The 2026 Europe report of the *Lancet* Countdown on health and climate change: narrowing window for decisive health action

Hedi K Kriit, José Chen-Xu, Jan C Semenza, Hannah Heiliger, Anil Markandya, Niheer Dasandi, Slava Jankin, Kim R van Daalen, Hicham Achebak, Anna Alari, Tilly Alcayna, Emily Ball, Joan Ballester, Hannah Bechara, Max W Callaghan, Monique van Cauwenberghe, Gina E C Charnley, Orin Courtenay, Marta Cirach, Paulina Garcia-Corral, Troy J Cross, Shouro Dasgupta, Zachary P Dickson, Matthew J Eckelman, Cornelius Erfort, Peter Fransson, Zia Farooq, Olga Gasparyan, Ian Hamilton, Marlies Hesselman, Risto Hänninen, Shih-Che Hsu, Tomáš Janoš, Harshavardhan Jatkar, Ollie Jay, Harry Kennard, Kajal Khanna, Gregor Kiesewetter, Rachel Lowe, Daniela Lührsen, Carla Maia, Jaime Martinez-Urtaza, Jan C Minx, Mark Nieuwenhuijsen, Julia Palamarchuk, Adria San José Plana, Tim Repke, Jorge A Roa-Contreras, Elizabeth J Z Robinson, Daniel Scamman, Natalia Shartova, Jodi D Sherman, Elena Sirotkina, Pratik Singh, Mikhail Sofiev, Marco Springmann, Lara Stucki, Federico Tartarini, Joaquin Triñanes, Maria Walawender, Marina Romanello, Josep M Antó, Maria Nilsson, Cathryn Tonne, Joacim Rocklöv

Executive summary

This third iteration of the *Lancet* Countdown on health and climate change in Europe report systematically tracks the health effects of climate change adaptation and mitigation action, economics and finance, and the engagement of various societal actors with the climate change and health nexus, drawing on data up to 2025. The report features seven new indicators, methodological updates, extended time series for existing indicators, and highlights inequalities in health risks and impacts where possible.

The current health risks and impacts of climate change

Indicators reveal a marked increase in both direct and indirect negative health impacts of heat exposure in Europe. Nearly all European regions monitored (823 [99·6%]) saw increased numbers of deaths attributable to heat during 2015–24 compared with 1991–2000, with an overall mean annual increase of 52 (95% CI 43–59) deaths per million inhabitants (indicator 1.1.3). Daily health warnings of extreme heat increased by 3·2 (318%) in 2015–24 compared with 1991–2000. Comparing 2015–24 with 1991–2000, exposure to heat increased by 1·17 billion (254%) person-days among infants and older people (≥65 years; indicator 1.1.1), and the average annual number of hours when heat exposure made light or moderate physical activity unsafe increased by 60 (88%; indicator 1.1.2). More than 1 million additional people were affected by moderate or severe food insecurity across Europe in 2023 compared with the annual average for the period 1981–2010, due to increased heatwaves and drought exposure (indicator 1.5.1). The increased annual mean temperature is estimated to have reduced the labour supply by approximately 24 h per worker per year across Europe in 2000–23, compared with 1965–94 (indicator 4.1.1).

The climatic suitability of emerging and re-emerging infectious diseases has increased rapidly over the past decade due to climate change (indicator 1.3), manifested by a geographical range expansion of some disease vectors, accompanied by more frequent outbreaks in Europe. For example, the annual transmission suitability for dengue virus increased by 297% in Europe in 2015–24, compared with 1981–2010, likely contributing to the rising number of local outbreaks of *Aedes*-borne arboviruses in Europe. Additionally, climate change has prolonged the pollen season by 1–2 weeks (indicator 1.4.1), increasing the duration of exposure for people with allergic rhinitis.

Climate change risks, vulnerabilities, and impacts are unevenly distributed across population groups and regions. Low-income households in Europe are 10·9 percentage points more likely to experience food insecurity due to an increase in heatwave and drought events compared with middle-income households (indicator 1.5.1). Outdoor workers in construction and agriculture are at particular risk of heat-related injuries due to increased heat exposure (indicator 4.1.1). People living in the poorest regions experience increased wildfire risks (indicator 1.2.2) and less access to green space compared with those living in less deprived regions (indicator 2.2.3). Although we observe an increasing number of countries that have established national health adaptation plans (indicator 2.1.2) and offer climate services to the health sector (indicator 2.2.1), it is important to ensure that adaptation strategies consider differences in risks to protect groups most vulnerable to the effects of climate change.

An integrated approach to climate change mitigation is needed

In Europe, carbon intensity (indicator 3.1.1) and coal use (indicator 3.1.2) declined in 2023 compared with 2022. Conversely, annual fossil fuel subsidies reached a new high in 2023 compared with 2010 (indicator 4.2.1), reaching €444 billion in 2023, reflecting government responses to soaring energy prices after Russia's invasion of Ukraine. At the same time, the share of renewable energy in the total European electricity supply increased to 21·5% in 2023, compared with 8·4% in 2016 (indicator 3.1.3). Investment trends also point in a positive direction; clean energy investment was

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For the Portuguese translation of the executive summary see Online for appendix 4

For the Italian translation of the executive summary Online for appendix 5

For the Polish translation of the executive summary see Online for appendix 6

Heidelberg Institute of Global Health, Heidelberg University Hospital and Medical Faculty, Heidelberg University, Heidelberg, Germany (H K Kriit PhD, Prof J C Semenza PhD, P Fransson PhD, P Singh MSc, Prof J Rocklöv PhD); **Heidelberg Planetary Health Hub, Interdisciplinary Center for Scientific Computing, Heidelberg University, Heidelberg, Germany** (H K Kriit, P Fransson, P Singh, Prof J Rocklöv); **Department of Epidemiology and Global Health, Umeå University, Umeå, Sweden** (H K Kriit, Prof J C Semenza, Z Farooq PhD, Prof M Nilsson PhD, Prof J Rocklöv); **ISGlobal, Barcelona, Spain** (J Chen-Xu PhD, H Achebak PhD, A Alari PhD, Prof J Ballester PhD, M Cirach MSc, T Janoš PhD, Prof M Nieuwenhuijsen PhD, N Shartova PhD, L Stucki PhD, Prof J M Antó MD PhD, Prof C Tonne ScD); **Universitat Pompeu Fabra, Barcelona, Spain** (J Chen-Xu, A Alari, Prof M Nieuwenhuijsen, L Stucki, Prof J M Antó, Prof C Tonne); **Potsdam Institute for Climate Impact Research, Member of the Leibniz Association, Berlin, Germany** (H Heiliger PhD, M W Callaghan PhD, J C Minx PhD, T Repke PhD); **Basque Centre for Climate Change, University of Basque, Leioa, Spain** (Prof A Markandya PhD); **Institute for Data and AI, University of Birmingham, Birmingham, UK** (Prof N Dasandi PhD, Prof S Jankin PhD); **British Heart Foundation Cardiovascular Epidemiology Unit, Department of Public Health and Primary Care, University of Cambridge, Cambridge, UK** (K R van Daalen PhD); **Victor Phillip Dahdaleh Heart and Lung Research Institute, University of Cambridge, Cambridge, UK** (K R van Daalen); **Red Cross Red Crescent Climate Centre, The Hague, Netherlands** (T Alcayna MSc); **Centre on Climate Change and Planetary Health** (T Alcayna, Prof R Lowe PhD), **Centre for Mathematical Modelling of Infectious Diseases** (T Alcayna, Prof R Lowe), **and Health in Humanitarian Crises Centre** (T Alcayna), **London School of Hygiene and Tropical Medicine, London, UK; Barcelona Supercomputing Center, Barcelona Spain** (E Ball PhD, Prof R Lowe, D Lührsen MSc, A San José Plana PhD); **Data Science Lab, Hertie School, Berlin, Germany** (H Bechara PhD); **Groningen Centre for Health Law, University of Groningen, Groningen, Netherlands** (M van Cauwenberghe PhD, M Hesselman PhD); **Institute for Global Health** (G E C Charnley PhD, M Walawender MSPH, M Romanello PhD), **Energy Institute** (S-C Hsu PhD, H Jatkar PhD), **and Institute for Sustainable Resources** (D Scamman EngD), **University College London, London, UK; CIBER Epidemiología y Salud Pública, Barcelona, Spain**

***Panel*: Indicators of the 2026 Europe Report of the *Lancet* Countdown**

Climate change impacts, exposures, and vulnerabilities

1.1: Heat and health
- 1.1.1: Exposure of at-risk populations to heatwaves
- 1.1.2: Physical activity-related heat stress risk
- 1.1.3: Heat-related mortality*

1.2: Health and extreme weather events
- 1.2.1: Drought
- 1.2.2: Wildfire smoke*

1.3: Climate-sensitive infectious diseases
- 1.3.1: Climatic suitability for non-cholerae *Vibrio**
- 1.3.2: Outbreak risk of West Nile virus*
- 1.3.3: Climatic suitability for dengue, chikungunya, and Zika
- 1.3.4: Climatic suitability for malaria
- 1.3.5: Outbreak risk of leishmaniasis*
- 1.3.6: Climatic suitability for ticks

1.4: Allergens
- 1.4.1: Allergenic trees

1.5: Food and water
- 1.5.1: Food insecurity

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- 2.1.2: Health national adaption plans
- 2.1.3: City-level climate change risks assessments

2.2: Adaptation, delivery, and implementation
- 2.2.1: Climate information services for health
- 2.2.2: Heat-health early warnings†
- 2.2.3: Green space

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- 3.4.1: Sustainable diets*

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- 4.1.1: Temperature and change in labour supply
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- 4.1.3: Monetised cost of unhealthy diets

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- 4.2.1: Net value of fossil fuel subsidies and carbon prices
- 4.2.2: Clean energy investment

4.3: Climate adaptation finance targeting the health sector†

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- 5.1.1: Coverage of health and climate change in scientific journals
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5.2: Individual engagement with health and climate change
- 5.2.1: Public perception of health and climate change†
- 5.2.2: Individual engagement with health and climate change on social media

5.3: Political engagement with health and climate change
- 5.3.1: Engagement with health and climate change in the European Parliament
- 5.3.2: Political engagement with health and climate change on social media
- 5.3.3: Political party engagement with health and climate change†

5.4: Corporate sector engagement with climate change and health

5.5: Media engagement with health and climate change

5.6: Engagement on health in climate-change litigation†

*These indicators are assessing epidemiological risk and health impacts. †These indicators are new to the 2026 Europe Report of the *Lancet* Countdown.

€427 billion compared with €229 billion in 2015 (86% higher) and fossil fuel investment was €76 billion in 2024, compared with €112 billion 2015 (32% lower; indicator 4.2.2). Although governments increased support for fossil fuels, particularly in response to geopolitical instability, upward trends in clean energy investment and renewable expansion were evident but need to be accelerated.

Progress towards the transition to renewable energy is underway; however, solid biomass, a major contributor to air pollution, accounted for 31% of total renewable energy consumption in 2023. Air pollution-attributable deaths from residential biomass burning increased by 1 per 100 000 (4%) in 2022 compared with 2000 (indicator 3.2.1). The use of biomass for residential heating contributes to net tree cover loss, which increased by 80% in 2014–23, compared with 2001–10 (indicator 3.6). Shifting away from combustion-based residential heating towards cleaner alternatives such as heat pumps should be a priority.

Air pollution-attributable deaths from the power and transport sectors continued to decline, despite the minimal decline in greenhouse gas emissions in the transport sector (indicator 3.2.1). Health-care sector greenhouse gas emissions declined slightly in 2022; however, the negative health effects attributable to health-care induced air pollution have increased by 24%, compared with 2010 (indicator 3.5). Integrated approaches to climate mitigation and adaptation are essential to maximise both climate and health co-benefits, the latter of which refers to improvements in human health that arise directly or indirectly from climate action.

Declining engagement with the climate change and health nexus

Despite increasing numbers of scientific studies published on the nexus of climate change and health (indicator 5.1.1), individual, political, corporate, and media engagement with the nexus showed a concerning decline in 2023, compared with previous years (indicators 5.2.1, 5.3, and 5.5). Encouragingly, climate litigation has emerged as a powerful platform for elevating the health argument within the broader climate agenda (indicator 5.6). The International Court of Justice determined that states have a binding legal obligation to act against climate change and recognise its effects on human wellbeing and planetary health.

In many respects, Europe is leading the transition to a healthier and safer future among world regions, notably by reducing its greenhouse gas emissions. However, increasing momentum is needed, particularly in the implementation of adaptation and mitigation policy at the local and national level, where the health co-benefits of climate action are expected to realise.

Introduction

In 1990, the hottest year on record at the time, the first Intergovernmental Panel on Climate Change (IPCC) report warned that global average temperatures could rise by 2°C above pre-industrial levels by 2025.[1] Although global efforts have contributed to keeping global average temperature below this prediction, there is no room for complacency. Today, the Paris Agreement target of 1·5°C has a 70% likelihood of being exceeded based on average temperatures between 2025–29.[2] Current mitigation policies are estimated to limit global warming to 3·1°C relative to the pre-industrial period by the end of this century.[3]

Historically, the EU has consistently achieved its climate targets,[4] and currently, it stands out as the global region with the largest reductions in total greenhouse gas emissions between 2022 and 2024.[3,5] Results are evident after the adoption of the European Green Deal in 2019; renewable energy provided nearly half of the electricity in 2024, dependency on coal and gas is falling,[6] and targets for 2030 and 2050 remain in reach if the deal is fully implemented.[3]

This third iteration of the *Lancet* Countdown in Europe report provides up-to-date evidence on the health effects of climate change, progress towards adaptation and realising the health co-benefits of mitigation, and the economic, financial, and societal engagement with climate change as a health issue. Here, 65 researchers from 46 academic and UN institutions track trends in climate change and health with 43 indicators across five domains (panel). Since the 2024 report, seven new indicators have been added and three removed.[7] We aimed to cover all 53 WHO Europe countries plus Lichtenstein and Kosovo as defined under the UN Security Council Resolution 1244. However, due to data availability, many indicators cover fewer countries in Europe (eg, 38 European Economic Area or EU-27 countries, appendix 7 pp 5–8).

Section 1: climate change impacts, exposures, and vulnerabilities

This section tracks 13 indicators on the health impacts, exposures, and vulnerabilities from rising temperatures, extreme weather events, climate-sensitive infectious diseases and allergens, and food insecurity.[8] Comparator baselines were unified across the indicator set and compared with the most recent decade (2015–24). Where possible, a historic 30-year baseline (1981–2010) was used, aligning with World Meteorological Organization (WMO) recommendations.[9] Where this was not possible due to data constraints, a 10-year baseline was applied (1991–2000).

1.1: heat and health

The frequency and intensity of heat exposure is increasing in Europe, with severe implications for human health. Heat exposure (indicators 1.1.1 and 1.1.2) has direct health effects through increased morbidity, such as heat-related illness, sleep loss, worsening of chronic diseases, adverse birth outcomes,[10] and mortality (indicator 1.1.3), and indirect effects through increase in food insecurity (indicator 1.5).

Indicator 1.1.1: exposure of at-risk populations to heatwaves

The summer of 2024 was the hottest on record in Europe, with some regions experiencing substantial bouts of extreme heat.[11] Heatwaves disproportionately affect some populations, especially infants (age <1 year) and older people (age ≥65 years);[10] this indicator quantifies exposure among those groups (appendix 7 pp 19–25). In 2024, these at-risk populations experienced 2·3 billion person-days of heatwave exposure, exceeding the previous maximum of 2·1 billion person-days recorded in 2023.[12,13] In 2015–24, heatwave exposure rose on average 254%, from 460 million person-days in 1991–2000 to 1·63 billion. This increase reflects two factors: demographic changes leading to more people in at-risk groups, and a 129% increase in the frequency of heatwave days. In 2024, older people in eastern Europe had the highest average exposure of 34·5 heatwave days per person.

