Arouk N. Too Hot to Handle: The Urgent Need for an EU-wide Heat-health Strategy. JGPOH 2025, posted: 08.05.2025. DOI: 10.61034/JGPOH-2025-09

Original Research

Too Hot to Handle: The Urgent Need for an EU-wide Heat-health Strategy

Nawwar Arouk[1]; Katharina Fritsch[1]; Elke Gijsen[1]; Astghik Baghinyan[1]; Carlo Dernini[1]; Marvin Nowack[1]; Vincent Niger[1], Issam Alsamara[1]

1 Department of International Health, Care and Public Health Research Institute (CAPHRI), Maastricht University, Maastricht, Netherlands

Recommended citation:
Arouk, N., et al. Too Hot to Handle: The Urgent Need for an EU-wide Heat Health Strategy. JGPOH 2024. DOI: 10.61034/JGPOH-2025-09, Website: https://jgpoh.com/

Corresponding author: Nawar Arouk
Faculty of Health, Medicine and Life Sciences, Maastricht University
Address: Tradgardsgatan 10, 58227, Linkoping, Sweden
Phone: +46729066296
Email: Nawwar.arrouk@gmail.com

Abstract

Context

Heatwaves are increasingly frequent and severe due to climate change, posing multidimensional threats to human, animal, and environmental health. In Europe, extreme heat has caused health crises, economic strain, and ecosystem damage, with the summer of 2023 illustrating the urgent need for coordinated responses. The current challenges include rising mortality, overwhelmed healthcare systems, strained infrastructure, and agricultural losses, highlighting the necessity for immediate and comprehensive policy interventions.

Identified Gaps

Our analysis revealed three critical gaps in current policies addressing heatwaves within the EU: 1. Lack of integration of the One Health approach: Policies fail to address the interconnected impacts on human, animal, and environmental health. 2. Insufficient multilevel governance: Fragmented responses and the absence of standardised Heat Health Action Plans (HHAPs) limit effective mitigation. 3. Limited cross-border collaboration: Heatwaves' transboundary nature demands better proactive planning and coordinated mechanisms across EU Member States.

Policy Options and Recommendations

This advocacy brief calls for the development and implementation of a comprehensive EU-wide Heat-Health Strategy, designed to address the increasing threat of heatwaves through a unified, collaborative and proactive approach. Key recommendations are 1. Encourage the adoption of national HHAPs grounded in One Health principles, 2. Strengthen early warning systems and health risk mapping, 3. Foster cross-border collaborations for better resource-sharing and adaptation strategies.

Keywords: Heatwaves, Heat-health, Heat-health Action Plans, European Union, One health, climate change.

Conflict of interests: We the authors declare no conflicts of interest.
Financial disclosure: None declared.
Ethics statement: Not applicable.
Data availability: All relevant data are within the paper and the supporting documents.
Author's contributions: All authors contributed equally.

Acknowledgements: We sincerely thank our supervisor, Issam Alsamara, for his invaluable advice and guidance on One Health governance and heatwaves, which were crucial in shaping this policy brief. Our gratitude also goes to Katarzyna Czabanowska and Martina Parić for their dedication and support greatly influencing this project.

Rationale for Action

Global Impact of Heatwaves: A One Health Perspective

Heatwaves have emerged as one of the most urgent and tangible signs of climate change, increasing in frequency and intensity at unprecedented rates worldwide. They drive record-breaking temperatures, amplify drought, fuel catastrophic wildfires, and deplete biodiversity, all while destabilising water sources, ecosystems, and food systems (1). These cascading impacts disrupt the delicate balance of our interconnected systems, threatening human health, food security, and biodiversity alike. From escalating heat-related deaths to surging food insecurity, zoonotic disease spillovers, and mass climate migration, heatwaves have become a pressing global reality (1). Addressing this crisis demands immediate action to mitigate current effects and strengthen resilience against an intensifying climate.

Heatwaves in Europe: An Urgent Threat

Europe faces a growing crisis, with the summer of 2023 delivering robust evidence of extreme heat risks across the continent. Record-breaking temperatures and pervasive heat stress swept through Europe, severely impacting public health and placing vulnerable populations, particularly the elderly and those with pre-existing health conditions, in life-threatening conditions (2). In July alone, nearly half of southern Europe was immersed in extreme heat, with Spain and Italy enduring several weeks of consecutive burning temperatures (3). Such prolonged exposure has led to widespread health crises, with countries like Greece and France reporting thousands of excess deaths and overwhelmed healthcare services (2).

The stress on Europe's infrastructure is equally severe. Energy grids are struggling to cope with unprecedented demand for cooling, causing widespread blackouts and disrupting essential services (4). Meanwhile, the agricultural sector faces severe losses as heatwaves damage crops, destabilising food supplies and inflating food prices, a phenomenon now dubbed 'heatflation' (5). Across Member States (MS), rising food costs are threatening to strain economies and highlight vulnerabilities within Europe's food security framework. With wildfires destroying critical natural habitats and contributing to record-breaking wildfire seasons, the compounding crises from extreme heat expose the urgent need for a unified EU response (6). Without coordinated action, Europe risks deepening divides in health, security, and resilience, endangering the collective future of its citizens and ecosystems. These devastating, multidimensional impacts heatwaves cause are summarised in Figure 1 below.

