Health equity impacts of climate change

A rapid review

Supplementary material

Contents

List of abbreviations

Abbreviation	Meaning
A&E	Accident and emergency
COPD	Chronic obstructive pulmonary disease
CPRD	Clinical Practice Research Datalink
DALYs	Disability-adjusted life years
GDP	Gross domestic product
GP	General practitioner
IMD	Index of Multiple Deprivation
LAD	Local authority district
LSOA	Lower-layer super output area
LTLA	Lower-tier local authority
NHS	National Health Service
NO_2	Nitrogen dioxide
NUTS-3	Nomenclature of territorial units for statistics
O_3	Ozone
ONS	Office for National Statistics
OR	Odds ratio
$PM_{2.5}$	Particulate matter less than 2.5 micrometres in diameter
PM_{10}	Particulate matter less than 10 micrometres in diameter
QCC	Quality criteria checklist

Data extraction tables

Table S.1. Observational studies

Reference	Study characteristics	Methods	Critical appraisal
Bennett and others, 2014 (1) 'Vulnerability to the mortality effects of warm temperature in the districts of England and Wales' Publication type: journal article	**Study design**: case-crossover (class C) **Objective**: to explore vulnerability factors in the association between temperature and mortality (health equity focus) **Setting**: England and Wales (all 376 local authority districts (LADs)) **Study sample** • n=921,288 cardiorespiratory deaths • n=441,788 male; n=479,500 female • 26% under 75 years old; 35% 75 to 84 years old; 39% 85 years old or older **Study period**: 2001 to 2010 (May to September of each year) **Data charting for mapping** Core20PLUS population • People experiencing the greatest deprivation (area-level quintiles of Carstairs score including unemployment, social class, house overcrowding and vehicle ownership status)	**Exposure** • Daily mean temperature (1°C increase in temperature above 85th percentile of recorded summer temperature for each LAD) **Outcomes** • Mortality: cardiorespiratory causes **Data collection methods** • Death records (all non-injury deaths) from UK Small Area Statistics Unit (including age, postcode of residence and date of death) linked to temperature and air pollution data using postcode • Mean daily temperatures at 5km^2 resolution from UK Met Office • Calculated PM$_{10}$ from 2 sources: annual PM$_{10}$ concentrations in a 1km^2 grid (from Defra Ambient Air Quality Assessment) and daily PM$_{10}$ concentrations (from Defra Automatic Urban and Rural Network) **Statistical analysis** • Time-stratified, case crossover analysis (temperature on day of death and the 3 days before compared with temperatures on control days when the death did not occur) • Relationship between temperature and mortality analysed using a piecewise linear model • Bayesian spatial model used to calculate percentage change in odds of mortality per 1°C increase in temperature for each LAD, adjusted for air pollution (PM$_{10}$) and national holidays **Data charting for mapping** Climate change-related exposure • Climate-related hazard: increase in ambient temperature	**QCC rating**: medium quality **Main limitations** • Deprivation measured at area level • Unclear description of outcome variable **Conflicts of interest**: no conflicts of interest reported

Reference	Study characteristics	Methods	Critical appraisal
Brown and others, 2010 (2) 'Do emergency department attendances by homeless people increase in cold weather?' Publication type: journal article	**Study design**: retrospective study (class D) **Objective**: to examine whether temperature influences A&E attendances for people experiencing homelessness (health equity focus) **Setting**: A&E department (Sheffield) **Study sample** • n=2,930 A&E attendances • n=2,482 (84.7%) male; n=448 (15.3%) female • Mean age = 37.4 years (median = 36 years) **Study period**: 1 January 2003 to 31 December 2008 **Data charting for mapping** Core20PLUS population • People experiencing homelessness (individual level)	**Exposure** • Daily minimum and maximum temperatures from one weather station in Sheffield **Outcomes** • Healthcare usage: daily A&E attendances **Data collection methods** • Hospital records from Northern General Emergency Department (records with no fixed abode recorded as address were classified as people experiencing homelessness) • Temperature data obtained from Weston Park Weather Station **Statistical analysis** • Spearman's rank correlation coefficient was used to analyse the relationship between temperature and A&E attendance • Conducted sensitivity analysis excluding data between the dates of 15 December to 15 January due to intervention for people experiencing homelessness over the Christmas period **Data charting for mapping** Climate change-related exposure • Climate-related hazard: increase in ambient temperature	**QCC rating**: medium quality **Main limitations** • Limited description of how exposure was measured • Inappropriate statistical analysis (correlation analysis does not account for temporal trends that could affect the results) **Conflicts of interest**: no conflicts of interest reported
Corcuera Hotz and others, 2020 (3) 'The Effects of Temperature on Accident and Emergency Department Attendances in London: A Time-Series Regression Analysis' Publication type: journal article	**Study design**: time series (class C) **Objective**: to investigate association between temperature and cause-specific and age-specific A&E attendances (not focused on health equity) **Setting**: A&E departments, Greater London, UK **Study sample** • n=13,400,000 A&E visits • Socioeconomic status: 53% of patients from Index of Multiple Deprivation (IMD) quintiles 1 and 2 (the 2 most deprived quintiles) **Study period**: 2007 to 2012	**Exposure** • Daily mean temperature, averaged for whole of London (1°C increase in ambient temperature) **Outcomes** • Healthcare usage: daily all-cause A&E visits and respiratory, cardiovascular, cerebrovascular, fractures and psychiatric cause-specific A&E visits **Data collection methods** • A&E attendance data obtained from NHS Digital • IMD data aggregated to Super Output Area level, collapsed into quintiles, and linked to A&E data • Meteorological data collected from numerous weather stations across Greater London • Air pollution and influenza data obtained from national monitoring systems	**QCC rating**: high quality **Main limitations** • Deprivation measured at area level **Conflicts of interest**: no conflicts of interest reported

Reference	Study characteristics	Methods	Critical appraisal
	Data charting for mapping Core20PLUS population • People experiencing the greatest deprivation (area level, quintiles of English IMD)	**Statistical analysis** • Distributed lag Poisson regression models adjusted for seasonality, long-term trends, day of week, UK public holidays, humidity, influenza • Sensitivity analysis further adjusted for ozone and PM_{10} concentrations **Data charting for mapping** Climate change-related exposure • Climate-related hazard: increase in ambient temperature	
Gao and others, 2023 (4) 'Association between long-term exposure to wildfire-related $PM_{2.5}$ and mortality: A longitudinal analysis of the UK Biobank' Publication type: journal article	**Study design**: prospective cohort study (class B) **Objective**: to investigate the association between long-term exposure to wildfire-related $PM_{2.5}$ and mortality (not focused on health equity) **Setting**: England, Wales and Scotland **Study sample** • n=492,394 participants selected from UK Biobank cohort (out of 502,444 who enrolled between 2004 to 2010; excluded 356 who died within a year of enrolment, 360 without a recorded address and 9,334 with incomplete data for covariates) • Mean age at enrolment = 56.5 years (SD = 8.1) • n=224,119 (45.5%) male, n=268,275 (54.5%) female • n=435,170 (88.4%) white ethnicity, n=57,224 (11.6%) non-white ethnicity **Study period**: unclear; exposure data from 2000 to 2019 (mean follow-up time = 11.2 years, SD = 1.5) **Data charting for mapping** Core20PLUS population • Ethnic minorities (non-white ethnicity)	**Exposure** • Three-year cumulative concentration of wildfire-related $PM_{2.5}$ (modelled) within 10km of residential address **Outcomes** • Mortality (all-causes) • Mortality (cause-specific: non-accidental, neoplasms, cardiovascular, respiratory, mental) not extracted here because not analysed separately for population of interest **Data collection methods** • Baseline data on demographics and address obtained from self-reported questionnaires collected as part of UK Biobank study • Data for deprivation obtained from national census data • Daily wildfire-related and non-wildfire related $PM_{2.5}$ concentrations estimated using models and matched to residential address based on individual postcodes **Statistical analysis** • Cox proportional hazards regression model used to calculate hazard ratios for mortality per $10 \mu g/m^3$ increase in wildfire-related $PM_{2.5}$ (time-varying exposure) • Adjusted for age, sex, ethnicity, education, current employment status, body mass index, household income, non-wildfire $PM_{2.5}$, smoking status, alcohol drinking status, Townsend deprivation index • Stratified analysis by ethnicity to test for effect modification; also stratified by other covariates, including Townsend deprivation index but not extracted here because subgroup does not meet inclusion criteria for this review of people experiencing the greatest deprivation	**QCC rating**: medium quality **Main limitations** • Selection bias (participants unlikely to be representative of target population) • Exposure poorly described and based on modelling (risk of exposure misclassification) **Conflicts of interest**: no conflicts of interest reported

Reference	Study characteristics	Methods	Critical appraisal
		Data charting for mapping Climate change-related exposure • Climate-related health risk: changes to air quality	
Gasparrini and others, 2022 (5) 'Small-area assessment of temperature-related mortality risks in England and Wales: a case time series analysis' Publication type: journal article	**Study design**: time series (class C) **Objective**: to evaluate the association between temperature and mortality, and whether this varies by deprivation (health equity focus) **Setting**: England and Wales (348 LADs) **Study sample** • n=10,716,879 death records • No demographic information reported • Report number of lower-layer super output areas (LSOAs), LADs, mean deaths per year and population-weighted daily mean temperature by region in Table 1 of the paper **Study period**: 1 January 2000 to 31 December 2019 **Data charting for mapping** Core20PLUS population • People experiencing the greatest deprivation (area level, quintiles of IMD)	**Exposure** • Average daily temperature at LSOA level **Outcomes** • Mortality: all causes **Data collection methods** • Temperature data obtained from the Met Office; calculated average daily temperature from min and max at $1km^2$ resolution and then aggregated to LSOA level by calculating weighted average for each LSOA • IMD data (2015 for England and 2014 for Wales) obtained from NOMIS • 2011 census data used to obtain LSOA-level data on proportion of population older than 65 years, proportion of houses with central heating, urban or rural classification, and population estimates by age group • Also included LSOA-level data for topographical characteristics and average age of buildings from administrative data sources **Statistical analysis** • Conditional Poisson regression to estimate the association between temperature and mortality (distributed lag of 21 days) for each LAD, stratified by broad age group, and adjusting for day of the week, long-term trends and seasonality • Pooled across age groups and LADs using meta-regression, adjusting for 15 demographic or area covariates (reported in Figure S2 of the paper), based on top 3 components derived from principal component analysis • Derived temperature mortality curves for each LSOA and calculated the relative risk at the 1st and 99th temperature percentiles, compared with the temperature with the lowest mortality (reference temperature) • Calculated heat- and cold-related standardised rate of excess all-cause mortality as deaths per 100,000 person-years, stratified by IMD quintiles (the European Standard Population was used as the reference population) **Data charting for mapping** Climate change-related exposure • Climate-related hazard: extreme heat • Climate-related hazard: extreme cold	**QCC rating**: medium quality **Main limitations** • Deprivation measured at area level • Characteristics of study population not reported **Conflicts of interest**: no conflicts of interest reported