Indicator 1.1.2: physical activity-related heat stress risk

Physical activity reduces risk of chronic disease and premature mortality and improves wellbeing.[14–16] Active

(Prof J M Antó, Prof C Tonne, M Nieuwenhuijsen); **The Zeeman Institute, University of Warwick, Coventry, UK** (O Courtenay PhD); **Hertie School of Governance, Berlin, Germany** (P Garcia-Corral PhD); **Heat and Health Research Centre** (T J Cross PhD, Prof O Jay PhD, F Tartarini PhD), **and School of Architecture Design and Planning** (F Tartarini), **The University of Sydney, Sydney, NSW, Australia; Centro Euro-Mediterraneo sui Cambiamenti Climatici, Venice, Italy** (S Dasgupta PhD); **Grantham Research Institute on Climate Change and the Environment** (S Dasgupta, Prof E J Z Robinson PhD, Z P Dickson PhD), **Department of Methodology** (Z P Dickson), **and Data Science Institute** (Z P Dickson), **London School of Economics and Political Science, London, UK; Department of Civil and Environmental Engineering, Northeastern University, Boston, MA, USA** (M J Eckelman PhD); **Witten/Herdecke University, Witten, Germany** (C Erfort PhD); **Department of Political Science, Florida State University, Tallahassee, FL, USA** (O Gasparyan PhD); **Aletta Jacobs School of Public Health, University of Groningen, Groningen, Netherlands** (M Hesselman); **Finnish Meteorological Institute, Helsinki, Finland** (R Hänninen DSci, J Palamarchuk PhD, Prof M Sofiev PhD); **RECETOX, Faculty of Science, Masaryk University, Brno, Czech Republic** (T Janoš); **University of Texas, Austin, TX, USA** (H Kennard PhD); **Department of Emergency Medicine and Pediatrics** (K Khanna MD), **and Department of Health Policy** (J A Roa-Contreras MSc), **School of Medicine, Stanford University, Palo Alto, CA, USA; Pollution Management Research Group, Energy, Climate, and Environment Program, International Institute for Applied Systems Analysis, Laxenburg, Austria** (G Kiesewetter PhD); **Catalan Institution for Research and Advanced Studies, Barcelona, Spain** (Prof R Lowe); **Global Health and Tropical Medicine,** Associate Laboratory in Translation and Innovation Towards Global Health, Instituto de Higiene e Medicina Tropical, Universidade Nova de Lisboa, Lisbon, Portugal (C Maia PhD); Department of Genetics and Microbiology, Universitat Autònoma de Barcelona, Barcelona, Spain (Prof J Martinez-Urtaza PhD); Department of Anesthesiology, Yale School of Medicine, New Haven, CT, USA (J D Sherman MD); Center for Data Science, New York University, New York, NY, USA (E Sirotkina MA); Oxford Martin Programme on the Future of Food and Nuffield Department of Population Health, University of Oxford, Oxford, UK (M Springmann PhD); Department of Electronics and Computer Science, Universidade de Santiago de Compostela, Santiago de Compostela, Spain (J Triñanes PhD); School of Public Health (G E C Charnley), and The George Institute (Prof I Hamilton PhD), Imperial College London, London, UK

Correspondence to: Hedi Katre Kriit, Heidelberg Institute of Global Health, Heidelberg University Hospital and Medical Faculty, Heidelberg University, Heidelberg 69120, Germany **Hedi.kriit@uni-heidelberg.de**

or

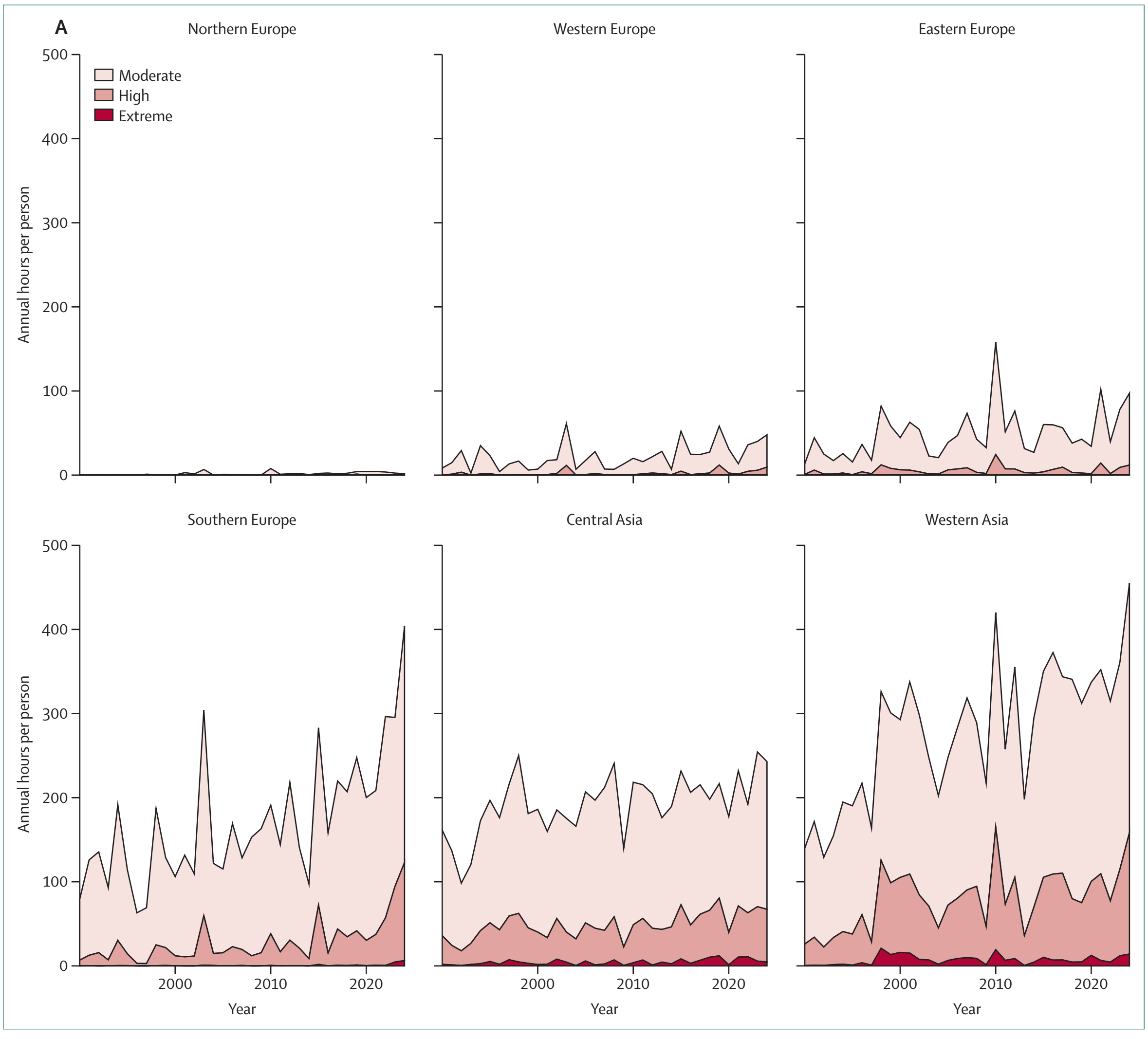
Prof Joacim Rocklöv, Heidelberg Institute of Global Health, Heidelberg University Hospital and Medical Faculty, Heidelberg University, Heidelberg 69120, Germany **joacim.rockloev@uni-heidelberg.de**

See Online for appendix 7

commuting (eg, cycling and walking) reduces greenhouse gas emissions and air pollution.[17] Heat stress can discourage physical activity and increase the risk of heat-related illness.[18] This indicator integrates temperature and humidity to estimate the number of hours when light (eg, walking) or moderate (eg, jogging) intensity outdoor physical activity presented a risk of heat-related illness (appendix 7 pp 26–30).[19] Compared with the previous report,[7] this report improves estimates in heat stress-risk trends during physical activity by incorporating population changes over time.[13] In 2024, people across Europe faced a record high 182 h of at least moderate heat stress risk for light physical activity—113 h (166%) more than the 1991–2000 annual average. Comparing 2015–24 to 1991–2000, average annual risky hours for moderate physical activity increased by 60 h (88%) for Europe, varying from a 639% (two more risky hours) increase in northern Europe to a 78% (155 more risky hours) increase in western Asia (figure 1A).

Indicator 1.1.3: heat-related mortality

In 2024, heat-related deaths in Europe were estimated to be 62 775,[20] and the latest projections suggest a steep rise in heat-related deaths by 2050–100, surpassing the reduction in cold-related deaths.[21–24] Heat-related mortality is estimated to have increased in 820 (99·6%) of the 823 monitored regions in 2015–24, with an overall mean increase of 52 annual deaths per million inhabitants (95% CI 43–59) compared with 1991–2000. The largest increases were in southern and south-eastern Europe (figure 1B). Compared with the last Europe report,[7] this indicator uses a new epidemiological framework that generates unbiased estimates from a delayed, non-linear association between temperature and mortality[25] to compute the change in the heat-related



(Figure 1 continues on next page)

mortality rate between 1991–2000 and 2015–24 (appendix 7 pp 31, 32).

1.2: health and extreme weather events

Indicator 1.2.1: drought

Drought risk is increasing in Europe due to rising temperatures, altered rainfall, and atmospheric patterns.[26] The Standardized Precipitation–Evapotranspiration Index 6 (SPEI6) tracks the occurrence of extreme-to-exceptional droughts in Europe,[27] capturing protracted water-balance deficits that can increase risk of water, food, and vector borne diseases, cardiovascular and respiratory illness, mental health disorders, and mortality (appendix 7 pp 33–37).[28] In the past decade (2015–24), 936 (65·2%) of the 1435 nomenclature of territorial units for statistics (NUTS)3 regions in Europe have experienced an extreme-to-exceptional summer drought and 983 (68·5%) of the regions experienced an increase in extreme-to-exceptional drought duration, compared with 1981–2010 (figure 1C).

Indicator 1.2.2: wildfire smoke

Climate change increases the frequency and intensity of wildfires.[29] Wildfire smoke is associated with increased mortality and morbidity,[30] showing stronger effects on respiratory morbidity than $PM_{2.5}$ from other sources.[31] This indicator tracks wildfire danger (as defined by the Fire Weather Index), annual population-weighted exposure to wildfire $PM_{2.5}$, and number of deaths attributable to wildfire $PM_{2.5}$. Compared with previous reporting,[7] the exposure–response function for wildfire $PM_{2.5}$ and mortality has been updated.[32] No clear trends in wildfire $PM_{2.5}$ exposure and attributable deaths were observed during 2003–24 (appendix 7 pp 38–50). The average annual number of deaths attributable to wildfire $PM_{2.5}$ exposure was estimated at 1·79 (95% CI 1·35–2·25) per 100 000 inhabitants. More economically deprived areas experienced higher wildfire danger, smoke exposure, and attributable mortality compared with less economically deprived areas.

1.3: climate-sensitive infectious diseases

Indicator 1.3.1: climatic suitability for non-cholerae Vibrio

Increasing sea surface temperature expands coastal areas suitable for non-cholerae *Vibrio* bacteria transmission,[33] to which humans can be exposed to through food or recreational water use, and can lead to infections

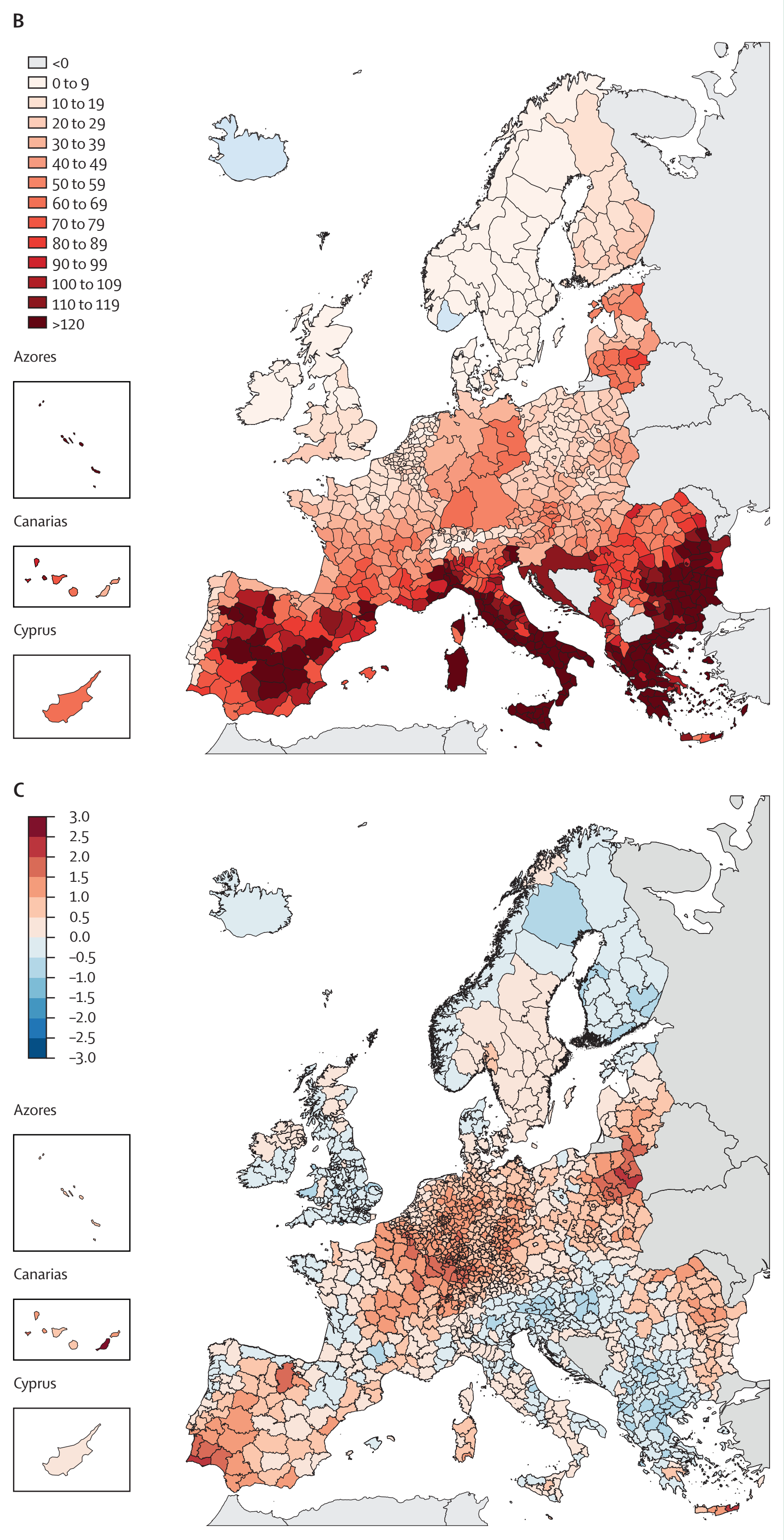


Figure 1: **Heat and health in Europe**
(A) Annual hours per person during which light outdoor physical activity (eg, walking) incurred a risk of heat-related illness. (B) Change in heat-related mortality expressed as the increase in annual deaths per million inhabitants in Europe, comparing 1991–2000 with 2015–24. (C) Change in drought duration, expressed as number of months in a year experiencing an extreme-to-exceptional drought event (population-weighted SPEI6 ≤–1·6) in Europe in the period 2015–24 compared with 1981–2010. SPEI6=Standardised Precipitation–Evapotranspiration Index 6.

of varying severity.[34,35] The threshold-based model considering salinity and sea surface temperature showed a consistent increase in the number of kilometres of coast length with favourable *Vibrio* conditions in Europe (appendix 7 pp 51–53). Shores around the Baltic Sea and northern Europe showed a 50% increase in the number of kilometres of coast length suitable for *Vibrio* in the last decade (2015–24) compared with the baseline (1982–2010). Notably, countries such as Italy and France, typically considered low-risk areas due to the Mediterranean's high salinity, experienced an increase of 31·6% in coastline suitable for *Vibrio* in 2015–24 compared with the baseline.

