The 2025 Report of the Lancet Countdown on Health and Climate Change

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List of Abbreviations

A&RCC – Adaptation & Resilience to Climate Change

AC – Air Conditioning

CDP – Carbon Disclosure Project

CFU – Climate Funds Update

CO_2 – Carbon Dioxide

CO_2e – Carbon Dioxide Equivalent

COP – Conference of the Parties

ECMWF – European Centre for Medium-Range Weather Forecasts

EE MRIO – Environmentally-Extended Multi-Region Input-Output

EH – Extreme Heat

EJ – Exajoule

EM-DAT – Emergency Events Database

ERA – European Centre for Medium-Range Weather Forecasts Reanalysis products

ETS – Emissions Trading System

EU – European Union

FAO – Food and Agriculture Organization of the United Nations

GBD – Global Burden of Disease

GDP – Gross Domestic Product

GGA – Global Goal on Adaptation

GHG – Greenhouse Gas

GNI – Gross National Income

GPW – General Programme of Work

GST – Global Stocktake

$GtCO_2$ – Gigatons of Carbon Dioxide

GW – Gigawatt

GWP – Gross World Product

HAP – Household Air Pollution

HDI – Human Development Index

HHA – Heat-Health Alert

HNAP – Health National Adaptation Plan

62 IEA – International Energy Agency

63 IHR – International Health Regulations

64 IK – Indigenous Peoples' Knowledge

65 IO – International Organisation

66 IPC – Infection Prevention and Control

67 IPCC - Intergovernmental Panel on Climate Change

68 IRENA - International Renewable Energy Agency

69 LPG – Liquefied Petroleum Gas

70 LT-LEDS – Long-term Low Emissions and Development Strategies

71 MODIS – Moderate Resolution Imaging Spectroradiometer

72 MRIO – Multi-Region Input-Output

73 Mt – Metric Megaton

74 $MtCO_2e$ – Metric Megatons of Carbon Dioxide Equivalent

75 NAP – National Adaptation Plan

76 NASA – National Aeronautics and Space Administration (US)

77 NBS – Nature-based solutions

78 NCDs – Non-communicable Diseases

79 NDCs - Nationally Determined Contributions

80 NDVI – Normalised Difference Vegetation Index

81 NHS – National Health Service

82 NO_x – Nitrogen Oxides

83 OECD – Organisation for Economic Cooperation and Development

84 O&G – Oil and Gas

85 $PM_{2.5}$ – Fine Particulate Matter (less than 2.5 micrometres in diameter)

86 PV – Photovoltaic

87 SCA – South and Central America

88 SDG – Sustainable Development Goal

89 SDU – Sustainable Development Unit

90 SILAM - System for Integrated Modelling of Atmospheric Composition

91 SPEI – Standardised Precipitation Evapotranspiration Index

92 SSS – Sea Surface Salinity

93 SST – Sea Surface Temperature

tCO_2 – Metric tons of Carbon Dioxide

tCO2/TJ – Metric tons of Carbon Dioxide per Terajoule

TJ – Terajoule

TES – Total Energy Supply

TWh – Terawatt Hours

UN – United Nations

UNEP – United Nations Environment Programme

UNFCCC – United Nations Framework Convention on Climate Change

UNGA – United Nations General Assembly

UNGD – United Nations General Debate

$ – 2024 United States Dollars (unless clarified in the text)

WHO – World Health Organization

WMO – World Meteorological Organization

WNV – West Nile Virus

Executive Summary

Driven by human-caused greenhouse gas (GHG) emissions, climate change is increasingly threatening lives, health and wellbeing. Mean annual temperatures exceeded 1.5°C above those of pre-industrial times for the first time in 2024 and, despite ever more urgent calls to tackle climate change, emissions rose to record levels. The environmental conditions on which human lives depend are being rapidly destabilised.

Authored by 128 multidisciplinary experts world-wide, the 2025 Report of the Lancet Countdown on Health and Climate Change is the 9th – and most comprehensive – assessment of the links between climate change and health. Its data reveal that, as the health risks and impacts of climate change break concerning new records, progress is being reversed across key areas, further threatening people's lives, health and wellbeing. They also reveal some areas of progress, which could inform important opportunities to accelerate action, and prevent the most catastrophic impacts of climate change (Panel 1).

The growing human costs of delayed climate action

The health threats of climate change keep growing. Of 20 indicators tracking the health risks and impacts of climate change in this report, 12 have set concerning new records in the latest year of data.

In 2020-2024, people faced 628% more health-threatening heatwave days than would be expected without climate change. Those under 1 and over 65 years old – the most vulnerable age groups - saw a record-high number of heatwave days in 2024, up by 389% and 304%, respectively, from the 1986-2005 average (indicator 1.1.1). The higher temperatures and increasingly vulnerable populations led to a 63% increase in heat-related deaths since the 1990s, reaching an estimated 546,000 yearly deaths on average in 2012-2021 (indicator 1.1.5). Heat-related morbidity is also growing, with heat exposure undermining sleep and the ability to work or exercise outdoors, threatening physical and mental health (indicators 1.1.2, 1.1.3 and 1.1.4).

Exposure to other harmful extreme weather events is also growing. The incidence of extreme precipitation days, which can trigger flash floods and landslides, and have major adverse health impacts, increased in 64% of the global land area between 1961-1990 and 2015-2024 (indicator 1.2.3). Meanwhile, a record-breaking 61% of the global land area was affected by extreme drought in 2024, 299% above the 1950s average, further threatening food and water security, sanitation, and causing downstream economic losses (indicator 1.2.2). The higher number of drought months and heatwave days in 2023 compared to 1981–2010 were associated with 123.7 million more people experiencing moderate or severe food insecurity in 124 countries analysed (indicator 1.4). Additionally, the meteorological risk of wildfires is growing, and 2024 saw a record-high 154,000 deaths from wildfire smoke-derived small particulate matter ($PM_{2.5}$) (indicator 1.2.1).

The changing climatic conditions are also affecting the risk of transmission of deadly infectious diseases. The probability of at least one domestically-transmitted case of leishmaniasis now exceeds 50% in 13 more countries than in the 1950s (indicator 1.3.4); while an additional 364 million people are at risk of diseases transmitted by *Rhipicephalus sanguineus* and *Hyalomma* ticks, including Rocky Mountain Spotted Fever and Crimean-Congo hemorrhagic fever (indicator 1.3.5). The risk of dengue transmission is also growing (indicator 1.3.1), as is the land area suitable for malaria transmission, particularly in the highlands of Africa, Asia and South America (indicator 1.3.2).

The multiple health impacts of climate change are increasingly burdening the economic conditions that support health and wellbeing. The health impacts of climate change are resulting in less productive populations, and a record-high 639 billion potential work hours were lost to heat exposure alone in 2024, 98% above the 1990–99 average, costing US$ 1.09 trillion or almost 1% of global GDP (indicators 1.1.3 and 4.1.3). In 2024, weather-related extreme events caused US$ 304 billion in global economic losses, a 58.9% increase from the 2010-2014 annual average. The magnitude and growing unpredictability of these losses put further pressure on strained insurance systems, and insurance coverage of extreme weather event-related losses fell from 67% in 2010-2014 to 55% in 2019-2023. As a result, the costs of these events are increasingly falling on public systems and individuals, affecting health, livelihoods, and socioeconomic wellbeing (indicator 4.1.1 and Panel 4).

While tracked here in isolation, the multiple health and economic impacts of climate change often occur simultaneously, compounding each other, and leading to multi-hit scenarios. As a result, they erode the social, economic, and environmental pillars on which people's health and survival depend, and further exacerbate the risk of social unrest and conflict.

Delays in adapting have further compounded the health impacts of climate change. Financial support has been meagre, while inadequate planning, often due to financial and technical restrictions, further limits resource allocation. Indeed, only 29 countries classified as 'developing' under the UNFCCC quantified their financial needs for health adaptation in their official National Adaptation Plans (NAPs) or Nationally Determined Contributions (NDC). Total principal bilateral health adaptation finance (US$84 million) and multilateral funding Green Climate Fund finance (US$166 million) between 2020 and 2022 represented less than 3.6% of these disclosed financial needs (indicator 4.3.4). Now, a political shift towards reduced foreign aid support from some of the world's wealthiest countries, further restricts support for development and activities that are essential to build resilience to the threats of climate change.

Strengthening adaptation efforts has become critically urgent. However, the costs and challenges to adaptation will continue to increase with every unit of GHG emitted. Simultaneous and effective mitigation is therefore essential to ensure adaptation remains feasible, affordable, and able to protect the world's populations from the worst health outcomes of climate change.

The price of backsliding: putting people in harm's way

Despite decades of scientific warnings, the world is currently heading towards a potentially catastrophic 2.7°C of heating, or more. And emissions keep rising.

Energy-related emissions increased 1.6% in 2023, reaching unprecedented levels; global agricultural GHG emissions reached an all-time high in the latest year of data

(2022); and global tree cover loss grew by 27% to over 28 million hectares in 2023, reducing the capacity to reduce atmospheric GHG concentrations (indicators 3.1.1, 3.3.1 and 3.4).

Paradoxically, as the need for decisive health-protective action grows, engagement is waning: only 30% of countries mentioned health and climate change in their UN General Debate (UNGD) statement in 2024, down from 62% in 2021 (indicator 5.4.1). The new US Administration withdrew the country from the Paris Agreement, and dismantled world-leading research in the field, as well as key health, climate and environmental agencies. Countries including Argentina and Hungary have taken similar obstructive stances, while others dropped crucial climate commitments. The US withdrawal from the World Health Organization (WHO) compounds climate threats, exacerbating health risks globally.

With reduced pressure from powerful political leaders, fossil fuel giants including Shell, BP, ExxonMobil, and Chevron have paused, delayed, or retracted their climate commitments, increasingly pushing the world towards a catastrophic future. As of March 2025, the 100 largest oil and gas companies had production strategies that put them on track to exceed their share of production consistent with 1.5°C of heating by 189% in 2040, up from 183% in March 2024 (indicator 4.2.2). Private banks contributed to this expansion, their lending to fossil fuel sector activities surging 29% to US$ 611 billion in 2024, and exceeding green sector lending by 15% (indicator 4.3.3). These fossil fuel investments threaten not only public health, but also national economies. The value of coal power sector assets at risk of being stranded in 2030 rose by 44% (to US$ 22.4 billion) from 2023 to 2024 (indicator 4.2.3). Meanwhile, delayed action and backtracked commitments have further reduced most countries' economic and social preparedness for a low-carbon, healthy transition (indicator 4.2.4).

Missed opportunities paid for with lives

Previous Lancet Countdown reports have highlighted the health opportunities afforded by a just and health-centered transition to a resilient, net-zero GHG emissions world. These benefits remain largely untapped, resulting in millions of avoidable deaths yearly.

Affordable, off-grid renewable electricity could tackle the major source of GHG emissions, whilst alleviating energy poverty and its adverse health impacts. Yet, 745 million people globally still lack access to electricity. Around 1 billion are served by healthcare facilities that lack reliable power supplies, and 88% of households in countries with Low Human Development Index (HDI) still primarily used polluting and unreliable fuels to meet their energy needs (indicator 3.1.2). Profound disparities in clean energy access have contributed to perpetuating this energy poverty: while 13.3% of the energy in Very High HDI countries, and 12% in High HDI countries, came from renewables in 2022, it represented only 3.5% in Low HDI countries (indicator 3.1.1). The air pollution resulting from the household use of dirty fuels and technologies across 65 countries resulted in 2.3 million deaths in 2022 (indicator 3.2.2), including some of the 2.52 million deaths still attributable to ambient air pollution globally in 2022 (indicator 3.2.1) - deaths that could largely be avoided by transitioning to clean renewable energy.

The failure to transition away from fossil fuels has also come at a major financial cost, straining resources that could have supported improved livelihoods, health and wellbeing. In response to the fossil fuel price spike that followed Russia's invasion of Ukraine, most countries – still heavily reliant on this source of energy - resorted to subsidies to keep energy affordable. As a result, 83% of countries reviewed provided net fossil fuel subsidies in 2023, allocating a net total US$ 956 billion to this purpose – the second-highest value on record. Of these countries, 17% allocated more funds to net fossil fuel subsidies than to national health budgets (indicator 4.3.2). These fiscal pressures can be reduced by eliminating the reliance on fossil fuels, making funds available to support activities that benefit – rather than harm – human health.

Turning to the food sector, the potential health benefits of more sustainable, climate-friendly diets also remain largely undelivered: mortality related to high-carbon, unhealthy diets increased from 148 to 150 per 100,000 people between 2021 and 2022, resulting in 11.8 million largely preventable deaths (indicators 3.3.1 and 3.3.2).

These undelivered opportunities highlight the potential of health-centered climate action in helping tackle some of the major issues facing populations and governments worldwide. Those countries prioritising this transition stand to gain the most from its health and economic benefits, and can still lead the way to a prosperous future for people within, and beyond their country borders.

Growing momentum

Amidst growing health harms, avoiding the most catastrophic impacts of climate change requires immediate and bold climate action by every individual and organisation. Some positive signs offer hope.

The growth of the clean energy sector is well underway. The share of electricity generated by modern renewables is growing rapidly, and reached a record-high of 12.1% in 2022 (indicator 3.1.1). The shift away from coal, particularly in High and Very High HDI countries, resulted in a 5.8% reduction in deaths attributable to ambient $PM_{2.5}$ from fossil fuel combustion between 2010 and 2022. In 2023, the clean energy sector accounted for 10% of global GDP growth, and countries leading the clean energy transition have also enjoyed substantial economic benefits. As the UK became the first major economy to halve global emissions from 1990 levels, its green economy grew three times faster than the broader economy. China's renewable energy sector contributed to a record 10% of its GDP in 2024 and caused its CO_2 emissions to fall for the first time, while delivering cleaner air and improving health outcomes. Globally, the growth in the renewable energy sector has resulted in an 18.3% increase in direct and indirect employment in renewable energy in 2023, reaching 16.2 million employees globally, and providing healthier and more sustainable job opportunities than the fossil fuel sector. Meanwhile, direct fossil fuel employment fell 0.7% to 9.06 million (indicator 4.2.1), even as fossil fuel production expanded.

Amidst waning engagement with climate change and health from some world leaders, the growing engagement of other actors enables important avenues for change. Local governments are emerging as strongholds for change. A growing number of cities are prioritising the protection of health through climate action, and 97% of those reporting to the CDP in 2024 declared having completed, or intending to complete, climate change risk assessments (indicator 2.1.3). The proactive engagement of individuals with climate change and health, key driver of community-led actions, is also growing (indicator 5.2 and Panel 6). Individuals and civil society organisations are increasingly resorting to litigation to advance the protection of the right to health and to a healthy environment, and keep governments and corporations accountable (Panel 5). Additionally, while mentions of health and climate change within companies' reports to the Global Compact fell in 2024 (indicator 5.5), there are signals of growing private sector support to progress climate action.