Reference	Study characteristics	Methods	Critical appraisal
Gong and others, 2022 (6) 'Current and future burdens of heat-related dementia hospital admissions in England' Publication type: journal article	**Study design**: time series (class C) **Objective**: to evaluate the association between temperature and hospital admissions for dementia (not focused on health equity) **Setting**: England **Study sample** • Total sample size not reported (but mean daily counts of hospital admissions for dementia reported in Figure 1 of the paper) • Demographic data not reported **Study period**: 1998 to 2009 (exact dates unclear) **Data charting for mapping** Core20PLUS population • People experiencing the greatest deprivation (area level, quintiles of IMD)	**Exposure** • Average daily temperature at regional level **Outcomes** • Morbidity: hospital admission for dementia **Data collection methods** • Emergency hospital admissions with dementia as primary diagnosis obtained from NHS Digital • Deprivation quintiles based on IMD rank at Super Output Area level from 2011 Census data (how IMD was assigned is not reported) • Temperature data obtained from the Met Office **Statistical analysis** • Negative binomial regression models to calculate percentage change in risk of hospitalisation per 1°C increase in temperature over 17°C, using a lag to include temperatures of 7 days prior to hospital admission • Adjusted for seasonal and other time-related trends and day of the week • Separate models were run for each IMD quintile **Data charting for mapping** Climate change-related exposure • Climate-related hazard: increase in ambient temperature	**QCC rating**: medium quality **Main limitations** • Deprivation measured at area level • Sample size and characteristics of study population not reported **Conflicts of interest**: no conflicts of interest reported
Hajat and others, 2023 (7) 'Ambient Temperature and Emergency Hospital Admissions in People Experiencing Homelessness: London, United Kingdom, 2011–2019' Publication type: journal article	**Study design**: time series (class C) **Objective**: to evaluate the association between changes in ambient temperature and hospitalisations among people experiencing homelessness (health equity focus) **Setting**: Greater London, United Kingdom **Study sample** • 148,177 emergency inpatient admissions with 'no fixed abode' address • 20,804 admissions with a diagnosis of homelessness **Study period**: 2011 to 2019	**Exposure** • Daily maximum and minimum ambient temperature, averaged across London **Outcomes** • Morbidity: all-cause emergency hospital admissions **Data collection methods** • Daily counts of emergency hospital admissions obtained from Hospital Episode Statistics • Daily maximum and minimum temperature data from Met Office HadUK-Grid dataset. Composite temperature series representing all of London was created by averaging values across the grid cells covering the city	**QCC rating**: medium quality **Main limitations** • No demographic data reported for participants **Conflicts of interest**: no conflicts of interest reported

Reference	Study characteristics	Methods	Critical appraisal
	Data charting for mapping Core20PLUS population • People experiencing homelessness (individual level)	**Statistical analysis** • Quasi-Poisson time series regression and distributed lag non-linear models (21-day lag) • Models controlled for long-term trends, seasonality and day of week • Estimated relative risk at different temperatures compared to minimum morbidity (temperature at which risk of hospital admission was lowest) • Estimated attributable fraction of admissions due to temperatures above minimum morbidity temperature **Data charting for mapping** Climate change-related exposure • Climate-related hazard: increase in ambient temperature	
Kearns and others, 2023 (8) 'Health gains from home energy efficiency measures: The missing evidence in the UK net-zero policy debate' Publication type: journal article	**Study design**: • study 1 – before-after study: interviews with households in deprived areas that had external wall insulation installed (class D) • study 2 – retrospective study of hospital admissions (class D) **Objective**: to evaluate health co-benefits of interventions to increase home energy efficiency in deprived areas (health equity focus) **Setting**: south-west Scotland (Ayrshire and Arran Health Board for hospital admissions) **Study sample** • Before-after study: n=229 interviews selected from households who had external wall insulation fitted as part of Home Energy Efficiency Programmes for Scotland • Retrospective study: number of hospital admissions occurring during study period not reported • No demographic information for either study **Study period**: • before-after study: winter following intervention in 2015 to 2017 • retrospective study: hospital admissions between May 2011 to September 2021	**Exposure** • External wall insulation **Outcomes** • Morbidity: self-reported health (Short Form-36 quality of life scale) • Morbidity: emergency hospital admissions (respiratory and cardiovascular) **Data collection methods** • Before-after study: interviews conducted before and after the winter of the year after wall insulation was fitted • Retrospective study: monthly data for emergency hospital admissions at postcode-level **Statistical analysis** • Before-after study: report pre- and post-installation scores for self-reported health, stratified by whether home was warmer following external wall insulation • Retrospective study: used z-scores to compare hospital admissions in areas where 50% or more of properties had external wall installation fitted (intervention group) with remaining postcodes in the health board area **Data charting for mapping** Climate change-related exposure • Solutions and responses to climate change: mitigation policy (net zero, Clean Growth Strategy)	**QCC rating**: • before-after study: low quality • retrospective study: low quality **Main limitations** • No assessment of deprivation at individual level • Limited statistical analyses (no assessment of statistical significance) • Potential for selection bias and self-report bias in before-after study • No adjustment for confounding or assessment of individual level exposure assessment in retrospective study **Conflict of interest**: 3 authors work for the Energy Agency

Reference	Study characteristics	Methods	Critical appraisal
	Data charting for mapping Core20PLUS population • People experiencing the greatest deprivation (area-level); was deemed as meeting the inclusion criteria although 73% of intervention area was in 2 most deprived quintiles for Scottish IMD		
Konstantinoudis and others, 2022 ([9](#)) 'Ambient heat exposure and COPD hospitalisations in England: a nationwide case-crossover study' Publication type: journal article	**Study design**: case-crossover (class C) **Objective**: to evaluate the association between increase in ambient temperature and hospital admissions for chronic obstructive pulmonary disease (COPD), and explore whether the association varies by deprivation (health equity focus) **Setting**: England **Study sample** • n=320,411 admissions for COPD after applying inclusion criteria • Excluded: 27,966 duplicated records, 37 patients living outside England, 1,211,813 admissions occurring outside of summer months, 12 admissions where non-event days could not be identified • Demographics not reported **Study period**: summer months (June to August) of 2007 to 2018 **Data charting for mapping** Core20PLUS population • People experiencing the greatest deprivation (area-level, quintiles of IMD 2015)	**Exposure** • Maximum daily temperature at postcode level **Outcomes** • Morbidity: hospital admissions with COPD as primary diagnosis **Data collection methods** • Data on hospital admissions for COPD, age, and postcode of residence was obtained from Hospital Episode Statistics • Daily temperature data (at $1km^2$ resolution) was obtained from the Met Office and linked to patient data on postcode; used to calculate maximum average temperature on day of hospital admission and 2 preceding days • Data for air pollution (ozone and $PM_{2.5}$) and humidity was also obtained from the Met Office • Lower-tier local authority (LTLA) level data for IMD (2015) was obtained from the Ministry of Housing, Communities and Local Government • LTLA-level data for green space (2015) and urbanicity (2011) was obtained from the Land Cover Map and ONS, respectively **Statistical analysis** • Bayesian conditional Poisson regression models with event days matched to non-event days (same day of the week and month) • Adjusted for humidity and public holidays in all analyses; further adjusted for air pollution (ozone and $PM_{2.5}$) in effect modification analyses • Assessed effect modification by age, sex and LTLA characteristics (IMD, green space, average temperature, and urbanicity) **Data charting for mapping** Climate change-related exposure • Climate-related hazard: increase in ambient temperature	**QCC rating**: medium quality **Main limitations** • Deprivation measured at area level • Characteristics of study population not reported **Conflicts of interest**: no conflicts of interest reported
Lambourg and others, 2022 ([10](#))	**Study design**: time series (class C)	**Exposure** • Monthly temperatures averaged for all GP practices within each LSOA	**QCC rating**: high quality

Reference	Study characteristics	Methods	Critical appraisal
'Use of a high-volume prescription database to explore health inequalities in England: assessing impacts of social deprivation and temperature on the prescription volume of medicines' Publication type: journal article	**Objective**: to examine the relationship between ambient temperature impact prescription volumes, and how this varies by deprivation (health equity focus) **Setting**: general practices, England **Study sample** • GP practice level: all patients from English NHS general practices who had prescriptions dispensed during the study period, including prisons and training units • Sample sizes (number of prescriptions) in most deprived quintile: n=141,948 antidepressants, n=142,053 antibiotics, n=140,374 bronchodilators **Study period**: 1 January 2011 to 31 December 2018 **Data charting for mapping** Core20PLUS population • People experiencing the greatest deprivation (area-level, quintiles of English IMD)	**Outcomes** • Morbidity: mental health, respiratory, other (prescriptions for antidepressants, bronchodilators and antibiotics, respectively) **Data collection methods** • Temperature data from the Met Office database (averaged across each LSOA after linking nearest weather stations to general practices) • Prescription data for antidepressants, antibiotics and bronchodilators from the NHS Business Services Authority • IMD data from Ministry of Housing, Communities and Local government (assigned to LSOAs) • Disability-adjusted life years (DALYs) from Global Burden of Disease data, linked to LSOAs **Statistical analysis** • Fixed-effect negative binomial regression models at LSOA level • Separate models for most and least deprived IMD quintiles; evaluated effect of temperature bins on prescription rates, adjusting for % aged 65 years or older, % female and DALYs • Quantified cold and heat sensitivity (defined as 1.5 to 7.3°C and 21.1 to 26.9°C, respectively) via incidence rate ratios (IRRs) comparing temperature bins to reference temperature (14.4 to 16.3°C), with 95% CIs **Data charting for mapping** Climate change-related exposure • Climate-related hazard: extreme cold • Climate-related hazard: increase in ambient temperature	**Main limitations** • Deprivation measured at area level **Conflicts of interest**: no conflicts of interest reported
Lamond and others, 2015 (11) 'An exploration of factors affecting the long-term psychological impact and deterioration of mental health in flooded households' Publication type: journal article	**Study design**: cross-sectional study (class D) **Objective**: to examine the long-term mental health impacts of flooding and factors affecting psychological deterioration (not focused on health equity) **Setting**: England (15 study sites across England impacted in the 2007 floods) **Study sample** • 280 owner-occupied households flooded in 2007 responded to the survey, identified from insurance	**Exposure** • 2007 flood events in England affecting more than 50 households; household exposure confirmed via insurance records **Outcomes** • Morbidity: severity of mental health deterioration (self-reported) **Data collection methods** • Sociodemographic data: collected via questions in the postal survey questionnaire (15 study sites) • Flood data: depth and duration obtained from insurance claims records	**QCC rating**: low quality **Main limitations** • Selection bias • Self-report bias • Limited consideration of study limitations in discussion of findings **Conflicts of interest**: not reported

Reference	Study characteristics	Methods	Critical appraisal
	claims records (12.1% response rate; no information reported for non-respondents) • No demographic information reported **Study period**: survey conducted at least 5 years after the 2007 floods (specific date not reported) **Data charting for mapping** Core20PLUS population • People experiencing the greatest deprivation (individual level, household income); household income of less than £15,000 was deemed to meet the inclusion criteria	• Mental health impact data: collected via postal survey questionnaire items. Asked respondents to self-assess impacts 'on the household'. Severity of mental health deterioration and symptom frequency measured via 5-point Likert scales (results for symptom frequency not reported for deprivation) **Statistical analysis** • Descriptive statistics to assess mental health impact prevalence • Correlation analysis to identify associated variables • Binary logistic regression model to predict likelihood of mental health deterioration • Income included as a categorical predictor in the binary logistic regression model using backward selection to identify factors associated with severe mental deterioration outcomes. Report odds ratios (ORs) by household income, relative to households earning above £55,000 **Data charting for mapping** Climate change-related exposure • Climate-related hazard: heavy rainfall and flooding	
Milojevic and others, 2011 ([12]) 'Long-term effects of flooding on mortality in England and Wales, 1994-2005: controlled interrupted time-series analysis' Publication type: journal article	**Study design**: time series (class C) **Objective**: to evaluate the association between flooding and mortality in the year following a flood (not focused on health equity) **Setting**: England and Wales **Study sample** • n=319 flood events (estimated to affect 57,000 households) • Included deaths occurring in flooded areas in the year before (n=771) and year after (n=693) the floods • Excluded floods with unknown date and deaths in the year before and year after a flood that occurred within 2 years of a previous flood • Report demographic characteristics of people who died (sex, age group, rural or urban, deprivation quintile, place of death) in Table 1 of the paper **Study period**: 1994 to 2005	**Exposure** • Flooding based on postcode of residence **Outcomes** • Mortality: all causes **Data collection methods** • Data for flood events obtained from UK Environment Agency's National Flood and Coastal Defence Database of Historic Flood Event Outlines • Demographic data obtained from death certificates • LSOA-level IMD data for 2014 **Statistical analysis** • Calculated the relative change in mortality in the year before and year after floods in flooded areas, compared with non-flooded areas within 5km of flood boundary • Stratified by IMD quintile and place of death **Data charting for mapping** Climate change-related exposure • Climate-related hazard: heavy rainfall and flooding	**QCC rating**: low quality **Main limitations** • Deprivation measured at area level • Exclusion criteria poorly justified • Potential exposure misclassification **Conflicts of interest**: no conflicts of interest reported