Indicator 1.3.2: outbreak risk of West Nile virus

West Nile virus is a climate-sensitive mosquito-transmitted virus[36] that can cause lethal neurological disease in humans.[37] In Europe, 1112 human cases of locally acquired West Nile virus were reported in 2025, which is above the annual average for the past decade.[38] Higher temperatures accelerate West Nile virus vectorial capacity, increasing the risk for human transmission.[36] A machine-learning model showed increasing West Nile Virus outbreak risk trends between 1951 and 2024 (figure 2). In 2015–24 the relative West Nile virus outbreak risk increased in western (473%), southern (127%), and eastern (108%) Europe, compared with 1981–2010 (appendix 7 pp 54–57).

Indicator 1.3.3: climatic suitability for dengue, chikungunya, and Zika

Climatic and socioeconomic changes are reshaping the geographical distribution and the dynamics of mosquito-borne arboviruses in Europe, such as dengue, chikungunya, and Zika.[39–41] The frequency of local outbreaks is increasing by 1·24 times every year on average, with most local outbreaks occurring in France.[42] This increase is partly driven by higher temperatures, which shorten the time to first outbreaks after the vector is established.[43] The overall average risk for dengue outbreaks increased by 297% across Europe during 2015–24 compared with the baseline period of 1981–2010. The average risk increase was 340% for eastern, 189% for northern, 147% for western, and 74% for southern Europe (figure 2). Similar trends were found for chikungunya and Zika viruses (appendix 7 pp 58–61).

Indicator 1.3.4: climatic suitability for malaria

Malaria is a climate-sensitive disease caused by *Plasmodium falciparum* and *P vivax*, which was eradicated in Europe.[44] However, more than 6000 cases were reported in 2022: 5365 (99·8%) of 5375 cases with information on importation status were travel-related and only 13 cases were locally acquired.[45] Therefore, monitoring climatic suitability for malaria transmission remains important. Compared with 1981–2010, climatic suitability for *P falciparum* increased in southern (26·6%), western (16·4%), and northern (46·7%) Europe and decreased for *P vivax* by 8·9% in eastern Europe in 2015–24 (appendix 7 pp 62–65).

Indicator 1.3.5: outbreak risk of leishmaniasis

Visceral leishmaniasis and cutaneous leishmaniasis are climate-sensitive zoonotic diseases, caused by *Leishmania* parasites and transmitted by infected female Phlebotominae sandfly bites. Visceral leishmaniasis, which evades the host immune system[46] and is lethal if untreated,[47] is endemic in southern Europe,[48] whereas cutaneous leishmaniasis, causing skin sores, is an emerging threat.[49,50] Following Carvalho and colleagues' approach,[51] the machine-learning model used here predicted only marginal risk increases across Europe in 2015–24: 2·47% for visceral leishmaniasis and 1·28% for cutaneous leishmaniasis compared with 1981–2010 baseline. At subnational levels (NUTS2), there were both large increases and decreases in risk (appendix 7 pp 66–76). Climate suitability for visceral leishmaniasis occurrence is increasing more in northern Europe, whereas cutaneous leishmaniasis suitability is mainly increasing in southern and eastern Europe. Despite the mismatch in space–time scales of the vector and disease data used to inform the models, these patterns are consistent with previous estimates of changing climatic suitability for leishmaniasis in Europe.[7,51]

Indicator 1.3.6: climatic suitability for ticks

Compared with the 2024 report,[7] this indicator used broader climatic suitability thresholds, and includes both *Ixodes* and *Hyalomma* ticks species, primary vectors for Lyme disease and Crimean–Congo haemorrhagic fever (appendix 7 pp 77–80).[52,53] Over the past decade (2015–24), climate suitability remained stable for *Ixodes* ticks but increased for *Hyalomma* compared with 1981–2010. In southern Europe, the activity season of the *Ixodes* tick (suited to temperate, wet regions) shortened by 0·9%. However, for the *Hyalomma* tick, adapted to hot and dry environments, the activity season increased by 11·9%.

1.4: allergens

Indicator 1.4.1: allergenic trees

Climate change is shifting the flowering season of plants that release allergenic pollen,[54,55] worsening conditions such as allergic rhinitis, bronchial asthma, and rhinoconjunctivitis. According to the European Community Respiratory Health Survey, the prevalence of allergic rhinitis is between 4% and 32% in Europe.[56] This indicator tracks changes in seasonal timing and the intensity of birch, alder, and olive pollen season (appendix 7 pp 81–90). Between 2015 and 2024, an earlier season start of 1–2 weeks was detected for all allergenic trees compared with 1991–2000. Compared with our 2024 report,[7] birch and alder show an approximately 15–20% increase in seasonal severity in eastern Europe, the

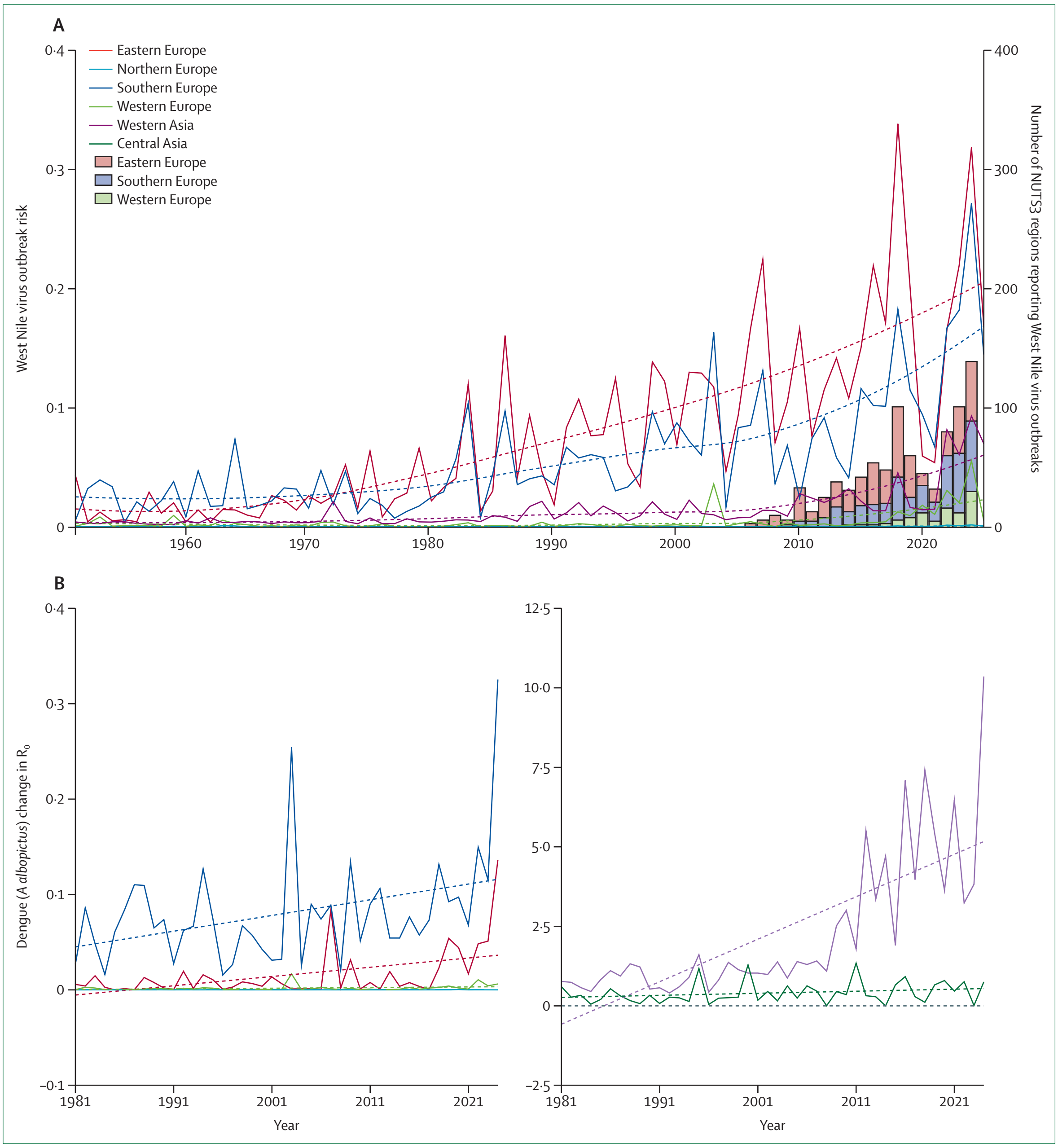


Figure 2: **Climate-sensitive infectious disease in Europe**

(A) Change in West Nile virus outbreak risk in European regions from 1950–2025 at the NUTS3 level (left vertical axis). The bars represent the number of NUTS3 regions reporting West Nile virus transmission from 2006–24 for each European region (right vertical axis). (B) Change in yearly average dengue basic reproduction number (R_0) for *Aedes albopictus* across European regions and central and western Asia between 1981 and 2024. NUTS3=nomenclature of territorial units for statistics.

southern British Isles, and northern areas of France and Germany, accompanied with extended season length. Higher olive pollen concentrations were also noted over Türkiye and small isolated areas in southern Spain.

1.5: food and water

Indicator 1.5.1: food insecurity

There is evidence that climate change is affecting food and nutrition security in Europe.[7] Weather and climate shocks push up the prices of fruit and vegetables, making it harder for lower-income households to afford a healthy and nutritious diet[57] and increasing the risk of non-communicable diseases.[58] This indicator uses time-varying panel regression to assess the effects of heatwaves and droughts on food insecurity (appendix 7 pp 91, 92).[59] In 2023, compared with the 1981–2010 baseline, an additional one million people experienced moderate or severe food insecurity in Europe, due to a higher number of heatwave days and drought months. A higher number of heatwave days was associated with a 1·05 percentage point higher moderate or severe food insecurity (95% CI 1·03–1·07), and the corresponding effect for drought months was a 0·62 percentage point increase (95% CI 0·60–0·64). Low-income respondents had a 10·9 percentage point higher risk of experiencing food insecurity than median-income respondents (95% CI 10·45–11.45).

Conclusion

In this section, increasing health risks, vulnerabilities, and impacts from climate change were reported. These changes are not equally distributed across European regions and within countries. In southern, eastern, and western Europe a higher risk for heat-related mortality, drought, West Nile virus outbreaks, and ticks was shown compared with other regions in Europe. Not all indicators could be disaggregated based on socioeconomic status, either on area or individual level, but where this was possible, the disaggregation at area level suggests that economically deprived groups were at higher risk for wildfire $PM_{2.5}$ exposure, and individual disaggregation showed higher risk of food insecurity for people with low-income. These findings underline the importance of effective climate health adaptation measures to respond to growing health threats.

Section 2: adaptation, planning, and resilience for health

In light of increasing climate change-induced health risks and impacts, the need to accelerate adaptation measures is recognised by the European Commission Mission on Adaptation to Climate Change.[60] Adaptation to climate change refers to actions to minimise exposure and vulnerability of a population to reduce adverse health outcomes. In this section, six indicators monitor adaptation, planning, and resilience for health to enable policy makers, stakeholders, and citizens to assess adaptation processes, identify gaps, and optimise resource allocation.

2.1: adaptation, planning, and assessment

Indicator 2.1.1: national assessments of climate change impacts, vulnerability, and adaptation for health

National vulnerability assessments inform countries of current and future health risks, vulnerabilities, and adaptation priorities of climate change. According to data from WHO and the Alliance for Transformative Action on Climate and Health (ATACH; appendix 7 p 93), 36 (68%) of 53 countries reported having ever conducted multisectoral health vulnerability and adaptation assessments as of March, 2025.[61] This is a substantial increase in countries that had conducted climate change vulnerability and adaptation assessments, compared with the last reporting in October, 2022;[7] however, direct comparison is not possible due to differences in data sources. ATACH is a WHO-hosted network, which aims to support member countries in delivering the commitments made at the UN Framework Convention on Climate Change 26th Conference of the Parties (ie, to develop climate-resilient and low-carbon health systems) into action. The completion rate of climate change vulnerability and adaptation for health assessments among ATACH members was higher (13 [76%] of 17) than for non-ATACH members (23 [64%] of 36).

Indicator 2.1.2: health national adaptation plans (HNAPs)

HNAPs are national adaptation plans developed by a given country's Ministry of Health to specifically address health risks of climate change. Based on WHO and ATACH data (appendix 7 p 93),[61] 36 (68%) of 53 countries had developed a HNAP as of March, 2025. Compared with previous reporting,[7] there was an increase in the number of countries that have complete HNAPs; however, direct comparison is not possible due to differences in data sources between the reports. Similarly, the rate of completion of HNAPs was higher among ATACH members (13 [76%] of 17), compared with non-ATACH members (23 [64%] of 36).

Indicator 2.1.3: city-level climate change risks assessments

Nearly two thirds of the population in Europe live in urban areas,[62] making city-level climate and health assessments essential for informing effective adaptation strategies. Using data from the Carbon Disclosure Project and the International Council for Local Environment Initiative, this indicator shows that 174 (83·3%) of 209 cities and municipalities in Europe have undertaken a climate risk and vulnerability assessment in 2023, compared with 75 (63%) of 118 in 2018–19 (appendix 7 pp 94, 95). Key climate hazards and their unequal health impacts among different populations are identified; however, cities highlighted that paucity of financial capacity, expertise, and political priority are hindering effective action.

2.2: adaptation, delivery, and implementation

Indicator 2.2.1: climate information services for health

The integration of climate information in health surveillance and health early warning systems (EWSs) is necessary to be able to anticipate and respond to climate-related health risks. This indicator draws information from the WMO's Climate Services Dashboard, which tracks the delivery of climate services to the health sector among WMO member states. In 2024, 42 (84%) of 50 European countries reported that climate services were provided to the health sector by meteorological institutes, 5 (10%) of countries had no data, and 3 (6%) reported no climate service provision to the health sector (appendix 7 p 96). Most members reported providing data services products (39 [78%]), followed by climate monitoring (33 [65%]), and climate analysis and diagnostics (32 [63%]), and tailored products (31 [61%]). Climate service products related to climate change projections were provided in 24 (47%) countries and 15 (29%) countries reported providing the health sector with climate predictions.

Indicator 2.2.2: heat-health early warnings

Most heat EWSs are based on regional thresholds of heat stress indices. This indicator uses a new epidemiological framework[25] to operationally transform temperatures into early warnings of heat-related mortality between 1991–2024, based on the EWS Forecaster.Health.[63,20] Daily warnings are categorised based on the fraction of daily deaths attributed to heat exposure: low (5–10%), moderate (10–15%), high (15–20%), and extreme (≥20%). In 2015–24 compared with 1991–2000, Europe experienced an increase in annual daily warnings categorised as low (7·7; 55% increase), moderate (4·3; 101% increase), high (2·6; 145% increase), and extreme (4·3; 318% increase; appendix 7 pp 97–99). In 2015–24, extreme annual warnings increased in southern (316%), western (450%), eastern (198%), and northern (238%) Europe, compared with 1991–2000 (figure 3).

Indicator 2.2.3: green space

Living in contact with green spaces is associated with better physical and mental health, and green spaces also reduce heat and air pollution exposure in urban areas.[64,65] On average, measured at district levels (appendix 7 pp 100–102), the population-weighted normalised difference vegetation index (NDVI) increased by 3% during 2000–24 in Europe; however, it is unclear if the change is attributable to an actual increase in NDVI or population change. Economically deprived areas experienced lower NDVI exposure, compared with less economically deprived areas.

