Psychology: volume 94, page 102,230
- 84. Green L, Ashton K, Edmonds N, Fletcher M, Azam S, Hughes K, and others (2024).

  'Determining the public health impact of climate change: a national study using a Health Impact Assessment approach in Wales' International Journal of Public Health: volume 69, page 1,606,972
- 85. Breth-Petersen M, Garay J, Clancy K, Dickson M, Angelo C (2023). '<u>Homesickness at home: a scoping review of solastalgia experiences in Australia</u>' International Journal of Environmental Research and Public Health: volume 20, page 2,541
- 86. du Bray M, Wutich A, Larson KL, White DD, Brewis A (2019). 'Anger and sadness: gendered emotional responses to climate threats in four island nations' Cross-Cultural Research: volume 53, pages 58 to 86
- 87. Thoma M V, Rohleder N, Rohner SL (2021). 'Clinical ecopsychology: the mental health impacts and underlying pathways of the climate and environmental crisis' Frontiers in Psychiatry: volume 12, page 675,936
- 88. To P, Eboreime E, Agyapong VIO (2021). '<u>The impact of wildfires on mental health: a scoping review</u>' Behavioural Sciences: volume 11, page 126
- 89. Galway LP, Beery T, Jones-Casey K, Tasala K (2019). 'Mapping the solastalgia literature: a scoping review study' International Journal of Environmental Research and Public Health: volume 16, page 2,662
- 90. Garcia DM, Sheehan MC (2016). 'Extreme weather-driven disasters and children's health' International Journal of Social Determinants of Health and Health Services: volume 46, pages 79 to 105
- 91. Golitaleb M, Mazaheri E, Bonyadi M, Sahebi A (2022). '<u>Prevalence of post-traumatic</u> stress disorder after flood: a systematic review and meta-analysis' Frontiers in Psychiatry: volume 13, page 890,671
- 92. Jermacane D, Waite TD, Beck CR, Bone A, Amlôt R, Reacher M, and others (2018). 'The English National Cohort Study of Flooding and Health: the change in the prevalence of psychological morbidity at year two' BMC Public Health: volume 18, page 330
- 93. Massazza A, Ardino V, Fioravanzo RE (2022). 'Climate change, trauma and mental health in Italy: a scoping review' Ardino V, editor. European Journal of Psychotraumatology: volume 13, page 2046374
- 94. Mulchandani R, Armstrong B, Beck CR, Waite TD, Amlôt R, Kovats S, and others (2020). 'The English National Cohort Study of Flooding and Health: psychological morbidity at three years of follow up' BMC Public Health: volume 20, page 321
- 95. Paranjothy S, Gallacher J, Amlôt R, Rubin GJ, Page L, Baxter T, and others (2011). 'Psychosocial impact of the summer 2007 floods in England' BMC Public Health: volume 11, page 145