As the health risks of climate change grow, the health sector is rising to the challenge. Healthcare-related GHG emissions fell by 12% between 2021 and 2022 (indicator 3.5) and, as of march 2025, 58.0% of WHO member states had completed a Vulnerability and Adaptation assessment, while 60% had completed a National Adaptation Plan for Health (indicators 2.1.1 and 2.1.2). The growing provision of climate change education to health professionals is growing, building capacity for further progress (Indicator 2.2.5). The Global Action Plan on Climate Change and Health adopted at the 78th World Health Assembly now opens new opportunities to advance health-promoting climate actions.

An urgent call to action: all hands on deck

Far from isolated, the growing leadership of key actors – local governments, civil society, private sector organisations and, importantly, the health sector – alongside the economic momentum of clean energy growth – provide a fertile ground for a health-centred system-wide transformation. As prominent leaders backslide commitments, the world faces a critical juncture. Realising a healthier, safer future demands bold action, and all hands on deck. There is no time left for further delay.

Introduction

The multiple impacts of climate change are converging to create an unprecedented threat to the health and survival of people around the world. In 2024, global annual mean surface temperatures exceeded pre-industrial levels by over 1.5°C for the first time on record, and the past 10 years were the hottest ever recorded. Throughout 2024, 152 record-breaking extreme weather events were registered across 61 countries,[1] and life-threatening extreme heat events are becoming more intense than previously predicted.[2] The economic conditions upon which health depends are being disrupted, with potentially catastrophic impacts.[3,4]

Despite this, greenhouse gas emissions continue to rise unabated.[5] As of COP29 in November 2024, implemented policies and actions put the world on track to a potentially devastating 2.7°C of heating, or more.[6]

Against this concerning backdrop, many countries are taking leaps in the wrong direction. In the US – the world's largest single historical contributor to climate change[7] – the Trump Administration dismantled world-leading climate research and key climate and environmental agencies, and pulled the US out of the Paris Agreement – all with potentially irreversible consequences for those in the US, and beyond.[8] Countries like Argentina and Hungary have taken similar stances. Alberta, Canada, lifted a moratorium on coal exploration,[9] and the EU is pursuing an easing of emissions rules.[10] Meanwhile, major corporations (including fossil fuel giants) have backtracked on their climate commitments, to the detriment of all.[11–14]

Compounding attacks on climate change mitigation, adaptation efforts are also under threat. The US' withdrawal from the World Health Organization (WHO) resulted in major funding cuts, impairing the ability to safeguard people's health in the face of climate hazards.[8,15] Cuts to USAID, alongside the reversal of aid funding from countries like the UK, Netherlands, Belgium and France, further increase the vulnerability of populations world-wide to soaring climate hazards, putting an equitable transition to a healthy future increasingly out of reach.[8]

Reversing these harmful policies and progressing meaningful climate action is now critical to protect people's health and survival. Encouragingly, doing so can simultaneously deliver major and near-term health and economic benefits. Some of these are already occurring. The clean energy sector accounted for 10% of global GDP growth in 2023.[16] As the UK has became the first major economy to halve its emissions from 1990 levels,[17] and its net zero GHG economy grew three times faster than the broader economy, supporting better livelihoods.[18] In China, clean energy contributed to a record 10% of GDP in 2024, and caused its emissions to fall for the first time.[19,20] Now a world leader in electric mobility, China attained major health and economic benefits from air quality improvements through transport electrification,[21] and prevented 46,000 deaths through the transition to cleaner energy in households between 2018 and 2020.[22] Clean renewable energy, now cheaper than fossil fuels and less vulnerable to geopolitical shocks, can also benefit the approximately 1 billion people still served by healthcare facilities without reliable energy,[23] and the 1.18 billion people still living with energy poverty.[24] Indeed, since 2017, at least 1000 healthcare facilities received solar electrification – progress that needs to be urgently scaled up to enable a sustainable and equitable future.[25]

The Global Action Plan on Climate Change and Health adopted in the 78th World Health Assembly opened new avenues [27]to drive a health-centred, accelerated response to climate change.[27] COP30 offers further opportunities to promote action. Taking stock and responding to countries' updated Nationally Determined Contributions (NDCs), it will offer an opportunity to encourage the necessary commitments for a safer future. The selection of indicators for the Global Goal on Adaptation enables further progress in ensuring accountability and meaningful target-setting for health protection. Importantly, COP30 will see the conclusion of the "Baku to Belém Roadmap to 1.3T", providing an opportunity to close the global climate finance gap.

To inform these urgently needed responses, the 2025 Global Report of the Lancet Countdown on Health and Climate Change presents the most comprehensive picture yet of the health consequences of current progress – or lack thereof – in tackling climate change. This year, its data helps inform key priority actions and opportunities for different actors in society to build a safer future (Panel 1).

Panel 1: Priorities for the protection of health amidst global turmoil.

With the threats of climate change growing, successful climate action requires a coordinated response across all levels. The priorities for action presented in the 2023 Lancet Countdown report remain relevant. However, the world has changed since. GHG emissions reached new record-highs (3.1.1); mean annual temperature in 2024 surpassed 1.5°C above pre-industrial levels for the first time; the global energy crisis has boosted fossil fuel profits and encouraged further expansion (indicator 4.2.2); climate sceptics now lead multiple countries, including the world's current largest historical emitter; and many corporations have backtracked on their climate commitments. The risks of climate change to people's health and survival reached unprecedented levels (Section 1).

Against this backdrop, the data in this year's report inform actions and opportunities for different actors to improve health and forge a safer future.

National governments

Despite a drop in government engagement with health and climate change (indicators 5.4), most country leaders continue to acknowledge the science, and the urgency of accelerated climate action. They can promote a safer future by:

1. Creating supportive regulations and financial incentives to enable affordable renewable energy, energy efficiency, and a safe fossil fuel phase-out. This is essential to keep climate risks within levels that countries can still adapt to, and can simultaneously reduce energy poverty and the economic impacts of volatile fossil fuel markets, limit stranded fossil fuel assets, boost economic development, and save millions of lives through cleaner air (indicators 3.1.2, 3.2.1, 3.2.2, 4.2.1, 4.2.3).
2. Monitoring and evaluating the health impacts of climate change and the health benefits of climate action. This includes establishing national climate change and health observatories, defining indicators for the Global Goal on Adaptation that enable the assessment of health-related adaptation progress, and using the resulting data to refine and enhance interventions to maximize both health and climate benefits.
3. Assessing and effectively communicating the health and climate benefits of climate change interventions. This involves promoting public understanding and literacy on the connections between health and climate change, thereby increasing support and engagement from individuals, the media, and corporations (indicators 5.1, 5.2, 5.4.1, and 5.5).
4. Redirecting net fossil fuel subsidies towards enabling equitable renewable energy access, and towards health promotion and other activities that improve – rather than harm – people's health and wellbeing (indicator 4.3.2).
5. Supporting Low HDI countries in the adoption of clean renewable energy and climate change adaptation, including through knowledge and technology transfer, and financial support, thereby promoting global health and development (indicators 3.1.1, 3.1.2, 3.2.1, 3.2.2).
6. Delivering evidence-based Nationally Determined Contributions (NDCs) and Long-Term Low-Emission Development Strategies (LT-LEDS) that match the ambitions laid out in the Paris Agreement, are financially costed, and prioritise interventions with health co-benefits (indicators 3.2, 3.3.2, and 5.4.1).
7. Building health resilience by developing and implementing science-based National Adaptation Plans, with well-defined and costed interventions, that have improvements in

people's health and wellbeing as an end goal, including health-tailored early warning and response systems (indicators 2.1.1, 2.1.2, 2.2.1, 2.2.4, 2.3.2, and 4.3.4).
8. Including community perspectives in the design of climate and health policies, with particular focus on the most vulnerable communities, and indigenous peoples (Panel 6).
9. Protecting multilateralism and international negotiations as key tools to promote global climate and health action (indicator 5.4.1).

City governments

Home to 56% of the world population and to the main drivers of GHG emissions, cities are key in delivering a healthy, equitable transition. Opportunities include:

1. Prioritising health in adaptation interventions, underpinned by evidence-based climate change and health risk assessments and tailored action plans (indicators 2.1.3, 2.3.1, and 2.3.2).
2. Expanding urban green and blue space to reduce heat exposure, prevent flooding, and improve mental and physical health (indicators 2.2.3 and 2.2.2).
3. Promoting zero-emission public transport and safe active travel through infrastructure and regulation. This would reduce transport-driven emissions, prevent up to 1.45 million deaths from improved air quality, and boost physical activity (indicators 3.1.3 and 3.2.1).
4. Foster climate-resilient, sustainable buildings, including through regulation and financial incentives, thereby reducing energy consumption, limiting climate impacts, reducing heat exposure, and limiting reliance on air conditioning (indicators 1.1, 1.2, 2.2.2, 3.1.2 and 3.2.2).
5. Reducing inequities and avoiding unintended harms, by integrating community perspectives in all climate actions, and supporting community-led initiatives, with particular focus on vulnerable communities and indigenous people's priorities and knowledge (Panel 6).

Individuals and civil society organisations

Individual, community-led, and civil society actions can drive meaningful progress with substantial health benefits (Panel 6). Though often dependent on permissive political landscapes and legal protection, availability and access to choices, and financial support, some actions these actors can take include:

1. Reducing overconsumption and prioritising the consumption of low-carbon, sustainable products, especially in Very High and High HDI countries which contribute the most to consumption-led GHG emissions and air pollution (indicator 4.2.5).
2. In line with nutritional needs, adopting low-carbon, healthy diets (indicators 3.3.1 and 3.3.2).
3. Choosing zero-emission public transport and active travel over fossil fuel-based options (indicator 3.5).
4. Shifting funds away from institutions that invest in fossil fuels (indicator 4.3.3).
5. Engaging in community-led action on health and climate change, supporting equitable inclusion of marginalised communities (Panel 6).
6. Choosing leaders that advocate for accelerated action on health and climate change (indicator 5.4.1).

7. Encouraging and supporting employers in taking science-based and stringent climate action (indicator 5.5).
8. Using litigation as means to promote the right to health and to a healthy environment (Panel 5).

Health systems

Healthcare systems are a crucial line of defence against climate hazards (Section 2), yet, the healthcare sector contributes substantially to the problem, accounting for 4.2% of global GHG emissions (indicator 3.5). They can support a safer future by delivering progress in line with the ambitions of the Alliance for Transformative Action on Climate and Health, including by:

1. Developing and implementing evidence-informed adaptation plans, and increasing resilience and capacity to respond to climate hazards (Section1, indicators 2.1.1 and 2.1.2).
2. Educating and training the health workforce on preparing for and responding to climate change (indicator 2.2.5).
3. Reducing their own GHG emission footprint by optimising resource use, eliminating unnecessary waste, shifting to renewable energy, and, whenever safe, replacing high global warming potential anaesthetic and inhaler gases with less damaging alternatives (indicator 3.5).
4. Raising awareness of climate change health risks amongst patients and the general public and promoting behaviours that deliver simultaneous benefits to climate change and health (indicators 3.2.1, 3.2.2, 3.3.2).

Private sector

The private sector has direct control over the majority of global greenhouse gas emissions and has substantial influence over governments. They can drive accelerated action by:

1. Setting science-based targets to decarbonise their operations and supply chains, eliminating on-site emissions, transitioning to zero-emission energy and transport fleets, increasing energy efficiency, and prioritising suppliers with strong climate change and health commitments.
2. Divesting from fossil fuels and the organisations that finance them (indicator 4.3.3).
3. Transitioning fossil fuel businesses towards renewable energy, in line with global commitments, and supporting the development of climate solutions, especially those with simultaneous health co-benefits (indicators 4.2.2, 4.2.3).
4. Developing public-private partnerships to enhance the development and transfer of technology.
5. Advocating for stronger climate and health governmental policies, for a more stable and equitable environment for investments and actions, and promoting climate and health literacy across the workforce, fostering a culture of sustainability and encouraging behaviours that support a zero-carbon, healthier future.

Funders

Financial support is a critical enabler of accelerated climate action. Funders can support a healthy future through the following actions:

1. Bilateral and multi-lateral funders can support vulnerable countries in delivering health-promoting climate action; thereby reducing global health risks, promoting sustainable global development, reducing global inequities and simultaneously tackling the drivers of conflict (indicator 4.3.4 and Panel 3).
2. Private, philanthropic and individual funders can support civil society organisations and community initiatives to scale up health-promoting and inclusive climate action (Panel 6).
3. Research funders can support the generation of evidence needed to inform effective climate actions and for litigation, can drive reductions in GHG emissions from the research they fund, and can move their investments from fossil fuels (indicators 5.3.1 and 5.3.2 and Panel 5).
4. Under the "Baku to Belém Roadmap to 1.3T", countries and funders can advance action by delivering concrete commitments in support of the US$1.3 trillion funding goal, prioritising grant-based and concessional finance, and activities that support people's health and wellbeing (indicator 4.3.4).
5. High-income countries can advance international climate action, development and health goals, simultaneously reducing the risk of conflict, by reversing cuts to international aid funding, and increasing financial support for synergistic climate, health and development initiatives with mutual co-benefits (Panel 3, indicator 4.3.4).
6. Private funders can have a prominent role in delivering climate action, particularly through investments in zero-carbon energy development, nature-based solutions, and infrastructure resilience.

While extensive, this list of actions is not exhaustive. With the threats of climate change growing, protecting people's health and survival demands simultaneous and unprecedented efforts to advance adaptation and mitigation, and requires an "all hands on deck" approach. Importantly, navigating this unknown territory will require careful monitoring and evaluation of progress, and evidence-informed course correction to maximise the impact of climate actions, reduce inequities, and limit unintended harms.

The suite of indicators in this report (Panel 2), originally developed in 2016,[28] has been refined to reflect scientific advancements and the changing need for actionable evidence from key stakeholders. These 57 indicators, developed by 128 prominent researchers from diverse disciplines and world regions, represent nine years of iterative refinement, most presenting improved models or datasets in this report. New or substantially improved indicators have been included, enabling more accurate monitoring of heat-related mortality; tracking the threat of climate-sensitive tick-borne diseases and leishmaniasis; taking stock of the health impacts of wildfire smoke; capturing urban bluespace cover; more comprehensively monitoring health adaptation funding for the most vulnerable countries; and assessing proactive individual engagement on health and climate change. The methodologies, data, caveats and future improvements of the indicators, alongside further findings, are presented in the Appendix - an essential companion to this report.

The new phase of the Lancet Countdown on Health and Climate Change

The Lancet Countdown brings together over 300 researchers from over 100 organisations worldwide across its Global and six Regional Centres. In 2024, it entered a new phase, enabled by the strategic partnership and critical financial support from the Wellcome Trust, and an ongoing partnership with the World Health Organisation (WHO). It is now strengthening the science underpinning its indicators and working to bridge persistent gaps in its monitoring effort. Core to its ambition, it is also working to increase the impact of its work through strengthened policy engagement, dissemination, and capacity building efforts. A new independent Board,[29] chaired by the Rt Hon Helen Clark, advises and oversees this work, providing strategic guidance and scrutiny, while a new Scientific Advisory Group is helping further advance the science and rigour of the collaboration.

