

Urgent action is needed to protect human health from the increasing effects of climate change



The progression of climate change is increasingly recognised as a climate emergency by international advisory bodies and governments worldwide, and there are growing warnings that it will be accompanied by severe health consequences.¹⁻³ During the UN Climate Conference in June, 2019 the UN Climate Change Executive Secretary Patricia Espinosa, called for more ambitious and immediate climate action to meet Paris Agreement targets. The World Conference on Health and Climate Change, organised by the International Federation of Red Cross and Red Crescent Societies in conjunction with WHO in April, 2019, was an important step in bringing stakeholders together to discuss preparedness and adaptation measures. A combination of mitigation measures to reduce greenhouse gas emissions and adaptation measures to adjust to the unavoidable is needed to meet global health needs, particularly given that many mitigation measures also have substantial health co-benefits. The growing attention of decision-makers to the health aspects of climate change is welcome and needed, but the increasing political visibility requires robust evidence to inform urgently needed, meaningful, and sustainable policies without inadvertent consequences.

There is mounting evidence of negative consequences of climate change on human health, from both direct and indirect effects, mediated by ecosystems and socioeconomic systems. Direct risks arise from increases in temperature and in the severity and frequency of heatwaves, droughts, wildfires, floods, and other extreme weather events. Ecosystem-mediated risks are a result of changes in air pollution, allergen exposures, water availability and quality, food and nutrition security, and altered distributions of pathogens, vectors,^{1,4} and hosts of infectious diseases. Risks mediated by socioeconomic systems come from forced migration, damage to infrastructure and health services, the economic effects of declining labour productivity (eg, due to rising temperatures), and conflict. In addition to hazard-related injuries, the resultant health effects include diseases communicated by vectors, water, and food; non-communicable diseases, especially cardiovascular, cerebrovascular, and respiratory illnesses;

undernutrition; and violent injuries (arising, for example, from indirect effects of climate change on civil conflict or criminal activity) and death. In addition, there is increasing recognition of mental health consequences of climate change.⁵ The groups most vulnerable to climate change related health effects are children, older people, those who are sick, and migrating and marginalised populations.

The health effects of climate change are detectable now and risks will increase over time, linked to the magnitude of climate change. However, solutions are attainable, and there are major opportunities to improve public health. A compelling example illustrating the health co-benefits of mitigation is shown by Lelieveld and colleagues,⁶ who state that a phase out of fossil fuels would avoid approximately 3·6 million premature deaths per year globally from ambient air pollution at today's population. The global benefit could be up to 5·6 million fewer deaths per year from air pollution if emissions from agriculture and households were also controlled. The health co-benefits of reducing combustion of fossil fuels and agricultural emissions to mitigate climate change were also emphasised in recent statements by national academies of science and medicine.^{7,8}

The recent report from the European Academies' Science Advisory Council (EASAC)¹ focuses on climate change effects on health in the EU but recognises that climate change effects in other regions have tangible consequences for Europe, and that the EU has roles and responsibilities in addressing problems outside Europe. The health risks from climate change originate from a wide range of interconnected causes and consequences, and therefore require broad policy consideration. For example, prolonged heatwaves might result not only in heat-related illnesses and deaths, but also in droughts affecting food and nutrition security, and wildfires causing air pollution. Therefore, there must be explicit consideration of health effects in all policies, ranging from climate change adaptation and mitigation strategies to the development of climate-smart food systems, urban planning, and new options for energy production and

Panel: The European Academies' Science Advisory Council (EASAC) policy recommendations for climate change in relation to human health

On the basis of detailed evaluation of a broad range of scientific evidence with a focus on Europe, the EASAC policy advisory report¹ reaffirms as an overarching recommendation that the top priority is to urgently stabilise the climate and to increase efforts to limit greenhouse gas emissions, with the aim of achieving a zero-carbon economy before 2050. EASAC's recommendations relating to human health can be summarised as follows.

Health in all policies

Make the best use of current evidence to develop coherent and coordinated EU policy frameworks that include benefits to health as a major consideration in adaptation and mitigation actions, including the following:

- Reform of the EU Adaptation Strategy to increase focus on health consequences of climate change
- Health impact assessment to be integrated into all climate change adaptation and mitigation strategies
- Development of healthy, climate-smart food systems, with corresponding modifications of the Common Agricultural Policy
- Development and promotion of dietary guidelines for sustainable healthy diets, including consideration of when and, if so, how the EU and Member States should use health or environmental criteria, or both, to influence food system policies
- Linkage of climate change and health objectives into all key EU domestic policies—eg, for reducing air pollution, and neighbouring country and international development policy initiatives
- Strengthen links between EU climate and health policies together with promoting similar policy links with global organisations including WHO, G7 and G20, and with collective action on the Sustainable Development Goals and the United Nations Framework Convention on Climate Change. Health considerations should be integrated into the implementation of Nationally Determined Contributions under the Paris Climate Agreement.