Conclusion

In this section, we present a novel heat-health EWS (indicator 2.2.2), which univocally points to an increasing number of public heat-health emergencies, warranting strong adaptation action. Expanding urban green space, such as parks and tree-lined streets, offers an adaptation strategy that helps to reduce both heat and air pollution exposure. Although technological and infrastructural solutions are necessary for climate resilient societies, they are not sufficient on their own. Intersectoral collaboration and community engagement are needed to effectively curb increasing climate change health risks and impacts.[66] Increasing numbers of countries and cities are conducting national risk assessments and HNAPs; however, little is known about the extent of implementation of adaptation strategies or the uptake of climate services by the health sector.

Section 3: mitigation actions and health co-benefits

Improving health and reducing health inequalities through accelerated mitigation can contribute to a more resilient, prosperous Europe, given that the monetised health co-benefits of mitigation actions largely offset climate policy costs.[67] In this section, seven indicators track greenhouse gas emissions in power generation, residential heating, transport, health care, and food consumption, together with associated health co-benefits related to air pollution and consumption of sustainable diets. Two new indicators have been added: the share of renewable biomass in residential heating and cooling, which has negative air pollution-related health impacts, and tree coverage change.[68] Given the specific mitigation commitments made by the EU as a supranational union, this section also presents results at the level of the EU's 27 countries to motivate closing gaps in member state implementation of current policies.

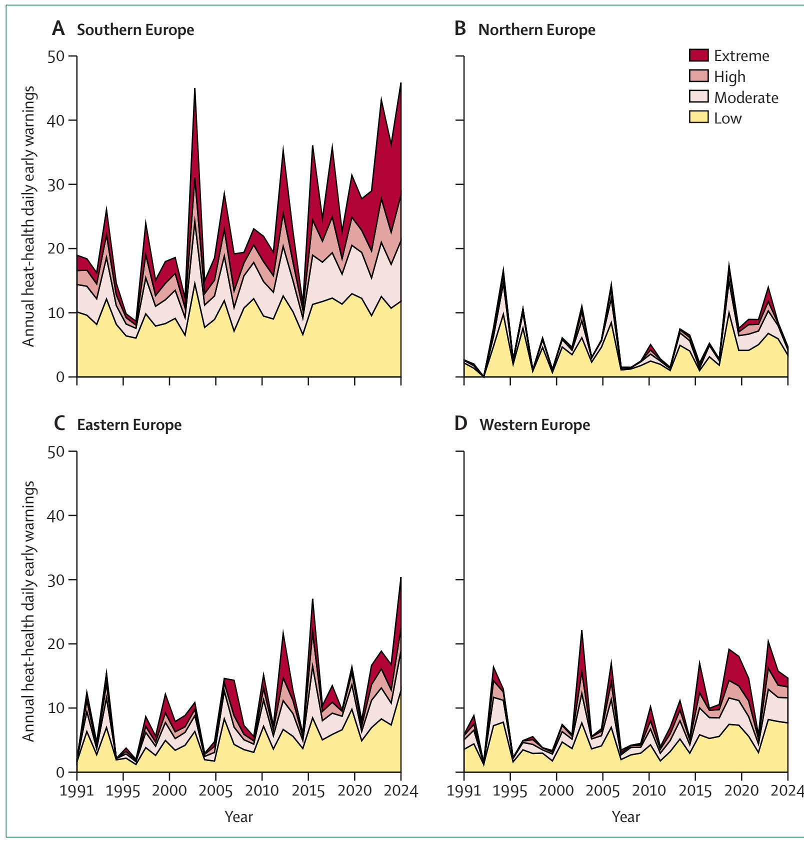


Figure 3: **Annual time series of heat-health daily early warnings for Europe**

3.1: energy systems and health

Indicator 3.1.1: carbon intensity of energy systems

This indicator quantifies the fossil fuel share and carbon intensity of the energy system in Europe using International Energy Agency (IEA) data.[69] The fossil fuel share in the energy system in Europe has reduced to 70·6%, according to provisional data from 2023, from 83·7% in 1990 (appendix 7 pp 103–104). In 2023, the carbon intensity of the energy sector in EU countries decreased by 8·8% compared with the level at the time of the adoption of the Paris Agreement in 2016.[70] After 2 years of increases between 2020 and 2022, emissions from fossil fuel combustion fell in 2023 to 2277 million tonnes of CO_2, representing an almost 10% reduction from 2022. Countries including Germany, Bulgaria, Estonia, Czechia, Denmark, and Portugal achieved double-digit reductions in 2023, compared with 2022. Still, threefold acceleration is needed to meet the EU's climate targets for emissions reductions in the energy system.

Indicator 3.1.2: coal phase-out

Coal emits the highest amount of CO_2 and health-harming air pollutants per unit of energy among fossil fuels. After two consecutive years of increase, coal use in Europe declined to 13·6% in total energy supply and to 14·6% in electricity output in 2023, compared with 14·8% and 16·7%, respectively, in 2022[69] (appendix 7 pp 105–109). In 2023, coal use in EU countries fell to 10·2% of total energy supply, compared with 12·4% in 2022. The coal share in electricity generation fell to a new low of 11·8%, representing a nearly 10% reduction since 2016, when it was 21·7%. Notably, countries such as Bulgaria, Czechia, Germany, and Poland, where coal use substantially increased during 2020–22, achieved a 3% reduction or more in 2023. Accelerating the phase-out of coal remains essential to meeting Europe's climate and air quality targets.

Indicator 3.1.3: renewable and zero-carbon emission energy

Electricity generation from modern renewables has grown remarkably since 2010, mainly driven by an increase in solar and wind power, and zero-carbon sources (eg, nuclear) in Europe.[71] Renewable energy in electricity generation accounted for 21·5% of the total electricity generation in Europe and 27% in EU countries, more than double the share recorded in 2016 for Europe (8·4%) and the EU (12·9%).[69] However, the share of total energy supply from zero-carbon sources in Europe (15%) and the EU (20%) has remained stable since 2016, and the share from renewables remained at approximately 5%. Luxembourg, Portugal, and Lithuania recorded increases of more than 15 percentage points in shares of renewables and zero-carbon sources in their energy mix in 2023 compared with 2022 (appendix 7 pp 108–110). However, continued action is needed to reach the target of 42·5% among EU countries by 2030.[72]

Indicator 3.1.4: biomass in renewable energy for heating and cooling

Solid biomass sourced from organic materials, such as wood and agricultural residues, is classified as a renewable energy. However, solid biomass combustion releases toxic air pollutants such as $PM_{2·5}$ and black carbon,[73,74] and releases more CO_2 emissions per unit of energy than fossil fuels;[75] these CO_2 emissions are only compensated for after decades of regrowth.[76] This indicator quantifies the share of solid biomass in energy used for residential heating and cooling and the share of biomass in the renewable energy mix overall. Out of total renewable energy consumption in Europe, 31% (33% in the EU) was derived from solid biomass used for heating and cooling in 2023 (appendix 7 pp 111–113).[77] In Europe, the share of total energy consumption in residential heating and cooling from solid biomass was 19% (18% in the EU) in 2023. In Europe, use of solid biomass for residential heating and cooling has increased by 2% since 2016 and 37% since 2004.

3.2: air pollution and health co-benefits

3.2.1: premature mortality attributable to $PM_{2.5}$

$PM_{2·5}$ originates partly from the same sources as greenhouse gases, particularly from fossil fuel combustion, and is the leading environmental risk factor for premature death and morbidity.[78] This indicator tracks mortality attributable to $PM_{2·5}$ from combustion of different fuels across power generation, transport, and residential sectors, together with corresponding CO_2 emissions. Compared with our 2024 report,[7] the exposure–response function for $PM_{2·5}$ and premature mortality is updated (appendix 7 pp 114–117).

Mortality attributable to $PM_{2·5}$ from the power sector decreased by 84% in the EU (65% in non-EU countries) between 2000 and 2022, whereas CO_2 emissions decreased only by 34% in the EU (17% in non-EU countries; figure 4). Mortality attributable to $PM_{2·5}$ from transport emissions decreased by 58% in the EU (52% in non-EU countries), driven by end of pipe controls; however, CO_2 emissions stagnated in the EU and increased 23% in non-EU countries, reflecting increasing transport activity. Mortality attributable to $PM_{2.5}$ from the residential sector increased in the EU by 4%, with a corresponding decrease in CO_2 emissions (30%), reflecting increasing residential use of solid biomass fuels (indicator 3.1.4), whereas in non-EU countries there was a decrease in air pollution-related deaths (47%), reflecting shifts away from coal.

3.3: low-carbon transport

Transport is the only sector with increasing greenhouse gas emissions since 1990, accounting for 29% of emissions in EU countries in 2022, mainly driven by increased passenger transport.[79] This indicator tracks per person and share of energy use from passenger vehicles powered by renewables and electricity, such as liquid biofuels, hydrogen, biomethane and so-called green electricity in EU countries (appendix 7 pp 118–120). The share of renewable energy in passenger transport increased from 1·4% in 2004 to 10·8% in 2022. However, in 2022, the dominant fuel in road transport remained fossil fuels (representing 95%), whereas electricity contributed only 0·3% to the total share. In the EU, most countries rely on fossil fuels, which represent more than 95% of their road transport energy. In

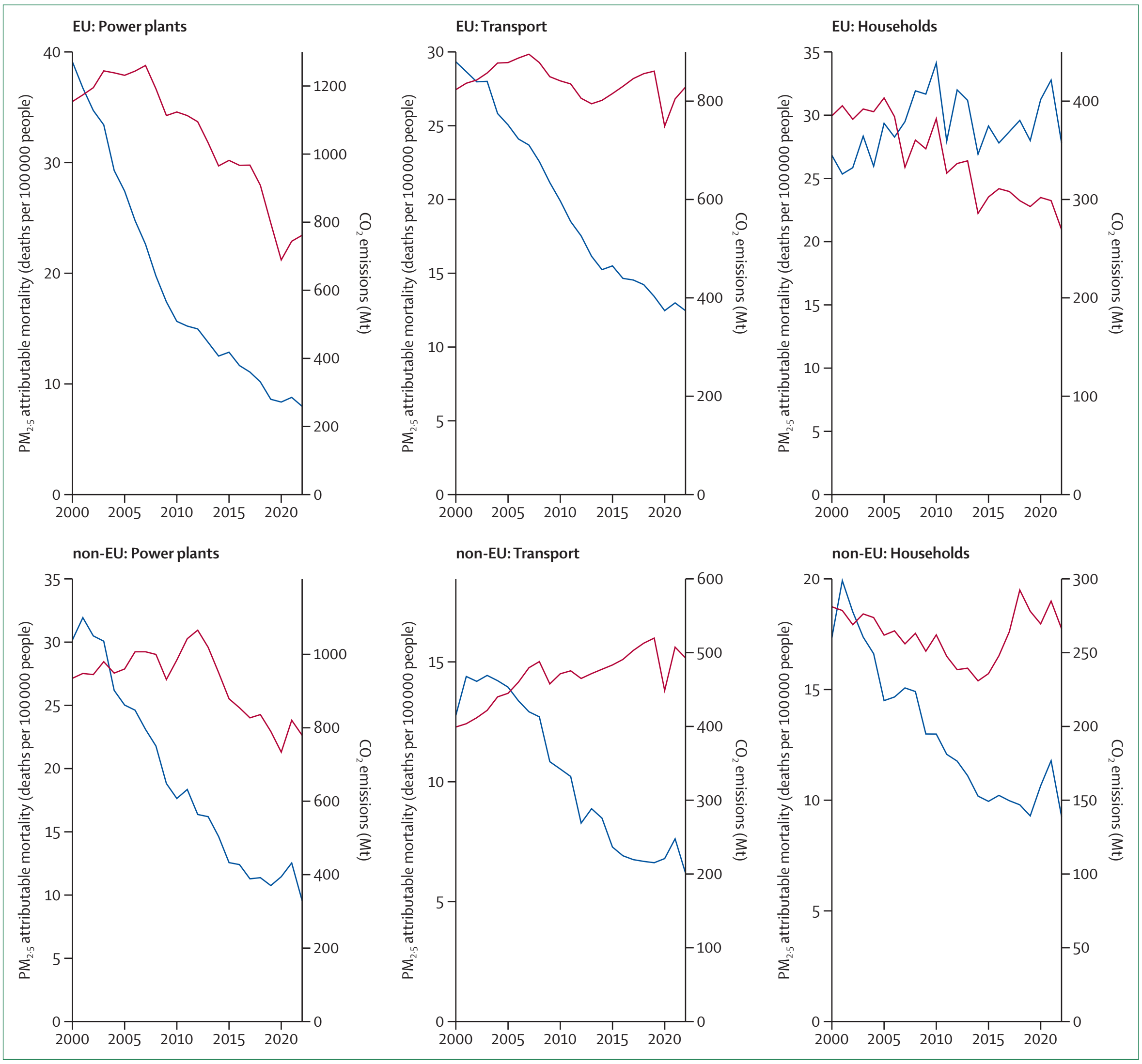


Figure 4: **Mortality attributable to $PM_{2.5}$ and CO_2 emissions across the energy, transport, and household sector in Europe**
Mortality represented by blue lines (left axis), compared with CO_2 emissions represented by red lines (right axis). Mt=million tonnes.

contrast, Sweden (29·0% renewable share), Finland (16·1% renewable share), and Belgium (9·8% renewable share) achieve particularly high shares of renewables (including biofuels) and electricity, together achieving around 10% of their road transport energy mix.

3.4: food, agriculture, and health

Indicator 3.4.1: sustainable diets

Nutrient-poor and energy-dense diets are a risk factor for several non-communicable diseases and are typically more prevalent among low-income groups.[80] Combining food consumption with an epidemiological model, this indicator estimates a 1% increase in diet-attributable mortality from 2021 to 2022 in Europe (30 deaths per million; appendix 7 pp 121–126). In northern and western Europe, diet-attributable mortality decreased by 4% and 0·5% respectively. In contrast, it increased in eastern Europe (1·3%) and southern Europe (2·2%). Although higher vegetable intake was associated with a lower risk of death, this benefit was offset by a rise in overweight and obesity rates, driven by increased calorie consumption from processed grains, oils, and poultry.

3.5: health-care sector emissions and harms

Health care contributes to both greenhouse gas and air pollution emissions,[81] which are both expected to increase due to growing demand for health care.[82] This indicator quantifies the health care-associated greenhouse gas emissions per person per year and the number of disability-adjusted life years (DALYs) attributable to $PM_{2.5}$ and ozone emissions associated with health-care sector activities (appendix 7 pp 127–133). Health-care sector emissions across 51 European countries were estimated to contribute 344 kg CO_2 equivalent (CO_2e) per person in 2022, corresponding to a 5·5% decrease per person and a 0·6% overall decrease in emissions, compared with 2010 (364 kg CO_2e per person). In EU countries, health-care emissions decreased by 9·8% and overall emissions decreased by 8·7% in 2022. DALYs associated with air pollutant exposure from health-care operations increased by 24% (531 000 DALYs) in Europe and by 7·8% in EU countries (267 000 DALYs) in 2022, compared with 2010. High healthy life expectancy can be achieved with comparatively low greenhouse gas emissions per person, suggesting countries in Europe might be able to reduce emissions without sacrificing health outcomes.