Through its new phase, the Lancet Countdown continues to operate an open approach to indicator development, now welcoming online proposals for indicators that meet the Lancet Countdown criteria.[30,31] In support of advancing the science of climate change and health, it has, wherever possible, made its indicator data available through its data platform, where it can be freely explored at higher levels of resolution than allowed for in the present report.[32]

At the core of the Lancet Countdown's efforts is the strengthening of its Regional Centres. Centres in Asia (Tsinghua University), Europe (Heidelberg University and ISGlobal), Latin America (Universidad Peruana Cayetano Heredia), Oceania (Macquarie University) and Small Island Developing States (University of the West Indies) now regularly publish regional assessments of climate change and health, harnessing local knowledge, and translating findings to meet the needs of local stakeholders.[33–37] In

2025, the Lancet Countdown launched its Africa Regional Centre, headquartered at Pretoria University, to advance the local generation of evidence to inform action in one of the world's most vulnerable regions.

The Lancet Countdown is further supporting health-centred climate action through partnerships with national and international organisations, that can make its findings available to inform action at the national and local level. Additionally, alongside WHO, it co-leads the Alliance for Transformative Action on Climate and Health's Task Team on indicators,[38] supporting the development and adoption of standardised climate change and health indicators for improved accountability and evidence-based action.

Moving forward, the Lancet Countdown will undertake a review of its current indicators, in order to identify priorities and gaps in its indicator suite, and ensure that it continues to provide data urgently needed to inform health-protective climate action.

Through these efforts, the Lancet Countdown will continue to strengthen the evidence base on climate change and health, and ensure that decision makers can access the latest science to advance evidence-based, health-protective actions, and inform the path towards a healthy future for all.

Panel 2: The indicators of the 2025 report of the Lancet Countdown on Health and Climate Change

Section 1: Health Hazards, Exposure, and Impact

- 1.1: Heat and Health
  - Indicator 1.1.1: exposure of vulnerable populations to heatwaves
  - Indicator 1.1.2: heat and physical activity
  - Indicator 1.1.3: change in labour capacity
  - Indicator 1.1.4: rising night-time temperatures and sleep loss
  - Indicator 1.1.5: heat-related mortality
- 1.2: Extreme weather-related events and health
  - Indicator 1.2.1: wildfires
  - Indicator 1.2.2: drought
  - Indicator 1.2.3: extreme precipitation
  - Indicator 1.2.4: sand and dust storms
  - Indicator 1.2.5: extreme weather and sentiment
- 1.3: Climate suitability for infectious disease transmission
  - Indicator 1.3.1: dengue
  - Indicator 1.3.2: malaria

        - Indicator 1.3.3: West Nile virus
        - Indicator 1.3.4: leishmaniasis
        - Indicator 1.3.5: tick-borne diseases
        - Indicator 1.3.6: *Vibrio*
    - Indicator 1.4: food security and undernutrition

Section 2: Adaptation, Planning, and Resilience for Health

- 2.1: Assessment and planning of health adaptation
    - Indicator 2.1.1: national assessments of climate change impacts, vulnerability, and adaptation for health
    - Indicator 2.1.2: national adaptation plans for health
    - Indicator 2.1.3: city or state-level climate change risk assessments
- 2.2: Enabling conditions, adaptation delivery, and implementation
    - Indicator 2.2.1: climate information for health
    - Indicator 2.2.2: benefits and harms of air conditioning
    - Indicator 2.2.3: urban green and blue spaces
    - Indicator 2.2.4: detection of, preparedness for, and response to health emergencies
    - Indicator 2.2.5: climate and health education and training
- 2.3: Vulnerabilities, health risk, and resilience to climate change
    - Indicator 2.3.1: vulnerability to severe mosquito-borne disease
    - Indicator 2.3.2: lethality of extreme weather events
    - Indicator 2.3.3: rising sea levels, migration, and displacement

Section 3: Mitigation Actions and Health Co-benefits

- 3.1: Energy use, energy generation, and health
    - Indicator 3.1.1: energy systems and health
    - Indicator 3.1.2: household energy use
    - Indicator 3.1.3: sustainable and healthy road transport
- 3.2: Air quality and health co-benefits
    - Indicator 3.2.1: mortality from ambient air pollution by sector
    - Indicator 3.2.2: household air pollution
- 3.3: Food, agriculture, and health co-benefits
    - Indicator 3.3.1: emissions from agricultural production and consumption
    - Indicator 3.3.2: diet and health co-benefits
- Indicator 3.4: tree cover loss
- Indicator 3.5: healthcare sector emissions and harms

Section 4: Economics and Finance

- 4.1: The economic impact of climate change and its mitigation
    - Indicator 4.1.1: economic losses due to weather-related extreme events
    - Indicator 4.1.2: costs of heat-related mortality
    - Indicator 4.1.3: loss of earnings from heat-related labour capacity reduction
    - Indicator 4.1.4: costs of the health impacts of air pollution
- 4.2: The transition to net zero-carbon, health-supporting economies
    - Indicator 4.2.1: employment in low-carbon and high-carbon industries
    - Indicator 4.2.2: compatibility of fossil fuel company strategies with the Paris Agreement
    - Indicator 4.2.3: stranded coal assets from the energy transition

- Indicator 4.2.4: country preparedness for the transition to net zero
- Indicator 4.2.5: production-based and consumption-based attribution of CO2 and PM2.5 emissions

4.3: Financial Transitions for a Healthy Future

- Indicator 4.3.1: clean energy investment
- Indicator 4.3.2: net value of fossil fuel subsidies and carbon prices
- Indicator 4.3.3: fossil fuel and green sector bank lending
- Indicator 4.3.4: health adaptation finance flows and disclosed needs

Section 5: Public and Political Engagement with Health and Climate Change

Indicator 5.1: media engagement

Indicator 5.2: individual engagement

5.3: Scientific engagement

- Indicator 5.3.1: scientific articles on health and climate change
- Indicator 5.3.2: scientific engagement on the health impacts of climate change

5.4: Political engagement

- Indicator 5.4.1: government engagement
- Indicator 5.4.2: engagement by international organisations

Indicator 5.5: corporate sector engagement

Section 1: Health Hazards, Exposure, and Impact

The health impacts of climate change are a function of increasing climate-related hazards, people's exposure to them, and their underlying vulnerabilities. In 2024, the world witnessed heatwaves, wildfires, floods, droughts, and storms of unprecedented scale and intensity[39]. People's lives are directly affected and threatened by the growing disruption of the societal systems that support health. In a series of indicators focussing on heat, other extreme weather-related events, conditions that favour the transmission of infectious diseases, and food insecurity, Section 1 tracks how climate-related hazards and the exposure of vulnerable populations have changed over time.

New indicators measuring the climate suitability for the transmission of leishmaniasis and tick-borne diseases further demonstrate how climate change is altering the risk of life-threatening infectious diseases. In a major update, a new heat-related mortality indicator employs state-of-the-art epidemiological models to assess risk among populations globally.[40]

1.1 Heat and health

Climate change is increasing exposure to health-threatening heat. Elderly people are especially at risk due to age-related decrements in thermoregulatory capacity.[41] Those with underlying chronic diseases (e.g. diabetes, cardiovascular, respiratory, or kidney disease) are also especially vulnerable.[42] Infants represent a high-risk group due to morphological disadvantages and limited capacity to engage in protective behaviours,[42] while heat exposure during pregnancy increases the risk of adverse birth outcomes.[43]

Indicator 1.1.1: exposure of vulnerable populations to heatwaves

Headline finding: Globally, people experienced an average of 19 heatwave days per year in 2020-2024, 16 days (628%) more than what would be expected without climate change. In 2024, people older than 65 years and infants younger than 1-year experienced record-high heatwave exposures – up by 304% and 389%, respectively, from the 1986-2005 baseline.

This indicator contrasts the number of heatwave days experienced from 2020 to 2024 with a counterfactual climate in which there was no human-caused global heating. It defines a heatwave as a period of at least two consecutive days when minimum and maximum temperatures exceed the local 1986–2005 95th percentile in the factual climate.[44] Globally, the average person experienced an average of 19 heatwave days per year, 16 days (628%) more than would be expected without climate change. On average, 10 or more heatwave days/year attributable to climate change occurred over this 5-year period in 80% of countries globally (180/226). More than 30 heatwave days per year attributable to climate change occurred in 13% of countries (20/226) Small Island Developing States, Africa, and Asia had the largest increases in heatwave exposure due to climate change (Figure 1).

Of all people exposed, infants under one year and adults over 65 years of age are particularly at risk.[45,46] In 2024, adults over 65 years and infants experienced record-high exposure to heatwaves, at 20.8 days and 20.5 days per person, respectively. This represents increases of 304% and 389%, respectively, compared to the 1986-2005 baseline average. From 2006 to 2024, on average each adult over 65 years and infant under 1 year experienced 10.8 and 9.4 heatwave days per year, respectively, of which 5.3 (49%) and 4.8 (51%) heatwave days per year are attributable to climate change.

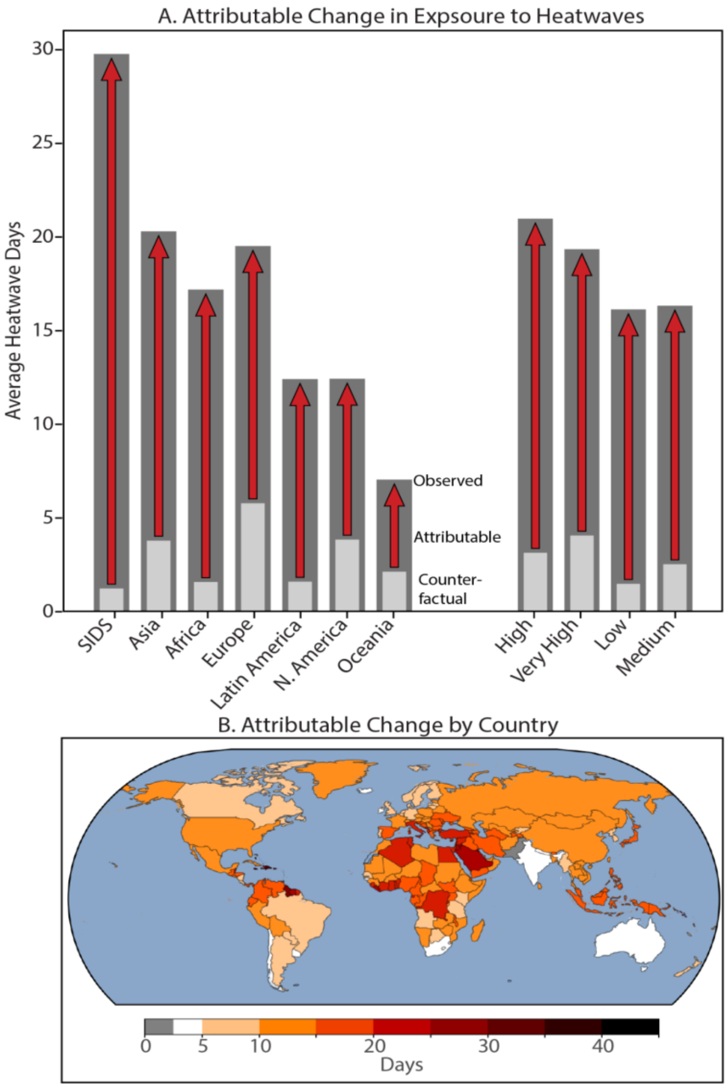


Figure 1. Top: *Average annual heatwave days 2020-2024 by region and HDI level. Light grey: heatwave days that would have been experienced without human-caused warming. Dark grey and red arrows: heatwave days added by climate change. Bottom: Attributable heatwave days by country (2020-2024).*

Indicator 1.1.2: heat and physical activity

Headline finding: In 2024, each person was exposed, on average, to a record-high 1,609 hours during which ambient heat posed at least a moderate heat stress risk during light outdoor exercise, 35.8% above 1990-1999.

Physical activity is essential for good general health; reducing the risk of chronic disease, cancer, and obesity; contributing to disease management; and improving mental health.[47,48] When replacing fossil fuel-based travel, it reduces GHG emissions and air pollution.[49] However, heat exposure decreases motivation to engage in outdoor physical activity, [50] and puts those who exercise at risk.[51] This indicator uses temperature, humidity, and solar radiation to estimate the number of hours during which light outdoor physical activity (e.g., walking) poses a risk of heat-related illness.[52]

In 2024, each person globally was exposed, on average, to a record-high 1,609 hours of at least moderate heat stress risk when light exercise was undertaken in outdoor environments– 424 hours (35.8%) above the 1990-99 average. There were on average 290 (24.4%) more annual hours of elevated heat stress risk in 2015-2024 than in 1990-1999.

Indicator 1.1.3: change in labour capacity

Headline finding: A record-high 639 billion potential work hours were lost in 2024, a 98% increase compared to the 1990–99 annual average.

Heat exposure endangers workers' health, particularly those working outdoors or performing strenuous tasks.[53] It also reduces labour productivity and undermines the social determinants of health through impacts on income and livelihoods.[54,55]

This indicator's first part monitors the number of people working outdoors, placing them at a heightened heat stress risk and attributable burden of disease. Globally, in 2024, an estimated 1·5 billion people—25·3% of the working-age population—worked outdoors, representing a small decrease from 2023 (25·9%). The proportion of this at-risk worker population is highest among males and middle-age people.

The second part of this indicator combines heat exposure (estimated using wet bulb globe temperature) with typical metabolic rates of worker groups to track potential work hours lost.[53,56] Improvements this year include capturing more island populations and employing preferred (UN) population estimates. It finds that, globally, 639 billion potential work hours were lost due to heat exposure in 2024, exceeding the 1990–99 average by 98.1% and eclipsing the previous high of 2023. Medium HDI countries were most impacted in 2024, losing a total of 316 billion potential hours. They were followed by High and Low HDI countries, with 167 and 118 billion potential hours lost, respectively. Considering average potential work hours lost per worker, Low and Medium HDI countries were most affected, with 250 and 358 potential hours lost, respectively. These countries collectively bear a growing share of global potential work hours lost, up from 54.3% in 1990 to 68.0% in 2024. In contrast, High HDI countries lost 120 potential work hours per worker on average, while Very High HDI countries were least affected, with only 45 potential hours lost.

Globally 17.7% of all potential work hours lost affected construction workers, and 63.5% affected agricultural workers, with the latter rising to 75.5% in Low, and 66.6% in Medium HDI countries, respectively.

Indicator 1.1.4: rising night-time temperatures and sleep loss

Headline finding: total sleep time lost due to high night-time temperatures increased by 6% in 2020–24 relative to the 1986–2005 baseline, reaching a record 9% increase in 2024.