- 96. Tempest EL, Carter B, Beck CR, Rubin GJ (2017). 'Secondary stressors are associated with probable psychological morbidity after flooding: a cross-sectional analysis' European Journal of Public Health: volume 27, pages 1,042 to 1,047
- 97. Waite TD, Chaintarli K, Beck CR, Bone A, Amlôt R, Kovats S, and others (2017). 'The English National Cohort Study of Flooding and Health: cross-sectional analysis of mental health outcomes at year one' BMC Public Health: volume 17, page 129
- 98. Munro A, Kovats RS, Rubin GJ, Waite TD, Bone A, Armstrong B (2017). 'Effect of evacuation and displacement on the association between flooding and mental health outcomes: a cross-sectional analysis of UK survey data' Lancet Planet Health: volume 1, pages e134 to e141
- 99. Batterham PJ, Brown K, Trias A, Poyser C, Kazan D, Calear AL (2022). 'Systematic review of quantitative studies assessing the relationship between environment and mental health in rural areas' Australian Journal of Rural Health: volume 30, page 306 to 320
- 100. Lane K, Charles-Guzman K, Wheeler K, Abid Z, Graber N, Matte T (2013). '<u>Health effects of coastal storms and flooding in urban areas: a review and vulnerability assessment</u>' Journal of Environmental and Public Health: volume 2013, page 913,064
- 101. Lowe D, Ebi KL, Forsberg B (2013). '<u>Factors increasing vulnerability to health effects</u>
  <u>before, during and after floods</u>' International Journal of Environmental Research and
  Public Health: volume 10, pages 7,015 to 7,067
- 102. Veenema TG, Thornton CP, Lavin RP, Bender AK (2017). 'Climate change-related water disasters' impact on population health' Journal of Nursing Scholarship: volume 49, page 625 to 634
- 103. Christie N, Griffin L, Chan N, Twigg J, Titheridge H (2016). 'Private needs, public responses: vulnerable people's flood-disrupted mobility' Disaster Prevention and Management: volume 25, pages 244 to 260
- 104. Mehring P, Geoghegan H, Cloke HL, Clark JM (2023). '<u>The F word: the experiential construction of flooding in England</u>' Emotion, Space and Society: volume 48, page 100,966
- 105. Mort M, Walker M, Lloyd Williams A, Bingley A (2018). '<u>Displacement: critical insights</u> from flood-affected children' Health and Place: volume 52, pages 148 to 154
- 106. Ab Kader NI, Yusof UK, Khalid MNA, Nik Husain NR (2022). 'Recent techniques in determining the effects of climate change on depressive patients: a systematic review' Journal of Environmental and Public Health: volume 2022, page 1,803,401
- 107. Brooks SK, Greenberg N (2023). 'Climate change effects on mental health: are there workplace implications?' Occupational Medicine: volume 73, pages 133 to 137
- 108. Corvetto JF, Helou AY, Dambach P, Müller T, Sauerborn R (2023). 'A systematic literature review of the impact of climate change on the global demand for psychiatric services' International Journal of Environmental Research and Public Health: volume 20, page 1,190
- 109. Crnek-Georgeson KT, Wilson LA, Page A (2017). '<u>Factors influencing suicide in older rural males: a review of Australian studies</u>' Rural and Remote Health: volume 17, page 4,020

- 110. Dumont C, Haase E, Dolber T, Lewis J, Coverdale J (2020). 'Climate change and risk of completed suicide' Journal of Nervous and Mental Disease: volume 208, pages 559 to 565
- 111. Hellden D, Andersson C, Nilsson M, Ebi KL, Friberg P, Alfvén T (2021). 'Climate change and child health: a scoping review and an expanded conceptual framework' Lancet Planetary Health: volume 5, pages e164 to e175
- 112. Levi M, Kjellstrom T, Baldasseroni A (2018). 'Impact of climate change on occupational health and productivity: a systematic literature review focusing on workplace heat' La Medicina del Lavoro: volume 109, pages 163 to 179
- 113. Padrón-Monedero A, Linares C, Díaz J, Noguer-Zambrano I (2024). 'Impact of drought on mental and behavioral disorders, contributions of research in a climate change context. A narrative review' International Journal of Biometeorology: volume 68, pages 1,035 to 1,042
- 114. Sanni O, Salami B, Oluwasina F, Ojo F, Kennedy M (2022). 'Climate change and African migrant health' International Journal of Environmental Research and Public Health: volume 19, page 16,867
- 115. Santos EGO, Queiroz PR, Nunes ADS, Vedana KGG, Barbosa IR (2021). 'Factors associated with suicidal behavior in farmers: a systematic review' International Journal of Environmental Research and Public Health: volume 18, page 6,522
- 116. Stanke C, Kerac M, Prudhomme C, Medlock J, Murray V (2013). '<u>Health effects of drought: a systematic review of the evidence</u>' PLoS Currents: . volume 5, page ecurrents. dis. 7a2c ee9e 980f 91ad 7697 b570 bcc4
- 117. van Daalen KR, Kallesøe SS, Davey F, Dada S, Jung L, Singh L, and others (2022). 'Extreme events and gender-based violence: a mixed-methods systematic review' Lancet Planetary Health: volume 6, pages e504 to e523
- 118. Vins H, Bell J, Saha S, Hess JJ (2015). <u>'The mental health outcomes of drought: a systematic review and causal process diagram</u>' International Journal of Environmental Research and Public Health: volume 12, pages 13,251 to 13,275
- 119. Abed Al Ahad M, Sullivan F, Demšar U, Melhem M, Kulu H (2020). '<u>The effect of air-pollution and weather exposure on mortality and hospital admission and implications for further research: a systematic scoping review</u>' PLoS ONE: volume 15, page e0241415
- 120. Arsad FS, Hod R, Ahmad N, Ismail R, Mohamed N, Baharom M, and others (2022). '<u>The impact of heatwaves on mortality and morbidity and the associated vulnerability factors: a systematic review</u>' International Journal of Environmental Research and Public Health: volume 19, page 16,356
- 121. Figueiredo T, Midão L, Rocha P, Cruz S, Lameira G, Conceição P, and others (2024). 'The interplay between climate change and ageing: a systematic review of health indicators' PLoS ONE: volume 19, page e0297116
- 122. Lohmus M (2018). 'Possible biological mechanisms linking mental health and heat-a contemplative review' International Journal of Environmental Research and Public Health: volume 15, page 1,515
- 123. Louis S, Carlson AK, Suresh A, Rim J, Mays MA, Ontaneda D, and others (2023).