Reference	Study characteristics	Methods	Critical appraisal
	Data charting for mapping Core20PLUS population • People experiencing the greatest deprivation (area-level, quintiles of IMD)		
Milojevic and others, 2017 (13) 'Mental health impacts of flooding: a controlled interrupted time series analysis of prescribing data in England' Publication type: journal article	**Study design**: time series (class C) **Objective**: to examine the impacts of flooding on mental health (not focused on health equity) **Setting**: England **Study sample** • 930 GP Practices selected if they were within 10km of a flood area of the targeted flood events • 186 GP practices in most deprived quintile **Study period**: June 2011 to November 2014 **Data charting for mapping** Core20PLUS population • People experiencing the greatest deprivation (area-level, quintiles of IMD)	**Exposure** • Large flooding events, including 2013 North East tidal surge, East coast tidal event, East Midland tidal surge, East of England tidal surge, Southwest floods 2013 to 2014 **Outcomes** • Morbidity: mental health (antidepressant prescribing rates) **Data collection methods** • General Practice Prescribing Data to obtain monthly counts of antidepressant prescriptions • UK Environment Agency recorded flood outlines to obtain areas exposed to flooding • GP practices assigned into quintiles of deprivation at LSOA level **Statistical analysis** • Controlled interrupted time series Poisson regression, comparing antidepressant prescriptions in 12 months before flood event to 12 months after • Adjusted for month, number of non-antidepressant prescriptions, and neighbourhood population density **Data charting for mapping** Climate change-related exposure • Climate-related hazard: heavy rainfall and flooding	**QCC rating**: medium quality **Main limitations** • Deprivation measured at area level • Potential exposure misclassification **Conflicts of interest**: no conflicts of interest reported
Murage and others, 2020 (14) 'What individual and neighbourhood-level factors increase the risk of heat related mortality? A case-crossover study of over 185,000 deaths in London	**Study design**: case-crossover (class C) **Objective**: to investigate how urban vegetation, housing characteristics and socio-economic factors may modify the association between exposure to heat and mortality (health equity focus) **Setting**: Greater London, UK	**Exposure** • Daily mean temperature at postcode level **Outcomes** • Mortality: all causes **Data collection methods** • Death records from ONS	**QCC rating**: high quality **Main limitations** • Deprivation measured at area level **Conflicts of interest**: no conflicts of interest reported

Reference	Study characteristics	Methods	Critical appraisal
using high-resolution climate datasets Publication type: journal article	**Study sample** • n=185,397 deaths • Sex: 50% male • Age: 32% aged 85 years or older **Study period**: May to September of 2007 to 2016 **Data charting for mapping** Core20PLUS population • People experiencing the greatest deprivation (quartiles of area-level income deprivation, area-level employment deprivation)	• Four-hourly temperature data collected from the Met Office weather station used to calculate mean daily temperature at 500m grid resolution, aggregated to postcode level • LSOA level data for socioeconomic deprivation, matched to postcode area for each death **Statistical analysis** • Cases (dates when a death occurred) matched to 3 control dates (same day of the week from a range of 28 days) • Conditional logistic regression models (3 day distributed lag) used to investigate association between exposure to heat and mortality per 1°C increase in temperature • Tested for effect modification by including interaction terms for socio-economic quartiles, land variables (including natural and built environment), age-group and sex **Data charting for mapping** Climate change-related exposure: • Climate-related hazard: increase in ambient temperature	
Page and others, 2012 (15) 'Temperature-related deaths in people with psychosis, dementia and substance misuse' Publication type: journal article	**Study design**: time series (class C) **Objective**: to assess the risk associated with high ambient temperatures in individuals with psychosis, dementia, and substance abuse (health equity focus) **Setting**: England (nationwide) **Study sample** • n=22,562 patients with a primary diagnosis of severe and long-term alcohol or substance abuse, psychosis or dementia who died in England during the study period • Approximately 8,000 patients with alcohol misuse or other substance misuse recorded in primary care records (calculated from Table 1 in the paper) • 82.1% aged at least 65 years **Study period**: 1 January 1998 to 31 December 2007	**Exposure** • Average daily temperature at regional level **Outcomes** • Mortality: all causes **Data collection methods** • Diagnostic and demographic data (age, gender and region of residence) collected from the UK GP Research Database and linked with death registration records from Office for National Statistics (ONS) • Daily temperature data collected for all monitoring stations in England from the British Atmospheric Data Centre • Relative humidity and daily temperature data collected from the Central England Temperature series. Assigned to deaths based on region of residence on death certificates **Statistical analysis** • Time series Poisson regression models used to estimate relative risk of death per 1°C increase in temperature above the 93rd percentile of the annual distribution of regional-specific temperature data (approximately equivalent to 18°C)	**QCC rating**: high quality **Main limitations** • None identified **Conflicts of interest**: no conflicts of interest reported

Reference	Study characteristics	Methods	Critical appraisal
	Data charting for mapping Core20PLUS population • People with drug and or alcohol dependency (individual level)	• Meta-analysis combined regional estimates • Models adjusted for relative humidity, seasonality, and day of week mortality patterns • Analysis stratified by age and diagnosis as effect modifiers **Data charting for mapping** Climate change-related exposure • Climate-related hazard: increase in ambient temperature	
Rizmie and others, 2022 (16) 'Impact of extreme temperatures on emergency hospital admissions by age and socio-economic deprivation in England' Publication type: journal article	**Study design**: time series (class C) **Objective**: to evaluate whether the association between extreme temperatures (heat and cold) and emergency hospital admissions varies by age and deprivation (health equity focus) **Setting**: England **Study sample** • n=29,371,084 emergency hospital admissions • Mean age = 58.4 years (43% older than 74 years), 52% male • Excluded admissions involving transfer between hospitals (0.03%) **Study period**: 1 April 2001 to 31 March 2012 **Data charting for mapping** Core20PLUS population • People experiencing the greatest deprivation (area-level, quintiles of IMD)	**Exposure** • Daily minimum and maximum outdoor temperature categorised into 5°C intervals from -5°C or below (extreme cold) to 30°C or above (extreme heat) at hospital level (unclear how this was assigned) **Outcomes** • Morbidity: emergency hospital admissions (cause-specific; infectious diseases, metabolic diseases, neoplastic diseases, respiratory diseases, circulatory diseases, injuries) **Data collection methods** • Daily number of emergency admissions for each hospital calculated from Hospital Episode Statistics data from NHS Digital • IMD score derived from hospital data based on patient's home postcode combined with 2011 Census data on IMD at LSOA level • Hospital-level temperature and rainfall data obtained from Met Office Integrated Data Archive System **Statistical analysis** • Used distributed lag Poisson regression to estimate incidence risk ratios (relative to reference temperature of 10 to 15°C) for daily admissions (and for 30 days after an extreme cold or extreme heat day as sensitivity analysis) • Adjustments were not clearly described; appeared to adjust for day of week, month, year, school holidays, public holidays, hospital factors, and rainfall • Standard errors were clustered and robust to account for correlations within hospitals • Ran separate models for each outcome, stratified by IMD quintile (least deprived quintile versus most deprived quintile) • Conducted various sensitivity analyses reported in Appendix of the paper	**QCC rating**: medium quality **Main limitations** • Deprivation measured at area level • Poor description of exposure assessment **Conflicts of interest**: no conflicts of interest reported

Reference	Study characteristics	Methods	Critical appraisal
		Data charting for mapping Climate change-related exposure • Climate-related hazard: extreme heat • Climate-related hazard: extreme cold • Climate-related hazard: increase in ambient temperature	
Symonds and others, 2021 (17) 'Home energy efficiency and subjective health in Greater London' Publication type: journal article	**Study design**: retrospective study (class D) **Objective**: to evaluate the association between household energy efficiency and air infiltration with self-reported health (not focused on health equity) **Setting**: Greater London **Study sample** • n=4,835 LSOAs (of which n=1,442 were in the most income deprived quartile) • Mean age = 35.2 years; mean percentage female = 50.1% • Table 2 of the paper reports means and percentiles for demographic information (age, sex, income deprivation, education deprivation) and for all covariates across all LSOAs **Study period**: Unclear **Data charting for mapping** Core20PLUS population • People experiencing the greatest deprivation (area-level, income deprivation; lowest quartile)	**Exposure** • Median household energy efficiency (Standard Assessment Procedure rating) for each LSOA • Median household air infiltration rate for each LSOA **Outcomes** • Morbidity: self-reported health **Data collection methods** • Household-level data for energy efficiency and air infiltration rates obtained from the Energy Performance Certificate database (Ministry of Housing, Communities and Local Government) in 2017 and most recent scores used to calculate median value for each LSOA • Data for average household energy consumption was obtained from 2011 Digest of United Kingdom Energy Statistics • LSOA level data from 2011 Census used to obtain data on self-reported 'good or very good' health, household type (flats, maisonettes, apartments) and household size • Population estimates by age and sex were obtained from ONS and used to calculate median age and % female for each LSOA • LSOA level data for 2011 Income and Education Deprivation domains and greenspace was obtained from the Department for Communities and Local Government (relevant results not reported for education deprivation) • LSOA level data on air quality and mean minimum winter temperature was obtained from London Atmospheric Emissions Inventory and Met Office HadUK-Grid dataset, respectively **Statistical analysis** • Beta regression used to calculate ORs, representing the change in self-reported health for LSOAs in the 25th percentile for the exposure, compared with the 75th percentile • Adjusted for % greenspace, average minimum winter temperature, air quality, education deprivation score, income deprivation score (not in subgroup analysis), % female, median age, % flats, floor area (selected based on variance inflation factors to reduce collinearity)	**QCC rating**: low quality **Main limitations** • Deprivation measured at area level • Poor description of methods • Self-report bias • Potential exposure misclassification **Conflicts of interest**: not reported

16

Reference	Study characteristics	Methods	Critical appraisal
		• Used bootstrapping to account for spatial autocorrelation **Data charting for mapping** Climate change-related exposure • Mitigation policy (Net zero strategy)	
Tammes and others, 2018 (18) 'Use of primary care data to predict those most vulnerable to cold weather' Publication type: journal article	**Study design**: case-crossover (class C) **Objective**: to evaluate the association between sociodemographic, clinical and home energy efficiency characteristics, and cold-related mortality (health equity focus) **Setting**: England **Study sample** • Total n=34,752 patients aged 65 years or older who could be linked to a death record were included in the analysis (after excluding 25 patients with missing data for deprivation) out of 537,623 patients in Clinical Practice Research Datalink (CPRD) • n=7,710 deaths from winter-related causes during winter months, which were also analysed separately; of these, 56.7% female; 11.9% aged 65 to 74 years, 31.1% aged 75 to 84 years, 57.0% aged 85 years or older; 20.2% in least deprived IMD quintile 1, 22.8% in IMD quintile 2, 22.1% IMD quintile 3, 18.6% IMD quintile 4, 16.3% most deprived IMD quintile 5 • Report other demographic characteristics for all covariates in Table 2 of the paper **Study period**: 1 April 2012 to 31 March 2014 **Data charting for mapping** Core20PLUS population • People experiencing the greatest deprivation (area-level, quintiles of 2015 English IMD)	**Exposure** • Average daily temperature for each of the 10 English Strategic Health Authorities (mean daily temperature during winter approximately 5°C) **Outcomes** • Mortality: all-causes • Mortality: deaths from winter-related causes occurring during winter months December to March; International Classification of Diseases (10th revision) codes for diseases of the circulatory system, respiratory system, nervous system, mental and behavioural disorders **Data collection methods** • Data obtained from CPRD and linked to ONS mortality data on NHS number • LSOA of residence based on patients' postcode in CPRD used to classify patients into IMD quintiles • Daily temperature data from the Met Office at 10 English Strategic Health Authority level • LSOA-level data on household energy efficiency used to derive percentage of properties with efficiency lower than 55% • Data on health status (binary indicator for emergency hospital admission in 2 years before death and a binary indicator for diagnosis with any of 7 chronic conditions) was derived from linked Hospital Episode Statistics data **Statistical analysis** • Used conditional logistic regression to estimate ORs for risk of death per 1°C decrease in temperature over a 3-day lag period for the 28th day before and after date of death (13-day lag period used in sensitivity analysis) • Tested for effect modification by including interaction between exposure and characteristic of interest and reported relative ORs • Reported results of unadjusted and adjusted models; adjusted models included interactions between temperature and all covariates (sex, age group, living in an institution, rural or urban, IMD quintile, house energy efficiency, emergency hospital admission, chronic conditions, region) • Compared characteristics of people who died in winter from winter-related causes using Chi-square test	**QCC rating**: high quality **Main limitations** • Deprivation measured at area level **Conflicts of interest**: no conflicts of interest reported