Anthropogenic environmental changes have driven nighttime temperatures to rise faster than daytime temperatures in many regions,[57–59] intensifying overnight heat stress and challenging nocturnal recovery. Elevated nighttime temperatures can disrupt sleep health, and are associated with altered sleep timing, quality and quantity,[60–65] as well as adverse downstream mental and physical health outcomes which are separately sensitive to sleep.[63,66–68]

Combining global ERA5 night-time minimum temperature data and derived temperature–sleep response functions from a prior multi-country sleep study,[45,65] this indicator estimates that annual sleep loss attributable to suboptimal night-time temperatures rose by an average of 6% in 2020–24 compared with 1986–2005. In 2024, sleep loss increased by 9% from baseline, the largest percentage increase in lost sleep in the past decade. Locations experienced up to nearly 12 hours (698.6 minutes) of extra annual sleep loss per person per year in 2020-24.

Indicator 1.1.5: heat-related mortality

Headline finding: in 2012-2021, global heat-related mortality reached an estimated average 546,000 deaths annually, up 63.2% from 335,000 in 1990-1999.

While, at present, cold temperatures still account for most temperature-related deaths,[69,70] increases in heat-related mortality are projected to exceed cold-related deaths in most regions if urgent climate adaptation and mitigation actions are not taken.[70–74] This indicator monitors heat-related mortality[75] using a newly-developed model framework[40] that builds on a mortality database for 120 countries. It then applies state-of-the-art meta-prediction models to consistently estimate the association between temperature and mortality from all causes in all countries globally,[76] and combines them with yearly mortality estimates from the Global Burden of Disease, making it the most comprehensive global estimate of heat-related mortality yet.

In 2012-2021, heat was associated with 0.96% [95% CI 0.64, 1.21] of all deaths occurring globally, up from 0.70% [0.45, 0.88] in 1990-1999 (37.1% increase). This corresponds to a heat-related mortality burden of 546,054 deaths [95% CI 362,127, 687,553] in 2012-2021, up from 334,672 [216,172, 423,800] in 1990-1999 (63.2% increase).In 2012-2021, heat-related deaths reached 1.73% [0.92, 2.38] of all deaths in Low HDI countries (up by +66.3% from 1990-1999), 1.45% [1.04, 1.78] in Medium HDI countries (+6.6%), 0.60% [0.37, 0.82] in High HDI countries (+87.5%), and 0.53% [0.37, 0.68] in Very High HDI countries (+82.8%) (

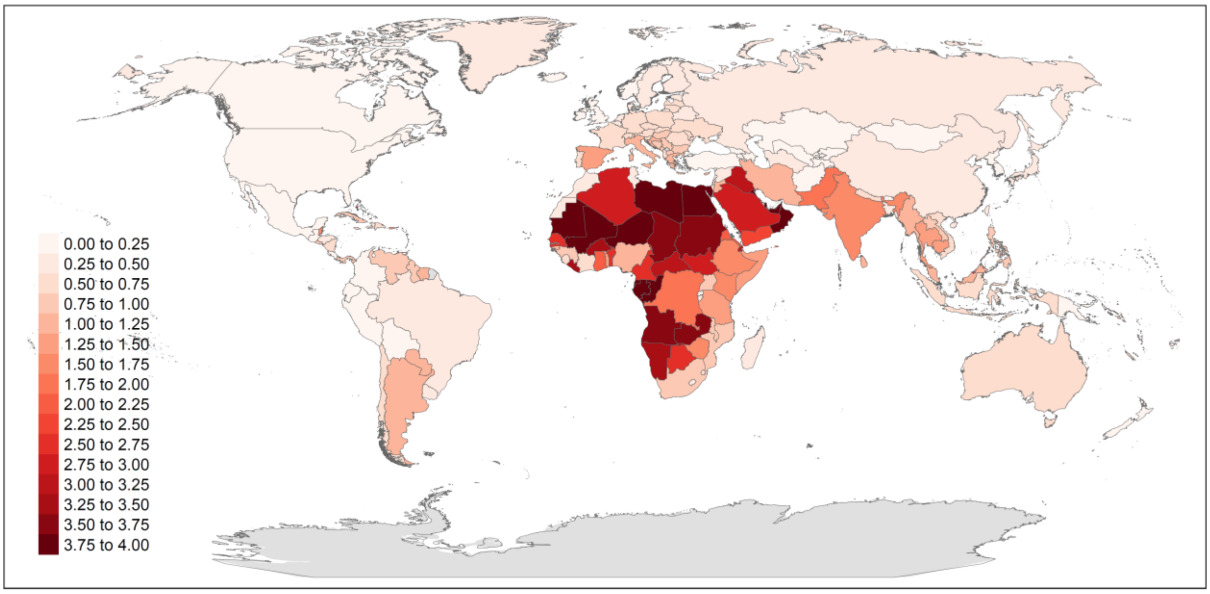


Figure 2).

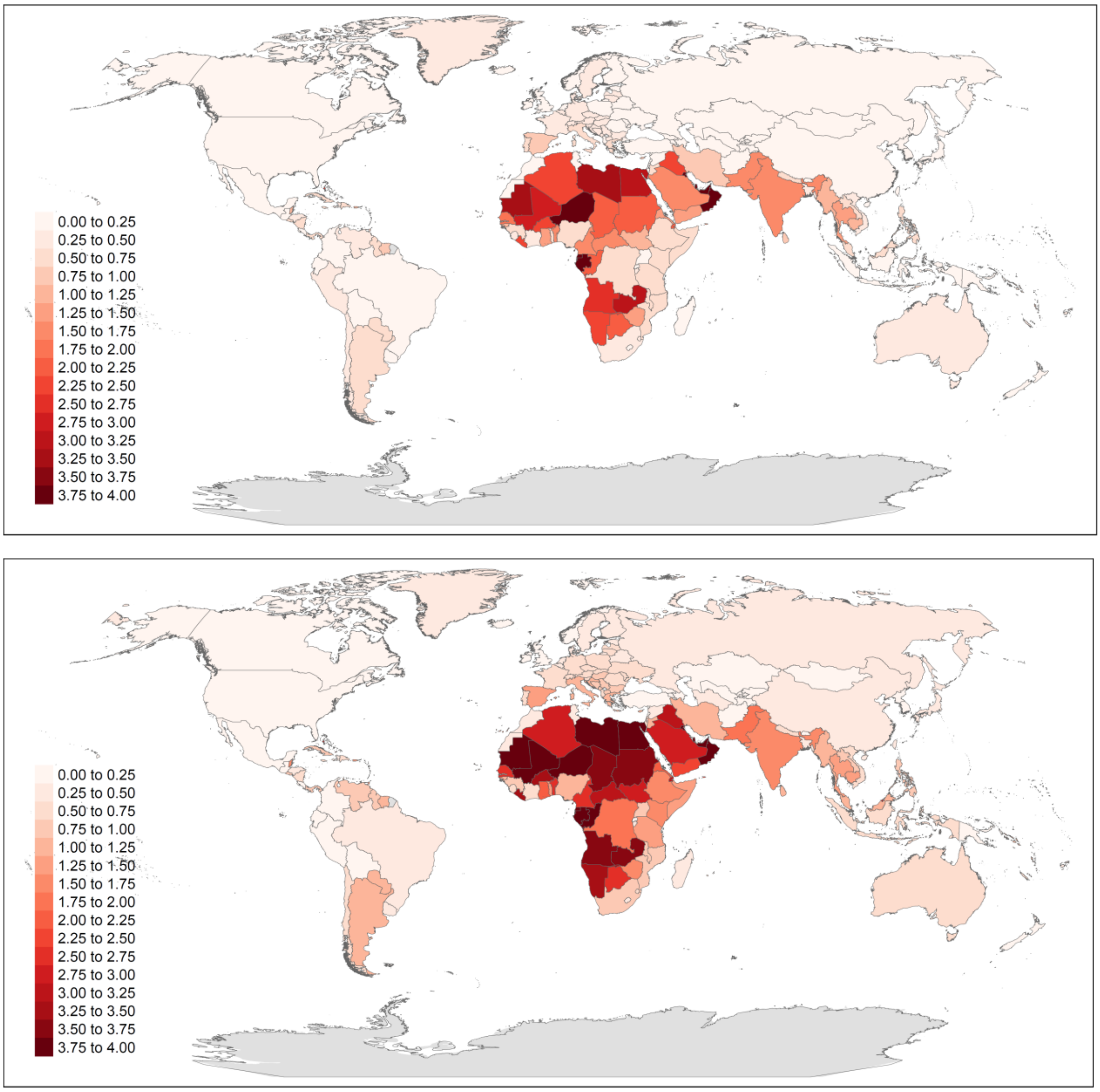


Figure 2: Average heat-related percentage of total deaths in 1990-1999 (top panel) and 2012-2021 (bottom panel).

1.2 Extreme weather-related events and health

Combined with decades of delays in adaptation, extreme weather events in 2024 caused at least 16,000 deaths, affected at least 166 million people,[77] exacerbated food insecurity,[39] and lead to the highest number of newly displaced people since 2008.[39]Detection and attribution studies found that anthropogenic climate change had increased the intensity or probability of occurrence of 26 of these, which accounted for over 370,00 deaths.[78] Beyond directly recorded impacts, these events often have pervasive impacts on local communities. While the indicators above covered heat-related impacts, the following indicators track exposure to and impacts of other climate-related extreme weather events.

Indicator 1.2.1: wildfires

Headline finding: In 2020-2024, exposure to days of at least very high wildfire risk increased by 6.6% on average globally, with 6 days per person more compared to 2003–2012. Deaths from wildfire-derived $PM_{2.5}$ air pollution reached a record-high 154,000 in 2024, up by 36% from the 2003-2012 average.

With hotter and drier conditions, climate change is increasing the risk of wildfires, which threaten physical and mental health, and can damage essential infrastructure, causing cascading health impacts.[79–81] This indicator tracks exposure to days of at least very high meteorological wildfire risk, using data from the Copernicus Emergency Management Service, and also tracks exposure to active wildfires, by overlaying population data with wildfire satellite observations. It also estimates wildfire smoke exposure using the SILAM chemistry transport model and satellite fire detection and, new this year, associated health impacts based on epidemiological models for $PM_{2.5}$-related mortality.[82]

During 2020–2024, people were exposed, on average, to 103 days of very high, or higher, wildfire risk —6 days more (6.6% increase) than on average during 2003–2012. Of the 188 countries for which data are available, 117 (62.2%) experienced increased exposure to wildfire risk. However, while 133 countries saw an increase in human exposure to active wildfires, average exposure decreased from 28 days per person in 2003-2012 to 23 days per person in 2020-2024 – a decrease that could be due to improved wildfire management and prevention, or to the reduction of available fuel for wildfires due to previous wildfires, land use change, or deforestation.

Between 2015-2024 people globally experienced 10.3 billion person-days annually (with person-days accounting both for the total number of people exposed, and the total number of days they were exposed), during which wildfire-related particulate matter ($PM_{2.5}$) concentrations exceeded the WHO maximum daily average guideline level of 15 ug/m^3; 17% higher than in 2003-2012. The world saw record-high fire-related $PM_{2.5}$ exposure in 2024, both in concentration and in the number of days.[83]

In 2024, exposure to fire-originated $PM_{2.5}$ caused a record-high 154,000 deaths, about 2% of all $PM_{2.5}$-related deaths, and up by 36% from 2003-2012. The average mortality increased 9% from 2003-2012 to 2015-2024, with Low HDI countries seeing the biggest increase (46%). In 2003-2024, 92 countries saw statistically significant ($p < 0.05$) changes in deaths from wildfire-derived $PM_{2.5}$, with mortality increasing in 92% (85) of them.

Indicator 1.2.2: drought

Headline finding: the percentage of the global land area affected by at least one month of extreme drought reached a record-breaking 60.7% in 2024, 299% above the 1951-1960 average.

Climate change-induced higher temperatures and altered precipitation patterns increase the incidence of droughts, with multi-dimensional impacts on wellbeing, health, and survival.[84–87] Droughts threaten food productivity and nutritional outcomes, compromise water security and sanitation, and increase the risk of water-borne infectious diseases.[86–88] They also affect air quality by increasing dust exposure and favouring wildfire occurrence (indicators 1.2.1 and 1.2.4). They also affect wellbeing and livelihoods by disrupting power generation and compromising river transportation.[89]

This indicator uses the Standardised Precipitation and Evapotranspiration Index (SPEI) to track the impact of precipitation and temperature changes on the incidence of extreme drought.[90,91] The percentage of global land area affected by at least one month of extreme drought reached a record-breaking 60.7% in 2024, exceeding by 299% the 1951-1960 average. Of the global land area, 23% experienced over 6 months of extreme drought, compared to 1% in baseline years, with the Amazonian region, south, north and east Africa, and the Horn of Africa in particular, disproportionately affected (Figure 3).