- 'Impacts of climate change and air pollution on neurologic health, disease, and practice: a scoping review' Neurology: volume 100, pages 474 to 483
- 124. Uibel D, Sharma R, Piontkowski D, Sheffield PE, Clougherty JE (2022). '<u>Association of ambient extreme heat with pediatric morbidity: a scoping review</u>' International Journal of Biometeorology: volume 66, pages 1,683 to 1,698
- 125. Thompson R, Hornigold R, Page L, Waite T (2018). '<u>Associations between high ambient temperatures and heat waves with mental health outcomes: a systematic review</u>' Public Health: volume 161, pages 171 to 191
- 126. Gong J, Part C, Hajat S (2022). '<u>Current and future burdens of heat-related dementia</u> hospital admissions in England' Environment International: volume 159, page 107027
- 127. Du W, FitzGerald GJ, Clark M, Hou XY (2010). '<u>Health impacts of floods</u>' Prehospital and Disaster Medicine: volume 25, pages 265 to 272
- 128. Kõlves K, Kõlves KE, de Leo D (2013). '<u>Natural disasters and suicidal behaviours: a systematic literature review</u>' Journal of Affective Disorders: volume 146, pages 1 to 14
- 129. Belleville G, Ouellet MC, Békés V, Lebel J, Morin CM, Bouchard S, and others (2023). 'Efficacy of a therapist-assisted self-help internet-based intervention targeting PTSD, depression, and insomnia symptoms after a disaster: a randomized controlled trial' Behavior Therapy: volume 54, pages 230 to 246
- 130. Wu Y, Gasevic D, Wen B, Yang Z, Yu P, Zhou G, and others (2024). 'Floods and cause-specific mortality in the UK: a nested case-control study' BMC Medicine: volume 22, page 188
- 131. Salib E (1997). '<u>Elderly suicide and weather conditions: is there a link?</u>' International Journal of Geriatric Psychiatry: volume 12, pages 937 to 941
- 132. Cornelius SL, Berry T, Goodrich AJ, Shiner B, Riblet NB (2021). 'The effect of meteorological, pollution, and geographic exposures on death by suicide: a scoping review' International Journal of Environmental Research and Public Health: volume 18, page 7,809
- 133. Frangione B, Rodriguez-Villamizar LA, Lang JJ, Colman I, Lavigne E, Peters C, and others (2022). 'Short-term changes in meteorological conditions and suicide: a systematic review and meta-analysis' Environmental Research: volume 207, page 112,230
- 134. Gao J, Cheng Q, Duan J, Xu Z, Bai L, Zhang Y, and others (2019). 'Ambient temperature, sunlight duration, and suicide: a systematic review and meta-analysis' Science of the Total Environment: volume 646, pages 1,021 to 1,029
- 135. Heo S, Lee W, Bell ML (2021). 'Suicide and associations with air pollution and ambient temperature: a systematic review and meta-analysis' International Journal of Environmental Research and Public Health: volume 18, page 7,699
- 136. Page LA, Hajat S, Kovats RS (2007). 'Relationship between daily suicide counts and temperature in England and Wales' British Journal of Psychiatry: volume 191, pages 106 to 112
- 137. Butler C, Walker-Springett K, Adger WN (2018). 'Narratives of recovery after floods: mental health, institutions, and intervention' Social Science and Medicine: volume 216,