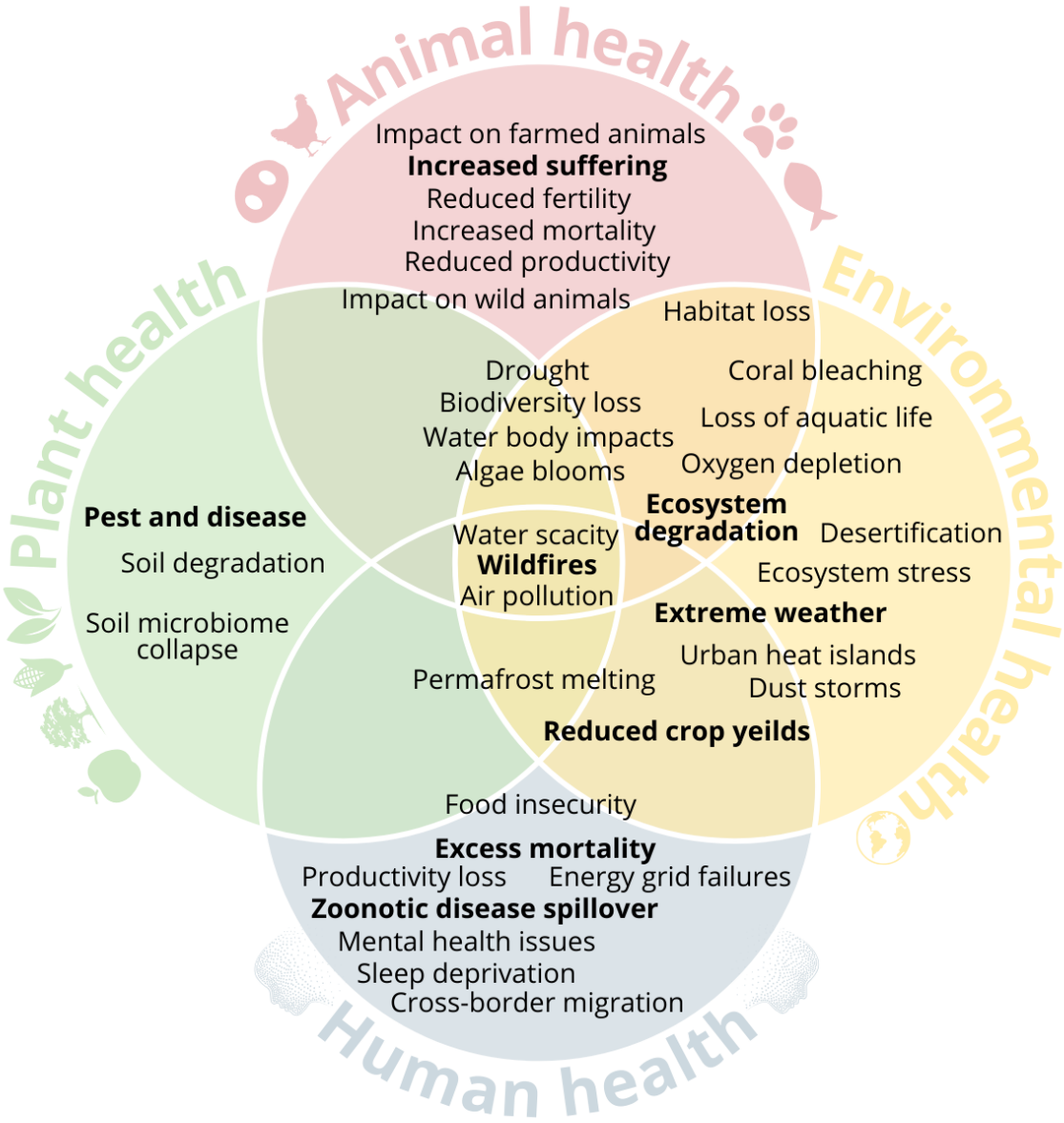


Figure 1. The impact of heatwaves on Human, Animal, Plant, and Environmental Health

Gaps in the Current Policy Approach

With the projected increase in the number of heatwaves over the next century (see Appendix B), prioritising climate resilience is crucial. While mortality rates from heatwaves have decreased in recent years due to improved public health prevention efforts, these successes reveal a paradox: current strategies, though effective in saving lives, fail to address the broader, multidimensional challenges heatwaves pose (7). Three critical gaps, described in the next section, continue to hinder comprehensive heatwave management in Europe (see Figure 2).