3.6 Tree cover loss and gain

Forest-based mitigation strategies, such as afforestation, reforestation, and sustainable forest management, can

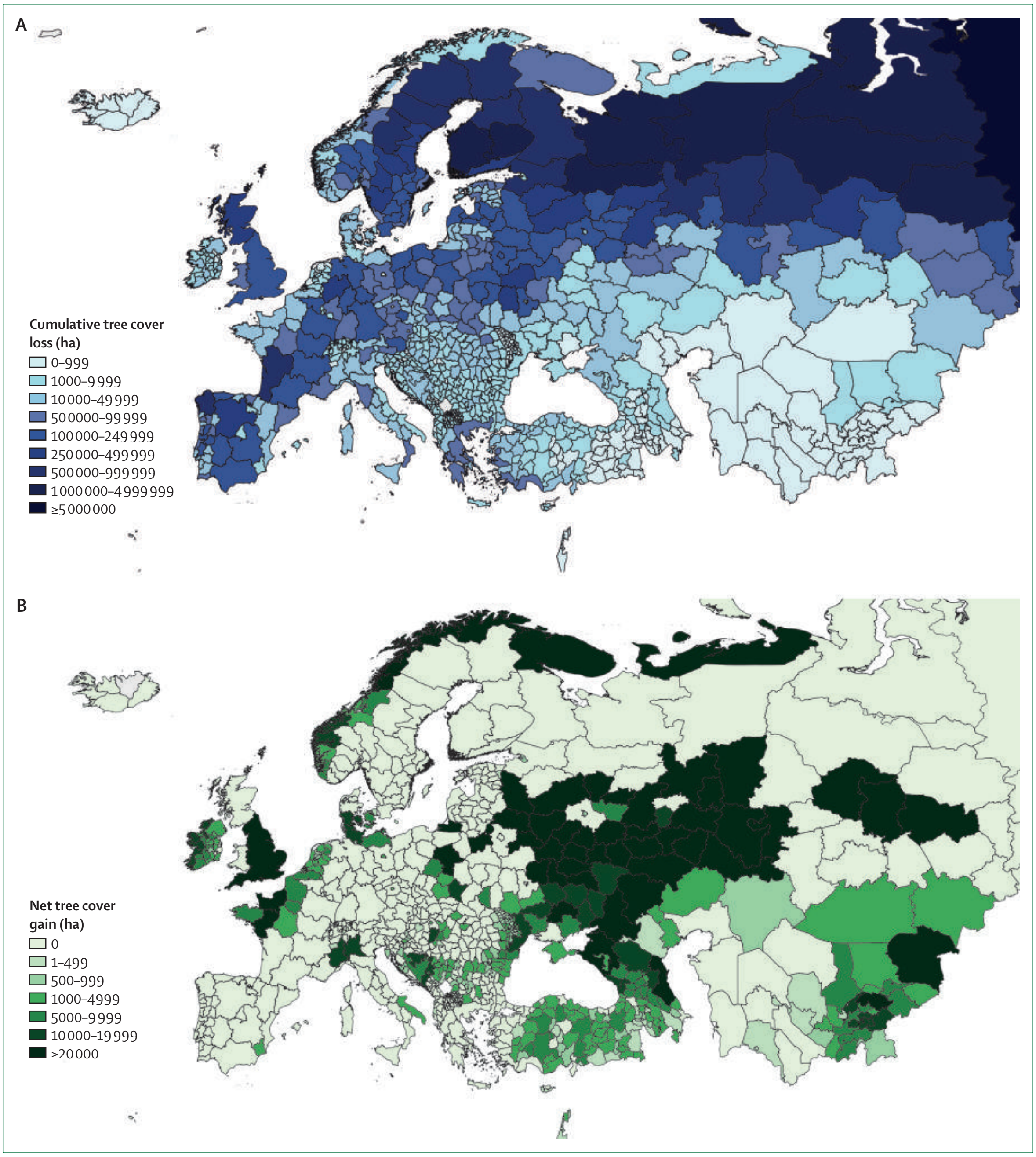


Figure 5: **Tree cover variation across Europe**
Data organised by WHO Europe region administrative area. (A) Cumulative tree cover loss in 2000–23. (B) Net tree cover gain in 2000 compared with 2022.

contribute to health co-benefits through improved air quality, temperature regulation, and healthier living environments.[68] Using satellite data,[83] this indicator quantifies tree cover loss with its respective drivers from 2001–23[84] and the cumulative gain in tree cover across forests, open woodlands, agriculture, and urban areas (appendix 7 pp 134–142) in 2020 compared with 2000.[85] Europe lost approximately 869·5 million ha (11·4%) of its tree cover from 2001 to 2023 (figure 5). Tree cover loss increased by 27·2 million ha (80%) during 2014–23 compared with 2001–10. Forestry was the main driver of tree cover loss and is the primary source of solid biomass for energy (see indicator 3.1.4).[86] In 2020, only 22 countries out of 53 had a net tree cover gain over 1% and a gain of more than 100 000 hectares over 20 years. The largest absolute gains in net tree cover occurred in Belarus (521·5 ha), Ukraine (426·5 ha), and Poland (406·7 ha). The highest percentages of net tree cover gained took place in Uzbekistan (37·4%), Tajikistan (26·8%), and Ireland (22·5%).

Conclusion

Although the energy transition is moving in the right direction in Europe and delivering health co-benefits, progress is too slow. Given the stagnant CO_2 emissions from passenger transport and the slight increase in diet-attributable mortality, efforts to promote healthy, sustainable travel and diets should be prioritised. Effort is needed to ensure healthy diets are affordable given the stark increases in food prices in Europe.[87] Not all mitigation actions necessarily deliver both climate and health benefits. Although considered renewable energy, solid biomass combustion for heating and cooling can result in unhealthy air pollution levels. Cleaner renewable technologies—including heat pumps and solar thermal collectors—should be prioritised. Integrated approaches are needed to accelerate the energy transition while also considering the implications for air pollution to avoid possible climate or health trade-offs.

Section 4: economics and financing

Lowering greenhouse gas emissions can boost the local economy, drive innovation and productivity, and provide substantial benefits in health and energy security and access.[88] There are uncertainties regarding the economic costs of climate change, mainly due to the incomparability of methodologies between studies and because not all climate impacts are included in the economic cost estimates.[89] However, there is broad agreement that by investing in preparedness, considerable economic losses related to premature mortality, reduction in labour productivity, impacts on agriculture and forestry, increased energy costs, sea level rise, and extreme weather events could be avoided.[88,90] This section tracks temperature effects on the labour force and the economy, net fossil fuel subsidies and carbon prices, investment in clean energy, the cost of unhealthy diets and, new for this report, climate adaptation finance for the health sector.

4.1: health-linked economic impacts and mitigation of climate change

Indicator 4.1.1: temperature and change in labour supply

Workers in sectors that are highly exposed to climate change, such as agriculture and construction, are increasingly affected by heat stress,[91–94] suggesting that adaptation measures such as heat alerts, EWSs, and labour protections are not sufficient.[95,96] This indicator combines the number of working hours with temperature and precipitation data[97] to estimate the change in working hours per person per year for high-exposure outdoor occupations due to climate change. In Europe, the number of working hours peaks at an annual mean temperature of 9·9°C for these workers.[98] In 2020–23, the labour supply in Europe was 1·52% lower (equivalent to 24 h less per worker per year) due to the temperature change, compared with the historical average of 1965–94. The highest declines in working hours were estimated to be in the Canary Islands in Spain, Cyprus, and Attica in Greece. Increased labour supply was estimated in regions such as Salzburg (Austria), South Tyrol (Italy), and Finland due to increased average temperature (appendix 7 pp 143, 144).

Indicator 4.1.2: impact of heat on economic activity

There is increasing evidence that the changing climate, including increasing temperatures, is negatively affecting economic activity.[99–102] This indicator estimates the effect of temperature anomaly, defined as the difference between current temperature and mean temperature from 1981–2010, on real gross domestic product (GDP) per capita growth in Europe. In 2021, GDP per capita growth in southern Europe was 0·99% (95% CI 0·973–1·001) lower due to positive temperature anomalies (a positive anomaly indicates that the observed temperature was higher than the reference value) compared with 1981–2010 average temperatures. In comparison, the reduction was only 0·106% (95% CI 0·100–0·111) in 2001, highlighting that the negative impacts of temperature anomalies have increased in southern Europe. For northern Europe, no statistically significant relationship between temperature anomaly and economic activity was found (appendix 7 p 145).

Indicator 4.1.3: monetised cost of unhealthy diets

This indicator estimates the costs of unhealthy diets among income groups, based on the number of diet-attributable deaths (indicator 3.4.1). Between 2021 and 2022, these costs increased by 1% (equivalent to US$95 billion measured in purchasing power parity terms (adjusted to the 2021 value; appendix 7 pp 146, 147). Following changes observed in diet-related mortality (indicator 3.4.1), the associated cost estimates changed due to an increase in vegetable intake by 11% (–$89 billion)

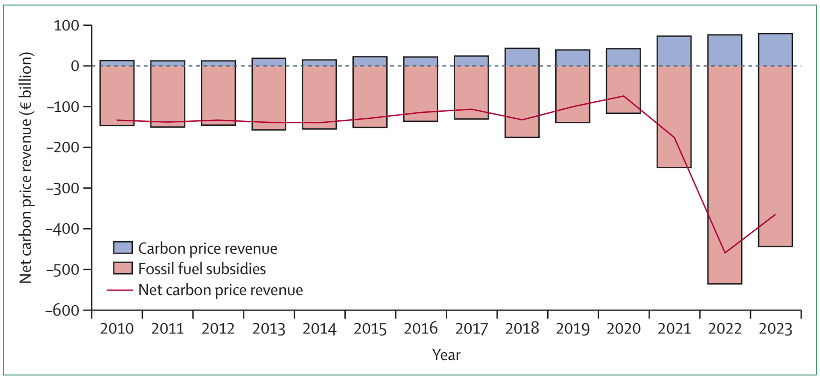


***Figure 6*: Gross carbon price revenue, fossil fuel subsidies, and net carbon price revenue (2010–23)**

and an increase in meat consumption by 2·4% ($7 billion). In northern and eastern Europe, the costs decreased by 1·7% (–$17 billion) and 0·2% (–$11 billion). However, they increased by 6·6% ($109 billion) in southern and 0·7% ($14 billion) in western Europe.

4.2: economics of the transition to zero-carbon economics

Indicator 4.2.1: net value of fossil fuel subsidies and carbon prices

Carbon prices incentivise the transition to a decarbonised economy, but many European governments continue to subsidise fossil fuels.[103] This indicator estimates net carbon revenues and average carbon prices in the WHO European region using data from the IEA, Organization for Economic Co-operation and Development (OECD), and World Bank.[104–106] Total carbon price revenue in Europe was €79·1 billion in 2023 (figure 6)—the highest on record. However, this was still only about a sixth (17·8%) of total fossil fuel subsidies (€444 billion). The corresponding net fossil fuel subsidies were €365 billion in 2023 in Europe. In 2021–23, the three highest values of fossil fuel subsidies since 2010 were recorded. Just ten countries, including Russia, Germany, the Netherlands, and the UK, were responsible for 90% of Europe's net fossil fuel subsidies in 2023 (appendix 7 pp 148–154). The Netherlands has increased its fossil fuel subsidies by a factor of nearly 50 since 2018, to prevent domestic industries from relocating abroad.[107,108] Paradoxically, some countries both supported and hindered fossil fuel usage, such as Germany, which had the highest carbon price revenue in Europe, but also the second highest fossil fuel subsidies. Net fossil fuel subsidies exceeded 10% of national health expenditure in 12 European countries in 2023 and exceeded the entire health budget in four countries.

Indicator 4.2.2: clean energy investment

Clean energy investment is essential for mitigation action and reducing air pollution exposure. This indicator tracks energy investment in Europe with data from the IEA (appendix 7 pp 155–158).[109] Clean energy investment (€427 billion) exceeded fossil fuel spending (€76 billion) in Europe by 461% in 2024. Clean energy investment grew by 3·0% in 2024 compared with 2023, and was 86·4% higher than in 2015, while fossil fuel investment grew by 5·2% in 2024 compared with 2023, but was 32·3% lower than in 2015. Spending on clean energy supply was 0·9% higher in 2024 than 2023, corresponding to a total of €148 billion, with solar the largest component at €63 billion. Investment in electricity networks and storage grew strongly by 13·1% in 2024 to €92 billion, whereas spending on energy efficiency and electrification grew only 0·3% in 2024, but still represented the largest component of total clean energy investment at €186 billion. To meet the Renewables and Energy Efficiency 2030 Pledge, also signed by the 27 EU member states, global investment in renewables must double and spending on efficiency and electrification nearly triple, requiring action by all countries.[110]

4.3: climate adaptation finance targeting the health sector

The mobilisation of climate finance is crucial to accelerate adaptation towards a climate resilient health sector. Climate and health are receiving increasing attention from international stakeholders; however, national governments do not have sufficient funding to address the climate and health nexus.[111] This indicator monitors the volumes and proportion of climate-related development finance (in US dollars per year) from European OECD Development Assistance Committee donor countries and private philanthropic donors that has a principal objective of climate change adaptation, based on Alcayna and colleagues' published method.[112] Between 2020 and 2022, European donors approved $13·97 billion for climate adaptation finance, of which only 0·07% ($97 million) was allocated as grants for health sector adaptation (appendix 7 pp 159, 160). Annual health adaptation financing fluctuated, declining from $44·3 million (0·8% of total climate adaptation finance) in 2020 to $24·8 million (0·7%) in 2021, before rising slightly in volume, but not share, to $28·3 million (0·6%) in 2022.

Conclusion

Climate change is associated with particularly severe harms in southern Europe, through reduced working hours and GDP. Moreover, costs of unhealthy diets have increased. Nonetheless, European countries continue to increase fossil fuel subsidies. Additionally, although Europe remains the world's largest public funder of climate action, the share of climate adaptation finance directed to strengthening health systems has declined. More ambitious mitigation and adaptation actions are needed. Assessments, such as of EWSs and flood risks in Europe, show that the costs avoided through proactive measures can far exceed their implementation costs.[113–115]

Section 5: public and political engagement

Tackling climate-related health risks in Europe requires strong public support and political action. Effective engagement across society is crucial for driving ambitious mitigation and adaptation policies and pro-environmental behavioural change.[116,117] Shared beliefs, persuasive communication, and trust are important elements to mobilise effective engagement, according to social science theories.[118–121] The previous *Lancet* Countdown Europe report highlighted the potential for health framing to build support for climate policies,[7] yet a gap persists between scientific understanding and societal action. This section monitors engagement trends across Europe. It tracks indicators spanning scientific output, public perception, political discourse, corporate reporting, media coverage, and climate litigation.

5.1: scientific engagement with health and climate change

Indicator 5.1.1: coverage of health and climate change in scientific articles

Scientific evidence underpins understanding of climate change's health implications. This indicator tracks scientific publications focusing on the climate and health nexus with mentions of European locations, using the OpenAlex database and machine learning classification based on established methods.[122] Since 1990, the number of relevant publications mentioning Europe (7881 identified) has grown substantially, peaking in 2023 before showing the first decline one year later in 2024 (appendix 7 pp 161–169). Most of this research (6407 publications; 81%) focuses on climate impacts, whereas studies on adaptation (1044; 13%) and mitigation (536; 7%) constitute smaller shares. Geographically, most studies mention locations in the UK (20%), Italy (11%), Spain (11%), France (9%), and Germany (8%). Recognition of the health impacts of climate change in Europe is increasing, but a gap persists in adaptation and mitigation research.

Indicator 5.1.2: coverage of health impacts of anthropogenic climate change

Linking observed health impacts to anthropogenic climate change is crucial for policy action. This indicator maps the scientific literature on climate change health impacts (from indicator 5.1.1) onto geographical areas where observed temperature and precipitation trends are attributable to anthropogenic forcing (appendix 7 pp 170–179).[123] Of the 6565 European climate impact publications identified, an overwhelming 6548 (99·7%) are located in regions where climate trends are attributable to human activity. The geographical focus remains concentrated, with the highest number of studies focusing on the UK (18·8%), Italy (11·5%), and Spain (11·3%), although publications per capita are more evenly distributed across Europe. The temporal trend closely mirrors overall climate and health research, including the 2024 decline after a 2023 peak.