- pages 67 to 73
- 138. El-Mousawi F, Mundo Ortiz A, Berkat R, Nasri B (2023). '<u>The impact of flood adaptation measures on affected population's mental health: a mixed method scoping review</u>' medRxiv: page 2023.04.27.23289166
- 139. Patel SS (2022). 'Revisiting how community resilience relates to the security and health harm caused by severe flooding: an analytical literature review' In: Community Resilience When Disaster Strikes
- 140. Ma T, Moore J, Cleary A (2022). 'Climate change impacts on the mental health and wellbeing of young people: a scoping review of risk and protective factors' Social Science and Medicine: volume 301, page 114,888
- 141. Findlater L, Robin C, Hopgood K, Waite T, National Study of Flooding and Health Study Group, Rubin G, and others (2023). 'Help-seeking following a flooding event: a cross-sectional analysis of adults affected by flooding in England in winter 2013/14' European Journal of Public Health: volume 33, pages 834 to 840
- 142. Milojevic A, Armstrong B, Wilkinson P (2017). 'Mental health impacts of flooding: a controlled interrupted time series analysis of prescribing data in England' Journal of Epidemiology and Community Health: volume 71, pages 970 to 973
- 143. Sørensen LN, Olesen KH, Midtgaard CD, Willert M V (2022). 'Risk of post-traumatic stress disorder following major disasters and critical incidents in police officers a systematic review' Journal of Police and Criminal Psychology: volume 37, pages 752 to 768
- 144. Andrade AS, Roca JS, Pérez SR (2023). 'Children's emotional and behavioral response following a migration: a scoping review' Journal of Migration and Health: volume 7, page 100,176
- 145. Mohammadi M, Jafari H, Etemadi M, Dalugoda Y, Ali HM, Phung H, and others (2023). 'Health problems of increasing man-made and climate-related disasters on forcibly displaced populations: a scoping review on global evidence' Disaster Medicine and Public Health Preparedness: volume 17, page e537
- 146. Futterman ID, Grace H, Weingarten S, Borjian A, Clare CA (2023). 'Maternal anxiety, depression and posttraumatic stress disorder (PTSD) after natural disasters: a systematic review' Journal of Maternal-Fetal and Neonatal Medicine: volume 36, page 2,199,345
- 147. Harville E, Xiong X, Buekens P (2010). '<u>Disasters and perinatal health:a systematic review</u>' Obstetrical & Gynecological Survey: volume 65, pages 713 to 728
- 148. Puthota J, Alatorre A, Walsh S, Clemente JC, Malaspina D, Spicer J (2022). 'Prenatal ambient temperature and risk for schizophrenia' Schizophrenia Research: volume 247, pages 67 to 83
- 149. Waddell SL, Jayaweera DT, Mirsaeidi M, Beier JC, Kumar N (2021). 'Perspectives on the health effects of hurricanes: a review and challenges' International Journal of Environmental Research and Public Health: volume 18, page 2,756
- 150. Aylward B, Cunsolo A, Vriezen R, Harper SL (2022). 'Climate change is impacting mental health in North America: a systematic scoping review of the hazards, exposures,