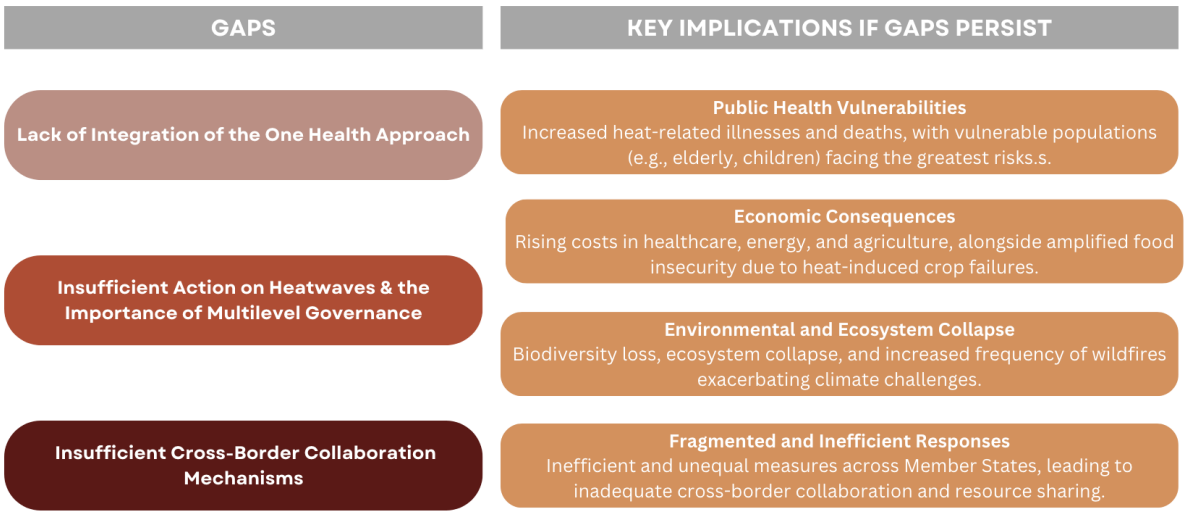


Figure 2. Conceptual Framework: Identified Policy Gaps in Addressing Heatwave Risks in the European Union and Key Implications.

Gap 1: Lack of Integration of the One Health Approach

Heatwaves, as an escalating climate challenge, impact human, animal, and environmental health in interconnected ways. Humans face heat stress, cardiovascular strain, and increased morbidity; animals suffer from livestock mortality and ecosystems endure biodiversity and crop loss, wildfires, and weakened natural cooling capacities (7–9). Despite these clear interdependencies, current heatwave-related policies lack the integration of a One Health approach, which recognises the interconnectedness of these sectors (see Box 1). The principles of One Health - equity, socio-political parity, socio-ecological equilibrium, stewardship, and transdisciplinarity - offer a critical framework for addressing the systemic challenges posed by heatwaves (10).

Box 1: *One Health Definition*

> "One Health is an integrated, unifying approach that aims to sustainably balance and optimise the health of people, animals, and ecosystems. It inherently recognises that the health of humans, domestic and wild animals, plants, and the wider environment (including ecosystems) are closely linked and interdependent." (10).

The recently published Scientific Opinion by the European Commission highlights that addressing complex health threats, such as heatwaves, requires cross-sectoral collaboration and governance structures that extend beyond traditional policy silos (10). Current policy frameworks tend to focus on isolated sectors and aspects of heatwaves, leaving significant gaps

in how human, animal, and environmental health systems interact and respond to heatwaves (see Appendix A).

Without the integration of One Health principles, the EU's response to heatwaves risks being reactive, fragmented, and insufficiently equipped to address the impacts of climate change (11). Policy mapping revealed that while many policies addressing climate change and some specific to heatwaves exist, they fail to integrate One Health principles effectively, resulting in fragmented responses (see Appendix A). Bridging this gap requires embedding One Health into existing EU policies and prioritising interdisciplinary governance frameworks (10). This gap highlights the critical need for a paradigm shift in EU heatwave mitigation, moving from siloed approaches to a comprehensive European Heat Health Strategy that strengthens collaboration and enhances resilience across all sectors.

Gap 2: Insufficient Recognition and Targeted Action on Heatwaves and the Importance of Multilevel Governance

Despite the growing severity of heatwaves, they remain neglected in EU-level policies and uncoordinated at national levels. According to the European Environment Agency (12) there is an urgent need for coordinated action across all governance levels, especially because societal preparedness is failing to keep pace with rising heat-related threats.

Heat Health Action Plans (HHAPs), implemented in various forms across Europe, have demonstrated their value in mitigating heatwaves' impact (13). The goals of the HHAPs are to mitigate the impact of heatwaves through cross-sectoral collaboration, early warning systems, actions to prevent the effects of the heat, effective communication, and governance structures to implement the programs (14). According to the visual map provided by the European Climate and Health Observatory, while most EU countries have national HHAPs, few countries have them only at a regional/local level such as Greece, Bulgaria, Lithuania, and Czechia (14). Additionally, several countries, including Denmark, Poland, and Estonia, do not have either national or regional plans in place.

Even though the goals are the same across the countries in the EU, all HHAPs are unique to each country, or even to a local region within the country (13,15). HHAPs do, however, share common characteristics and could benefit from a standardised framework to help better prepare for emergencies. For example, Vanderplanken et al. (15) identified gaps in the governance aspect of HHAPs through a qualitative study and identified certain best practices for a more structured approach. They found that countries that had multilevel governance responses were able to provide timely support in times of heatwaves and avoid duplicate actions in contrast to those that lacked it. Similarly, other best practices include the involvement of stakeholders from various disciplines in collaborative governance.

Historically, the southern regions of the EU have been more intensely impacted by heatwaves in the EU than the northern countries such as Germany and the Netherlands (16). This further calls for increased collaboration and knowledge-sharing, especially from the countries with

more practice and knowledge, to ensure better heat-health preparedness across the continent amid the rising trends (see Appendix B).

This is also highlighted in Regulation (EU) 2021/1119 (17) where it is mentioned that the MS must establish "multilevel climate and energy dialogues," which must involve all relevant stakeholders. These multilevel collaborations can enhance the governance structures, facilitating knowledge-sharing and supporting the development and implementation of standardised frameworks for HHAPs, ensuring a more coordinated and effective response to heatwave-related health risks across the EU.

Gap 3: Insufficient Cross-Border Collaboration Mechanisms

Article 168 of the Treaty on the Functioning of the European Union (TFEU) provides the legal basis for EU action on public health, allowing the EU to support MS in combating serious cross-border health threats (18). Heatwaves do not adhere to national borders, indiscriminately affect MS of the different EU regions and thus should be recognised as a serious threat to health. While some mechanisms for cross-border collaboration exist, they primarily focus on emergency response. Although this is valuable, heatwaves necessitate proactive planning and collaboration to address their long-term and transboundary impacts effectively.