Reference	Study characteristics	Methods	Critical appraisal
		Data charting for mapping Climate change-related exposure • Climate-related hazard: extreme cold	
Tieges and others, 2020 (19) 'The Impact of Regeneration and Climate Adaptations of Urban Green–Blue Assets on All-Cause Mortality: A 17-Year Longitudinal Study' Publication type: journal article	**Study design**: time series (class C) **Objective**: to examine the health co-benefits of increasing urban blue space from canal regeneration (health equity focus) **Setting**: North Glasgow **Study sample** • n=145 small geographical areas, comprising 500 to 1,000 residents per area on average (n=114 included in analysis) • Population estimates: 123,011 in 2001 and 126,318 in 2017 (95,569 and 95,493 included in analysis, respectively) • Number of deaths not reported **Study period**: 2001 to 2017 **Data charting for mapping** Core20PLUS population • People experiencing the greatest deprivation (area-level); deemed as meeting the inclusion criteria although approximately half of areas in most deprived quintile of Scottish IMD	**Exposure** • Distance from Glasgow canal (categorised as 0m to 500m, 500m to 1,000m and 1,000 to 1,500m) **Outcomes** • Mortality: all-causes **Data collection methods** • All data obtained from National Records of Scotland • Geographical areas based on data from 2001 Census and updated using 2011 Census • Annual number of deaths and mid-year population estimates obtained from mortality records **Statistical analysis** • Mortality rates calculated as a percentage of the population for each area • Linear mixed model with fixed factors of year and distance to the canal • Unadjusted and adjusted models, with domains of the Scottish IMD (income, employment, housing, education and geographic access) included as covariates • Separate linear mixed model (unadjusted and adjusted as above) comparing the areas within 0m to 500m and 500m to 1,000m of the canal with an affluent area of Glasgow (Hyndland and Dowanhill, median Scottish IMD decile = 10) **Data charting for mapping** Climate change-related exposure • Solutions and responses to climate change exposure pathways: adaptation policy and interventions (Glasgow smart canal project)	**QCC rating**: low quality **Main limitations** • No assessment of deprivation at individual level • No demographic data reported for study areas • Limited description of canal regeneration project **Conflicts of interest**: no conflicts of interest reported
Wan and others, 2022 (20) 'Temperature-related mortality and associated vulnerabilities: evidence from Scotland using	**Study design**: time series (class C) **Objective**: to evaluate whether the association between cold- and heat-related mortality varies by socio-economic characteristics (health equity focus)	**Exposure** • Average daily temperature for each 'locality' (resolution unclear) **Outcomes** • Mortality: all causes • Mortality: cause-specific (cardiovascular and respiratory) – not reported by deprivation, so not extracted here	**QCC rating**: medium quality **Main limitations** • Deprivation measured at area level • Limited description of exposure assessment

Reference	Study characteristics	Methods	Critical appraisal
extended time-series datasets' Publication type: journal article	**Setting**: Scotland (4 major cities (Aberdeen, Dundee, Edinburgh, Glasgow) and 3 regions (East, West, North), excluding the 4 cities) **Study sample** • n=2,683,885 deaths in total (n=569,094 in most deprived quintile) • Report total deaths during study period by city and region and age group, sex, marital status, cause of death, and deprivation quintile in Table A5 of the paper **Study period**: 1974 to 2018 **Data charting for mapping** Core20PLUS population • People experiencing the greatest deprivation (area-level, quintiles of modified version of the Carstairs Index)	**Data collection methods** • Data for the Carstairs Index were obtained from Scottish Census data in 1981, 1991, 2001 and 2011 (modified by replacing male unemployment with total unemployment) • Temperature data obtained from HadUK-Grid Gridded Climate Observation; calculated average daily temperature as mean of average maximum and minimum • Data on humidity and air pollution (PM_{10} and O_3 concentrations) was only available for Edinburgh and recorded at a single site (Royal Botanic Garden and Edinburgh St Leonards, respectively) for the period 2004 to 2018 **Statistical analysis** • Quasi-Poisson regression with distributed lag models to calculate relative risk (RR) scores for the association between daily temperature and mortality for each city and region separately and for 15-year periods (1974 to 1988, 1989 to 2003, 2004 to 2018) • Combined across cities and regions using multivariate meta-analysis and then performed meta-regression across time periods with random effects for cities and regions to calculate RR scores for all areas combined for the entire study period • The reference temperature for calculating RR scores was the 10th (2.3°C) and 90th (14.5°C) percentiles of the annual temperature distribution averaged across the 4 cities and 3 regions; report RR across the whole temperature distribution and use the RR at the 1st percentile (-1.7°C) and 99th percentile (17.9°C) to summarise extreme cold and extreme heat, respectively • Conducted separate analyses for mortality from cold (October to April of each year with 14-day lag) and heat (June to August of each year with one-day lag) • Adjusted for long-term trends and short-term variation in mortality (interactions between year and splines for day of the year), public holidays, and day of the week • Performed various sensitivity analyses to assess length of lags, how lags and adjustments for long-term trends and short-term variation in mortality were modelled, and adjustment for humidity and air pollution (Edinburgh only, 2004 to 2018) • Performed subgroup analysis by stratifying the analysis by Carstairs deprivation quintile and fitting separate models; also stratified by broad age group (0 to 74 years versus at least 75 years) and deprivation simultaneously **Data charting for mapping** Climate change-related exposure • Climate-related hazard: extreme heat	**Conflicts of interest**: no conflicts of interest reported

Reference	Study characteristics	Methods	Critical appraisal
		• Climate-related hazard: extreme cold	
Zafeiratou and others, 2023 (21) 'Assessing heat effects on respiratory mortality and location characteristics as modifiers of heat effects at a small area scale in Central-Northern Europe' Publication type: journal article	**Study design**: time series (class C) **Objective**: to evaluate the association between heat and respiratory mortality, and explore whether this association varies by socio-economics (health equity focus) **Setting**: England and Wales (also reported results for Norway and Germany but not extracted here) **Study sample** • n=247,836 deaths occurring in 346 LADs during study period • Demographic information not reported **Study period**: May to September, 2000 to 2018 **Data charting for mapping** Core20PLUS population • People experiencing the greatest deprivation (area-level, 5th percentiles of GDP per inhabitant and proportion of working age population in employment)	**Exposure** • Daily mean temperature for each LSOA (34,753 LSOAs included) **Outcomes** • Mortality: respiratory causes **Data collection methods** • LSOA-level data for deaths from ONS • Daily mean air temperature data at 1km^2 resolution from Met Office, aggregated to LSOA-level • NUTS-3 level data for GDP per inhabitant and employment from ONS • Modelled air pollution data (2008 to 2018) aggregated to LSOA-level **Statistical analysis** • Poisson regression distributed lag non-linear models allowing for overdispersion (2-day lag) • Including interaction between small area, year, month, and day to adjust for seasonality and trends • Separate models for each LAD, combined with multivariate meta-analysis • Calculated relative risk of respiratory mortality at 95th compared to 75th percentile, based on area-specific temperature distributions • Effect modification analysis at NUTS-3 level using multivariate meta-regression to pool effect estimates across LADs, comparing 5th to 95th percentile for GDP and employment using Wald test • Adjusted for population density • Conducted sensitivity analysis with 3-day lag, restricting to June to August, and using Minimum Mortality Temperature instead of 75th percentile **Data charting for mapping** Climate change-related exposure • Climate-related hazard: extreme heat	**QCC rating**: high quality **Main limitations** • Deprivation measured at area level **Conflicts of interest**: no conflicts of interest reported

Table S.2. Modelling studies

Reference	Study and model characteristics	Scenarios and outcome measures	Critical appraisal
Williams and others, 2018 (22) 'The Lancet Countdown on health benefits from the UK Climate Change Act: a modelling study for Great Britain' Publication type: journal article	**Study objective**: to assess the health co-benefits resulting from meeting the UK Climate Change Act targets through reductions in air pollution (health equity focus) **Setting**: Great Britain (findings also reported for Scotland, London and Wales individually) **Model** • National-level energy systems model (UK TIMES) used to develop energy use scenarios • Community Multi-scale Air Quality (CMAQ) model and the Atmospheric Dispersion Modelling System roads model used to estimate air pollution concentrations at 10km resolution across UK (2km in urban areas), then averaged to ward level to use as population weighting at local authority level • Weather Research and Forecasting model combined with Carbon-climate Earth System Model to generate meteorological fields • A life table methodology was used to model the impacts of air pollution on health (results not extracted as only reported for main analysis, not for population of interest) **Data source**: • 2011 Census data (population demographics and deprivation data) • ONS mortality data (mortality rates) **Study period**: 2011 to 2154 (outcome of interest assessed at 2035 and 2050) **Data charting for mapping** Core20PLUS population • People experiencing the greatest deprivation (area-level, quintiles of Carstairs index)	**Exposure or intervention** • Climate change mitigation policy (UK Climate Change Act) **Outcomes** • Proxy outcome: exposure to air pollution • Projected health outcomes (life years gained and lost for the main analysis, but not by deprivation; results not extracted here) **Scenarios** • Baseline scenario: no further climate mitigation beyond already achieved, does not meet Climate Change Act target • Nuclear scenario: meets target with limited increase in nuclear power • Low-greenhouse gas scenario; meets target without limiting nuclear-build • Constant scenario: holds 2011 air pollutant concentrations until 2050 **Data charting for mapping** Climate change-related exposure • Solutions and responses to climate change: mitigation policy (UK Climate Change Act)	**Main limitations** • Although refer to previous study for model evaluation, unclear if model set up has changed (for example evidence of CMAQ model evaluation would be helpful) • Lack of specific information on some modelling aspects (for example UKTIMES model) in references cited, though documentation does exist • Deprivation measured at area level **Conflict of interest**: no conflicts of interest reported

Reference	Study and model characteristics	Scenarios and outcome measures	Critical appraisal

Yu and others, 2020 (23)
 	
'Disruption of emergency response to vulnerable populations during floods'
 	
Publication type: journal article
	Study objective: to evaluate the impact of flooding on emergency service coverage in vulnerable populations (health equity focus)
	
	Setting: England
	
	Model
	• Network-based spatial analysis assuming normal traffic levels (speed limit) used to model coverage of Ambulance Service and Fire and Rescue stations within 4 response time targets
	• Performed model validation for a flood event in London on 23 June 2016 and found good agreement for both flooded areas and Fire Service response times
	• Conducted sensitivity analysis with various speed reductions to assess impact of traffic
	