- <u>vulnerabilities, risks and responses</u>' International Review of Psychiatry: volume 34, pages 34 to 50
- 151. Ein N, Plouffe RA, Liu JJW, Gervasio J, Baker C, Carleton RN, and others (2024). 'Physical and psychological challenges faced by military, medical and public safety personnel relief workers supporting natural disaster operations: a systematic review' Current Psychology: volume 43, pages 1,743 to 1,758
- 152. Thompson R, Fisher HL, Dewa LH, Hussain T, Kabba Z, Toledano MB (2022).

  'Adolescents' thoughts and feelings about the local and global environment: a qualitative interview study' Child and Adolescent Mental Health: volume 27, pages 4 to 13
- 153. Gislason MK, Kennedy AM, Witham SM (2021). '<u>The interplay between social and ecological determinants of mental health for children and youth in the climate crisis</u>' International Journal of Environmental Research and Public Health: volume 18, page 4,573
- 154. Lee S, First JM (2022). 'Mental health impacts of tornadoes: a systematic review' International Journal of Environmental Research and Public Health: volume 19, page 13,747
- 155. Cheng JJ, Berry P (2013). '<u>Health co-benefits and risks of public health adaptation</u>
  <a href="mailto:strategies to climate change: a review of current literature">strategies to climate change: a review of current literature</a>' International Journal of Public Health: volume 58, pages 305 to 311
- 156. Venkataramanan V, Packman AI, Peters DR, Lopez D, McCuskey DJ, McDonald RI, and others (2019). 'A systematic review of the human health and social well-being outcomes of green infrastructure for stormwater and flood management' Journal of Environmental Management: volume 246, pages 868 to 880
- 157. Amorim JH (2021). 'Regulating and cultural ecosystem services of urban green infrastructure in the Nordic countries: a systematic review' International Journal of Environmental Research and Public Health: volume 18, page 29
- 158. Ntontis E, Drury J, Amlôt R, Rubin GJ, Williams R, Saavedra P (2021). 'Collective resilience in the disaster recovery period: emergent social identity and observed social support are associated with collective efficacy, well-being, and the provision of social support' British Journal of Social Psycholology: volume 60, pages 1,075 to 1,095
- 159. Hall CE, Wehling H, Stansfield J, South J, Brooks SK, Greenberg N, and others (2023). 'Examining the role of community resilience and social capital on mental health in public health emergency and disaster response: a scoping review' BMC Public Health: volume 23, page 2,482
- 160. Greene G, Paranjothy S, Palmer SR (2015). 'Resilience and vulnerability to the psychological harm from flooding: the role of social cohesion' American Journal of Public Health: volume 105, pages 1,792 to 1,795
- 161. Fernandez A, Black J, Jones M, Wilson L, Salvador-Carulla L, Astell-Burt T, and others (2015). 'Flooding and mental health: a systematic mapping review' PLoS One: volume 10, page e0119929
- 162. Benevolenza MA, DeRigne L (2018). '<u>The impact of climate change and natural disasters</u> on vulnerable populations: A systematic review of literature' Journal of Human Behavior in