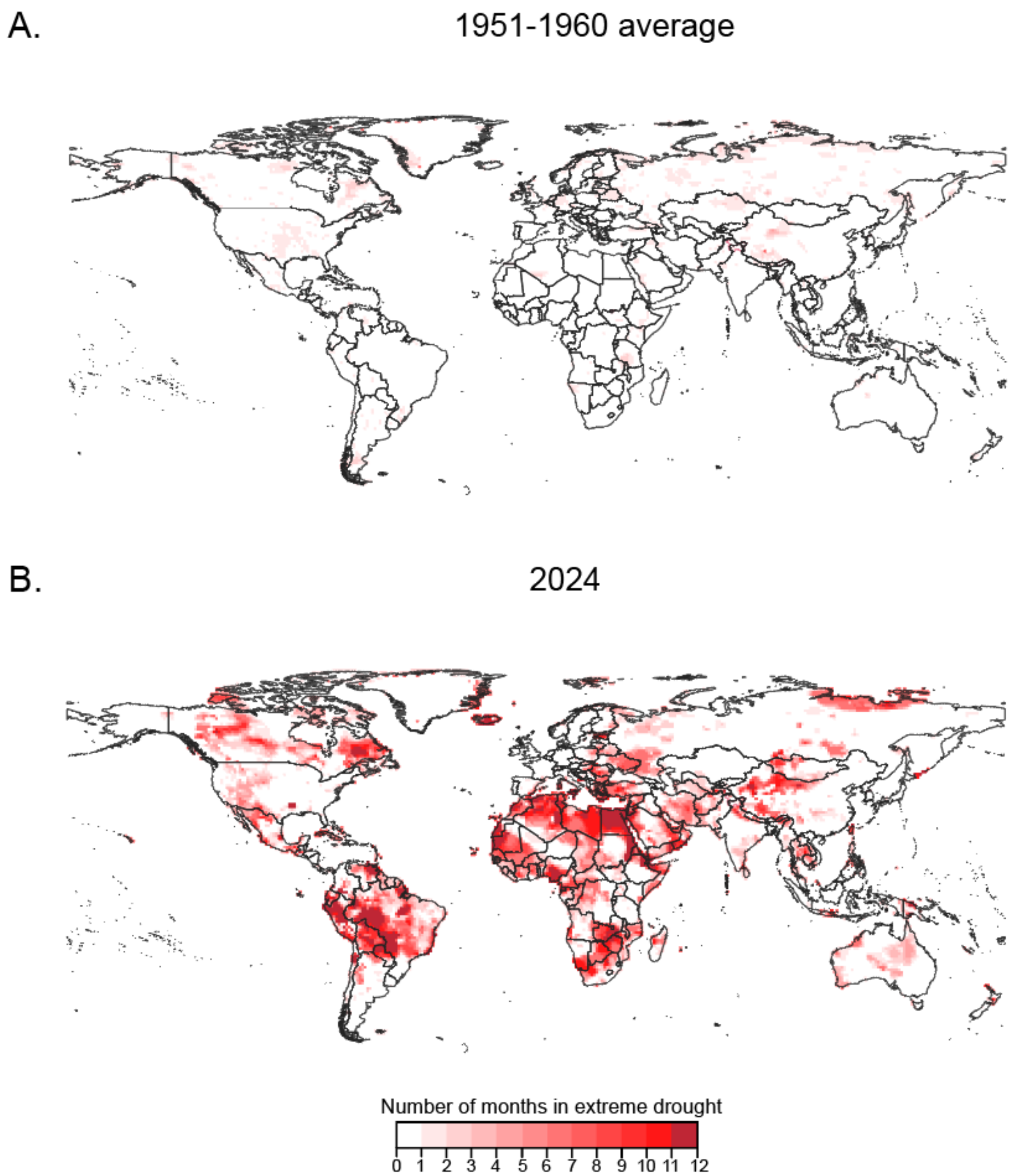


Figure 3: Annual number of months of extreme drought, on average, in 1951-1960 (A), and in 2024 (B)

Indicator 1.2.3: extreme precipitation

Headline finding: in 2015–24, a record 64% of global land area saw increases in extreme precipitation events from baseline, and in 2024 the average annual number of >99th-percentile events per 79 km^2 reached a record high of five.

Anthropogenic greenhouse-gas emissions have warmed the atmosphere, intensifying the hydrological cycle and increasing the risk of more frequent and intense extreme precipitation events.[58,59,92] These events—and the floods, landslides and environmental changes they trigger—can directly and indirectly increase the risk of respiratory and cardiovascular diseases, injury or drowning, damage to critical infrastructure, contamination of water supplies, waterborne disease outbreaks, and adverse impacts on mental health and sentiment.[77,93–97]

Compared to the 1961–90 baseline, the land area–weighted average number of annual extreme (>99th percentile) daily precipitation events per 79 km^2 increased by a record 11% in the recent 1995–2024 period, and rose to a record 5 events in 2024—1.3 more events than baseline, a 35% increase. Concurrently, 64% of global land area experienced an increase in extreme precipitation frequency during 2015–24, the highest share observed in the indicator's 30-year record.

Indicator 1.2.4: sand and dust storms

Headline finding: Between 2003–2012 and 2019–2023, the average annual number of days that people were exposed to desert dust levels above WHO guidance levels rose in 38% of countries and declined in 19%.

Sand and dust storms are driven by both climate change and land mismanagement. Hotter, drier conditions;[39] poor land use; and increased burned areas from wildfires intensify erosion. Sand and dust storms significantly raise particulate matter levels and pose numerous health risks, including increased risk for asthma and cardiovascular disease.[98–100] They also spread soil pathogens, causing diseases like Valley Fever and meningitis,[101] and reduce visibility, increasing traffic and aviation accidents.[102,103]

Between 2003-2012, and 2019-2023, people in the middle to high latitude (> 35°N) countries experienced higher levels of dust exposure. Days of exposure to desert dust above the WHO PM_{10} daily limit (45 μg/m^3) increased in 38% of countries (90% of which were Very High and High HDI), while decreased in 19% of countries (all are High and Very High HDI) (Figure 1). In the lower latitude (> 35°N) and southern countries, days of exposure to desert dust above the WHO PM_{10} daily limit (45 μg/m^3) increased in 23% of countries (30% of which were Very High and High HDI), but decreased in 34% of countries (66% of which were Medium and Low HDI). People in Africa and Asia faced the most exposure, with 98–105 days annually from 2019-2023.

Indicator 1.2.5: extreme weather and sentiment

Headline finding: in 2024, extreme heat events cumulatively worsened human sentiment by a record 132% relative to the 2006–22 baseline.

A growing body of literature outlines the myriad of ways that climate change is challenging mental health globally.[104,105] Among numerous pathways, anthropogenic climate change has increased the frequency, intensity, duration, and extent of heatwaves,[59] which can contribute both directly and indirectly to subclinical psychosocial stress,[93,106–112] and elevate clinical risks of anxiety, depression, mood, and substance use disorders, as well as self-injury and suicide.[67,113–116]

This indicator links a text-based sentiment analysis of over 8 billion geolocated social media posts from X (formerly Twitter) with coincident heatwave exposure via multivariate fixed-effects models and a multi-stage cumulative estimation procedure o estimate the annual population-weighted sentiment-altering impact of extreme heat. Between 2015 and 2024, extreme heat events worsened sentiment by an average of 33% above the 2006–22 baseline effect. In 2024, the annual effect reached 132% (95% CI: 102% - 162%) above baseline—the largest annual impact registered thus far.

1.3: Climate suitability for infectious disease transmission

Changing environmental conditions are affecting the transmission of vector-, water-, food-, air-, and soil-borne diseases.[117,118] The following indicators track the influence of climate change on the transmission of infectious diseases.

Indicator 1.3.1: dengue

Headline finding: the average climate-defined transmission potential of dengue by Aedes albopictus and Aedes aegypti increased by 48.5% and 17.0%, respectively, from 1951-60 to 2015-24.

Increasing human mobility, urbanisation, and increasingly favourable climatic conditions, have driven an increased global burden of dengue fever, which presents a growing public health challenge.[119–121] Approximately 7.6 million dengue cases were reported to WHO between January and April 2024, a three-fold increase compared to the same period in the previous year,[122] resulting in over 16,000 severe cases and more than 3,000 fatalities globally.[123] This indicator assesses the transmission dynamics of dengue by tracking its basic reproduction number (R_0). It uses a mechanistic framework integrating temperature, rainfall, daylight duration, and human population density data.[124–127] The estimated global average R_0 for *Aedes albopictus* and *Aedes aegypti* mosquitoes increased 48.5% and 17.0%, respectively, between 1951-60 and 2015-24 (Figure 4), reflecting an increased risk of dengue transmission globally. Similar trends were also observed for transmission suitability of chikungunya and Zika viruses. Overall, R_0 for chikungunya transmission by *Ae. albopictus* increased by 48.5%, and R_0 for Zika transmission by *Ae. aegypti* increased by 17.1% globally during 2015-24.

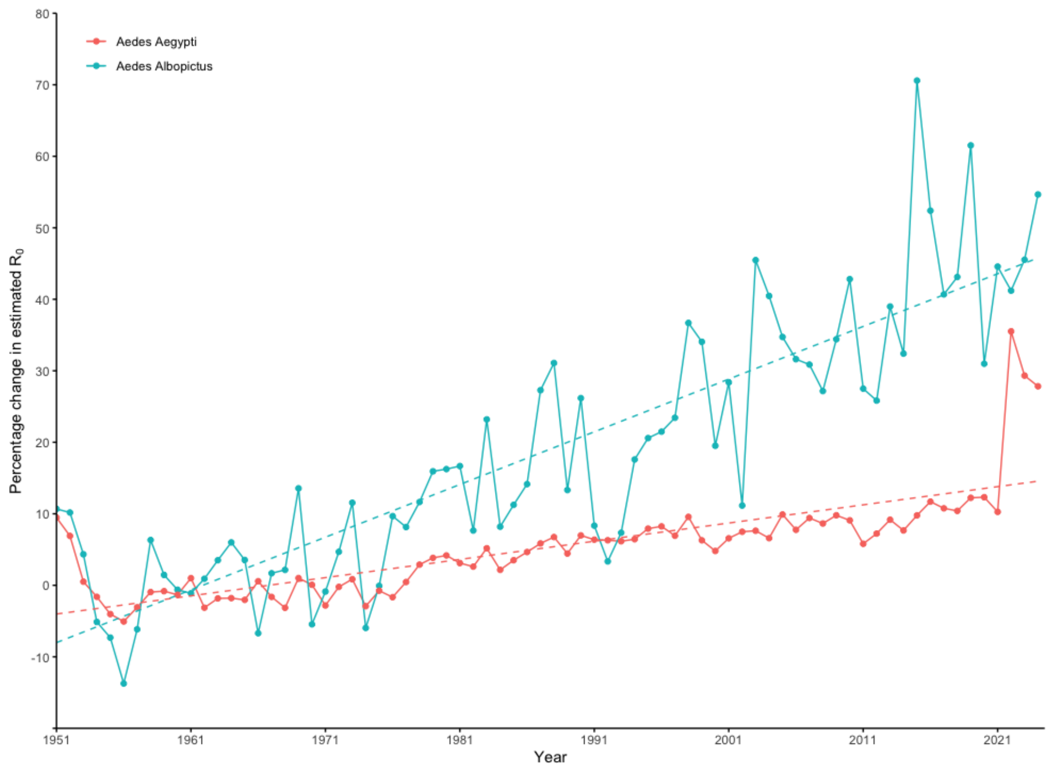


Figure 4: Percentage change in yearly average dengue absolute R_0 for Aedes albopictus and Aedes aegypti globally in the period 1950-2024.

Indicator 1.3.2: malaria

Headline finding: While changes in climatically suitable areas for malaria transmission have marginally increased globally from 1951-1960 to 2015-2024, there were *pronounced increases in highland areas, with a 14.6% increase for Plasmodium falciparum and 13.9% increase for Plasmodium vivax.*

Malaria claims over 500,000 lives annually, with children and pregnant women disproportionately affected.[128,129] The range and seasonality of malaria transmission are influenced by temperature, rainfall, and humidity, which are affected by climate change. This indicator monitors the length of season with climatically suitable conditions for malaria transmission caused by the two most prevalent malaria parasites (*Plasmodium vivax* and *Plasmodium falciparum*), spread by Anopheles mosquitoes.

Tropical regions generally show decreases, while temperate regions show increases in the length of season climatically suitable for malaria transmission. From 1951-1960 to 2015-2024, 28.2% of land area with Anopheles mosquitoes showed an increase, 47.3% showed a decrease, and 24.5% remained stable for the length of transmission season for *P. vivax*. For *P. falciparum*, 28.3% of land area remained stable, while 34.6% showed an increase and 37.1% saw a decrease. Over the same period, global land area suitable for malaria transmission increased by 1.3% for both *P. vivax* and *P. falciparum*. In highland regions (>1500m), areas suitable for *P. falciparum* transmission increased by 14.6% and by 13.9% for *P. vivax*.

Indicator 1.3.3: West Nile virus

Headline finding: The temperature suitability for West Nile virus transmission has increased by 0.7% from 1951-1960 to 2015-2024.

West Nile virus is a zoonotic pathogen transmitted by *Culex* mosquitoes, causing potentially fatal neurological disease in humans.[130] The virus is found world-wide, and the transmission range is expanding as local temperatures increase.[131] This indicator uses a mechanistic model built on experimental data, to track the temperature-dependent relative basic reproduction number of West Nile virus (WNV-R0) of three key *Culex* species.[132] Driven by changes in temperature, the average annual WNV-R0 was 0.7% higher in 2015-2024 compared to 1951-1960 in the regions where the three *Culex* species are present. During the same period, WNV-R0 increased in Very High (8.0%), High (1.8%), and Medium (1.1%) HDI countries. However, Low HDI countries experienced a decrease in R0 (-7.4%) as temperatures exceed the optimal range for WNV transmission.

Indicator 1.3.4: leishmaniasis

Headline finding: the number of countries with at least a 50% chance of one or more leishmaniasis case per year increased from 26 to 39 countries from 1951-1960 to 2014-2023.

Leishmaniases are potentially fatal diseases caused by *Leishmania* parasites, and transmitted by sand flies.[133] Endemic in 99 countries or territories, they disproportionately affect the poorest, with an estimated 700,000 to 1 million new cases every year causing 20,000-40,000 deaths.[133] Climate change-driven changes in temperature and humidity affect sand fly activity, metabolism, and development, increasing the length of the vector's infectious period and therefore infection risk.[134135] This indicator uses a machine-learning model driven by climatic and socio-economic variables, to estimate the probability of least one human leishmaniasis case in a given location (accounting for both cutaneous and visceral leishmaniasis, the most frequent and deadly forms, respectively).[136] From 1951-1960, 26 countries had 50% chance or more of at least one case of leishmaniasis each year; this number grew to 39 countries in 2014-2023 (50% increase). Regions at greatest risk include Africa, Asia, and the Eastern Mediterranean.

Indicator 1.3.5: tick-borne diseases

Headline finding: compared to 1951-1960, the area that is climatically suitable for Rhipicephalus sanguineus and Hyalomma ticks has expanded by 6.9% and 3.2%, respectively – putting an additional 364 million people at risk.

Ticks are the second most important arthropod vector of infectious disease transmission, after mosquitoes.[137] Their potential to transmit disease—shaped by their feeding behaviour and environmental distribution—can be influenced by climate change.[138] This new indicator tracks the environmental suitability for tick species that act as the primary vectors for the majority of human cases of tick-borne disease globally (*Ixodes spp., Hyalomma spp., Rhipicephalus sanguineus,* and *Amblyomma* *cajennense*).[139–141] It uses a threshold-based model that incorporates temperature, humidity, daylength, and land cover requirements specific to different tick species.

Between 1951-1960 and 2015-2024, the area with suitable weather conditions for *Rhipicephalus sanguineus* ticks increased 6.9% to an all-time high, while the number of months suitable for disease transmission by these ticks increased 12.4% for their presence and activity, putting a record-high approximately 325 million additional people (+4.7%) at risk of exposure. The suitable area for *Hyalomma* ticks increased by 3.2% from 1951–1960 to 2015–2024, with a 33% increase in suitable months for their presence and activity.

Indicator 1.3.6: *Vibrio*

Headline finding: a record-high 91,195 km of coastline waters showed environmental conditions suitable for Vibrio transmission in 2024 - a 3·2% increase from the previous record in 2023.

Vibrio pathogens are transmitted through contact with marine waters or contaminated seafood, potentially causing severe skin, ear, and gastrointestinal infections and life-threatening sepsis.[142] As climate change makes coastal waters hotter and less saline, *Vibrio* transmission potential increases.[143] This indicator uses a mechanistic model incorporating sea surface temperature and salinity, to monitor suitable coastal water conditions for Vibrio transmission.