	Data source:
	• 2011 Census used to obtain data for ethnicity and household deprivation (deprived in 1 to 4 dimensions; employment, health and disability, education, housing) for 171,372 Output Areas and Small Areas
	• Ordnance Survey data used to map the road network (MasterMap Integrated Transport Network)
	• Risks of Flooding from Rivers and Sea dataset (50 x 50m) and Risk of Flooding from Surface Water dataset (2 x 2m)
	
	Study period: unclear
	
	Data charting for mapping
	Core20PLUS population
	• People experiencing the greatest deprivation (individual-level, household deprivation); households deprived in in 2 to 4 dimensions was deemed to meet the inclusion criteria
	• Ethnic minorities (individual-level, Asian, Black, Mixed, Other)
		Exposure or intervention
		• Flood risk maps (from rivers and the sea and extreme rainfall)
		
		Outcomes
		• Proxy outcome: access to healthcare (ambulance service response times within 7 minutes, 15 minutes, 18 minutes, and 40 minutes)
		
		Scenarios
		• Baseline: no flood
		• Three scenarios for risk of flooding from rivers and the sea based on annual exceedance probabilities:
		  – more than 3.3% (small flood, once in less than 30 years)
		  – 3.3% to 1% (medium flood, once in 30 to 100 years)
		  – 1% to 0.1% (large flood, once in 100 to 1,000 years)
		• Three potential flood zones from extreme rainfall identified for annual exceedance probabilities of 3.3%, 1% and 0.1%
		
		Data charting for mapping
		Climate change-related exposure
		• Climate-related hazard: heavy rainfall and flooding
			Main limitations
			• Lack of sensitivity analysis about flood depth for road closures
			• Deprivation and ethnicity measured at area level
			
			Conflict of interest: no conflicts of interest reported

Excluded studies

Table S.3. Exclusion reason: wrong study design (n=33)

Author	Year	Title
Armstrong and others	2014	Conditional Poisson models: a flexible alternative to conditional logistic case cross-over analysis
Andrijevic and others	2023	Towards scenario representation of adaptive capacity for global climate change assessments
Ascione and others	2022	The trend of heat-related mortality in European cities
Bates and others	2012	The impact of climate change upon health and health inequalities in the North West of England
Bennett and Friel	2014	Impacts of climate change on inequities in child health
Brennan and others	2020	Preventative strategies and interventions to improve outcomes during heatwaves
Buchs and others	2011	Who bears the brunt? Distributional effects of climate change mitigation policies
Crandon and others	2022	The clinical implications of climate change for mental health
De Chavez and others	2017	Using environmental monitoring to complement in-depth qualitative interviews in cold homes research
Ferguson and others	2021	Systemic inequalities in indoor air pollution exposure in London, UK
Fitton and Moncaster	2019	Arguments for a co-production approach to community flood protection
Gasparrini and Armstrong	2010	Time series analysis on the health effects of temperature: Advancements and limitations
Hagg and others	2019	Scotland adapts: A capability framework for a climate ready public sector
Hosford and others	2021	The effects of road pricing on transportation and health equity: A scoping review
Jay and others	2021	Reducing the health effects of hot weather and heat extremes: from personal cooling strategies to green cities
Khosla and others	2021	Health risks of extreme heat
Kroeger	2023	Households worldwide become food insecure when it is too hot
Lindley and others	2011	Climate change, justice and vulnerability
McKee and others	2021	The changing health needs of the UK population
Munro and others	2020	Sustainable health equity: achieving a net-zero UK
Negev and Kovats	2016	Climate change adaptation in the reorganized UK public health system: a view from local government
NHS Providers	2021	Climate change is a public health emergency: the NHS is rising to the challenge
Oyebanjo and Bushell	2014	A critical evaluation of the UK SunSmart campaign and its relevance to Black and minority ethnic communities
Public Health England	2018	Heatwave plan for England: protecting health and reducing harm from extreme heat and heatwaves
Public Health Scotland	2023	Working together to build climate-resilient, healthy and equitable places A briefing for local government and partners
Ruane and others	2016	The Vulnerability, Impacts, Adaptation and Climate Services Advisory Board (VIACS AB v1.0) contribution to CMIP6
Sayers and others	2018	Flood vulnerability, risk, and social disadvantage: current and future patterns in the UK
Slenning	2010	One health and climate change: linking environmental and animal health to human health

Author	Year	Title
Stevens and others	2022	A comprehensive urban programme to reduce energy poverty and its effects on health and wellbeing of citizens in six European countries: study protocol of a controlled trial
Townend and others	2021	Operationalising coastal resilience to flood and erosion hazard: A demonstration for England
van Daalen and others	2023	Approaching unsafe limits: climate-related health inequities within and beyond Europe
Wan and others	2023	Heat-health governance in a cool nation: A case study of Scotland
Zaidi and Pelling	2015	Institutionally configured risk: Assessing urban resilience and disaster risk reduction to heat wave risk in London

Table S.4. Exclusion reason: wrong publication type (n=6)

Author	Year	Title
Bone and others	2010	Will drivers for home energy efficiency harm occupant health?
Capone and others	2023	Interaction between air pollutants and pollen grains: effects on public and occupational health
Donaldson and Wedzicha	2013	Deprivation, winter season, and COPD exacerbations
Firth	2014	Healthy settings and developing wellbeing in the community: RSPH annual conference and awards ceremony – 1st October 2014
Murray and Ebi	2012	IPCC special report on managing the risks of extreme events and disasters to advance climate change adaptation (SREX)
Rutter	2019	'July heatwave' causes highest A&E demand ever

Table S.5. Exclusion reason: wrong language (n=1)

Author	Year	Title
Fernandez and Rodela	2020	"Hay poder en numeros": understanding the development of a collectivist Latinx parent identity and conscientizacao amid an anti-immigrant climate

Table S.6. Exclusion reason: no explicit link to climate change (n=75)

Author	Year	Title
Al Ahad	2022	The spatial-temporal effect of air pollution on GP visits and hospital admissions by ethnicity in the United Kingdom: An individual-level analysis
Al Ahad	2023	The association of long-term exposure to outdoor air pollution with all-cause GP visits and hospital admissions by ethnicity and country of birth in the United Kingdom
Al Ahad and others	2023	The spatial-temporal effect of air pollution on individuals' reported health and its variation by ethnic groups in the United Kingdom: a multilevel longitudinal analysis
Al Ahad and others	2022	Does long-term air pollution exposure affect self-reported health and limiting long term illness disproportionately for ethnic minorities in the UK? A Census-based individual level analysis
Al Ahad and others	2022	Air pollution and individuals' mental wellbeing in the adult population in United Kingdom: A spatial-temporal longitudinal study and the moderating effect of ethnicity
Astell-Burt and others	2013	Effect of air pollution and racism on ethnic differences in respiratory health among adolescents living in an urban environment
Atkinson and others	2013	Long-term exposure to outdoor air pollution and incidence of cardiovascular diseases
Barnes and others	2019	Emissions vs exposure: Increasing injustice from road traffic-related air pollution in the United Kingdom
Bixby and others	2015	Associations between green space and health in English cities: an ecological, cross-sectional study
Brunt and others	2017	Air pollution, deprivation and health: understanding relationships to add value to local air quality management policy and practice in Wales, UK
Carey and others	2018	Are noise and air pollution related to the incidence of dementia? A cohort study in London, England
Charlton and others	2023	Long-term outdoor air pollution and COVID-19 mortality in London: an individual-level analysis
Chua and others	2020	Ambient air pollution associations with retinal morphology in the UK Biobank
Cruz and others	2022	Association of environmental and socioeconomic indicators with serious mental illness diagnoses identified from general practitioner practice data in England: A spatial Bayesian modelling study
Doiron and others	2019	Air pollution, lung function and COPD: results from the population-based UK Biobank study
Fecht and others	2015	Associations between air pollution and socioeconomic characteristics, ethnicity and age profile of neighbourhoods in England and the Netherlands
Feng and others	2023	The effects of long-term exposure to air pollution on incident mental disorders among patients with prediabetes and diabetes: Findings from a large prospective cohort
Ferguson and others	2023	Analysis of inequalities in personal exposure to PM2.5: A modelling study for the Greater London school-aged population
Gao and others	2023	Association between long-term exposure to wildfire-related PM2.5 and mortality: A longitudinal analysis of the UK Biobank
Geary and others	2023	Ambient greenness, access to local green spaces, and subsequent mental health: a 10-year longitudinal dynamic panel study of 2.3 million adults in Wales
Geary and others	2023	Green-blue space exposure changes and impact on individual-level well-being and mental health: a population-wide dynamic longitudinal panel study with linked survey data
Gray and others	2023	Deprivation based inequality in NOx emissions in England
Grey and others	2017	The short-term health and psychosocial impacts of domestic energy efficiency investments in low-income areas: a controlled before and after study
Halonen and others	2016	Long-term exposure to traffic pollution and hospital admissions in London
Hao and others	2023	Ethnic disparities in ambient air and traffic-related pollution exposure and ethnic-specific impacts on clinical biomarker levels

Author	Year	Title
Hart and others	2013	Ambient air pollution exposures and risk of rheumatoid arthritis
Heyman and others	2011	A randomised controlled trial of an energy efficiency intervention for families living in fuel poverty
Horton and others	2023	Air pollution and public health vulnerabilities, susceptibilities and inequalities in Wales, UK
Jephcote and Chen	2012	Environmental injustices of children's exposure to air pollution from road-transport within the model British multicultural city of Leicester: 2000-09
Johnes and others	2023	Using sensor data to identify factors affecting internal air quality within 279 lower income households in Cornwall, South West of England
Karamanos and others	2021	Air pollution and trajectories of adolescent conduct problems: the roles of ethnicity and racism; evidence from the DASH longitudinal study
Karamanos and others	2023	Associations between air pollutants and blood pressure in an ethnically diverse cohort of adolescents in London, England
Kazakos and others	2020	Quantifying the health burden misclassification from the use of different PM2.5 exposure tier models: A case study of London
Kazakos and others	2021	Impact of COVID-19 lockdown on NO2 and PM2.5 exposure inequalities in London, UK
Keidel and others	2019	The role of socioeconomic status in the association of lung function and air pollution-A pooled analysis of 3 adult ESCAPE cohorts
Kelly and others	2011	The London low emission zone baseline study
Khan and others	2018	Criegee intermediates and their impacts on the troposphere
Kotecha and others	2020	Differential association of air pollution exposure with neonatal and postneonatal mortality in England and Wales: A cohort study
Laborde and others	2011	Assessment of training needs for disaster mental health preparedness in black communities
Lavigne and others	2019	Associations between metal constituents of ambient particulate matter and mortality in England: an ecological study
Lee and others	2022	Quantifying the impact of air pollution on COVID-19 hospitalisation and death rates in Scotland
Li and others	2023	Long-term exposure to air pollution and incident non-alcoholic fatty liver disease and cirrhosis: A cohort study
Li and others	2023	Associations of long-term joint exposure to various ambient air pollutants with all-cause and cause-specific mortality: evidence from a large population-based cohort study
Liu and others	2024	Exposure to residential green and blue space and the natural environment is associated with a lower incidence of psychiatric disorders in middle-aged and older adults: findings from the UK Biobank
Luo and others	2022	Long-term exposure to ambient air pollution is a risk factor for trajectory of cardiometabolic multimorbidity: A prospective study in the UK Biobank
Ma and others	2023	Exposure to various ambient air pollutants and 9 cardiovascular conditions among individuals with diabetes: A prospective analysis of the UK Biobank
Marks and others	2016	Geographical and temporal trends in imported infections from the tropics requiring inpatient care at the Hospital for Tropical Diseases, London - a 15 year study
Martin-Bassols and others	2023	Effect of in utero exposure to air pollution on adulthood hospitalizations
Mebrahtu and others	2023	Differences in public's perception of air quality and acceptability of a clean air zone: A mixed-methods cross sectional study
Milojevic and others	2017	Socioeconomic and urban-rural differentials in exposure to air pollution and mortality burden in England
Mitchell and others	2011	A comparison of green space indicators for epidemiological research
Moran and others	2022	Does prison location matter for prisoner wellbeing? The effect of surrounding greenspace on self-harm and violence in prisons in England and Wales
Moran and others	2023	Greenspace in prison improves well-being irrespective of prisoner characteristics, with particularly beneficial effects for younger and unsentenced prisoners, and in overcrowded prisons
Morrison and others	2014	An initial assessment of spatial relationships between respiratory cases, soil metal content, air quality and deprivation indicators in Glasgow, Scotland, UK: relevance to the environmental justice agenda