- the Social Environment: volume 29, pages 266 to 281
- 163. Becker JP, Paixão R, Quartilho MJ (2022). '<u>Dynamic psychotherapy as a PTSD treatment for firefighters: a case study</u>' Healthcare: volume 10, page 530
- 164. Cobham VE, McDermott B (2025). "School-based screen-and-treat": an effective blueprint for expediating access to care in children experiencing PTSD following disasters' British Journal of Clinical Psychology: volume 64, pages 47 to 62
- 165. Cowlishaw S, Gibson K, Alexander S, Howard A, Agathos J, Strauven S, and others (2023). 'Improving mental health following multiple disasters in Australia: a randomized controlled trial of the Skills for Life Adjustment and Resilience (SOLAR) programme' European Journal of Psychotraumatology: volume 14, page 2,284,032
- 166. Frenette É, Ouellet MC, Guay S, Lebel J, Békés V, Belleville G (2023). '<u>The effect of an internet-based cognitive behavioral therapy intervention on social support in disaster evacuees</u>' Journal of Clinical Psychology: volume 79, pages 1,713 to 1,725
- 167. Goetz AR, Kennedy SM, Kook M, Guzick AG, Nwankwo GNA, Hana LM, and others (2023). 'Examining the effectiveness of the transdiagnostic unified protocol for emotional disorders delivered to youth following Hurricane Harvey' Child and Youth Care Forum: volume 52, pages 1,413 to 1,429
- 168. Gunn KM, Skaczkowski G, Dollman J, Vincent AD, Brumby S, Short CE, and others (2023). 'A self-help online intervention is associated with reduced distress and improved mental wellbeing in Australian farmers: the evaluation and key mechanisms of www.ifarmwell.com.au' Journal of Agromedicine: volume 28, pages 378 to 392
- 169. Lindhe N, Berg M, Andersson K, Andersson G (2024). 'Experiences of undergoing internet-delivered cognitive behavioural therapy for climate change-related distress: a qualitative study' BMC Psychiatry: volume 24, page 775
- 170. Obuobi-Donkor G, Shalaby R, Agyapong B, Dias RDL, Agyapong VIO (2024). 'Mitigating psychological problems associated with the 2023 wildfires in Alberta and Nova Scotia: sixweek outcomes from the Text4Hope Program' Journal of Clinical Medicine: volume 13, page 865
- 171. Weinzimmer SA, Goetz AR, Guzick AG, Hana LM, Cepeda SL, Schneider SC, and others (2022). 'Primary outcomes for adults receiving the Unified Protocol after Hurricane Harvey in an integrated healthcare setting' Community Mental Health Journal: volume 58, pages 1,522 to 1,534
- 172. Renn T, Dowdy-Hazlett T, Collins C, Killian M, Alani D (2024). 'The feasibility and acceptability of Cognitive Behavioral Intervention for Trauma in Schools (CBITS) in a rural community impacted by environmental trauma and Covid-19' School Mental Health: volume 16, pages 973 to 982
- 173. Heinz AJ, Wiltsey-Stirman S, Jaworski BK, Sharin T, Rhodes L, Steinmetz S, and others (2022). 'Feasibility and preliminary efficacy of a public mobile app to reduce symptoms of postdisaster distress in adolescent wildfire survivors: Sonoma Rises' Psychological Services: volume 19, pages 67 to 79
- 174. Lindhe N, Bengtsson A, Byggeth E, Engström J, Lundin M, Ludvigsson M, and others (2023). 'Tailored internet-delivered cognitive behavioral therapy for individuals

- experiencing psychological distress associated with climate change: A pilot randomized controlled trial' Behaviour Research and Therapy: volume 171, page 104,438
- 175. Müller L, Rapoport O, Rahe M (2024). 'Mindfulness meditation improves mental health in flood survivors and disaster volunteers: a randomized wait-list controlled trial'