Existing frameworks provide a foundation for such collaboration, yet their potential remains underutilised for heatwave-specific challenges (see Appendix A). Examples are the Regulation (EU) 2022/2371 on serious cross-border threats to health (19) and the EU Civil Protection Mechanism, RescEU (20); neither mechanism explicitly addresses the unique and evolving challenges of heatwaves. Regulation (EU) 2022/2371 (19) lacks specific recognition of heatwaves as serious environmental threats to health, while rescEU's focus on sudden disasters limits its capacity to support the proactive (20), long-term strategies required to mitigate heatwave impacts effectively.

This gap in cross-border collaboration highlights a critical vulnerability in the EU's ability to respond to the increasing intensity and frequency of heatwaves. Without mechanisms explicitly designed for heatwave risks, the EU remains ill-equipped to manage the effects of this escalating threat.

Proposed Policy Options

The threat level and the impacts of heatwaves, faced by EU countries, are increasingly evident. While some MS have HHAPs, the capacity and commitment vary. Additionally, heatwaves do not adhere to borders, necessitating a coordinated approach to mitigating their effects. Various stakeholders within and beyond the EU play a key role in addressing climate resilience (see Appendix C). The EU is well positioned to support MS in developing and maintaining robust HHAP and enabling regional collaboration when necessary.

The proposed policy option is an EU-wide Heat-Health Strategy essential for a heat-resilient Europe. This strategy would promote cross-border collaboration and adopt a One Health

approach, addressing heatwaves' impact on humans, animals, and ecosystems. It should encourage MS to develop or revise their HHAPs while considering local contexts and varying risk levels. This dual approach strengthens resilience and mitigates the far-reaching impacts of heatwaves across Europe. Specific recommendations for the strategy are outlined below.

Policy Recommendations

EU Heat-Health strategy

To address the current lack of policy focus on heatwaves in existing legislation, we recommend the EU to develop a strategy by providing the MS with guidelines for HHAPs on a national level. This strategy should promote a One Health approach and encourage cross-border collaboration to ensure coordinated action across MS in mitigating the health risks of heatwaves and adapting to their impacts (see Figure 3).

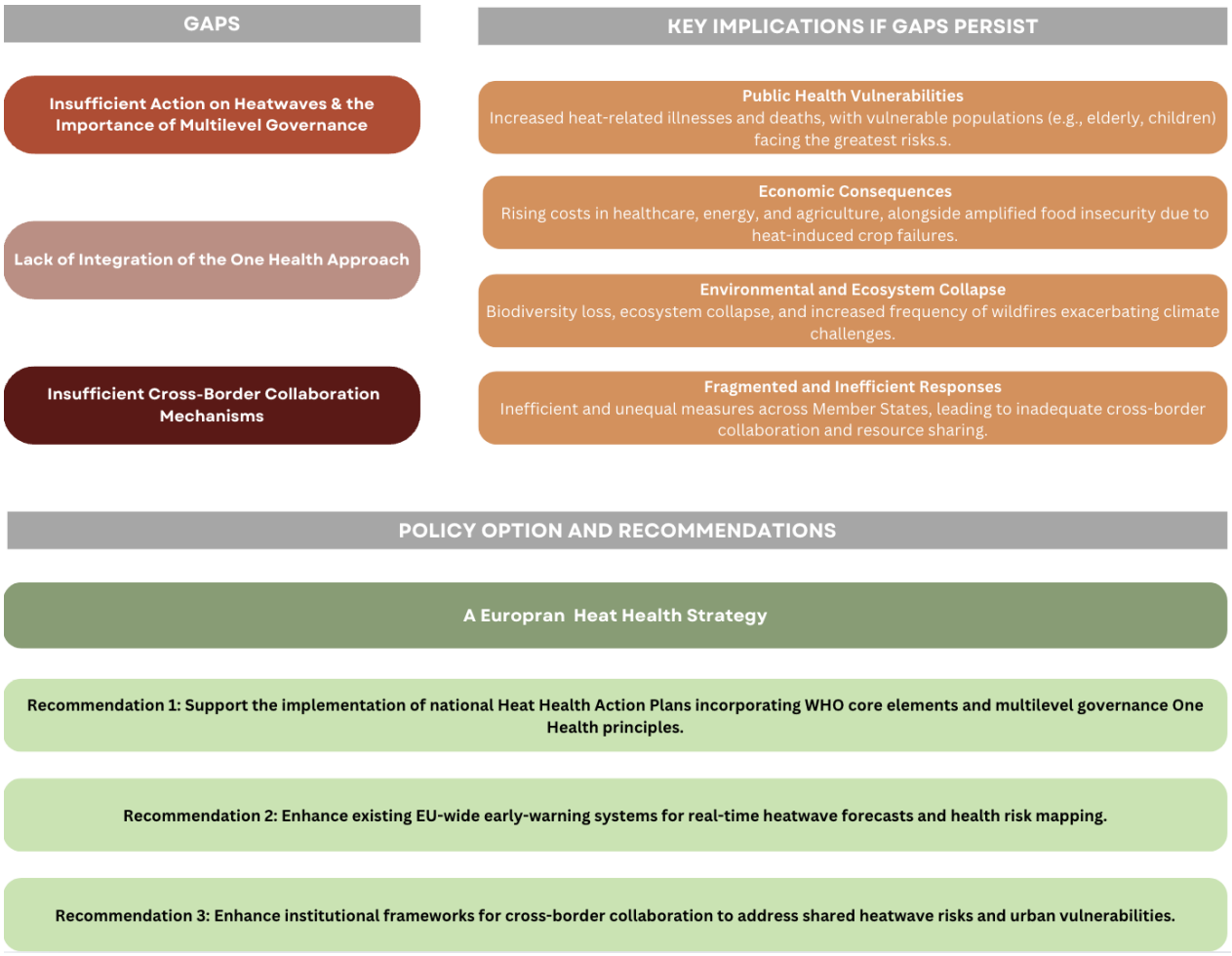


Figure 3. Conceptual Framework: Identified Policy Gaps in Addressing Heatwave Risks in the European Union, Key Implications, and Strategic Recommendations.