In 2024, a record 85 countries showed coastal water conditions suitable for *Vibrio* transmission at any one time, and the coastline length with suitable conditions reached a record-high of 91,195 km – a 3·2% increase from the previous record in 2023 and 36% above the 1990-1999 average. The total population living within 100 km of coastal waters with conditions suitable for *Vibrio* transmission reached a record-high of 1.68 billion in 2024, up by 4·4% from the previous record-high in 2023. Vibriosis cases also hit a record high in 2024, with an estimated 722,780 cases globally.

Indicator 1.4: Food security and undernutrition

Headline finding: the higher number of heatwave days and drought months in 2023, compared to 1981–2010, was associated with 123·7 million more people experiencing moderate or severe food insecurity.

Between 713 and 757 million people faced hunger in 2023, and 2·8 billion people (35%) were unable to afford a healthy diet in 2022.[144] Temperature and precipitation extremes can reduce crop yields, farm worker labour capacity (indicator 1.1.3), and access to water and sanitation, and can disrupt supply chains. Climate change-induced coastal sea surface temperature elevation, reduced oxygenation, ocean acidification, and coral reef bleaching are compromising marine resources.[145–147] Increased food insecurity increases the risk of malnutrition which harms both health and economic development.[148]

The first part of this indicator combines data from the FAO Food Insecurity Experience Scale (FIES)[149] from 124 countries with annual heatwave days anomaly (compared to the 95th percentile of the frequency in 1981-2010), and drought months (SPEI–12) during the growing seasons of maize, rice, sorghum, and wheat, using a time-varying panel regression.[150] Compared to 1981–2010, the anomaly in annual heatwave days was associated with 3·15 percentage-points higher moderate or severe food insecurity in 2023, and the greater number of drought months was associated with food insecurity being 2·23 percentage-points higher. The combined effect is equivalent to approximately 123·7 million more people experiencing food insecurity due to climate change.

The second part of this indicator tracks sea surface temperature variations in coastal regions relevant for marine food productivity across 173 countries and territories from 1958 to 2024.[151] Average global coastal sea surface temperatures were 0.74°C higher in 2022–2024 than in 1981–2010, with Europe and Asia experiencing the greatest increases. This increase puts marine productivity at risk, particularly threatening coastal Indigenous and low-income fishing communities.[152] The loss of marine productivity can also drive a shift towards farmed fish consumption, which is generally of lower nutritional value.

Conclusion

In 2024, as global temperatures reached record levels, so have most of the health risks of climate change monitored in this section. All-time highs were documented across all heat indicators, with record numbers reported for heatwave exposure per person, hours of unsafe outdoor physical activity, lost labour capacity due to heat stress, and sleep loss from high night-time temperatures (indicators 1.1.1–1.1.4). The new heat-related mortality indicator demonstrates that heat-attributable deaths have risen by more than one-third since the 1990s (indicator 1.1.5). An all-time high number of deaths from wildfire-derived air pollution, and land area affected by extreme drought were also recorded in 2024, while extreme precipitation events and exposure to sand and dust storms continued to grow (indicators 1.2.1-1.2.4).

In 2024, there was a record-length of global coastline suitable for *Vibrio* transmission (indicator 1.3.6). Climate-defined suitability for the transmission of potentially fatal dengue, West Nile virus, Leishmaniasis, and tick-borne disease continued to grow, as did the converted land area suitable for malaria (indicators 1.3.1-1.3.4). Increased heatwaves and droughts also led to a record number of people facing food insecurity (indicator 1.4).

Collectively, this section illustrates the rapidly escalating, life-threatening effects of climate change. What these indicators, presented here in isolation, do not capture, is the potentially synergistic and compounding effects of the multiple health impacts of climate change occurring together, both on individual health, as well as on health systems, and the broader determinants of health. Evidence suggests that these multiple impacts are starting to affect the social, political, cultural, and economic conditions on which health depends, simultaneously heightening the risk of social unrest and conflict (Panel 3).

The year-on-year record-highs across multiple indicators provide evidence that climate change mitigation and adaptation policies to-date have been insufficient to protect people’s health and survival. Without the urgent and decisive action needed to curb the rising risks, the health impacts, which fall disproportionately on poorer countries, will accelerate.

Panel 3: Climate change, health, and conflict

The understanding of the links between climate change and conflict has grown substanially over the past 20 years. This relationship is now widely recognised as a complex, multicausal phenomenon shaped by local social and cultural dynamics, economic fluctuations, and geopolitical forces at both the domestic and international levels.

Structural conditions such as poverty, weak governance, and inequality elevate the risk of conflict.[5] Climate change, alongside delayed and unequitable adaptation measures (Section 2), causes system-wide impacts that simultaneously strain each of these drivers, exacerbating the risk of conflict: it undermines development, disrupts livelihoods, harms public health, and damages the economy (Section 1 and indicator 4.1); it can strain institutions, drive migration,[6,7] and increase the risk of violence.[8,9] These impacts, though individually may be of limited magnitude, often occur simultaneously, deepening social vulnerabilities,[8,10] compounding each other, and increasing the risk of social tipping points and conflict.[10]

The links between climate change and conflict are most pronounced in rural economies that rely on agriculture and renewable natural resources. Climate stressors such as extreme heat, shifts in rainfall patterns, droughts, and floods reduce crop yields,[11] lower household income,[12] reduce land ownership,[13] and raise food prices.[14] As a result, conflict risk then increases as, for example, inequality deepens and related grievances emerge.[8]

Empirical studies across Africa, Asia, and Latin America link droughts, especially during crop growing seasons, to higher risks of riots, communal violence, and insurgency.[15–17] Floods have also been shown to increase public support for violence.[18–20] Historical cases like the 2007–2008 food riots and the Arab Spring illustrate how climate-driven price shocks relate to unrest.[21,22] Newly-formed land following floods and extreme rainfall events trigger political instability and conflict where ownership and access to resources become contested.[23–25] Climate change intensifies these tensions as natural resources are further strained, and heatwaves and other climate-related extreme events, food insecurity, and poor health[26] interact to pose complex challenges for governance.[27]

Climate shocks can also trigger displacement, straining infrastructure, increasing job competition, and heightening intergroup tensions especially in ethnically divided or resource-scarce areas.[8] The Syrian case is frequently cited, though contested, as drought-driven migration may have contributed to unrest.[28,29] While environmental migrants are often viewed more favourably than economic migrants in high-income countries due to perceived deservingness,[30] studies from Sub-Saharan Africa and South Asia show that such distinctions are less pronounced and may at times result in low-level conflict.[31,32]

While many studies focus on the links between climate-induced resource scarcity and conflict, climate change and the response to it also increase the risk of conflict linked to resource abundance. In the quest for increasing renewable energy generation, tensions are rising over the ownership and exploitation of land containing essential minerals such as lithium, cobalt, copper and rare earth elements.[33] The melting of Arctic ice has similarly opened access to oil, gas, and fisheries, intensifying geopolitical competition over these resources.[34]

Preventing climate-related conflict requires a broad commitment to managing the social and economic transformations that accompany climate change. A just transition, one that ensures fairness in how the benefits of climate action are distributed, can reduce key drivers of instability by protecting livelihoods, addressing inequalities, and fostering inclusive development.[35] Strengthening food systems enhances resilience and reduces the risks of food insecurity and malnutrition, which are linked to social unrest. Likewise, protecting workers from climate-related shocks and disruptions can help prevent economic grievances from escalating into conflict. Although evidence remains limited, health-centered adaptation, such as investing in equitable climate-resilient health systems, may also contribute to social stability by reducing vulnerability and improving community trust and cohesion. In a time of growing geopolitical volatility, strengthening multilateral cooperation and ensuring that the transition is not only green but also just may be essential to building peace in a climate-affected world.[36]

Section 2: adaptation, planning, and resilience for health

Section 1 outlines the growing health risks and impacts that already result from climate change and insufficient adaptation efforts to date. With hazards set to continue growing even under the most ambitious climate change mitigation scenarios, urgent efforts to adapt systems, infrastructure, and communities are urgently needed to protect the health and survival of people today, and in the future.

Many of the adaptation actions needed align with low- or no-regret public health policies which have historically underpinned public health gains, including strengthening health systems, improving sanitation and hygiene, and advancing disease prevention.[153,154] Accelerating climate change adaptation for health requires efforts to address barriers, especially those that disproportionately affect low-resource settings, and further limit the capacity of the most vulnerable communities to adapt.[155,156] These include institutional weaknesses, resource constraints, knowledge gaps, and inadequate financing, many identified in the 2022 Global Stocktake – the world's assessment of progress on climate action and reaching Paris Agreement goals.[157] This is critical to deliver the necessary move from planning to tangible, widespread implementation of adaptation measures that effectively reach those most in need.

Indicators in this section track progress and challenges in assessing, planning, and delivering climate change adaptation for health; the conditions that facilitate health adaptation; and the changing vulnerabilities to adverse climate-related health outcomes. While major data limitations restrict the capacity to develop global indicators on climate change adaptation for health, country-led efforts to report indicators of progress towards the WHO's Global Programme of Work 14, as well as towards the UNFCCC's Global Goal on Adaptation is likely to advance the available data to inform an increasingly comprehensive assessment in upcoming years.

2.1 Assessment and planning of health adaptation

Comprehensive assessments of climate- and climate change-related health risks are crucial to inform the planning and implementation of urgent health adaptation interventions. The following indicators track the progress on health adaptation assessments and planning.

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

Headline finding: as of March 2025, 58.0% (112/193) of WHO member states reported having ever completed a vulnerability and adaptation assessment.

Vulnerability and adaptation (V&A) assessments allow for a comprehensive understanding of the potential health risks and impacts associated with climate change. They provide critical information to decision-makers, inform planning and intervention activities, and guide resource allocation.[158]

As of March 2025, 112 (58.0%) of 193 WHO member states reported having completed a V&A assessment, while 45 (23.3%) had not ever completed a V&A and 36 (18.7%) did not have data available. Of those that have completed a V&A, 19 (17%) are classified as Low HDI, 17 (15.2%) as Medium HDI, 31 (27.7%) as High HDI, and 44 (39.3%) as Very High HDI countries.

The Alliance for Transformative Action on Climate and Health (ATACH) – led by the WHO – tracks the implementation of COP26 Health Programme commitments, including V&A assessments.[159] Among countries that have opted in and made voluntary commitments to make their health systems more resilient and sustainable, 73.9% (68/92) of ATACH members had ever completed a V&A, which is a much higher rate than those WHO members that are not part of ATACH (43.6%, 44/101).

Indicator 2.1.2: national adaptation plans for health

Headline finding: as of March 2025, 60.1% (116/193) of WHO member states reported having ever completed a Health National Adaptation Plan (HNAP).

HNAPs are critical for integrating health risks of climate change in national planning and decision-making processes. They can help to ensure that health is considered and incorporated into climate change adaptation policies, programmes, and interventions.

As of March 2025, 116 (60.1%) of WHO member states reported having ever completed a HNAP, while 43 (22.3%) had never completed a HNAP and 34 (17.6%) did not have data available. Of those members with HNAPs completed, 39.3% (44) are Very High HDI countries, while 30.4% (34) are High, 17.9% (20) are Medium, and 15.2% (17) are Low HDI countries.

Of countries that voluntarily committed to developing more sustainable and resilient health systems through the WHO's ATACH, 73.9% (68/92) have ever completed a HNAP. This is a much higher rate than those who have not opted into ATACH (47.5%, 48/101).

Indicator 2.1.3: city or state-level climate change risk assessments

Headline finding: in 2024, 834 (97%) of 858 cities reported having completed, being in the process of conducting, or expecting to conduct city-level climate risk and vulnerability assessment .

With 56% of the world's population currently living in urban areas, and an expected increase to 70% by 2050, cities have a major role to play in protecting health amidst growing climate change impacts.[160] Since 2017, this indicator uses data from the CDP (formerly Carbon Disclosure Project) to report on city-level assessments of climate change risks.[161] In 2024, of the 858 cities or states voluntarily responding to the climate risk assessment module, 834 (97%, 1% higher than 2023) reported having completed, being conducting, or planning to conduct within two years, city-level climate risk and vulnerability assessment. Using newly compiled historic data, 1,429 cities or states (62%, 2,318) have reported undertaking at least one climate risk and vulnerability assessment since 2015.

Of the 820 (96%) cities responding to the health module (a reporting record), 605 (74%) noted climate change to be impacting either health outcomes, health systems or other sectors relevant to health. Of the 605, 61% (499) noted impacts on health outcomes, 27% (219) noted impacts on health systems and 9% (77) noted impacts on other sectors relevant to health. Leading climate-related health hazards identified included urban flooding (28%, 170), storms (21%, 127), heat stress (17%, 107) and extreme heat (16%, 99). Heat-related illnesses (41%, 251), disruption to health-related services (25%, 151) and exacerbation of NCD (23%, 140) were the leading public health issues identified.

2.2: Enabling conditions, adaptation delivery, and implementation

Successful health adaptation requires enabling conditions including good governance, multistakeholder collaboration, stable and long-term financing mechanisms, technology transfer and capacity building. The following indicators track progress on conditions that are important enablers for health adaptation.

Indicator 2.2.1: climate information for health

Headline finding: in 2024, 161 (83%) of 193 World Meteorological Organization members reported providing climate services for the health sector.

The use of climate data is critical to effectively anticipate and respond to climate-related health risks and to assist public health planning and decision-making.[162] This indicator uses information from the World Meteorological Organization's (WMO) Climate Services Dashboard to track the delivery of climate services to the health sector across WMO member states.[163]

In 2024, 83% of WMO members (161/193) reported their meteorological sector provided climate services for the health sector. The South West Pacific WHO region had the most member states providing climate services for health (21/22, 95%). It was followed by Africa (47/53, 89%), Europe (42/50, 84%), Asia (28/34, 82%), South America (9/12, 75%), and North Central America and the Caribbean (14/22, 64%). Data services were the most commonly provided service (149/193, 77%), followed by climate monitoring (120/193, 62%), climate analysis and diagnostics (117/193, 61%), climate predictions (103/193, 53%), tailored products (99/193, 51%), and climate change projections (81/193, 42%).[163]

Indicator 2.2.2: benefits and harms of air conditioning

Headline finding: since 2000, the share of households with air conditioning has nearly doubled, reaching 37% in 2023, potentially saving 114,000 lives annually. While 48% of households in High and Very High HDI countries had air conditioning, only 2% in Low HDI countries did.

As heat-related health risks grow (indicators 1.1), so does the need for cooling to protect vulnerable populations from heat-related morbidity and mortality. Unprecedented heat exposure in 2024 led to a 5% increase in building-related electricity consumption, largely from air conditioning (AC).[164] While AC is an effective cooling tool, it can exacerbate inequalities in energy consumption, GHG emissions, air pollution and environmental degradation.[165] It can also increase outdoor heat exposure through its waste heat.