  Mindfulness: volume 15, pages 2,750 to 2,764
- 176. Hart CR, Berry HL, Tonna AM (2011). 'Improving the mental health of rural New South Wales communities facing drought and other adversities' Australian Journal of Rural Health: volume 19, pages 231 to 238
- 177. Crompton D, Kohleis P, Shakespeare-Finch J, FitzGerald G, Young R (2023).
  'Opportunistic mental health screening: is there a role following a disaster? Lessons from the 2010-2011 Queensland (Australia) floods and cyclones' Prehospital and Disaster Medicine: volume 38, pages 223 to 231
- 178. Schwartz RM, Corley SS, Rasul R, Bevilacqua KG, Gonzalez A, Gillezeau C, and others (2023). 'Assessing the feasibility and effectiveness of a linkage into mental health care program for adults affected by Hurricane Sandy' Disaster Medicine and Public Health Preparedness: volume 17, page e238
- 179. Page K, Hossain L, Liu D, Kim YH, Wilmot K, Kenny P, and others (2025). 'Outcomes from the Victorian Healthy Homes Program: a randomised control trial of home energy upgrades' BMJ Open: volume 15, page e082340
- 180. Lebenbaum M, Hassan SA (2024). 'Screening and treatment of posttraumatic stress disorder in wildfire evacuees: a cost-utility analysis' MDM Policy and Practice: volume 9, page 23814683241260424
- 181. Heinz AJ, Wiltsey-Stirman S, Sharin T, Loskot T, Mason D, Jaworski BK, and others (2022). 'Rising from the ashes by expanding access to community care after disaster: an origin story of the Wildfire Mental Health Collaborative and preliminary findings' Psychological Services: volume 19, pages 58 to 66
- 182. Powell T, Scott J, Yuma P, Hsiao Y (2022). 'Surviving the storm: a pragmatic non-randomised examination of a brief intervention for disaster-affected health and social care providers' Health and Social Care in the Community: volume 30, page e6217 to e6227
- 183. Gunn KM, Skaczkowski G, Dollman J, Vincent AD, Short CE, Brumby S, and others (2022). 'Combining farmers' preferences With evidence-based strategies to prevent and lower farmers' distress: co-design and acceptability testing of ifarmwell' JMIR Human Factors: volume 9, page e27631
- 184. Eichholtzer AC, Driscoll DA, Patrick R, Galletta L, Lawson J (2024). '<u>The co-benefits of biodiversity citizen science for well-being and nature relatedness</u>' Applied Psychology: Health and Well-Being: volume 16, pages 515 to 536
- 185. Foley H, Leach M, Feng X, Astell-Burt T, Brymer E (2023). '<u>Towards key principles for the design and implementation of nature prescription programs</u>' Sustainability: volume 15, page 9,530
- 186. Levesque A, Rocque R (2024). 'An innovative framework for teaching climate change: integrating emotion coping strategies and exploring a new climate emotion scale among Canadian youth' Environmental Education Research: volume 30, pages 1 to 21

- 187. Longman J, Braddon M, Verlie B, Schlosberg D, Hampshire L, Hawke C, and others (2023). 'Building resilience to the mental health impacts of climate change in rural Australia' Journal of Climate Change and Health: volume 12, page 100,240
- 188. Calabria L, Marks E (2024). 'What happens in Climate Cafés? Exploring responses to the psychological burdens of climate change in seven UK women' The Cognitive Behaviour Therapist: 2024/10/30. volume 17, page e33

#### About the UK Health Security Agency

UK Health Security Agency (UKHSA) prevents, prepares for and responds to infectious diseases, and environmental hazards, to keep all our communities safe, save lives and protect livelihoods. We provide scientific and operational leadership, working with local, national and international partners to protect the public's health and build the nation's health security capability.

<u>UKHSA</u> is an executive agency, sponsored by the <u>Department of Health and Social Care</u>.

#### © Crown copyright 2025

Prepared by: Centre for Climate and Health Security

For queries relating to this document, please contact: <a href="mailto:climate.change@ukhsa.gov.uk">climate.change@ukhsa.gov.uk</a>

Published: November 2025

Publishing reference: GOV-18915

#### **OGL**

You may re-use this information (excluding logos) free of charge in any format or medium, under the terms of the Open Government Licence v3.0. To view this licence, visit <u>OGL</u>. Where we have identified any third party copyright information you will need to obtain permission from the copyright holders concerned.



UKHSA supports the Sustainable Development Goals