5.2: individual engagement with health and climate change

5.2.1: public perception of health and climate change

Public priorities shape the political landscape for climate and health action and influence individual behaviour.[124,125] Using Eurobarometer data (2005–24) for 29 European countries, this indicator tracks the importance that citizens place on health and climate change as national issues (appendix 7 pp 180–182). Health consistently ranks as a top public priority, featuring in the top three concerns since 2016. Climate change, while rising from 12th priority in 2005, plateaued around fifth to sixth priority between 2019 and 2024. The percentage of respondents identifying both health and climate change as top priorities remains very low, peaking at only 3·6% in 2021 and settling at 1·2% in 2023 and 2024. Although northern Europe showed slightly higher nexus prioritisation, the overall trend suggests the public in Europe largely considers these major issues separately (figure 7A), indicating a challenge for effective health framing.[126] Women prioritised the climate and health nexus more frequently than men, particularly in northern Europe.

5.2.2: individual engagement with health and climate change on social media

Social media platforms reflect and shape public discourse, acting as key "amplification stations".[121] Shifting analysis from X (formerly Twitter) to TikTok for 2024, this indicator tracks engagement with the climate and health nexus in user-generated content across 26 European countries (appendix 7 pp 183–193).[127,128] From nearly 25 090 geolocated, multilingual video descriptions mentioning "climate change", only 7·32% (1837 posts) also contained health-related keywords. The intensity of this co-rhetoric showed an upward trend towards the end of 2024, possibly linked to external events such as unusually warm temperatures. Substantial heterogeneity exists across countries, although data limitations (eg, language coverage and geolocated data bias) warrant caution in interpretation.

5.3: political engagement with health and climate change

Indicator 5.3.1: engagement with health and climate change in the European Parliament

Political responses are crucial for translating evidence and concern into policy action. The European Parliament provides one arena to gauge political attention.[129] This indicator tracks mentions of health, climate change, and their intersection in legislators' speeches (2014–24; appendix 7 pp 194–228). Climate change and health are discussed frequently as standalone topics; however, explicit linkage between them is rare. In 2024, only

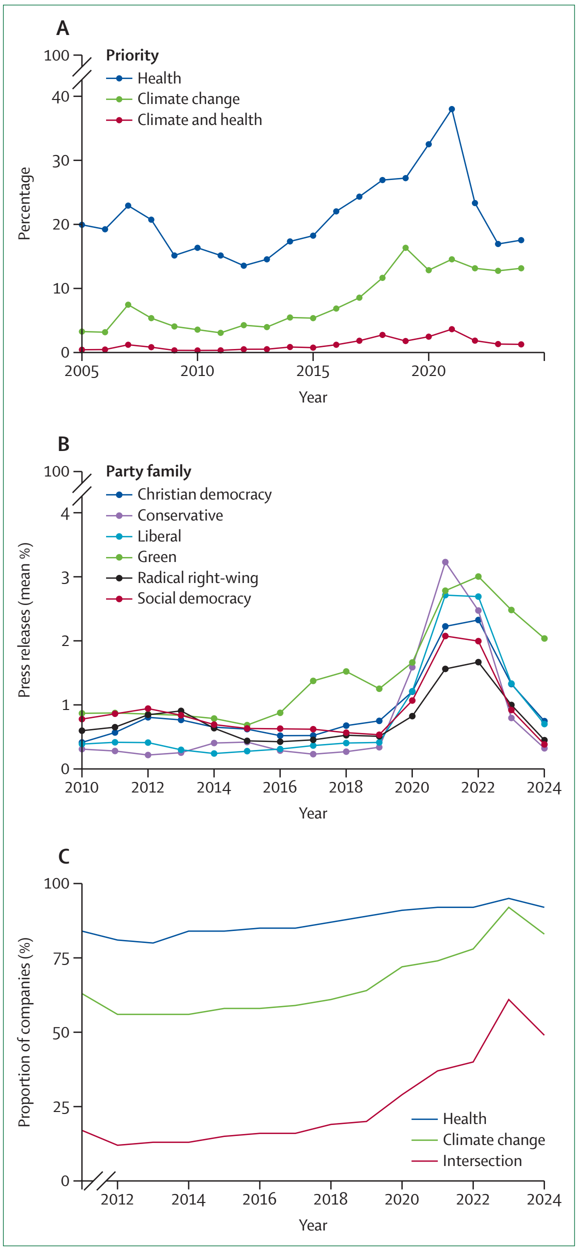


Figure 7: **Public, political, and corporate engagement with climate and health**
(A) Public prioritisation of health and climate change in Europe (2005–24). Total number of respondents from 2005–24 was 1 032 635, with an annual mean number of respondents of 51 632. (B) Political party communication (N=550 704) focusing on the climate and health nexus by party family (2010–24) with mean annual percentage of official press releases from 139 European political parties (grouped by family) focusing on the intersection of climate change and public health. (C) Corporate engagement with health, climate change, and their intersection (2011–24). The percentage of European companies submitting UN Global Compact reports that reference health, climate change, or their intersection.

21 of 4477 speeches referenced the intersection, compared with 204 mentioning climate change and 341 mentioning health. This represents a major drop in engagement across all categories compared with 2023 (which saw 66 intersection, 714 climate, and 1060 health mentions) and the 2021 peak (91 intersection, 600 climate, and 1652 health mentions). In 2024, intersection mentions were led by members of the European Parliament from Slovenia, Poland, and Germany. However, direct comparison is complicated, due to the 2024 parliamentary election.

Indicator 5.3.2: political engagement with health and climate change on social media

Online presence is a key communication channel for political actors. Political social media (X) use was monitored for European heads of state and government (leaders), the European Parliament, and the European Commission and its College of Commissioners (EC) from 2022–24, analysing in total 268 297 tweets (70 251 from leaders, 70 538 from the European Parliament, and 64 017 from the EC (appendix 7 pp 229–259). For the European Parliament, quotes counted include those from committees, the legislative backbone of the EU policy-making process.[130] Health topics generally received more attention than climate change across groups. Monthly health mentions peaked in January, 2022, for the European Parliament (215 [9·03%] of 2381 posts); May, 2022, for the EC (104 [5·10%] of 2038 posts); and January, 2022, for leaders (120 [7·78%] of 1543 posts). Monthly climate mentions peaked in March, 2023, for the European Parliament (167 [7·51%] of 2225 posts); December, 2023, for the EC (83 [4·71%] of 1763), and December, 2023, for leaders (160 [4·96%] of 3227). Engagement with the climate and health intersection remained exceptionally low. The European Parliament's highest intersection engagement was 3·27% (78 of 2381 posts) in January, 2022, and the EC's peak was merely 0·27% (5 of 1823 posts) in May, 2024. Over 3 years, European heads of state and government posted about the intersection only 36 times (0·05%; total 70 251 posts), suggesting an attenuation of the nexus signal by political actors online.[121]

Indicator 5.3.3: political party engagement with health and climate change

Political parties play a crucial part in setting agendas and mobilising support through their communication strategies.[118,119] This indicator analyses 550 704 press releases from 139 parties across 24 European countries published between 2010 and 2025, using a language model to identify the substantive focus (appendix 7 pp 260–263).[131,132] The COVID-19 pandemic created a policy window,[133] triggering a sharp, temporary increase in press releases linking climate change and health in 2020–21, particularly from social democratic parties. However, this integration was not sustained. By 2024, focus on the climate and health nexus returned to the low pre-pandemic baseline of around 1%. Green, liberal, and conservative parties are more likely to link the issues than radical right parties, but the absence of sustained nexus communication across most party families suggests it is not a core element of their strategic communication, reflecting persistent silos and hindering its integration into the broader political agenda (figure 7B).

5.4: corporate sector engagement with health and climate change

Corporate engagement is essential for climate and health action.[134,135] This indicator tracks corporate communication via UN Global Compact Communication on Progress reports in Europe (2011–24; appendix 7 pp 264–274). General mentions of "health" remain high and stable (found in >88% of 25 272 reports submitted by European companies). However, engagement referencing climate change and the intersection with health showed a dip in 2024 after rising in previous years (figure 7C). This volatility suggests potentially superficial strategic framing rather than deep integration. By sector, the highest proportion of reports with at least one reference to health and climate within a 25-word window in 2024 was seen in banking (78% [69 of 88 reports]), real estate investment trusts (88% [7 of 8 reports]), and life insurance (75% [12 of 16 reports]), whereas the health-care sector had mentions in only 46 (47%) of 99 reports.

5.5: media engagement with health and climate change

Media coverage, acting through key "amplification stations",[121] shapes public understanding and influences policy agendas. This indicator assesses media engagement by analysing TikTok video descriptions posted by 197 prominent media outlets across 38 European countries during 2024 (appendix 7 pp 275–296). Analysis of 96 969 multilingual video descriptions shows that climate change is a topic of discussion (20 435 [21%] contained climate-related keywords). Yet only 2776 (13·5%) of these climate change video descriptions also included health-related terms. This suggests that written media narratives on TikTok, while addressing climate change, often fail to fully incorporate the health frame,[119] potentially limiting the audience's engagement with climate health impacts.[136,137]

5.6: engagement on health in climate-change litigation

Climate litigation provides a distinct channel for engagement.[138,139] This indicator tracks health references in European climate case documents (2011–24), sourced from the Sabin Centre's Climate Case Chart (appendix 7 pp 297–321). The findings reveal engagement on health, featuring 11 252 references in more than half the documents since 2011 (561 of 961 case documents). Engagement surged in 2019, peaking sharply in 2020–21, before declining in 2022–24 but remaining above pre-2019 levels (figure 8). The peak can be explained by several cases pursuing health as a key objective of litigation during this period, including through novel references to mental health (1474 mentions total, 1297 [88%] of these since 2019), with terms such as "climate anxiety" frequently appearing, especially in cases brought by youth and other vulnerable groups.[140] This indicator suggests the legal system has become a crucial venue for framing climate change as a physical and mental health issue.

Conclusion

Despite expanding scientific evidence documenting climate change health impacts across Europe, this important nexus remains insufficiently integrated into key societal spheres. Public awareness appears fragmented, with health prioritised but often not linked to climate change. Political actors mirror this disconnect; the climate and health intersection is nearly absent from parliamentary debates, social media strategies, and party communications, reflecting persistent policy silos. Corporate reporting shows inconsistent engagement with the nexus, whereas media coverage underutilises the health frame. This siloing prevents the full leveraging of health arguments, which is known to increase personal relevance and potentially policy support[136,137] to accelerate climate action. The surge in health-focused climate litigation between 2019–21, particularly highlighting mental health, indicates the law is a powerful channel for raising these issues. Breaking these silos remains paramount to ensure effective engagement with the climate and health nexus.

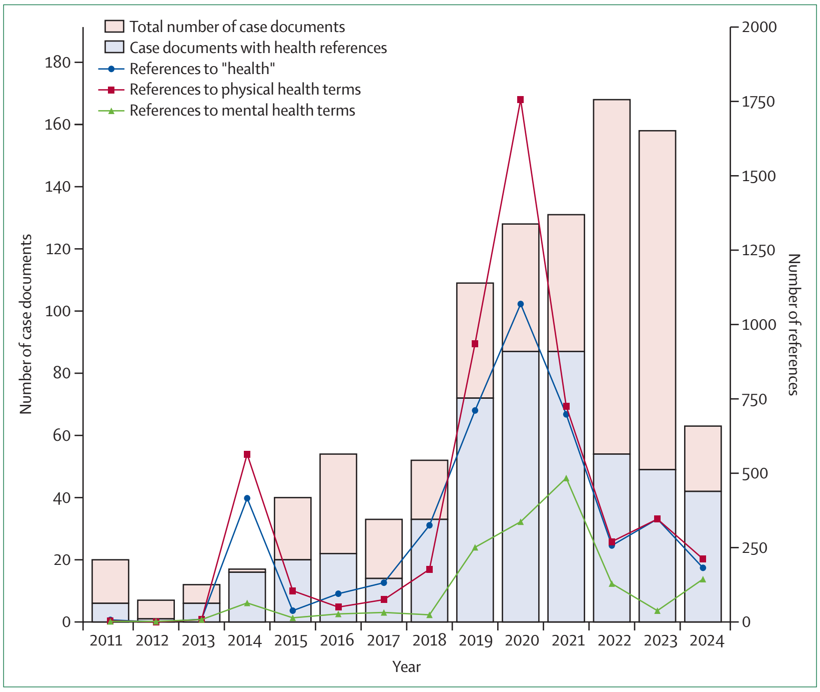


Figure 8: **Engagement with health in European climate change litigation documents (2011–24)**
Total number of case documents filed annually (grey bars, left axis) and number of documents containing health references (blue bars, left axis), overlaid with the annual number of references to the term "health", terms related to physical health, and terms related to mental health (appendix 7 pp 296–320) within those documents (lines, right axis).

Conclusion: the 2026 report of the *Lancet* Countdown in Europe

This third iteration of the *Lancet* Countdown in Europe report highlights a clear upward trend in both direct (eg, heat exposure) and indirect (eg, infectious diseases and food insecurity) health risks and impacts linked to climate change (section 1). These underscore the urgent need for effective adaptation measures, including heat-health action and greening of cities (section 2), and public health guidance that accounts for heat-related risks when being physically active. As economically deprived areas show higher vulnerability to extreme weather events, it is imperative that preparedness planning contributes to building resilience by addressing the unequal distribution of risks and impacts posed by climate change.[141]

There are some positive trends in adaptation and mitigation measures. An increasing number of countries and cities reported completing climate risk assessments (section 2). Compared with 2024,[7] there were reductions in fossil fuel and coal as sources of energy and an increase in the use of renewable energy sources (section 3); however, the current share of renewables needs to almost double to reach the target of 42·5% of energy consumption among EU member states by 2030.[142] Health co-benefits of climate action highlighted in this report provide further evidence for Europe and EU countries to intensify efforts to bridge the ambition gap to net zero.[72] However, our indicators show little progress in reducing greenhouse gas emissions from passenger transport or shifts to healthy, sustainable diets, suggesting that measures to encourage uptake of active transport (eg, restricting car access in urban centres and expanding bicycle infrastructure) and sustainable diets (eg, making healthy food affordable) should be prioritised.

Although Europe committed to phasing out fossil fuels subsidies by 2025 in several international arenas,[143,144] a sharp increase in subsidies was reported in 2023–24 (section 4), driven by the energy crises following Russia's invasion of Ukraine.[145] Such subsidies risk slowing the energy transition, reinforcing fossil fuel use, and increasing air pollution, thereby hindering progress toward climate–health targets. Although the rise in subsidies is expected to be temporary,[145] only Denmark has adopted a comprehensive national plan to phase out fossil fuel subsidies. Unless the rest of Europe follows Denmark's example, this setback will likely compromise reaching 2030 net zero goals. Redirecting financial flows to climate action is essential to reinforce Europe's strategic direction and commitment to climate leadership. Part of these flows should finance the adaptation of low-income countries' health-care systems, which currently receive very little funding for this purpose.

Climate litigation has emerged as a powerful platform for elevating the health argument within the broader climate agenda.[144,146] However, a decrease of engagement with the climate and health nexus among the European Parliament and other societal sectors indicates an increasing engagement gap. Climate change health impacts are already apparent in Europe, and these will accelerate without proper scaling up of adaptation measures and global mitigation efforts. Progress made in Europe must not be taken for granted; societal engagement with the nexus of climate change and health is low and there are signs it is decreasing. Renewed engagement, particularly by policy makers, is central to increasing momentum to protect the health of European populations and further unlocking the health co-benefits of mitigation actions.