Recommendation 1: Support the Implementation of National Heat Health Action Plans Incorporating WHO Core Elements and Multilevel Governance One Health Principles

To address the need for effective HHAPs, we recommend that the EU encourages and supports the MS in developing national HHAPs. National HHAPs should adopt a multilevel governance approach to address local needs and vulnerabilities effectively. MS are encouraged to incorporate a One Health approach, integrate the WHO's (9) core elements for heat health action planning, leverage existing systems, and adopt a long-term intersectoral strategy (see Box 2). The EU should play a vital role in facilitating these efforts by providing support, for instance by establishing funding opportunities to assist MS in developing their HHAPs.

One Health Principles

We strongly recommend incorporating One Health principles into heat health action planning. Animal welfare should be included in HHAP by establishing, for instance, clear guidelines for farmers and livestock management during heatwaves, such as ensuring adequate shade, ventilation, and access to water for all animals. At the same time, specific regulations on animal transport should be enforced, including stricter temperature controls, journey limits, and handler training during heatwaves, to mitigate heat stress and dehydration. Additionally, the HHAPs should incorporate nature-based solutions, such as urban greening, wetland restoration, and sustainable agriculture.

Box 2: *WHO core elements for heat health action planning* (9).

WHO identified eight core elements for heat health action planning to enhance implementation success:

1. Agreement on a lead body
2. Accurate and timely alert systems
3. A heat-related health information plan
4. A reduction in indoor heat exposure
5. Particular care for vulnerable population groups
6. Preparedness of the health and social care system
7. Long-term urban planning
8. Real-time surveillance and evaluation

Intersectoral collaboration

To incorporate One Health principles and multi-level governance, we recommend intersectoral collaboration between health, environmental, and social services, supported by political commitment and adequate resources. This should be guided by the "One Health Governance" document from the GCSA (10) and informed by data on the economic benefits of heat-health interventions to improve decision-making, monitoring, and evaluation across MS (21).

Evaluation and monitoring

We recommend that the EU prioritises the regular evaluation of HHAPs to ensure they remain effective in the face of changing climate conditions. Given the evolving nature of heatwave risks and the impact of climate change, HHAPS must be continuously assessed and updated to stay relevant and effective in protecting public health.

Recommendation 2: Enhance Existing EU-wide Early Warning Systems for Real-Time Heatwave Forecasts and Health Risk Mapping

We recommend that the EU strengthening existing early warning systems (EWS), such as the Copernicus Emergency Management Service (CEMS) and MeteoAlarm, to address heatwave-related health risks. This can be achieved by enhancing real-time data, heatwave forecasts and health risk mapping. Both systems monitor climate-related hazards. However, they could be improved by integrating health risk mapping and forecasting for heatwaves. While they address heat events, their focus on heat health risks is less specific than on other weather-related events like floods or storms. A centralised data repository, building on systems like the Joint Research Centre tools, should be integrated for seamless access to up-to-date heat risk data across MS, ensuring coordinated interventions and eliminating gaps in response (22,23).

Recommendation 3: Enhance Institutional Frameworks for Cross-Border Collaboration to Address Shared Heatwave Risks and Urban Vulnerabilities

We recommend that the EU heat-health strategy prioritise cross-border collaboration, as heatwaves do not respect national borders, and such cooperation would enhance Europe's resilience to this growing threat. Cross-border initiatives can drive research on the health impacts of extreme heat, standardise data collection, and improve early warning systems across the EU (24). To support this, an EU-wide heat-health solidarity fund should be established to assist regions with fewer resources. Additionally, research partnerships should focus on the health impacts of heatwaves, vulnerable populations, and the socioeconomic effects of extreme heat, with an emphasis on adaptation strategies for border regions and densely populated urban areas. Building on Climate-ADAPT, a knowledge-sharing platform should be created as a centralised hub for case studies, best practices, policy recommendations, and adaptation plans, with a dedicated heat-health section to streamline access to the most relevant resources for all MS.

Institutional frameworks

We strongly recommend that countries sharing cross-border regions establish institutional frameworks, such as networks, organisations, or legal entities, to take responsibility for fostering collaboration and coordination between these regions on heat-health issues (see Box 3).

Box 3: *Best practice cross border-collaboration*

The Climate-ADAPT platform, an EU initiative launched by the European Environment Agency (EEA) and the European Commission, serves as a key example of successful cross-border collaboration for climate adaptation. Climate-ADAPT offers a centralised platform for sharing data, policy frameworks, adaptation case studies, and scientific knowledge relevant to climate change. By making these resources widely accessible, Climate-ADAPT allows MS to benefit from each other's experiences and insights, which can then be adapted to local contexts. This platform has proven effective in facilitating cross-border partnerships, developing early-warning systems, and harmonising climate action strategies across Europe (12).