Author	Year	Title
Moyo and others	2019	Persistence of imported malaria Into the United Kingdom: An epidemiological review of risk factors and at-risk groups
Nachman and Parker	2012	Exposures to fine particulate air pollution and respiratory outcomes in adults using 2 national datasets: a cross-sectional study
Oliver and others	2024	A cross-sectional analysis of biodiversity, publicly accessible green space and mental well-being in Wales using routinely collected data
Raaschou-Nielsen and others	2013	Air pollution and lung cancer incidence in 17 European cohorts: Prospective analyses from the European Study of Cohorts for Air Pollution Effects (ESCAPE)
Richardson and others	2013	A regional measure of neighborhood multiple environmental deprivation: Relationships with health and health inequalities
Riddell and Babiker	2017	Imported dengue fever in East London: a 6-year retrospective observational study
Roca-Barcelo and others	2020	Risk of respiratory hospital admission associated with modelled concentrations of Aspergillus fumigatus from composting facilities in England
Ronaldson and others	2022	Associations between air pollution and multimorbidity in the UK Biobank: A cross-sectional study
Schembari and others	2015	Ambient air pollution and newborn size and adiposity at birth: Differences by maternal ethnicity (the Born in Bradford Study Cohort)
Sharpe and others	2015	Fuel poverty increases risk of mould contamination, regardless of adult risk perception & ventilation in social housing properties
Shi and others	2023	Dynamic association of ambient air pollution with incidence and mortality of pulmonary hypertension: A multistate trajectory analysis
Smith and others	2019	Characteristics of the environment and physical activity in midlife: Findings from UK Biobank
Temam and others	2017	Socioeconomic position and outdoor nitrogen dioxide (NO2) exposure in Western Europe: A multi-city analysis
Tieges and others	2022	Investigating the association between regeneration of urban blue spaces and risk of incident chronic health conditions stratified by neighbourhood deprivation: A population-based retrospective study, 2000-2018
Tonne and others	2018	Socioeconomic and ethnic inequalities in exposure to air and noise pollution in London
Tonne and Wilkinson	2013	Long-term exposure to air pollution is associated with survival following acute coronary syndrome
Travaglio and others	2021	Links between air pollution and COVID-19 in England
Wan and others	2022	Greenspace and mortality in the U.K. Biobank: Longitudinal cohort analysis of socio-economic, environmental, and biomarker pathways
Ward Thompson and others	2016	Mitigating stress and supporting health in deprived urban communities: The importance of green space and the social environment
Xie and others	2021	Interactions with artificial water features: A scoping review of health-related outcomes
Yap and others	2012	Association between long-term exposure to air pollution and specific causes of mortality in Scotland

Table S.7. Exclusion reason: wrong country (n=40)

Author	Year	Title
Adeleye and Tiwari	2024	Empirical assessment of methane emissions, socioeconomic factors, and infant mortality in Europe
Akritidis and others	2024	Strong increase in mortality attributable to ozone pollution under a climate change and demographic scenario
Bachmeyer and others	2020	Cases of malaria in travellers with sickle cell disease - Chemoprophylaxis is important for this risk group
Bai and others	2023	Neighborhood deprivation and rurality associated with patient-reported outcomes and survival in men with prostate cancer in NRG Oncology RTOG 0415
Cassidy and others	2024	Regional temperature extremes and vulnerability under net zero CO_2 emissions
Chen and others	2023	Long-term exposure to low-level PM2.5 and mortality: Investigation of heterogeneity by harmonizing analyses in large cohort studies in Canada, United States, and Europe
Chen and others	2024	The impact of geopolitical risk on CO2 emissions inequality: Evidence from 38 developed and developing economies
Colón-González and others	2021	Projecting the risk of mosquito-borne diseases in a warmer and more populated world: a multi-model, multi-scenario intercomparison modelling study
Conlon and others	2020	Mapping human vulnerability to extreme heat: A critical assessment of heat vulnerability indices created using principal components analysis
Doran and others	2016	Homelessness and other social determinants of health among emergency department patients
Ferrreira and others	2019	Home-based and informal work exposes the families to high levels of potentially toxic elements
Fewster and others	2022	Imminent loss of climate space for permafrost peatlands in Europe and Western Siberia
Gasparrini and others	2017	Projections of temperature-related excess mortality under climate change scenarios
Gebhardt and others	2023	The relationship of climate change awareness and psychopathology in persons with pre-existing mental health diagnoses
Harrington and Otto	2023	Underestimated climate risks from population ageing
Heltberg and Bonch-Osmolovskiy	2011	Mapping vulnerability to climate change - Mapping vulnerability to climate change
Khan and others	2021	Towards an efficient storm surge and inundation forecasting system over the Bengal delta: chasing the Supercyclone Amphan
Kihal-Talantikite and others	2017	Developing a data-driven spatial approach to assessment of neighbourhood influences on the spatial distribution of myocardial infarction
Kimutai and others	2022	Attribution of the human influence on heavy rainfall associated with flooding events during the 2012, 2016, and 2018 March-April-May seasons in Kenya
Kroeger	2023	Heat is associated with short-term increases in household food insecurity in 150 countries and this is mediated by income
Laryea and others	2023	Climate justice implications of banning air-freighted fresh produce
Leng and others	2023	Global inequities in population exposure to urban greenspaces increased amidst tree and nontree vegetation cover expansion
Li and others	2023	Green physical activity for leisure connects perceived residential greenspace and mental well-being
Little and others	2023	Future increased risk from extratropical windstorms in northern Europe
Lloyd and others	2023	The direct and indirect influences of interrelated regional-level sociodemographic factors on heat-attributable mortality in Europe: Insights for adaptation strategies
Lyons and others	2023	The effect of 'smoky' coal bans on chronic lung disease among older people in Ireland
McDuffie and others	2023	The social cost of ozone-related mortality impacts from methane emissions

Author	Year	Title
Moradi and others	2023	Particulate matter pollution remains a threat for cardiovascular health: Findings from the Global Burden of Disease 2019
Moulds and others	2021	Modeling the impacts of urban flood risk management on social inequality
Reddington and others	2023	Inequalities in air pollution exposure and attributable mortality in a low carbon future
Ribeiro and others	2015	Development of a measure of multiple physical environmental deprivation. After United Kingdom and New Zealand, Portugal
Richardson and others	2013	Particulate air pollution and health inequalities: a Europe-wide ecological analysis
Rohat and others	2019	Influence of changes in socioeconomic and climatic conditions on future heat-related health challenges in Europe
Sunikka-Blank and Galvin	2021	Single parents in cold homes in Europe: How intersecting personal and national characteristics drive up the numbers of these vulnerable households
Tillett	2011	Pregnancy pause: Extreme heat linked to shortened gestation
Watts and others	2015	Health and climate change: Policy responses to protect public health
Wu and others	2023	From quantity to quality: Effects of urban greenness on life satisfaction and social inequality
Zhao and others	2019	Assessing socio-economic drought evolution characteristics and their possible meteorological driving force
Zhao and others	2024	Long-term prediction of the effects of climate change on indoor climate and air quality
Zhou and others	2023	The effects of heatwave on cognitive impairment among older adults: Exploring the combined effects of air pollution and green space

Table S.8. Exclusion reason: wrong population (n=137)

Author	Year	Title
Ahmed and others	2021	Forecasting underheating in dwellings to detect excess winter mortality risks using time series models
Akram and Arabi	2023	Water-energy nexus for Birmingham, UK
Almendra and others	2019	Cold-related mortality in 3 European metropolitan areas: Athens, Lisbon and London. Implications for health promotion
Alves and others	2018	Multi-criteria approach for selection of green and grey infrastructure to reduce flood risk and increase co-benefits
Anonymous	2016	Heatwave plan outlines how staff can flag up risks to public health
Arbuthnott and others	2018	What is cold-related mortality? A multi-disciplinary perspective to inform climate change impact assessments
Arbuthnott and others	2020	Years of life lost and mortality due to heat and cold in the 3 largest English cities
Armstrong and others	2010	Association of mortality with high temperatures in a temperate climate: England and Wales
Armstrong and others	2018	The impact of home energy efficiency interventions and winter fuel payments on winter- and cold-related mortality and morbidity in England: a natural equipment mixed-methods study
Ayling and others	2021	Impact of reduced rainfall on above ground dry matter production of semi-natural grassland in South Gloucestershire, UK: A rainfall manipulation study
Bei and others	2013	A prospective study of the impact of floods on the mental and physical health of older adults
Bhaskaran and others	2010	Short term effects of temperature on risk of myocardial infarction in England and Wales: time series regression analysis of the Myocardial Ischaemia National Audit Project (MINAP) registry
Bhaskaran and others	2012	Heat and risk of myocardial infarction: hourly level case-crossover analysis of MINAP database
Bohm and others	2023	Emotional reactions to climate change: a comparison across France, Germany, Norway, and the United Kingdom
Bolt and others	2023	Seasonality of acute kidney injury phenotypes in England: an unsupervised machine learning classification study of electronic health records
Bouzid and others	2014	Climate change and the emergence of vector-borne diseases in Europe: case study of dengue fever
Broderick and others	2015	Clinical, geographical, and temporal risk factors associated with presentation and outcome of vivax malaria imported into the United Kingdom over 27 years: observational study
Bryan and others	2020	The health and well-being effects of drought: assessing multi-stakeholder perspectives through narratives from the UK
Button and Coote	2016	Public health in a changing climate
Carroll and others	2010	Health and social impacts of a flood disaster: responding to needs and implications for practice
Chandwani and others	2023	Impact of environmental exposures on lung cancer in patients who never smoked
Chen and others	2023	The association between exposure to air pollution and dementia incidence: The modifying effect of smoking
Chen and others	2023	Ambient air pollution and risk of enterotomy, gastrointestinal cancer, and all-cause mortality among 4,708 individuals with inflammatory bowel disease: A prospective cohort study
Christidis and others	2010	Causes for the recent changes in cold- and heat-related mortality in England and Wales
Christie and others	2016	Private needs, public responses: vulnerable people's flood-disrupted mobility
Clarke and others	2021	Inventories of extreme weather events and impacts: Implications for loss and damage from and adaptation to climate extremes
Climate Just		Case study: Retrofitting UK hospitals to reduce overheating risk Academic case study of Addenbrooke Hospital, Cambridge
Coles and others	2017	Beyond 'flood hotspots': Modelling emergency service accessibility during flooding in York, UK