Contributors

The report was conducted by five working groups, which were responsible for the design, drafting, and review of their individual indicators and sections. All authors contributed to the overall paper structure and concepts and provided input and expertise to the relevant sections. JRoc and JCS (Working Group leads), CT, PF, PS, EJZR, HA, JM-U, JB, JT, JP, LS, MSo, RL, RH, SD, ZF, EB, DL, GECC, ASJP, OJ, FT, TJC, AA, CM, and OC contributed to Working Group 1. JCS and JRoc (Working Group leads), CT, KRvD, HKK, MNie, JB, TJ, NS, and MC contributed to Working Group 2. CT (Working Group lead), GK, S-CH, HK, IH, KRvD, HKK, JC-X, JDS, MJE, HJ, and MSp contributed to Working Group 3. AM and HH (Working Group leads), DS, EJZR, SD, MSp, and TA contributed to Working Group 4. ND and SJ (Working Group leads), HB, MC, OG, JCM, MH, ZPD, TR, JC-X, CT, JAR-C, CE, PGC, ES, MvC, MWC, and KK contributed to Working Group 5. MR and MW provided support from the global *Lancet* Countdown. HKK and JRoc (Co-directors) provided coordination and strategic direction, with support from CT (Co-director), JC-X, MNil (Co-chair), and JMA (Co-chair).

Declaration of interests

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References

1 Houghton JT, Jenkins GJ, Ephraums JJ. Climate Change: the IPCC scientific assessment. Cambridge University Press, 1990. https://www.ipcc.ch/site/assets/uploads/2018/03/ipcc_far_wg_I_full_report.pdf (accessed June 13, 2025).

2 World Meteorological Organization. WMO global annual to decadal climate update 2025–2029. May, 2025. https://www.un-ilibrary.org/content/books/9789211543261 (accessed Sept 22, 2025).

3 UN Environment Programme. Emissions gap report 2024: No more hot air ... please! With a massive gap between rhetoric and reality, countries draft new climate commitments. 2024. https://www.unep.org/emissions-gap-report-2024 (accessed May 3, 2025).

4 Dupont C, Moore B, Boasson EL, et al. Three decades of EU climate policy: racing toward climate neutrality? *Wiley Interdiscip Rev Clim Change* 2024; **15:** e863.

5 UN Environment Programme. Emissions gap report 2025: Off target – continued collective inaction puts global temperature goal at risk. November, 2025. https://wedocs.unep.org/items/9f0bf855-2069-42a6-a856-4b389f740c5c (accessed Jan 13, 2026).

6 Rosslow C, Petrovich B. European electricity review 2025. EMBER. Jan 23, 2025. https://ember-energy.org/latest-insights/european-electricity-review-2025/ (accessed April 6, 2026).

7 van Daalen KR, Tonne C, Semenza JC, et al. The 2024 Europe report of the *Lancet* Countdown on health and climate change: unprecedented warming demands unprecedented action. *Lancet Public Health* 2024; **9:** e495–522.

8 Estoque RC, Ishtiaque A, Parajuli J, Athukorala D, Rabby YW, Ooba M. Has the IPCC's revised vulnerability concept been well adopted? *Ambio* 2023; **52:** 376–89.

9 World Meteorological Organization. WMO Guidelines on the Calculation of Climate Normals. 2017. https://library.wmo.int/records/item/55797-wmo-guidelines-on-the-calculation-of-climate-normals (accessed March 25, 2026).

10 Ebi KL, Capon A, Berry P, et al. Hot weather and heat extremes: health risks. *Lancet* 2021; **398:** 698–708.

11 Copernicus Climate Change Service. Record 'warm daytimes' in southeastern Europe. C3S seasonal lookback: summer 2024. 2024. https://climate.copernicus.eu/c3s-seasonal-lookback-summer-2024 (accessed May 12, 2025).

12 Copernicus Climate Change Service. Climate Data Store. ERA5-Land hourly data from 1950 to present. July 12, 2019. https://cds.climate.copernicus.eu/datasets/reanalysis-era5-land?tab=overview (accessed Sept 24, 2024).

13 Center For International Earth Science Information Network-CIESIN-Columbia University. Gridded population of the world, version 4 (GPWv4): population density, revision 11. NASA Earth Data. 2018. https://earthdata.nasa.gov/data/catalog/sedac-ciesin-sedac-gpwv4-popdens-r11-4.11 (accessed April 4, 2026).

14 Warburton DER, Bredin SSD. Health benefits of physical activity: a systematic review of current systematic reviews. *Curr Opin Cardiol* 2017; **32:** 541–56.

15 Klarenberg H, van der Velde JHPM, Peeters CFW, et al. Leisure time physical activity is associated with improved diastolic heart function and is partly mediated by unsupervised quantified metabolic health. *BMJ Open Sport Exerc Med* 2024; **10:** e001778.

16 Skurvydas A, Istomina N, Dadeliene R, et al. Mood profile in men and women of all ages is improved by leisure-time physical activity rather than work-related physical activity. *BMC Public Health* 2024; **24:** 546–49.

17 Tartarini F, Smallcombe JW, Lynch GP, Cross TJ, Broderick C, Jay O. The Sports Medicine Australia extreme heat risk and response guidelines and web tool. *J Sci Med Sport* 2025; **28:** 690–99.

18 Vecellio DJ, Cottle RM, Tony Wolf S, Larry Kenney W. Critical environmental limits for human thermoregulation in the context of a changing climate. *Exerc Sport Mov* 2023; **1:** e00008.

19 Romanello M, Walawender M, Hsu S-C, et al. The 2024 report of the *Lancet* Countdown on health and climate change: facing record-breaking threats from delayed action. *Lancet* 2024; **404:** 1847–96.

20 Janoš T, Quijal-Zamorano M, Shartova N, et al. Heat-related mortality in Europe during 2024 and health emergency forecasting to reduce preventable deaths. *Nat Med* 2025; **31:** 4065–74.

21 Ballester J, Robine J-M, Herrmann FR, Rodó X. Long-term projections and acclimatization scenarios of temperature-related mortality in Europe. *Nat Commun* 2011; **2:** 358.
22 Martínez-Solanas È, Quijal-Zamorano M, Achebak H, et al. Projections of temperature-attributable mortality in Europe: a time series analysis of 147 contiguous regions in 16 countries. *Lancet Planet Health* 2021; **5:** e446–54.
23 Quijal-Zamorano M, Martínez-Solanas È, Achebak H, et al. Seasonality reversal of temperature attributable mortality projections due to previously unobserved extreme heat in Europe. *Lancet Planet Health* 2021; **5:** e573–75.
24 Masselot P, Mistry MN, Rao S, et al. Estimating future heat-related and cold-related mortality under climate change, demographic and adaptation scenarios in 854 European cities. *Nat Med* 2025; **31:** 1294–302.
25 Basagaña X, Ballester J. Unbiased temperature-related mortality estimates using weekly and monthly health data: a new method for environmental epidemiology and climate impact studies. *Lancet Planet Health* 2024; **8:** e766–77.
26 Bakke SJ, Ionita M, Tallaksen LM. Recent European drying and its link to prevailing large-scale atmospheric patterns. *Sci Rep* 2023; **13:** 21921.
27 Vicente-Serrano SM, Begueria S, Lopez-Moreno JI. A multiscalar drought index sensitive to global warming: the Standardized Precipitation Evapotranspiration Index. *J Clim* 2010; **23:** 1696–718.
28 Salvador C, Nieto R, Vicente-Serrano SM, García-Herrera R, Gimeno L, Vicedo-Cabrera AM. Public health implications of drought in a climate change context: a critical review. *Annu Rev Public Health* 2023; **44:** 213–32.
29 Burton C, Lampe S, Kelley DI, et al. Global burned area increasingly explained by climate change. *Nat Clim Chang* 2024; **14:** 1186–92.
30 Gould CF, Heft-Neal S, Johnson M, Aguilera J, Burke M, Nadeau K. Health effects of wildfire smoke exposure. *Annu Rev Med* 2024; **75:** 277–92.
31 Aguilera R, Corringham T, Gershunov A, Benmarhnia T. Wildfire smoke impacts respiratory health more than fine particles from other sources: observational evidence from southern California. *Nat Commun* 2021; **12:** 1493–98.
32 Alari A, Ballester J, Milà C, et al. Quantifying the short-term mortality effects of wildfire smoke in Europe: a multicountry epidemiological study in 654 contiguous regions. *Lancet Planet Health* 2025; **9:** 101296.
33 Masson-Delmotte V, Zhai P, Pörtner H-O, et al, and the Intergovernmental Panel on Climate Change. Global warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty. Cambridge, UK, and New York, NY, USA: Cambridge University Press, 2018.
34 Andersson Y, Ekdahl K. Wound infections due to *Vibrio cholerae* in Sweden after swimming in the Baltic Sea, summer 2006. *Euro Surveill* 2006; **11:** E060803.2.
35 Semenza JC, Herbst S, Rechenburg A, et al. Climate change impact assessment of food- and waterborne diseases. *Crit Rev Environ Sci Technol* 2012; **42:** 857–90.
36 Heidecke J, Wallin J, Fransson P, et al. Uncovering temperature sensitivity of West Nile virus transmission: novel computational approaches to mosquito-pathogen trait responses. *PLOS Comput Biol* 2025; **21:** e1012866.
37 Camp JV, Nowotny N. The knowns and unknowns of West Nile virus in Europe: what did we learn from the 2018 outbreak? *Expert Rev Anti Infect Ther* 2020; **18:** 145–54.
38 European Centre for Disease Prevention and Control, European Food Safety Authority. Surveillance of West Nile virus infections in humans and animals in Europe, monthly report - data submitted up to 3 December 2025. *EFSA J* 2025; **23:** e9835.
39 Rocklöv J, Tozan Y. Climate change and the rising infectiousness of dengue. *Emerg Top Life Sci* 2019; **3:** 133–42.
40 Lillepold K, Rocklöv J, Liu-Helmersson J, Sewe M, Semenza JC. More arboviral disease outbreaks in continental Europe due to the warming climate? *J Travel Med* 2019; **26:** taz017.
41 Semenza JC, Sudre B, Miniota J, et al. International dispersal of dengue through air travel: importation risk for Europe. *PLoS Negl Trop Dis* 2014; **8:** e3278.
42 Cattaneo P, Salvador E, Manica M, et al. Transmission of autochthonous *Aedes*-borne arboviruses and related public health challenges in Europe 2007-2023: a systematic review and secondary analysis. *Lancet Reg Health Eur* 2025; **51:** 101231.
43 Farooq Z, Segelmark L, Rocklöv J, et al. Impact of climate and *Aedes albopictus* establishment on dengue and chikungunya outbreaks in Europe: a time-to-event analysis. *Lancet Planet Health* 2025; **9:** e374–83.
44 Boualam MA, Pradines B, Drancourt M, Barbieri R. Malaria in Europe: a historical perspective. *Front Med* 2021; **8:** 691095.
45 European Centre for Disease Prevention and Control. Malaria - annual epidemiological report for 2022. Apr 24, 2024. https://www.ecdc.europa.eu/en/publications-data/malaria-annual-epidemiological-report-2022 (accessed May 13, 2025).
46 Scarpini S, Dondi A, Totaro C, et al. Visceral leishmaniasis: epidemiology, diagnosis, and treatment regimens in different geographical areas with a focus on pediatrics. *Microorganisms* 2022; **10:** 1887.
47 WHO. Leishmaniasis. Jan 12, 2023. https://www.who.int/news-room/fact-sheets/detail/leishmaniasis (accessed Sept 22, 2025).
48 European Center for Disease Prevention and Control 2022. Surveillance, prevention and control of leishmaniases in the European Union and its neighbouring countries. Jun 20, 2022. https://www.ecdc.europa.eu/sites/default/files/documents/leishmaniasis-surveillance-eu.pdf (accessed March 26, 2026).
49 Tunalı V, Özbilgin A. Knock, knock, knocking on Europe's door: threat of leishmaniasis in Europe with a focus on Turkey. *Curr Res Parasitol Vector Borne Dis* 2023; **4:** 100150.
50 Kurt Ö, Özbilgin A, Petersen E, Ergönül Ö. An update on the imported cutaneous leishmaniasis in Europe. *Infect Dis Clin Microbiol* 2023; **5:** 59–62.
51 Carvalho BM, Maia C, Courtenay O, et al. A climatic suitability indicator to support *Leishmania infantum* surveillance in Europe: a modelling study. *Lancet Reg Health Eur* 2024; **43:** 100971.
52 Uusitalo R, Siljander M, Lindén A, et al. Predicting habitat suitability for *Ixodes ricinus* and *Ixodes persulcatus* ticks in Finland. *Parasit Vectors* 2022; **15:** 310.
53 Estrada-Peña A, de la Fuente J, Latapia T, Ortega C. The impact of climate trends on a tick affecting public health: a retrospective modeling approach for *Hyalomma marginatum* (Ixodidae). *PLoS One* 2015; **10:** e0125760.
54 Sofiev M, Bergmann K-C. Allergenic pollen: a review of the production, release, distribution and health impacts. Netherlands: Springer, 2012.
55 Pfaar O, Bastl K, Berger U, et al. Defining pollen exposure times for clinical trials of allergen immunotherapy for pollen-induced rhinoconjunctivitis - an EAACI position paper. *Allergy* 2017; **72:** 713–22.
56 Pawankar R, Canonica GW, Holgate ST, Lockey RF, Blasis MS. WAO white book on allergy: update 2013. Milwaukee, Wisconsin: World Allergy Organization, 2013.
57 Kotz M, Donat MG, Lancaster T, et al. Climate extremes, food price spikes, and their wider societal risks. *Environ Res Lett* 2025; **20:** 081001.
58 Aune D, Giovannucci E, Boffetta P, et al. Fruit and vegetable intake and the risk of cardiovascular disease, total cancer and all-cause mortality-a systematic review and dose-response meta-analysis of prospective studies. *Int J Epidemiol* 2017; **46:** 1029–56.
59 Dasgupta S, Robinson EJZ. Attributing changes in food insecurity to a changing climate. *Sci Rep* 2022; **12:** 4709–11.
60 European Commission. EU Mission on Adaptation to Climate Change. https://mission-adaptation-portal.ec.europa.eu/about/eu-mission-adaptation-climate-change_en (accessed March 25, 2026).
61 Romanello M, Walawender M, Hsu S-C, et al. The 2025 report of the *Lancet* Countdown on health and climate change: climate change action offers a lifeline. *Lancet* 2025; **406:** 2804–57.
62 World Bank Group. Urban population (% of total population) - Europe & Central Asia. 2024. https://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS?end=2024&locations=Z7&start=1960&view=chart (accessed Aug 29, 2025).
63 Barcelona Institute for Global Health. Forecaster.Health. 2024. https://forecaster.health/ (accessed April 6, 2026).