Conclusion

Heatwaves represent an escalating global challenge that profoundly impacts human, animal, plant, and environmental health. Addressing this crisis demands an urgent, unified, and proactive approach. Our analysis showed fragmented responses to heatwaves, insufficient attention to their impacts on animal and environmental health, and limited cross-border collaboration across EU MS. The EU can strengthen multilevel governance and foster effective cross-border collaboration by implementing an EU-wide Heat-Health Strategy that integrates One Health principles and evidence-based best practices. Such decisive action is critical to protect vulnerable populations and ecosystems and mitigate economic and ecological losses, ensuring equitable preparedness across MS and securing a sustainable future for all.

References

1. World Health Organization. Heat and health [Internet]. Available from: https://www.who.int/news-room/fact-sheets/detail/climate-change-heat-and-health

2. Prevention Web. Heat caused over 47,000 deaths in Europe in 2023, the second highest burden of the last decade [Internet]. 2024 [cited 2024 Nov 10]. Available from: https://www.preventionweb.net/news/heat-caused-over-47000-deaths-europe-2023-second-highest-burden-last-decade

3. Copernicus. Copernicus Emergency Management Service (CEMS) [Internet]. 2023 [cited 2024 Nov 10]. Available from: https://www.copernicus.eu/en/copernicus-services/emergency

4. Hernández-Morales A. Cities fight to keep the lights on in extreme weather events [Internet]. 2023 [cited 2024 Nov 15]. Available from: https://www.politico.eu/article/europe-cities-fight-keep-lights-on-extreme-weather-climate-crisis-energy-blackout/

5. York J. Heatflation: How high temperatures drive up food prices [Internet]. 2022 [cited 2024 Nov 12]. Available from: https://www.france24.com/en/europe/20220721-heatflation-how-high-temperatures-drive-up-food-prices

6. Ritchie H. How many people die from extreme temperatures, and how this could change in the future: Part two [Internet]. 2024 [cited 2024 Nov 10]. Available from: https://ourworldindata.org/part-two-how-many-people-die-from-extreme-temperatures-and-how-could-this-change-in-the-future#article-citation

7. Vitali A, Felici A, Esposito S, Bernabucci U, Bertocchi L, Maresca C, et al. The effect of heat waves on dairy cow mortality. J Dairy Sci. 2015;98(7):4572–9.

8. West F. How do heatwaves affect wildlife? [Internet]. 2022 [cited 2024 Nov 13]. Available from: https://www.woodlandtrust.org.uk/blog/2022/08/how-heatwaves-affect-wildlife/

9. World Health Organization. Planning heat-health action [Internet]. 2024 [cited 2024 Nov 12]. Available from: https://www.who.int/europe/activities/planning-heat-health-action

10. European Commission. One Health Governance in the European Union [Internet]. LU: Publications Office; 2024 [cited 2024 Dec 5]. Available from: https://data.europa.eu/doi/10.2777/8697309

11. Bishen S. How One Health can help ease climate-driven health crises [Internet]. 2024 [cited 2024 Nov 15]. Available from: https://www.weforum.org/stories/2024/07/one-health-can-help-ease-climate-driven-health-crises/

12. European Environment Agency. European climate risk assessment: executive summary [Internet]. LU: Publications Office; 2024 [cited 2024 Dec 6]. Available from: https://data.europa.eu/doi/10.2800/204249

13. Climate-ADAPT. Heat Health Action Plans [Internet]. 2019. Available from: https://climate-adapt.eea.europa.eu/en/metadata/adaptation-options/heat-health-action-plans

14. Climate-ADAPT. National Heat-Health Warning Systems and Action Plans [Internet]. 2024. Available from: https://climate-adapt.eea.europa.eu/en/observatory/evidence/national-and-sub-national-warning-systems

15. Vanderplanken K, Van Den Hazel P, Marx M, et al. Governing heatwaves in Europe: comparing health policy and practices. Health Res Policy Syst. 2021;19(1):20.

16. Kovats RS, Kristie LE. Heatwaves and public health in Europe. *Eur J Public Health*. 2006;16(6):592–9.

17. Official Journal of the European Union. Regulation (EU) No 2021/1119 of the European Parliament and of the Council of 30 June 2021 establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 ('European Climate Law') [Internet]. 2021. Available from: https://eur-lex.europa.eu/eli/reg/2021/1119/oj

18. European Union. Consolidated versions of the Treaty on European Union and the Treaty on the Functioning of the European Union: Charter of Fundamental Rights of the European Union [Internet]. LU: Publications Office; 2010 [cited 2024 Dec 6]. Available from: https://data.europa.eu/doi/10.2860/58644

19. Official Journal of the European Union. Regulation (EU) No 2022/2371 of the European Parliament and of the Council of 23 November 2022 on serious cross-border threats to health and repealing Decision No 1082/2013/EU [Internet]. 2022. Available from: https://eur-lex.europa.eu/eli/reg/2022/2371/oj

20. European Civil Protection and Humanitarian Aid Operations. rescEU [Internet]. 2024. Available from: https://civil-protection-humanitarian-aid.ec.europa.eu/what/civil-protection/resceu_en

21. Casanueva A, Burgstall A, Kotlarski S, Messeri A, Morabito M, Flouris AD, et al. Overview of existing heat-health warning systems in Europe. *Int J Environ Res Public Health*. 2019;16(15):2657.

22. Martinez GS, Linares C, Ayuso A, Kendrovski V, Boeckmann M, Diaz J. Heat-health action plans in Europe: Challenges ahead and how to tackle them. *Environ Res*. 2019;176:108548.