Author	Year	Title
Committee on Climate Change	2017	UK climate change risk assessment 2017 synthesis report: priorities for the next five years
Cowen	2012	Hot weather increases death risk in psychosis patients
Dadvand and others	2011	Association between maternal exposure to ambient air pollution and congenital heart disease: A register-based spatiotemporal analysis
De'Donato and others	2015	Changes in the effect of heat on mortality in the last 20 years in nine European cities. Results from the PHASE Project
Emerson and others	2019	Risk of exposure to air pollution among British children with and without intellectual disabilities
Erens and others	2021	Public attitudes to, and behaviours taken during, hot weather by vulnerable groups: results from a national survey in England
Fernando and others	2013	Non-cirrhotic portal hypertension in the HIV-infected individual
Findlater and others	2023	Help-seeking following a flooding event: a cross-sectional analysis of adults affected by flooding in England in winter 2013/14
Fontalba-Navas and others	2017	Incidence and risk factors for post-traumatic stress disorder in a population affected by a severe flood
Foster and others	2021	An advanced empirical model for quantifying the impact of heat and climate change on human physical work capacity
Fox-Rogers and others	2016	Is there really "nothing you can do"? Pathways to enhanced flood-risk preparedness
Gale and others	2020	Association between exposure to air pollution and prefrontal cortical volume in adults: A cross-sectional study from the UK biobank
Gasparrini and others	2012	The effect of high temperatures on cause-specific mortality in England and Wales
Glasper	2011	Planning for a heat wave: the implications for health care
Goldney and others	2023	Long-term ambient air pollution exposure and prospective change in sedentary behaviour and physical activity in individuals at risk of type 2 diabetes in the UK
Gough and others	2019	Assessment of overheating risk in gynaecology scanning rooms during near-heatwave conditions: A case study of the Royal Berkshire Hospital in the UK
Graham and others	2019	Flood- and weather-damaged homes and mental health: An analysis using England's Mental Health Survey
Green and others	2016	Mortality during the 2013 heatwave in England – How did it compare to previous heatwaves? A retrospective observational study
Green and others	2017	City-scale accessibility of emergency responders operating during flood events
Grobusch and others	2021	Travel-related infections presenting in Europe: A 20-year analysis of EuroTravNet surveillance data
Hajat and Gasparrini	2016	The excess winter deaths measure why its use is misleading for public health understanding of cold-related health impacts
Hajat and others	2016	Public health vulnerability to wintertime weather: time-series regression and episode analyses of national mortality and morbidity databases to inform the Cold Weather Plan for England
Hajat and others	2014	Climate change effects on human health: projections of temperature-related mortality for the UK during the 2020s, 2050s and 2080s
Halliday and others	2022	The island effect: Spatial effects on mental wellbeing and residence on remote Scottish islands
Hamilton and others	2015	Health effects of home energy efficiency interventions in England: a modelling study
Hammer and others	2023	Assessment of the association between ambient air pollution and stillbirth in the UK: Results from a secondary analysis of the MiNESS case-control study
Hannam and others	2014	Air pollution exposure and adverse pregnancy outcomes in a large UK birth cohort: use of a novel spatio-temporal modelling technique
Health Protection Agency	2012	Health effects of climate change in the UK 2012
Huang and others	2020	Weather regimes and patterns associated with temperature-related excess mortality in the UK: a pathway to sub-seasonal risk forecasting
Hughes and others	2014	Using an emergency department syndromic surveillance system to investigate the impact of extreme cold weather events

Author	Year	Title
Jenkins and others	2014	Probabilistic spatial risk assessment of heat impacts and adaptations for London
Jenkins and others	2022	Updated projections of UK heat-related mortality using policy-relevant global warming levels and socio-economic scenarios
Jermacane and others	2018	The English national cohort study of flooding and health: the change in the prevalence of psychological morbidity at year 2
Jiang and others	2023	Co-exposure to multiple air pollutants, genetic susceptibility, and the risk of myocardial infarction onset: A cohort analysis of the UK Biobank participants
Johnson and Yu	2020	From flooding to finance: NHS ambulance-assisted evacuations of care home residents in Norfolk and Suffolk, UK
Kantamaneni and others	2019	Assessing and mapping regional coastal vulnerability for port environments and coastal cities
Kaye and others	2023	The impact of climate change and natural climate variability on the global distribution of Aedes aegypti
Killeen and others	2017	Measuring, manipulating and exploiting behaviours of adult mosquitoes to optimise malaria vector control impact
Killip and others	2014	Innovation in low-energy residential renovation: UK and France
Kim and Lee	2019	Differential mechanisms of potato yield loss induced by high day and night temperatures during tuber initiation and bulking: Photosynthesis and tuber growth
King	2013	Neighborhood walkable urban form and C-reactive protein
Konstantinoudis and others	2023	Asthma hospitalisations and heat exposure in England: a case-crossover study during 2002-2019
Koscikova and Krivstov	2023	Environmental and social benefits of extensive green roofs applied on bus shelters in Edinburgh
Lelieveld and others	2023	Air pollution deaths attributable to fossil fuels: observational and modelling study
Li and others	2019	Lyme disease risks in Europe under multiple uncertain drivers of change
Li and others	2023	Long-term exposure to ambient air pollution, genetic susceptibility, and the incidence of bipolar disorder: A prospective cohort study
Liu and others		Association between birth weight/joint exposure to ambient air pollutants and type 2 diabetes: a cohort study in the UK Biobank
Lomas and Kane	2013	Summertime temperatures and thermal comfort in UK homes
Lowe and others	2016	Evaluation of an early-warning system for heat wave-related mortality in Europe: Implications for sub-seasonal to seasonal forecasting and climate services
Luo and others	2023	Air pollution and allergic rhinitis: Findings from a prospective cohort study
Ma and others	2024	Genetic susceptibility modifies relationships between air pollutants and stroke risk: A large cohort study
Macintyre and others	2023	Impacts of emissions policies on future UK mortality burdens associated with air pollution
Madaniyazi and others	2024	Seasonality of mortality under climate change: a multicountry projection study
Mahmood and others	2017	Impact of air temperature on London Ambulance call-out incidents and response times
Marques and others	2017	Cyclosporiasis in travellers returning to the United Kingdom from Mexico in summer 2017: lessons from the recent past to inform the future
Mason and others	2010	The psychological impact of exposure to floods
Masselot and others	2023	Excess mortality attributed to heat and cold: a health impact assessment study in 854 cities in Europe
Mavrogianni and others	2010	London housing and climate change: Impact on comfort and health – preliminary results of a summer overheating study
Mavrogianni and others	2015	Urban social housing resilience to excess summer heat
McRobert	2010	Flooding and the role of the local authority
Moss and others	2022	Spatio-temporal epidemiology of SARS-CoV-2 virus lineages in Teesside, UK, in 2020: effects of socio-economic deprivation, weather, and lockdown on lineage dynamics

Author	Year	Title
Mulchandani and others	2019	Effect of insurance-related factors on the association between flooding and mental health outcomes
Mulchandani and others	2020	The English national cohort study of flooding & health: psychological morbidity at 3 years of follow up
Murage and others	2017	Effect of night-time temperatures on cause and age-specific mortality in London
Murage and others	2018	Variation in cold-related mortality in England since the introduction of the Cold Weather Plan: Which areas have the greatest unmet needs?
Nichols and Richardson	2011	Climate change, health and sustainability: a brief survey of primary care trusts in the south west of England
Ntontis and others	2020	Endurance or decline of emergent groups following a flood disaster: Implications for community resilience
Ntontis and others	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
Ogunbode and others	2019	The resilience paradox: flooding experience, coping and climate change mitigation intentions
Paranjothy and others	2011	Psychosocial impact of the summer 2007 floods in England
Parsons and others	2010	Modelling the effects of the weather on admissions to UK trauma units: a cross-sectional study
Pinsent and others	2014	Risk factors for UK Plasmodium falciparum cases
Prichard and others	2022	Differential health responses to climate change projections in 3 UK cities as measured by ambulance dispatch data
Psistaki and others	2020	Weather patterns and all-cause mortality in England, UK
Psistaki and Paschalidou	2023	The effect of apparent temperature on all-cause mortality in England, UK
Rendell and others	2020	Public health implications of solar UV exposure during extreme cold and hot weather episodes in 2018 in Chilton, South East England
Robin and others	2020	Impact of flooding on health-related quality of life in England: results from the National Study of Flooding and Health
Rodopoulou and others	2015	Searching for the best modeling specification for assessing the effects of temperature and humidity on health: a time series analysis in 3 European cities
Rustemeyer and Howells	2021	Excess Mortality in England during the 2019 Summer Heatwaves
Sahani and others	2022	Heat risk of mortality in 2 different regions of the United Kingdom
Sartini and others	2016	Effect of cold spells and their modifiers on cardiovascular disease events: Evidence from 2 prospective studies
Scarborough and others	2012	Contribution of climate and air pollution to variation in coronary heart disease mortality rates in England
Seklecka and others	2017	Mortality effects of temperature changes in the United Kingdom
Seklecka and others	2017	Mortality effects of temperature changes in the United Kingdom
Sharpe and others	2015	Higher energy efficient homes are associated with increased risk of doctor diagnosed asthma in a UK subpopulation
Sharpe and others	2019	Household energy efficiency and health: Area-level analysis of hospital admissions in England
Sheffield and others	2018	Association between particulate air pollution exposure during pregnancy and postpartum maternal psychological functioning
Singh and others	2024	Impacts of ambient air quality on acute asthma hospital admissions during the COVID-19 pandemic in Oxford City, UK: a time-series study
Symonds and others	2019	MicroEnv: A microsimulation model for quantifying the impacts of environmental policies on population health and health inequalities
Syukrowardi and others	2014	Factors affecting resilience in elementary school-aged children after exposing the floods
Taylor and others	2015	Mapping the effects of urban heat island, housing, and age on excess heat-related mortality in London
Taylor and others	2016	Mapping indoor overheating and air pollution risk modification across Great Britain: A modelling study
Taylor and others	2018	Estimating the influence of housing energy efficiency and overheating adaptations on heat-related mortality in the West Midlands, UK

Author	Year	Title
Taylor and others	2021	Projecting the impacts of housing on temperature-related mortality in London during typical future years
Tempest and others	2017	Secondary stressors are associated with probable psychological morbidity after flooding: a cross-sectional analysis
Tobías and others	2012	A cautionary note to prevent the heat effects on human health
Tomlinson and others	2011	Including the urban heat island in spatial heat health risk assessment strategies: a case study for Birmingham, UK
Twiddy and others	2022	Understanding the long-term impact of flooding on the wellbeing of residents: A mixed methods study
Undorf and others	2020	Learning from the 2018 heatwave in the context of climate change: are high-temperature extremes important for adaptation in Scotland?
Vinten and others	2019	Water for all: Towards an integrated approach to wetland conservation and flood risk reduction in a lowland catchment in Scotland
Waite and others	2017	The English national cohort study of flooding and health: cross-sectional analysis of mental health outcomes at year one
Whittle and others	2010	Flood, vulnerability and urban resilience: a real-time study of local recovery following the floods of June 2007 in Hull
Whittle and others	2010	After the rain - learning the lessons from flood recovery in Hull. Final project report for 'Flood, Vulnerability and Urban Resilience: a real-time study of local recovery following the floods of June 2007 in Hull'
Wind and Komproe	2012	The mechanisms that associate community social capital with post-disaster mental health: A multilevel model
Wingfield and Brisley	2017	Assessment of the impact of recently built flood alleviation schemes in managing long-term residual flood risk in England
Wolf and others	2014	Performance assessment of a heat wave vulnerability index for Greater London, United Kingdom
Wong and others	2018	Physical, psychological, and social health impact of temperature rise due to urban heat island phenomenon and its associated factors
Yi and others	2023	Modelling urban dwellers' indoor heat stress to enhance heat-health warning and planning
Zhang and others	2023	Assessment of short-term heat effects on cardiovascular mortality and vulnerability factors using small area data in Europe

Table S.9. Exclusion reason: wrong exposure (n=24)