64 Iungman T, Cirach M, Marando F, et al. Cooling cities through urban green infrastructure: a health impact assessment of European cities. *Lancet* 2023; **401:** 577–89.
65 Nieuwenhuijsen MJ. Green infrastructure and health. *Annu Rev Public Health* 2021; **42:** 317–28.
66 Semenza JC. Lateral public health: advancing systemic resilience to climate change. *Lancet Reg Health Eur* 2021; **9:** 100231.
67 Moutet L, Bernard P, Green R, et al. The public health co-benefits of strategies consistent with net-zero emissions: a systematic review. *Lancet Planet Health* 2025; **9:** e145–56.
68 van den Bosch M, Bartolomeu ML, Williams S, et al. A scoping review of human health co-benefits of forest-based climate change mitigation in Europe. *Environ Int* 2024; **186:** 108593.
69 International Energy Agency. World Energy Balances. April 2024 – IEA family and beyond. April 17, 2024. https://www.iea.org/data-and-statistics/data-product/world-energy-balances (accessed April 6, 2026).
70 International Energy Agency. Energy statistics data browser. 2023. https://www.iea.org/data-and-statistics/data-tools/energy-statistics-data-browser?country=WORLD&fuel=Energy%20supply&indicator=TESbySource (accessed March 26, 2026).
71 International Renewable Energy Agency. Tracking energy transition progress. 2011–25. https://www.irena.org/Energy-Transition/Outlook/Tracking-progress (accessed March 25, 2026).
72 European Commission. REPowerEU. Affordable, secure and sustainable energy for Europe. https://commission.europa.eu/topics/energy/repowereu_en (accessed March 25, 2026).
73 Paisi N, Kushta J, Pozzer A, Violaris A, Lelieveld J. Health effects of carbonaceous PM2.5 compounds from residential fuel combustion and road transport in Europe. *Sci Rep* 2024; **14:** 1530.
74 Climate & Clean Air Coalition. Black Carbon: an air pollutant with damaging effects on human health, crops, ecosystems and climate. https://www.ccacoalition.org/short-lived-climate-pollutants/black-carbon (accessed Oct 29, 2025).
75 Tran H, Juno E, Arunachalam S. Emissions of wood pelletization and bioenergy use in the United States. *Renew Energy* 2023; **219:** 119536.
76 Sterman JD, Siegel L, Rooney-Varga JN. Does replacing coal with wood lower CO2 emissions? Dynamic lifecycle analysis of wood bioenergy. *Environ Res Lett* 2018; **13:** 015007.
77 Eurostat. Renewable energy statistics. EU. 2024. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Renewable_energy_statistics (accessed May 20, 2024).
78 WHO. WHO global air quality guidelines: particulate matter (PM2.5 and PM10), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide. Sept 22, 2021. https://www.who.int/publications/i/item/9789240034228 (accessed March 25, 2026).
79 European Environmental Agency. Transport and mobility: key facts. Feb 10, 2025. https://www.eea.europa.eu/en/topics/in-depth/transport-and-mobility?activeTab=fa515f0c-9ab0-493c-b4cd-58a32dfaae0a (accessed June 6, 2025).
80 Carrillo-Alvarez E, Rifà-Ros R, Salinas-Roca B, Costa-Tutusaus L, Lamas M, Rodriguez-Monforte M. Diet-related health inequalities in high-income countries: a scoping review of observational studies. *Adv Nutr* 2025; **16:** 100439.
81 Eckelman MJ, Huang K, Lagasse R, Senay E, Dubrow R, Sherman JD. Health care pollution and public health damage in the United States: an update. *Health Aff* 2020; **39:** 2071–79.
82 Or Z, Seppänen A-V. The role of the health sector in tackling climate change: a narrative review. *Health Policy* 2024; **143:** 105053.
83 Hansen MC, Potapov PV, Moore R, et al. High-resolution global maps of 21st-century forest cover change. *Science* 2013; **342:** 850–53.
84 Curtis PG, Slay CM, Harris NL, Tyukavina A, Hansen MC. Classifying drivers of global forest loss. *Science* 2018; **361:** 1108–11.
85 Global Land Analysis and Discovery. Index of/users/Potapov/GLCLUC202/Forest_extent_2020. https://gladxfer.umd.edu/users/Potapov/GLCLUC2020/Forest_extent_2020/ (accessed May 1, 2025)
86 European Commission JRC Publications Repository. Brief on biomass for energy in the European Union. 2019. https://publications.jrc.ec.europa.eu/repository/handle/JRC109354 (accessed March 25, 2026).
87 Robayo M, Lucchetti LR, Delgado-Prieto L, Badiani-Magnusson R. Soaring food prices threaten recent economic gains in the EU. World Bank. July 2, 2025. https://hdl.handle.net/10986/43410 (accessed Jan 14, 2026).
88 Organisation for Economic Co-operation and Development, UN Development Programme. Investing in climate for growth and development: the case for enhanced NDCs. 2025. https://www.oecd.org/content/dam/oecd/en/about/projects/new-ndcs-to-deliver-climate-action-for-growth/investing-in-climate-for-growth-and-development-the-case-for-enhanced-NDCs-key-messages.pdf (accessed March 25, 2026).
89 Morris J, Rose SK, Reilly J, Gurgel A, Paltsev S, Schlosser CA. Reconciling widely varying estimates of the global economic impacts from climate change. *Nat Clim Chang* 2025; **15:** 124–27.
90 Shukla AR, Skea J, Reisinger A, et al. Summary for policymakers. In: Shukla AR, Skea J, Slade R, et al, eds. climate change 2022: mitigation of climate change contribution of working group III to the sixth assessment report of the intergovernmental panel on climate change. Intergovernmental Panel on Climate Change. 2022. https://www.ipcc.ch/report/ar6/wg3/chapter/summary-for-policymakers/ (accessed March 25, 2026).
91 Dasgupta S, van Maanen N, Gosling SN, Piontek F, Otto C, Schleussner C-F. Effects of climate change on combined labour productivity and supply: an empirical, multi-model study. *Lancet Planet Health* 2021; **5:** e455–65.
92 Schleypen JR, Mistry MN, Saeed F, Dasgupta S. Sharing the burden: quantifying climate change spillovers in the European Union under the Paris Agreement. *Spat Econ Anal* 2022; **17:** 67–82.
93 Dasgupta S, Robinson EJZ, Shayegh S, Bosello F, Park RJ, Gosling SN. Heat stress and the labour force. *Nat Rev Earth Environ* 2024; **5:** 859–72.
94 Parsons LA, Shindell D, Tigchelaar M, Zhang Y, Spector JT. Increased labor losses and decreased adaptation potential in a warmer world. *Nat Commun* 2021; **12:** 7286.
95 Dasgupta S, Robinson EJZ. The labour force in a changing climate: research and policy needs. *PLoS Clim* 2023; **2:** e0000131.
96 Robinson EJZ, Howarth C, Zhou Y, Dasgupta S. Improving the resilience of the UK labour force in a 1.5°C world. Grantham Research Institute on Climate Change and the Environment. April, 2025. https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2025/04/working-paper-423-Robinson-et-al.pdf (accessed March 25, 2026).
97 Copernicus Climate Change Service Climate Data Store. ERA5-Land hourly data from 1950 to present. July 12, 2019. https://cds.climate.copernicus.eu/doi/10.24381/cds.e2161bac (accessed April 7, 2025).
98 van Daalen KR, Romanello M, Rocklöv J, et al. The 2022 Europe report of the *Lancet* Countdown on health and climate change: towards a climate resilient future. *Lancet Public Health* 2022; **7:** e942–65.
99 Burke M, Hsiang SM, Miguel E. Global non-linear effect of temperature on economic production. *Nature* 2015; **527:** 235–39.
100 Kalkuhl M, Wenz L. The impact of climate conditions on economic production. Evidence from a global panel of regions. *J Environ Econ Manage* 2020; **103:** 102360.
101 Kahn ME, Mohaddes K, Ng RNC, Pesaran MH, Raissi M, Yang J-C. Long-term macroeconomic effects of climate change: a cross-country analysis. *Energy Econ* 2021; **104:** 105624.
102 Dasgupta S, Bosello F, De Cian E. Mistry, M. Global temperature effects on economic activity and equity: a spatial analysis. Working Paper 22-1. January, 2022. https://ideas.repec.org/p/rff/dpaper/dp-22-01.html#download (accessed March 25, 2026).
103 WHO. Quantitative risk assessment of the effects of climate change on selected causes of death, 2030s and 2050s. Sept 18, 2014. https://www.who.int/publications/i/item/9789241507691 (accessed March 25, 2026).
104 Organisation for Economic Co-operation and Development. Fossil fuel support. 2025. https://www.oecd.org/en/topics/fossil-fuel-support.html (accessed Jan 24, 2025).
105 International Energy Agency. Fossil Fuel Subsidies Database. November, 2025. https://www.iea.org/data-and-statistics/data-product/fossil-fuel-subsidies-database (accessed March 25, 2026).

106 World Bank. State and trends of carbon pricing dashboard. 2024. https://carbonpricingdashboard.worldbank.org/ (accessed March 25, 2026).

107 Oil Change International. New study estimates the Netherlands' fossil fuel subsidies at €37.5 billion per year, despite long-standing promises to end this support. Sept 4, 2023. https://oilchange.org/news/new-study-estimates-the-netherlands-fossil-fuel-subsidies-at-e37-5-billion-per-year-despite-long-standing-promises-to-end-this-support/ (accessed March 25, 2026).

108 International Energy Agency, Organisation for Economic Co-operation and Development. The Netherlands' effort to phase out and rationalise its fossil-fuel subsidies. 2020. https://iea.blob.core.windows.net/assets/e5b458a6-78f9-4293-88a7-f488222f2f48/oecd-iea-review-of-fossil-fuel-subsidies-in-the-netherlands.pdf (accessed June 10, 2026).

109 International Energy Agency. World Energy Investment 2025. June 5, 2025. https://www.iea.org/reports/world-energy-investment-2025 (accessed June 18, 2026).

110 United Nations Framework Convention on Climate Change. Global renewables and energy efficiency pledge. 2023. https://www.cop28.com/en/global-renewables-and-energy-efficiency-pledge (accessed March 25, 2026).

111 WHO. WHO health and climate change global survey report, 1st edn. Nov 8, 2021. https://www.who.int/publications/i/item/9789240038509 (accessed March 25, 2026).

112 Alcayna T, O'Donnell D, Chandaria S. How much bilateral and multilateral climate adaptation finance is targeting the health sector? A scoping review of official development assistance data between 2009–2019. *PLOS Glob Public Health* 2023; **3:** e0001493.

113 Dottori F, Mentaschi L, Bianchi A, Alfieri L, Feyen L. Cost-effective adaptation strategies to rising river flood risk in Europe. *Nat Clim Chang* 2023; **13:** 196–202.

114 Chiabai A, Spadaro JV, Neumann MB. Valuing deaths or years of life lost? Economic benefits of avoided mortality from early heat warning systems. *Mitig Adapt Strategies Glob Change* 2018; **23:** 1159–76.

115 Pappenberger F, Cloke HL, Parker DJ, Wetterhall F, Richardson DS, Thielen J. The monetary benefit of early flood warnings in Europe. *Environ Sci Policy* 2015; **51:** 278–91.

116 Brownstein M, Kelly D, Madva A. Individualism, structuralism, and climate change. *Environ Commun* 2022; **16:** 269–88.

117 Kumpu V. What is public engagement and how does it help to address climate change? A review of climate communication research. *Environ Commun* 2022; **16:** 304–16.

118 Sabatier PA. An advocacy coalition framework of policy change and the role of policy-oriented learning therein. *Policy Sci* 1988; **21:** 129–68.

119 Entman RM. Framing: toward clarification of a fractured paradigm. *J Commun* 1993; **43:** 51–58.

120 Chong D, Druckman JN. Framing theory. *Annu Rev Polit Sci* 2007; **10:** 103–26.

121 Kasperson RE, Renn O, Slovic P, et al. The social amplification of risk: a conceptual framework. *Risk Anal* 1988; **8:** 177–87.

122 Berrang-Ford L, Sietsma AJ, Callaghan M, et al. Systematic mapping of global research on climate and health: a machine learning review. *Lancet Planet Health* 2021; **5:** e514–25.

123 Callaghan M, Schleussner C-F, Nath S, et al. Machine-learning-based evidence and attribution mapping of 100,000 climate impact studies. *Nat Clim Chang* 2021; **11:** 966–72.

124 John P, Bertelli A, Jennings W, Bevan S. Public opinion and the policy agenda. In: Policy agendas in British politics. Comparative studies of political agendas series. Palgrave Macmillan, 2013: 130–52.

125 Walgrave S, Soontjens K, Sevenans J. The impact of public opinion on political action. Oxford: Oxford University Press, 2022.

126 Nisbet MC. Communicating climate change: why frames matter for public engagement. *Environment* 2009; **51:** 12–23.

127 Cody EM, Reagan AJ, Mitchell L, Dodds PS, Danforth CM. Climate change sentiment on Twitter: an unsolicited public opinion poll. *PLoS One* 2015; **10:** e0136092.

128 Sanford M, Painter J, Yasseri T, Lorimer J. Controversy around climate change reports: a case study of Twitter responses to the 2019 IPCC report on land. *Clim Change* 2021; **167:** 59.

129 Tsebelis G, Kalandrakis A. The European parliament and environmental legislation: the case of chemicals. *Eur J Polit Res* 1999; **36:** 119–54.

130 Neuhold C. The 'legislative backbone' keeping the institution upright? The role of European Parliament Committees in the EU policy-making process. *SSRN* 2001; **5:** 302785.

131 Erfort C, Stoetzer LF, Klüver H. The PARTYPRESS database: a new comparative database of parties' press releases. *Research & Politics* 2023; **10**: 20531680231183512.

132 Dickson ZP, Hobolt SB. Going against the grain: climate change as a wedge issue for the radical right. *Comp Polit Stud* 2025; **58:** 1733–59.

133 Kingdon JW. Agendas, alternatives, and public policies, 2nd edn. New York: HarperCollins, 1995.

134 Voegtlin C, Pless NM. Global governance: CSR and the role of the UN global compact. *J Bus Ethics* 2014; **122:** 179–91.

135 Podrecca M, Sartor M, Nassimbeni G. United Nations global compact: where are we going? *Soc Responsib J* 2022; **18:** 984–1003.

136 Dasandi N, Graham H, Hudson D, Jankin S, vanHeerde-Hudson J, Watts N. Positive, global, and health or environment framing bolsters public support for climate policies. *Commun Earth Environ* 2022; **3:** 239.

137 Kotcher J, Maibach E, Miller J, et al. Views of health professionals on climate change and health: a multinational survey study. *Lancet Planet Health* 2021; **5:** e316–23.

138 Phelan AL, Patterson D, Tahzib F, et al. Collective action and legal mobilisation for the right to health in the climate crisis. *Lancet* 2024; **403:** 2272–74.

139 Toolan N, Marcus H, Hanna EG, Wannous C. Legal implications of the climate-health crisis: a case study analysis of the role of public health in climate litigation. *PLoS One* 2022; **17:** e0268633.

140 Hesselman M. Climate change as a global health threat in international climate law and human rights law. In: Toebes BCA, Beyer MA, Perehudoff SK, et al. Global health law disrupted: COVID-19 and the climate crisis. *TMC Asser Press* 2021; 91–128.

141 European Environmental Agency. Social fairness in preparing for climate change: how just resilience can benefit communities across Europe. June 10, 2025. https://www.eea.europa.eu/en/analysis/publications/social-fairness-in-preparing-for-climate-change-how-resilience-can-benefit-communities-across-europe (accessed March 25, 2026).

142 European Environment Agency. 2.3 Trends in the energy system. Sept 28, 2025. https://www.eea.europa.eu/en/europe-environment-2025/thematic-briefings/climate-change/trends-in-the-energy-system (accessed Jan 18, 2026).

143 Climate Action Network Europe. Fossil fuel subsidies and the European Semester progress or regression? Dec 23, 2024. https://caneurope.org/content/uploads/2024/12/Fossil-fuel-subsidies_European-Semester.pdf (accessed March 25, 2026).

144 Liverpool L. These veteran female activists are fighting a pivotal climate case with science. Nature. Aug 24, 2023. https://www.nature.com/articles/d41586-023-02633-2 (accessed March 25, 2026).

145 Nill J. Fossil fuel subsidies in EU member states – trends and analytical challenges. European Commission. Dec 16, 2024. https://economy-finance.ec.europa.eu/publications/fossil-fuel-subsidies-eu-member-states-trends-and-analytical-challenges_en (accessed June 17, 2025).

146 Hesselman M, Patterson DW, Phelan AL, Meier BM, Tahzib F, Gostin LO. Ensuring health at the heart of climate change Advisory Opinion. *Lancet* 2025; **405:** 178–81.