23. Bittner MI, Matthies EF, Dalbokova D, Menne B. Are European countries prepared for the next big heat wave? *Eur J Public Health*. 2014;24(4):615–9.

24. European Commission. The European Green Deal [Internet]. 2021 [cited 2024 Sep 24]. Available from: https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en

25. European Commission. Biodiversity strategy for 2030 [Internet]. 2024. Available from: https://environment.ec.europa.eu/strategy/biodiversity-strategy-2030_en

26. Official Journal of the European Union. Council Directive 98/58/EC of 20 July 1998 concerning the protection of animals kept for farming purposes [Internet]. 1998. Available from: https://eur-lex.europa.eu/eli/dir/1998/58/oj

27. Heat Shield Research Platform. Heat Shield Research Platform [Internet]. Available from: https://www.heat-shield.eu/

28. Official Journal of the European Union. Technical guidance on the climate proofing of infrastructure in the period 2021–2027 [Internet]. 2021. Available from: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52021XC0916(03)

29. Martinez GS, Kendrovski V, Salazar MA, de'Donato F, Boeckmann M. Heat-health action planning in the WHO European Region: Status and policy implications. *Environ Res*. 2022;214:113709.

30. GRID-Arendal. Projected extreme heatwaves: 2020-2052 [Internet]. 2015. Available from: https://www.grida.no/resources/7074

31. European Commission. EU Civil Protection Mechanism [Internet]. 2024 [cited 2025 Feb 10]. Available from: https://civil-protection-humanitarian-aid.ec.europa.eu/what/civil-protection/eu-civil-protection-mechanism_en

Appendix A. Policy Mapping Heatwave Action

Table I1.
Policy Mapping Heatwave Action

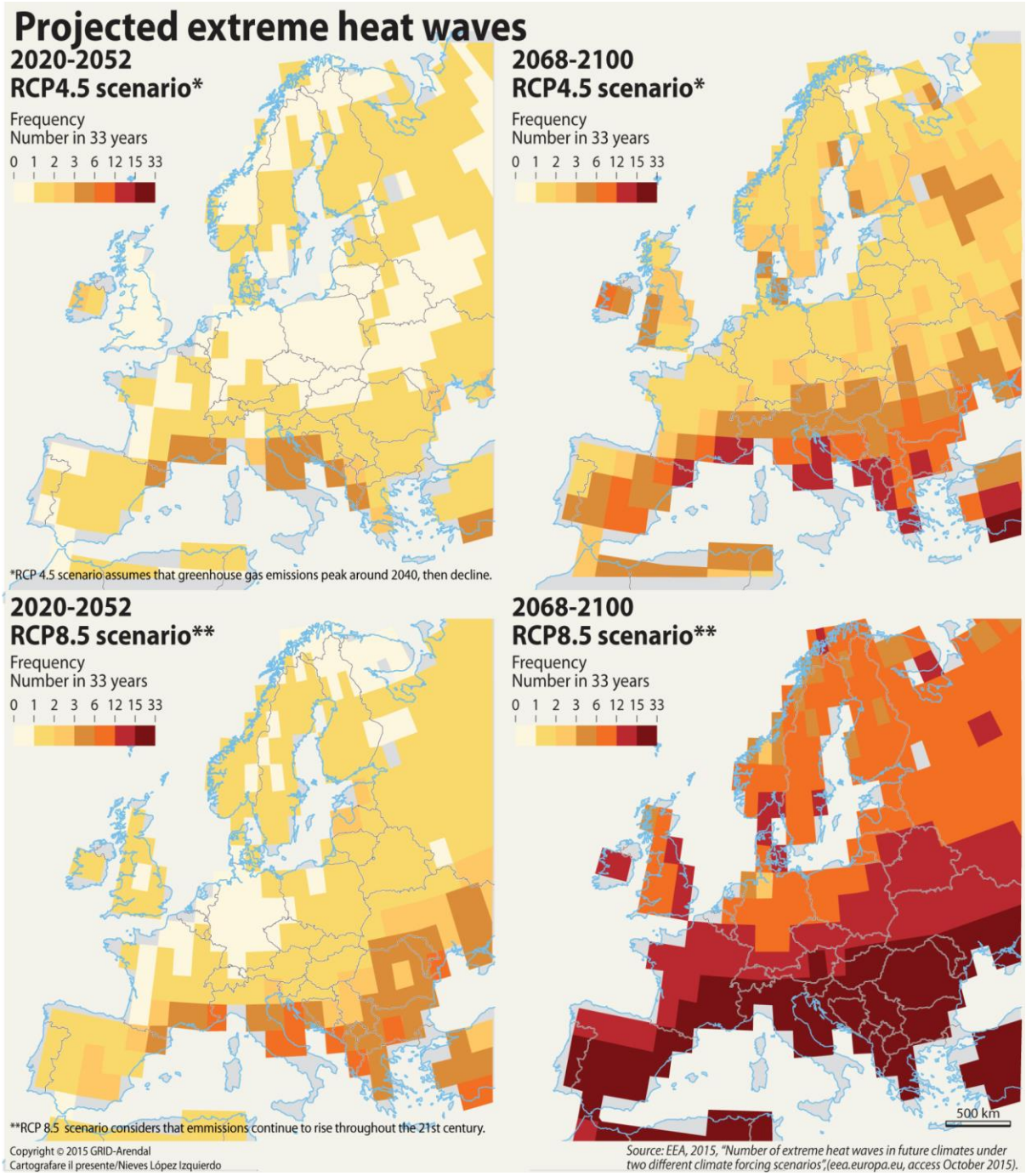
Policy/Mechanism	Focus/Scope	Gap	Impact
Regulation (EU) 2022/2371 on Serious Cross-Border Threats to Health (19)	Addresses cross-border public health threats, focusing on preparedness, response, and crisis management.	Mentions environmental threats but lacks specific provisions or tailored actions for heatwaves.	Closing this gap enables proactive, cross-border measures to mitigate health risks associated with extreme heat events.
European Union Civil Protection Mechanism (31)	Provides a framework for disaster response and mutual aid for acute crises, such as wildfires, floods, and earthquakes.	Lacks a preventive, long-term framework for addressing chronic threats like heatwaves.	Incorporating preventive measures and adaptations for heatwaves enhances resilience, reduces mortality, and eases health strain.
European Green Deal (24)	Aims to achieve climate neutrality by 2050 through interdisciplinary initiatives addressing climate, transport, and energy.	Does not include strategies for heatwave mitigation efforts.	Including heatwave resilience plans strengthens interdisciplinary impact, addressing health, ecosystems, and urban vulnerabilities.
European Climate Law (17)	Establishes a binding framework for climate neutrality by 2050, emphasising adaptation and mitigation.	Does not specifically mention heatwaves or tailored adaptation measures for heat-health.	Adding targeted provisions promotes resilience for humans, animals, and ecosystems facing rising temperatures.