Author	Year	Title
Astell-Burt and others	2014	The association between green space and mental health varies across the lifecourse. A longitudinal study
Bakolis and others	2021	Mental health consequences of urban air pollution: prospective population-based longitudinal survey
Cooper and others	2017	Lyme disease and Bell's palsy: an epidemiological study of diagnosis and risk in England
Dadvand and others	2014	Inequality, green spaces, and pregnant women: roles of ethnicity and individual and neighbourhood socioeconomic status
Foudi and Osés-Eraso	2022	Information, experience, and willingness to mitigate mental health consequences from flooding through collective defence
Houston and others	2021	Social influences on flood preparedness and mitigation measures adopted by people living with flood risk
Hunter and others	2016	Coastal clustering of HEV; Cornwall, UK
Kane and others	2011	Understanding occupant heating practices in UK dwellings
Kennard and others	2020	The associations between thermal variety and health: Implications for space heating energy use
Khan and others	2022	Association of patient and family reports of hospital safety climate with language proficiency in the US
Khieu and others	2017	Modelled seasonal influenza mortality shows marked differences in risk by age, sex, ethnicity and socioeconomic position in New Zealand
Lewer and others	2023	Opioid injection-associated bacterial infections in England, 2002-2021: A time series analysis of seasonal variation and the impact of Coronavirus Disease 2019
Lloyd and others	2017	Emergency department presentations of people who are homeless: The role of occupational therapy
Maund and others	2019	Wetlands for wellbeing: Piloting a nature-based health intervention for the management of anxiety and depression
Milojevic and others	2016	Methods to estimate acclimatization to urban heat island effects on heat- and cold-related mortality
Mutz and others	2021	Exploring health in the UK Biobank: associations with sociodemographic characteristics, psychosocial factors, lifestyle and environmental exposures
Ogbebor and others	2018	Seasonal variation in mortality secondary to acute myocardial infarction in England and Wales: a secondary data analysis
Pattnaik	2023	Role of health equity in the climate action plans of London boroughs: A health policy report
Paudyal and others	2021	Clinical characteristics, attendance outcomes and deaths of homeless persons in the emergency department: implications for primary health care and community prevention programmes
Pearce and others	2010	Environmental justice and health: the implications of the socio-spatial distribution of multiple environmental deprivation for health inequalities in the United Kingdom
Rees and others	2017	Trend analysis of imported malaria in London; observational study 2000 to 2014
Shi and others	2024	Risk of winter hospitalisation and death from acute respiratory infections in Scotland: national retrospective cohort study
Wagner and others	2014	Migrant health and infectious diseases in the UK: findings from the last 10 years of surveillance
Warner and others	2023	Infections in travellers returning to the UK: a retrospective analysis (2015-2020)

Table S.10. Exclusion reason: wrong outcome (n=73)

Author	Year	Title
Abourashed and others	2024	Development and validation of the MosquitoWise survey to assess perceptions towards mosquitoes and mosquito-borne viruses in Europe
Alves and others	2020	Climate change policies and agendas: Facing implementation challenges and guiding responses
Arnell and others	2021	The effect of climate change on indicators of fire danger in the UK
Barrett and others	2022	Eat or heat: fuel poverty and childhood respiratory health
Boeckmann and Zeeb	2014	Using a social justice and health framework to assess European climate change adaptation strategies
Brooks and others	2015	Case studies of community resilience to climate change
Butler and others	2018	Narratives of recovery after floods: Mental health, institutions, and intervention
Caan	2023	Poor housing is a problem in heatwaves as well as cold weather
Chalabi and others	2016	Evaluation of the cold weather plan for England: modelling of cost-effectiveness
Climate Just		Case study: Combining climate change adaptation and social housing refurbishment in the London Borough of Barking and Dagenham
Climate Just		Case study: Health promotion and climate mitigation in Middlesbrough
Connon	2017	Extreme weather, complex spaces and diverse rural places: An intra-community scale analysis of responses to storm events in rural Scotland, UK
Demski and others	2017	Experience of extreme weather affects climate change mitigation and adaptation responses
Dittrich and others	2019	A cost-benefit analysis of afforestation as a climate change adaptation measure to reduce flood risk
Fazey and others	2017	Community resilience to climate change: Outcomes of the Scottish Borders climate resilient communities project
Ferranti and others	2023	Incorporating heat vulnerability into local authority decision making: An open access approach
Ferlie	2015	Commentary on text of interview with Professor Lord Ara Darzi: 'Desirable? Yes, but is it achievable?'
Fernandez-Bilbao and others	2011	Impacts of climate change on disadvantaged UK coastal communities
Fielding	2012	Inequalities in exposure and awareness of flood risk in England and Wales
Fielding	2018	Flood risk and inequalities between ethnic groups in the floodplains of England and Wales
Fragkos and others	2021	Equity implications of climate policy: Assessing the social and distributional impacts of emission reduction targets in the European Union
Garbutt	2015	Assessment of social vulnerability under 3 flood scenarios using an open source vulnerability index
Garrett and others	2023	Visiting nature is associated with lower socioeconomic inequalities in well-being in Wales
Georgiou and others	2022	A population-based retrospective study of the modifying effect of urban blue space on the impact of socioeconomic deprivation on mental health, 2009-2018
Gralepois and others	2016	Is flood defense changing in nature? Shifts in the flood defense strategy in six European countries
Grover and Daniels	2017	Social equity issues in the distribution of feed-in tariff policy benefits: A cross sectional analysis from England and Wales using spatial census and policy data
Gustin and others	2018	Forecasting indoor temperatures during heatwaves using time series models
Hart and others	2018	Contextual correlates of happiness in European adults
Hino and Hall	2017	Real options analysis of adaptation to changing flood risk: structural and nonstructural measures
Houston and others	2021	Environmental vulnerability and resilience: Social differentiation in short- and long-term flood impacts

Author	Year	Title
Huaccha	2023	Regional persistence of the energy efficiency gap: Evidence from England and Wales
Hyland and Donnelly	2015	Air pollution and health – the views of policy makers, planners, public and private sector on barriers and incentives for change
Jones and Mays	2016	The experience of potentially vulnerable people during cold weather: implications for policy and practice
Kantamaneni	2019	Evaluation of social vulnerability to natural hazards: a case of Barton on Sea, England
Kaźmierczak and Cavan	2011	Surface water flooding risk to urban communities: Analysis of vulnerability, hazard and exposure
Kennedy-Asser and others	2022	Projected risks associated with heat stress in the UK Climate Projections (UKCP18)
Khare and others	2015	Heat protection behaviour in the UK: results of an online survey after the 2013 heatwave
Kidd and others	2021	The climate change-homelessness nexus
Kidd and others	2023	A response framework for addressing the risks of climate change for homeless populations
Kim and Donohue	2011	Demographic, developmental and life-history variation across altitude in Erysimum capitatum
Kings and Ilbery	2010	The environmental belief systems of organic and conventional farmers: Evidence from central-southern England
Kreslake and others	2016	Developing effective communication materials on the health effects of climate change for vulnerable groups: a mixed methods study
Lacey-Barnacle	2020	Proximities of energy justice: contesting community energy and austerity in England
Laszkiewicz and others	2023	Who does not use urban green spaces and why? Insights from a comparative study of thirty-three European countries
leBrasseur	2023	Citizen sensing within urban greenspaces: Exploring human wellbeing interactions in deprived communities of Glasgow
Lomas and others	2021	Dwelling and household characteristics' influence on reported and measured summertime overheating: A glimpse of a mild climate in the 2050's
Macintyre and others	2018	Assessing urban population vulnerability and environmental risks across an urban area during heatwaves – implications for health protection
Majekodunmi and others	2020	A spatial exploration of deprivation and green infrastructure ecosystem services within Glasgow city
Munro and others	2017	Effect of evacuation and displacement on the association between flooding and mental health outcomes: a cross-sectional analysis of UK survey data
Olsen and others	2023	Inequalities in neighbourhood features within children's 20-minute neighbourhoods and variation in time spent locally, measured using GPS
Paauw and others	2024	Recognition of differences in the capacity to deal with floods-A cross-country comparison of flood risk management
Parker	2023	Barriers to green inhaler prescribing: ethical issues in environmentally sustainable clinical practice
Petzold	2016	Limitations and opportunities of social capital for adaptation to climate change: a case study on the Isles of Scilly
Preston and others	2013	Distribution of carbon emissions in the UK : implications for domestic energy policy
Reynolds and others	2019	Healthy and sustainable diets that meet greenhouse gas emission reduction targets and are affordable for different income groups in the UK
Rundblad and others	2010	Communication, perception and behaviour during a natural disaster involving a 'Do Not Drink' and a subsequent 'Boil Water' notice: a postal questionnaire study
Sanchez-Guevara and others	2019	Assessing population vulnerability towards summer energy poverty: Case studies of Madrid and London
Sanderson and Ford	2017	Projections of severe heat waves in the United Kingdom
Sayers and others	2015	Climate Change Risk Assessment 2017: Projections of future flood risk in the UK
Scheelbeek and others	2020	United Kingdom's fruit and vegetable supply is increasingly dependent on imports from climate-vulnerable producing countries
Schulte and Hudson	2023	A cross-sectional study of inequalities in digital air pollution information access and exposure reducing behavior uptake in the UK

Author	Year	Title
Sheng and others	2023	Climate shocks and wealth inequality in the UK: evidence from monthly data
Shikder and others	2012	Summertime impact of climate change on multi-occupancy British dwellings
Shoari and others	2022	Towards healthy school neighbourhoods: A baseline analysis in Greater London
Soetanto and others	2017	The perceptions of social responsibility for community resilience to flooding: the impact of past experience, age, gender and ethnicity
Tang and Rundblad	2015	The potential impact of directionality, colour perceptions and cultural associations on disaster messages during heatwaves in the UK
Town and Country Planning Association	2016	Planning for the climate challenge? Understanding the performance of English local plans
Vellei and others	2017	Overheating in vulnerable and non-vulnerable households
Wade and others	2015	Developing H++ climate change scenarios for heat waves, droughts, floods, windstorms and cold snaps
Watkiss and others	2016	Climate change impacts on the future cost of living (SSC/CCC004)
Wolf and others	2010	Heat waves and cold spells: an analysis of policy response and perceptions of vulnerable populations in the UK
Zahiri and Gupta	2023	Examining the risk of summertime overheating in UK social housing dwellings retrofitted with heat pumps
Zhou and others	2023	Exploring socio-ecological inequalities in heat by multiple and composite greenness metrics: A case study in Belfast, UK

Table S.11. Exclusion reason: duplicate reference (n=16)

Author	Year	Title
Arbuthnott and others	2020	Years of life lost and mortality due to heat and cold in the three largest English cities
Bryan and others	2020	The health and well-being effects of drought: assessing multi-stakeholder perspectives through narratives from the UK
Dear and McMichael	2011	The health impacts of cold homes and fuel poverty
Health Protection Agency	2012	Health effects of climate change in the UK 2012: current evidence, recommendations and research gaps
Hocking and others	2020	Heat, energy efficiency, smart technology and health: A review of evidence from high-income countries, with a focus on the UK
Karamanos and others	2021	Air pollution and trajectories of adolescent conduct problems: the roles of ethnicity and racism; evidence from the DASH longitudinal study
Konstantinoudis and others	2021	Ambient heat exposure and COPD hospitalisations in England: A nationwide case-crossover study during 2007-2018
Milojevic and others	2016	Methods to estimate acclimatization to urban heat island effects on heat- and cold-related mortality
Murage and others	2018	Variation in cold-related mortality in England since the introduction of the Cold Weather Plan: Which areas have the greatest unmet needs?
Oyebanjo and Bushell	2014	A critical evaluation of the UK SunSmart campaign and its relevance to Black and minority ethnic communities
Seklecka and others	2017	Mortality effects of temperature changes in the United Kingdom
Tainio and others	2017	Mortality, greenhouse gas emissions and consumer cost impacts of combined diet and physical activity scenarios: a health impact assessment study
Taylor and others	2021	Projecting the impacts of housing on temperature-related mortality in London during typical future years
Tieges and others	2020	The impact of regeneration and climate adaptations of urban green-blue assets on all-cause mortality: A 17-year longitudinal study
Wolf and others	2010	Heat waves and cold spells: an analysis of policy response and perceptions of vulnerable populations in the UK
Zafeiratou and others	2023	Assessing heat effects on respiratory mortality and location characteristics as modifiers of heat effects at a small area scale in Central-Northern Europe

Reports not retrieved

Table S.12. Reports not retrieved (n=2)

Author	Year	Title
Lowe	2015	Moral action on climate change and health equity
Lucas	2013	Health inequities related to occupational health impacts of climate change

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339

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