Data from the International Energy Agency (IEA) show that the proportion of households with air conditioning nearly doubled between 2000 (19%) and 2023 (37%). This increase was dominated by Very High HDI (increasing from 35% to 48%) and High HDI (from 16% to 48%) countries. China (High HDI) dominated this trend, with the share of households with air conditioning growing from 24% in 2000 to 73% in 2023. In contrast, AC access grew from 1% to only 2% in low HDI countries across the same period (Figure 5).

Although the energy efficiency of air conditioning has improved, operating units remain energy intensive and expensive. Since 2000, air conditioning-related greenhouse gas emissions rose 89%, to 1,100 $MtCO_2$ in 2023, exceeded by the national emissions of only six countries.[166]

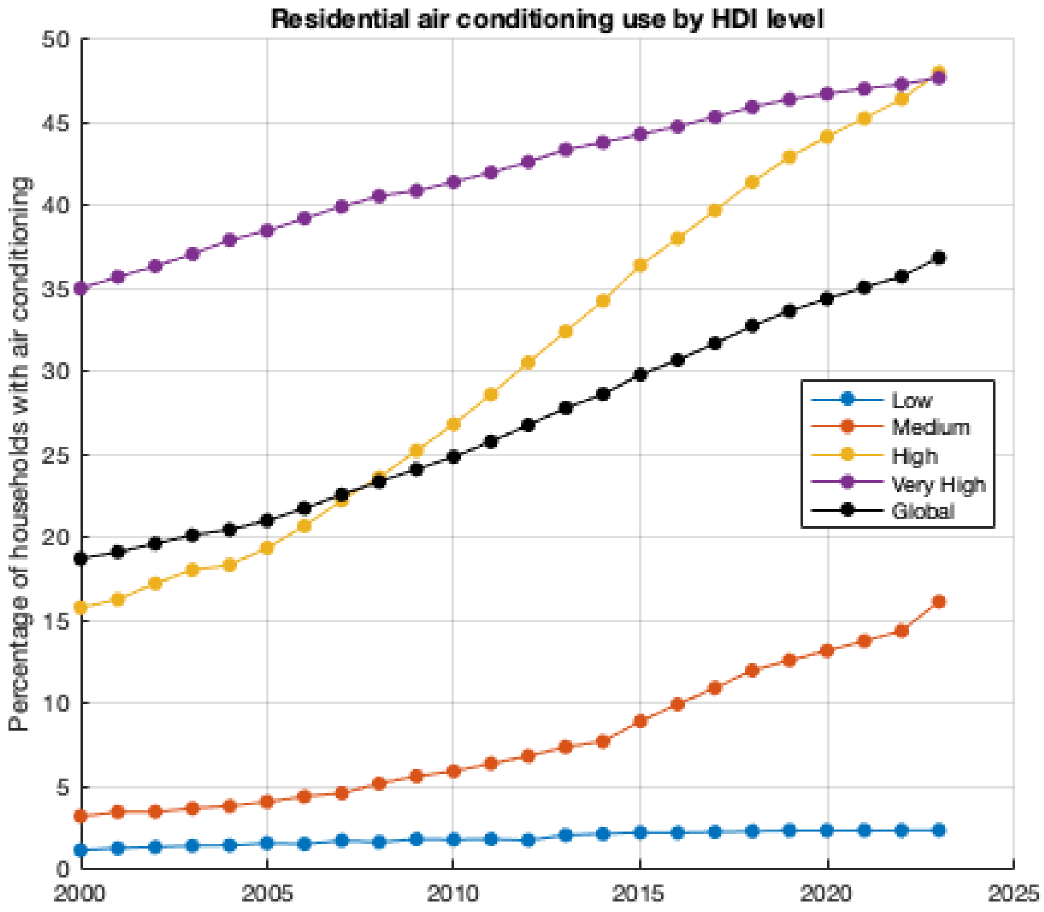


Figure 5: Annual percentage of households with air conditioning, from 2000 to 2023, globally and by HDI Group

Indicator 2.2.3: urban green and blue spaces

Headline finding: in 2024, exposure to urban greenspace remained practically unchanged from the 2015-2020 average (+0.2%), with individual city changes ranging from -34% to +69%.

Green spaces can provide local cooling by reducing the intensity of heat islands,[167,168] and they can also reduce flood risk.[169,170] Exposure to urban green spaces can also have substantial positive effects on physical and mental health.[171–174] Similarly, urban blue spaces (rivers, lakes, and coastlines) are also linked to improved mental and physical health.[175] This indicator uses population-weighted Normalized Difference Vegetation Index (NDVI) from Landsat satellite data to estimate green space exposure for 1041 urban centres across 174 countries (Figure

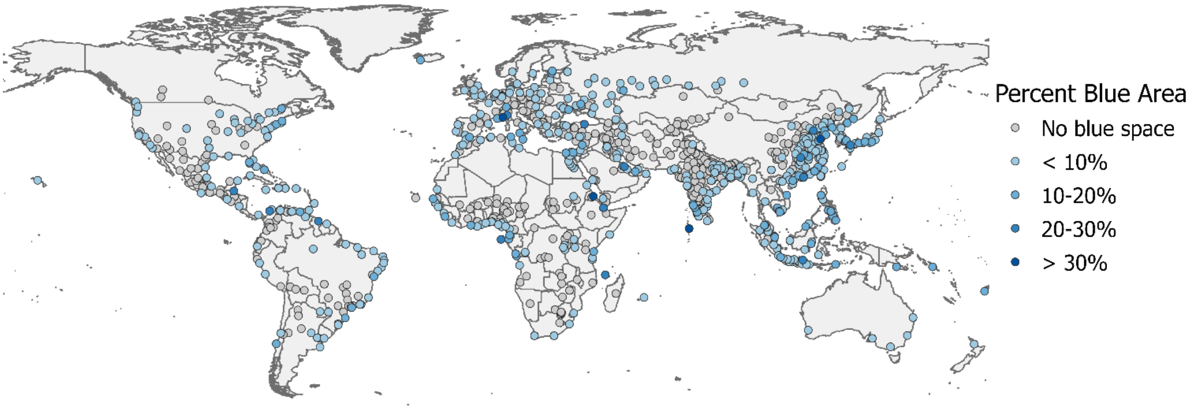


Figure 6). New this year, this indicator includes a calculation of the percentage of each city that is considered blue space using satellite-derived landcover data.[176] While substantial changes were recorded in green space exposure in individual cities (from 69% increase to 34% decrease), global and regional population-weighted peak-season NDVI has remained largely unchanged since 2015. On average, cities with Very High and High HDI experienced slight increases in NDVI in 2024 (+1.6%), while those with Medium and Low HDI experienced slight decreases (-2.1% and -1.7%, respectively).

On average across the 1,041 cities, blue spaces made up 2.9% of the urban area (Figure 6). Blue spaces were more abundant in more developed cities, accounting for 4.2% of the urban area in cities in Very High, 3.1% in cities in High, 1.8% in cities in Medium, and 1.8% in cities in Low HDI countries. Using combined green and blue space landcover percentages, cities in Low HDI countries had a higher proportion of combined green space and blue space (42%) than cities classified as “High” (29%) or “Very High” (20%).Given the potential health benefits of urban green spaces, increasing access, while preventing gentrification and managing risk of infectious disease transmission, could represent a key adaptation tool.

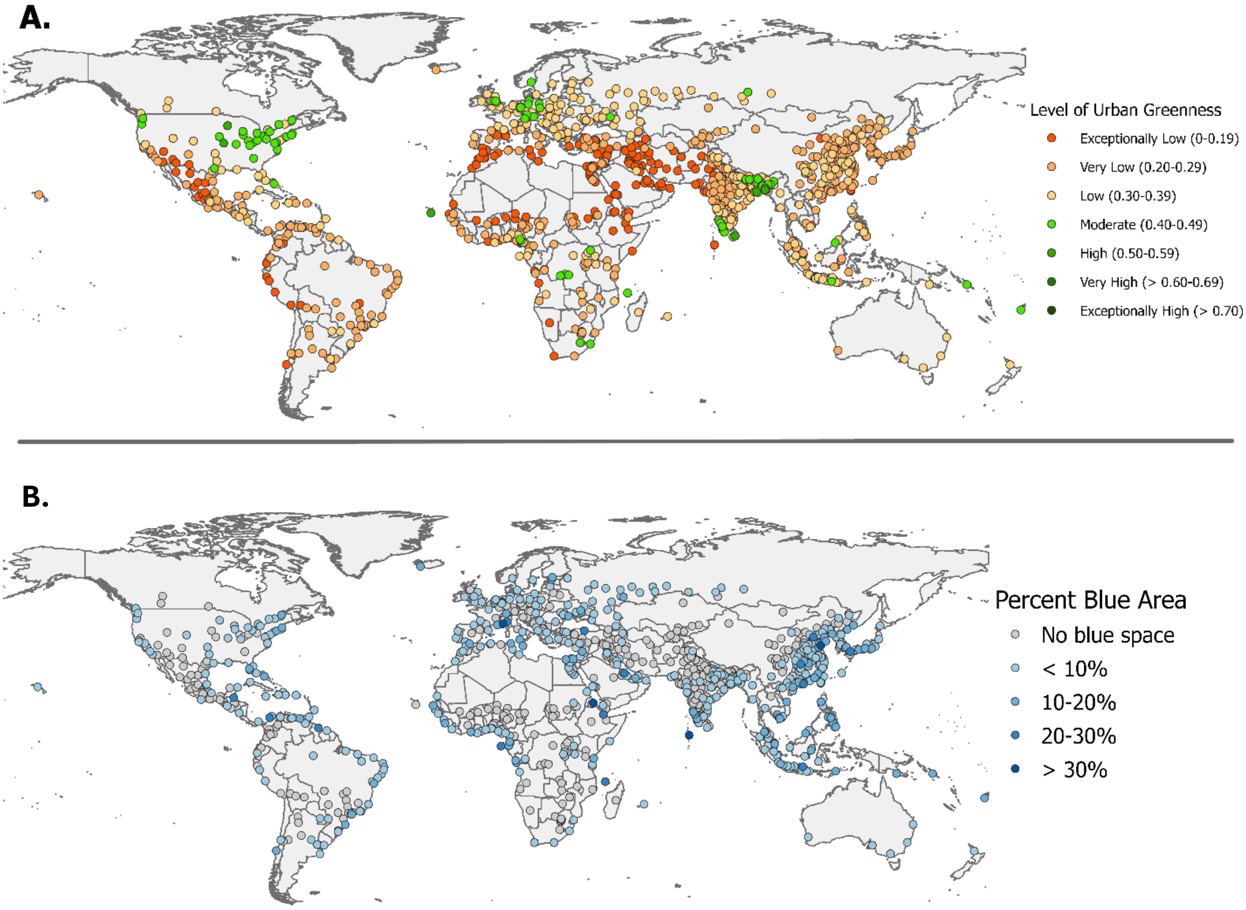


Figure 6: Level of urban greenness in urban centres with more than 500,000 inhabitants in 2024 (panel A). Urban greenness is characterized by the population-weighted peak (greenest) season Normalized Difference Vegetation Index (NDVI). panel B shows the percent of the urban area that is blue (water bodies, permanent wetlands). In both A & B, each dot represents a city.

Indicator 2.2.4: detection of, preparedness for, and response to health emergencies

Headline finding: in 2024, 135 (69%) of 196 WHO member states reported having high-to-very-high implementation of health emergency management capacity, an increase of 4 countries with respect to 2023.

Sufficient emergency preparedness and response capacity is key to reduce the impact of health emergencies, including those resulting from extreme events and disease outbreaks which are increasingly likely due to climate change.[177]

This indicator monitors the level of implementation of the International Health Regulations core capacity on health emergency management (capacity 7) and financing for public health emergency response (capacity 3.2). Self-reported data from the electronic States Parties Self-Assessment Annual Reporting tool are used.[178]

In 2024, 135 (69%) of 196 countries reported high to very high implementation (score of 61–100) of health emergency management capacities, of which 57 (42.2%) were very high HDI countries, 38 (28.1%) were high HDI countries, 26 (19.3%) were medium HDI countries, and only 11 (8.2%) were low HDI countries.

The level of implementation of capacity 7 was positively associated with that of capacity 3.2 in 2024, with very high and high HDI countries having the highest levels of implementation for both. Low HDI countries tend to have low to medium levels of implementation for both capacities.

Indicator 2.2.5: climate and health education and training

Headline finding: in 2024, 66% of 454 public health and 72% of 147 medical institutions worldwide provided climate and health education, reaching 20% of students enrolled in public health and 64% of those in medical education.

Health professionals play a pivotal role in addressing climate-related health impacts, and climate education is key to build local capacities for an informed response.[179–183]This indicator assesses the number of students receiving climate and health education in degree-granting public health and medical institutions, drawing on the world's largest survey in this field, which ran from October 2024 to February 2025 covering 454 degree-granting public health institutions across 90 countries, and 147 medical institutions across 46 countries.

The offer of climate change and health education by surveyed public health institutions was comparable across all HDI country groups, with highest coverage in Very High HDI countries (73%, compared to 68% in Low, 54% in Medium and 66% in High HDI countries). Most training occurred in master's programs (34%), and was mandatory in only 15% of all institutions. Larger differences were recorded among medical institutions, with 85% of those in Very High HDI countries providing climate education, compared to 40% of those in Low HDI, 50% in Medium, and 50% in High HDI countries. From all medical students receiving climate education, only 7% were from Low HDI countries. However, 64% of all institutions made education mandatory.

These findings suggest that climate education remains insufficiently integrated in medical and public health training, leaving many future professionals unprepared to recognise, prevent, and manage climate change-related risks, especially in the most vulnerable countries.[184]

2.3: Vulnerabilities, health risk, and resilience to climate change

As climate-related health hazards grow, adaptation measures are needed to reduce vulnerability and minimise associated risks. This group of indicators monitors the change in health vulnerabilities to climate hazards.

Indicator 2.3.1: vulnerability to severe mosquito-borne disease

Headline finding: global vulnerability to severe dengue increased by 32% from 1990-1999 to 2015-2024, with High HDI countries seeing the largest increase (56.3%).

Climate change is increasingly favouring the transmission of dengue and other urban mosquito-borne diseases (Indicator 1.3.1).[185] Inadequate sanitation and waste management, limited surveillance, warning and response systems, and limited access to preventive measures and healthcare, can increase the vulnerability to adverse outcomes, exacerbating health risks.[186] This indicator, in an improvement from previous years, captures relative vulnerability to severe dengue by combining susceptibility from urbanisation and coping capacity from health-care access and quality, measured by dengue mortality.[187]

Global vulnerability to severe dengue increased by 32% from 1990-1999 to 2015-2024. The highest relative increases were seen in High and Medium HDI countries (56.3% and 50.6%, respectively), followed by Low HDI countries (48.1%), and Very High HDI countries (10.1%). These increases were mostly driven by urbanisation.