Technical guidance on the climate proofing of infrastructure in the period 2021–2027 (28)	Provides guidelines for climate adaptation in infrastructure projects.	Does not include specific heat wave-related health guidelines.	Addressing this gap strengthens systems to protect vulnerable populations and improve health resilience during extreme heat.
WHO Heat-Health Action Plans (9)	Provides a framework for heat-health action planning, including risk assessments, early warnings, and public engagement.	Lacks guidance for cross-border integration of heat-health action plans, as well as a One Health approach to mitigating the effects of heatwaves.	Standardising responses with EU-wide strategies enhances preparedness, coordination, and health outcomes during extreme heat.
Animal Welfare Legislation (26)	Provides guidelines and regulations on the welfare of farm animals, including during transport	No specific requirements for managing rising temperatures or heat stress in farms and transport facilities.	Addressing this gap prevents heat-related animal suffering, maintaining ethical standards and reducing livestock mortality.
HEAT-SHIELD Research Platform (27)	Provides non-binding resources to protect workers from heat, including sector-specific guidelines and weather monitoring.	Lacks binding guidelines or incentives for adoption by all employers.	Establishing mandatory measures reduces heat-related health risks for workers and enhances resilience across sectors.
EU Biodiversity Strategy for 2030 (25)	A comprehensive strategy to protect nature and mitigate ecosystem degradation.	Limited focus on proactive strategies to protect ecosystems from heatwaves.	Strengthening heatwave-specific ecosystem strategies improves biodiversity resilience and prevents ecological collapse.

Appendix B. Projected heatwaves in Europe between 2020 and 2100

Figure II1.

Projected heatwaves in Europe between 2020 and 2100 (31).



Appendix C. Stakeholder Analysis

Table III1.
Stakeholder Mapping and Analysis

	Low interest	Medium interest	High interest
Low power		- Compassion in World Farming (CIWF) - RPP - FleishmanHillard - Burson Cohn & Wolfe - Caritas Europe - HelpAge International Migrants' Rights Network - European Federation of National Organisations Working with the Homeless (FEANTSA) - Red Cross EU Office	- Fridays for Future Europe - European Youth Forum
Medium power	- European Research Council (ERC)	- Joint Research Centre - Committee on Agriculture and Rural Development (AGRI) - Committee on Regional Development (REGI) - Ministries of Agriculture - European Centre for Disease Prevention and Control (ECDC) - European Climate Foundation (ECF) - Eurogroup for Animals - European Environmental Bureau (EEB) - Copa-Cogeca - European Dairy Association (EDA)	- DG CLIMA (Climate Action) - DG ENV (Environment) - European Climate and Health Observatory - European People's Party (EPP) - Progressive Alliance of Socialists and Democrats (S&D) - Renew Europe (RE) - Identity and Democracy (ID) - Climate-ADAPT - Ministries of Environment - Municipalities of particularly heat-affected regions - Urban planning bodies of these areas - European Environmental Agency (EEA) - European Climate, Infrastructure and Environment Executive Agency (CINEA) - WHO Europe - UNEP - UN Environment Programme - European Public Health Alliance (EPHA) - Health and Environment Alliance (HEAL) - Climate Action Network (CAN) Europe - Greenpeace - Friends of the Earth Europe - European Hospital and Healthcare Federation (HOPE) - Technical University of Munich (TUM) - London School of Hygiene & Tropical Medicine (LSHTM) - One Health EJP - European Federation of Building and Woodworkers (EFBWW) - European Federation of Food, Agriculture and Tourism Trade Unions (EFFAT)
High power	- DG MOVE (Transport) - DG GROW (Internal Market, Industry, Entrepreneurship and SMEs) - Ministries of Finance - Ministries of Defense - European Investment Bank (EIB) - OECD (Organisation for Economic Co-operation and Development) - RAND Europe	- European Commission Secretariat-General	- DG SANTE (Health and Food safety) - Committee on the Environment, Public Health and Food Safety (ENVI) - Greens/European Free Alliance (Greens/EFA) - European Parliament Intergroup on Climate Change, Biodiversity and Sustainable Development - Ministries of Health