Fill knowledge gaps through research and integration of data sets

Alongside continued commitment to basic research, further research is needed to characterise alternative scenarios, tipping points, and effective adaptation and mitigation strategies, in addition to improved surveillance and linkage between environmental, socioeconomic, and health data.

Health-risk communication

Raise awareness of current and potential effects of climate change on health. The scientific community must do more to understand individual and institutional behaviour, counter misinformation and polarisation, and strengthen the response of health services and EU agencies.

transport, and must be linked with the EU's and other (eg, G7 and G20) global policies (panel).

The necessary policy changes need to be informed by research that integrates environmental, socioeconomic, and health data. A major priority for future research should be the quantification of the evidence for effectiveness of mitigation and adaptation actions, including health-impact assessments, to inform necessary policy changes. For example, cities will be affected more than rural areas by some aspects of climate change (eg, high temperatures due to the

heat-island effect, spread of diseases due to high population densities, and threatened water supplies) and must increasingly implement reforms (eg, to reduce greenhouse gas emissions, air pollution, and energy and water demand). However, the efficacy of such strategies, why they work, and under what conditions remain poorly understood and require systematic analysis, capitalising on the availability of new evaluation methods.⁹ We note also the importance of instituting early warning systems—eg, for the spread of infectious disease, extreme weather events, heat, cold, and air pollution, but how effective these systems are in adaptation to climate change is unclear. Early warning systems have high intersectoral relevance, because they not only improve public health but also lower the costs caused by reductions in travel and work performance, and therefore economic output, during pandemics or heatwaves. There is a need to make better use of the evidence already available and to fill knowledge gaps. Transdisciplinary integration of effective adaptation and mitigation strategies in system design and data evaluation is required to identify synergies, unintended consequences, and trade-offs, and to achieve the multifactorial strategies necessary to respond to, and prepare for, climate change.

Bringing evidence together will reveal new opportunities to inform action at national and regional levels, to reduce the risks to health, and to gain multiple benefits to health from zero-carbon policies to ensure the wellbeing of current populations without compromising the health of future generations. The recommended rapid and decisive actions described in the EASAC report¹ (panel) are of core value in tackling multiple Sustainable Development Goals. Until now, the effects of climate change on human health have been relatively neglected in EU policy. The EASAC report welcomes the growing commitment by the European Commission to raise the visibility of problems caused by climate change. But there are still policy disconnects to resolve. We particularly emphasise that a continuing uncertainty on what is an EU-level or what is country-level responsibility on health must not be an obstacle to the urgent action required by all.

The scientific community must do more to raise awareness of current and potential effects of climate change on health, to understand individual and institutional behaviour, to counter misinformation

and polarisation, and to strengthen the response of health services and EU agencies. EASAC will support action to extend assessment of climate change effects on health to particularly vulnerable territories such as the Arctic region and the Mediterranean. In addition, through the work of the InterAcademy Partnership, the global network of academies of science, medicine, and engineering, EASAC will stimulate further assessment and action worldwide.

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- 1 European Academies' Science Advisory Council. The imperative of climate action to protect human health in Europe. 2019. <https://easac.eu/publications/details/the-imperative-of-climate-action-to-protect-human-health-in-europe/> (accessed July 1, 2019).
- 2 Haines A, Ebi K. The imperative for climate action to protect health. *N Engl J Med* 2019; **380**: 263–73.
- 3 Solomon CG, LaRocque RC. Climate change – a health emergency. *N Engl J Med* 2019; **380**: 209–11.
- 4 Ryan SJ, Carlson CJ, Mordecai EA, Johnson LR. Global expansion and redistribution of *Aedes*-borne virus transmission risk with climate change. *PLoS Negl Trop Dis* 2019; **13**: e0007213.
- 5 Hayes K, Bleshki G, Wiseman J, Burke S, Reifals L. Climate change and mental health: risks, impacts and priority actions. *Int J Ment Health Syst* 2018; **12**: 28.
- 6 Lelieveld J, Klingmuller K, Burnett RT, et al. Effects of fossil fuel and total anthropogenic emission removal on public health and climate. *Proc Natl Acad Sci USA* 2019; **9**: 7192–97.
- 7 German National Academy of Sciences Leopoldina. Saubere luft – stickstoffoxide und feinstaub in der atemluft: grundlagen und empfehlungen. 2019. <https://www.leopoldina.org/publikationen/detailansicht/publication/saubere-luft-stickstoffoxide-und-feinstaub-in-der-atemluft-grundlagen-und-empfehlungen-2019/> (accessed July 1, 2019)
- 8 Academy of Science of South Africa, Brazilian Academy of Sciences, German National Academy of Sciences Leopoldina, U.S. National Academy of Medicine, U.S. National Academy of Sciences. Air pollution and health. A science-policy initiative. 2019. <https://www.leopoldina.org/en/publications/detailview/publication/air-pollution-and-health-2019/> (accessed July 1, 2019)
- 9 Lamb WF, Creutzig F, Callaghan MW, Minx JC. Learning about urban climate solutions from case studies. *Nat Clim Chang* 2019; **9**: 279–87.

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