Indicator 2.3.2: lethality of extreme weather events

Headline finding: adjusted for HDI, countries with Health Early Warning Systems (HEWS) showed a significantly faster decline in the annual mortality rate from floods and storms from 2000 to 2024 than countries without HEWS (3.2% vs 1.6% decrease per year, p<0.001).

Extreme weather events are changing in frequency, intensity, and duration,[59] posing direct risks to health and wellbeing.[104] Climate-informed early warning systems for health (HEWS) can help buffer the impact of these events on health outcomes and death.[188]

This indicator combines data from the Centre for Research on the Epidemiology of Disasters' emergency events database (EM-DAT) and data from the 2021 WHO Health and Climate Change Survey.[189] A negative binomial regression model was fitted to evaluate the association between disaster-related mortality (due to floods and storms) and the implementation of HEWS for injuries. As HDI level likely plays an important role in disaster preparedness and disaster-related health outcomes, the model adjusts for HDI group.

Observed population-weighted mortality rates decreased substantially between the 2000-2009 and 2015-2024 periods. Whilst countries without HEWS showed a notably larger decrease (53%) compared to those with HEWS (17%), they also had substantially higher mortality rates in the 2000-2009 baseline period compared to countries with HEWS (0.034 vs 0.007 deaths per 100,000). Consequently, despite achieving a greater percentage reduction, the mortality rate for the non-HEWS group in 2015-2024 (0.016 deaths per 100,000 people) remained considerably higher than in countries with HEWS (0.006 deaths per 100,000 people). Overall, countries with HEWS showed a significantly higher rate of decline in annual mortality, than countries without HEWS (3.2% vs 1.6% decrease per year, p<0.001).

Indicator 2.3.3: rising sea levels, migration, and displacement

Headline finding: in 2024, 156.7 million people were living less than 1 m above current sea levels. As of December 2024, 59 national policies identified across 44 countries connected climate change and migration while mentioning health.

Between 1993 and 2023, global average sea level rose 101.4 mm and it is projected to continue rising.[190,191] Sea level rise (SLR) is already affecting low-lying coastal communities, cities, and islands.[192,193] In 2024, 156.7 million people lived less than 1m above sea level. SLR impacts include saltwater intrusion, erosion, loss of coastal ecosystems, and flooding, which can negatively affect livelihoods, damage infrastructure, contribute to mental and physical health risks, and lead to direct injury and death.[194–196]

Populations can adapt to SLR through, among others, engineered coastal defences, ecosystem management, or land reclamation. Human migration and relocation could be a response where in situ adaptation limits are reached.[197] Some people might be unable or unwilling to move, becoming trapped.[198]

As of December 2024, 59 national policies identified across 44 countries connected climate change and migration while mentioning health. Three policies, each from a different country, mentioned immobility in the context of climate change. The policies rarely demonstrate a significant basis in science examining links or lack of links among climate change, (im)mobility, and health. Policies focus on the negative impacts of climate change affecting mobility and health, with limited focus on the impacts and responses that might improve health and wellbeing. Some nuances appear, such as adapting health systems to deal with migration and how the health of existing migrants could be affected by climate change.

Conclusion

The findings from this section reveal some positive steps on adaptation for health in recent years, including an increase in city-level risk assessments (indicator 2.1.3), high levels of provision of meteorological services for health (indicator 2.2.1), and evidence suggesting HEWS has reduced mortality from extreme weather events (indicator 2.3.2). However, they reveal that overall progress has been uneven and insufficient, with High and Very High HDI countries making most progress, while Low HDI countries are less prepared and supported.

National-level adaptation planning and assessment remains slow, with only a third of surveyed countries completing V&A and HNAPs since 2020 (indicators 2.1.1 and 2.1.2). Key policies on mobility and migration rarely demonstrate links among climate change, (im)mobility, and health (indicator 2.3.3). Furthermore, the number of countries reporting high to very high levels of implementation of health emergency management capacity has remained stagnant (indicator 2.2.5), and vulnerability to dengue is increasing globally (indicator 2.3.1).

Although enough evidence and knowledge are available to inform adaptation intervention, the previous two sections show how delays in their delivery have already resulted in avoidable death, disease, and loss of livelihoods. Equitable allocation of sufficient resources is urgently needed to prevent the worst impacts of climate change now and in the future. However, the challenges to adaptation will continue to grow, and the limits to adaptation (financial, technological and political) loom closer, unless combined with an urgent decrease in GHG emissions, to keep global temperature rise within the limits of our capacity to adapt.

Section 3: Mitigation Actions and Health Co-benefits

The gap between current global emissions and the reductions needed to meet the Paris Agreement goals has continued to widen in 2024. With current policies and commitments, the world is heading toward a mean temperature increase of 2.7°C above the pre-industrial average, by the end of the century.[199] Without immediate and unprecedented action, the capacity to adapt will be exceeded and climate impacts will continue to grow.[200]

Indicators in Section 3 reflect the multifaceted relationship between mitigation actions and public health outcomes, and monitor progress – or lack thereof – towards limiting climate hazards to health. They track progress on the energy transition that defines both GHG emissions and health outcomes; the potential health co-benefits from improved air quality resulted from reducing fuel combustion; the health opportunities of transitioning to low-emissions food systems and diets; tree cover loss, vital due to its impact on carbon sinks, respiratory health and zoonotic disease risks; and healthcare sector emissions, exposing the importance of ensuring that efforts to improve health do not inadvertently generate net harms to health by exacerbating climate change-related risks.

3.1: Energy use, energy generation, and health

The energy sector is the largest single contributor to global greenhouse gas (GHG) emissions, accounting for approximately 68% of the total.[201] The transition towards zero-emission energy is key for human health and survival: it can not only result in reduced emissions and increased efficiency, but can also improve air quality, equitable and stable access to energy, and ultimately reduce inequities, improve health, and protect people from the life-threatening risks of climate change.

Indicator 3.1.1: energy systems and health

Headline finding: Global energy-related emissions grew by 1.6% during 2023, pushing associated CO_2 emissions to a new all-time high.

UNEP Emissions Gap Report shows that energy-related fossil fuel-derived CO_2, which accounts for about 68% of global GHG emissions, was the primary driver of emissions growth in 2023.[201] To prevent the most catastrophic climate change scenarios, global GHG emissions must rapidly drop, especially in the energy sector. This indicator tracks energy sector mitigation based on data from the International Energy Agency (IEA). The energy sector saw a 1.6% increase in emissions in 2023, and this increase translated to a 2% rise in global GHG emissions (above the 0.3% increase in 2022). The share of fossil fuels (including coal, oil and natural gas) in the global total energy supply (TES) has decreased minimally from 82% in 2016 (when the Paris Agreement entered into force) to 81% in 2022 (equivalent to 1993 levels).[202] In line with this drop, the carbon intensity of the energy sector reached a new record-low of 54.8 tCO2 per TJ in 2022, falling by 3.7% over the period from 2016 to 2022.[202]

Among fossil fuels, coal emits the most carbon per unit of energy and causes the highest levels of toxic air pollution, including PM, SO_2, NO_x, and other contaminants. Coal phase-out is therefore crucial to protect people's health from immediate harms, as well as for those posed by climate change. However, the share of coal used for electricity supply has increased to record levels in Low, Medium and High HDI countries since 2016, reaching 9.9%, 67.9%, and 53.1% respectively in 2022. Very High HDI countries, in contrast, reduced the share of coal from 24.7% in 2016 to 17.3% in 2022. These trends highlight persistent global inequalities in access to clean energy. As countries work to meet the growing demand for electricity, keeping health and equity at the heart of that transition is important to avoid exacerbating disparities.

Modern renewable energy enhances energy efficiency, reduces pollution, and benefits public health. It can also be delivered in remote locations, helping reduce energy poverty and driving progress toward net-zero emissions and sustainable development.[203] The share in the use of modern renewable energy for electricity generation has continued to grow, from 5.5% in 2016 to a record-high 12.1% in 2022. Low, Medium, High and Very High HDI countries all show an increase in the share of clean renewables, 2.2%, 4.4%, 7.6% and 6.6% respectively. However, disparities persist in the access to clean renewable energy. While 13.3% of the energy in Very High HDI countries, and 12% in High HDI countries, comes from renewables, this share is only 8.6% in Medium HDI countries, and just 3.5% in Low HDI countries in 2022.

The unequal transition to clean energy and the continued growth in energy-sector emissions show that a structural transformation in this sector is urgently needed to avoid the most dangerous climate change scenarios.

Indicator 3.1.2: household energy use

Headline finding: The proportion of household energy coming from harmful solid biomass dropped from 28% in 2016 to 26% in 2022. However, 88% of the energy in Low, and 64% of the energy in Medium HDI countries still came from solid biomass in 2022.

Energy access is essential to good health, enabling healthy indoor temperatures, the refrigeration of food and medicines, providing access to information and education, supporting everyday activities and employment.[204] Energy-poor households often rely on highly polluting biomass to meet their energy needs. This widens intra-household inequities, as women and children are often in charge of sourcing this fuel, which exposes them to risks of violence and injury, and hinders their capacity to undertake employment and education.[205] Globally, while 15 million people gained electricity access between 2022 and 2023, 745 million still lack this essential resource.[206]

Using IEA data, this indicator monitors main fuel types used in the residential sector. Globally, per-capita household energy consumption rose by 2% between 2016 and 2022. While the share of household electricity use grew from 26% to 28%, the use of heavily polluting solid biomass in the household sector decreased from 28% in 2016 to 26% in 2022, and that of coal by 1.5%, driven by progress in Medium and High HDI countries. The use of natural gas, which is less polluting than solid fuels but still contributes to household air pollution and, importantly, to climate change, increased by 0.8% between 2016 and 2022. There was very little change with solid biomass and electricity use in both Low and Very High HDI countries. In 2022, solid biomass remained the dominant source of household energy in Low HDI countries, accounting for 88%, while electricity made up just 4%.

Despite some improvement since 2010, there were still 675 million people without access to electricity and 2.3 billion people relying on polluting fuels and outdated technologies for cooking globally in 2022, hindering sustainability and public health.[207,208] Dirty fuel combustion for cooking creates severe indoor air pollution, disproportionately harming women and children in lower HDI countries.[209] According to WHO data tracking progress toward Sustainable Development Goal 7 (SDG7), only 60% of the global rural population had access to fuels that are cleaner than solid fuels (including electricity, liquefied petroleum gas, natural gas, biogas, solar energy, and alcohol) in 2023, compared to 77% of the urban population.[210] Major inequities persist between countries, with just 13% of the population in Low HDI countries having access to these resources, against 98% in Very High HDI countries.

Notably, although SDG7 classifies natural gas and liquefied petroleum gas as clean fuels, their combustion still releases toxic nitrogen dioxide (NO_2), and its burning contributes to climate change, threatening people's health and survival. LPG and natural gas are often considered transition fuels, as they are typically less polluting than coal. However, between 2016 and 2022, the use of liquid fossil fuels and natural gas in households remained steady at around 35%. Usage rates varied significantly during this period, averaging 47.3% in very high HDI countries, 33.9% in high HDI, 16.7% in medium HDI, and only 6.5% in low HDI countries. These figures highlight the importance of addressing energy poverty by expanding access to reliable, healthy, and renewable energy sources, especially in the world's most underserved regions.

Indicator 3.1.3: sustainable and healthy road transport

Headline finding: Despite rapid uptake of electric vehicles, less than 0.38% of global road transport energy was supplied by electricity in 2022, up from 0.28% in 2021.

The shift away from combustion engine vehicles is essential to climate change mitigation. If done right, this transition can help avoid nearly 1.5 million deaths caused by transport-derived air pollution (see indicator 3.2.1), encourage more equitable access to public transport, help reduce traffic in urban centres, and improve population health if safe active travel options are implemented. The global road transport system is in the early stages of a major technological shift away from fossil fuels, towards the use of battery electric vehicles. China is leading this shift, where 49% of new car sales in 2024 were electric vehicles.[211] In contrast, the growth in EVs has slowed in the US and Europe.[212] This indicator tracks the share of overall road transport energy by fuel type using data from the IEA. It finds that, while the use of electricity for road travel increased by 36% from 2021 to 2022, it remained at only 0.38% of global road energy. In China, electricity still accounted for only 2% of all road travel energy in 2022; while fossil fuels accounted for the remaining 98%, exceeding the proportion in most European countries. The use of electricity increased to 5.2% and 1.6% in Norway and Sweden, respectively, where fossil fuel use fell to 83.7% and 71% in road transport in 2022.

Phasing out fossil fuel vehicles is necessary for limiting climate change and has the substantial benefit of reducing harmful air pollution. However, the greatest health gains are available through shifting to active travel and zero-emissions public transport.[213]

3.2: Air quality and health co-benefits

Many sources of GHG emissions also contribute to air pollution, exposure to which increases the risk of respiratory and cardiovascular disease, certain cancers, diabetes, neurological issues, and complications during pregnancy.[214] This section examines how mitigation measures may offer health co-benefits by reducing air pollution.

Indicator 3.2.1: mortality from ambient air pollution by sector

Headline finding: Deaths attributable to ambient $PM_{2.5}$ from fossil fuel combustion decreased by 5.8 % from 2.68 million in 2010 to 2.52 million in 2022.

Understanding the source of emissions of GHG and air pollution is key to devising effective climate change mitigation measures with health co-benefits. This indicator combines atmospheric modelling with emitting sectors' activities information, to estimate mortality associated with anthropogenic ambient $PM_{2.5}$.

This indicator uses estimates of sectoral source contributions to annual mean exposure to ambient $PM_{2.5}$ calculated with the GAINS model and calculates their health impact using a Fusion risk model.[82] The model now accounts for emissions from vehicles that do not comply with emissions standards, leading to higher figures than in previous reports. Since 2010, global average exposure to total anthropogenic $PM_{2.5}$ decreased by 9.0%, from 23.1 to 21.0 μgm^{-3}, while exposure to $PM_{2.5}$ from fossil fuels decreased by 18.7%, from 10.1 to 8.2 μgm^{-3}. A significant part of this reduction, however, was caused by the introduction of more stringent air pollution control technologies which did not reduce CO_2 emissions.[37]

Deaths attributable to $PM_{2.5}$ from fossil fuels decreased from 2.68 million to 2.52 million (5.8%) from 2010 to 2022, mostly driven by reduced coal use in Very High and High HDI countries (Figure 7). Despite the reduction, 1.00 million annual deaths were still attributable to coal combustion globally in 2022. That year, the use of fossil fuels in road travel resulted in 1.20 million deaths globally, while fossil fuels in the power sector accounted for 0.74 million, and the use of polluting fuels (including biomass) in the household sector contributed to 1.18 million – in addition to the many more resulting from indoor air pollution.

Lockdowns during the COVID-19 pandemic only caused a small decrease in $PM_{2.5}$ in 2020 and 2021, mostly due to reduced traffic, and did not have a lasting effect on longer term trends. Low HDI countries, with comparably younger populations and lower ambient air pollution, had the lowest ambient anthropogenic $PM_{2.5}$-related mortality in 2022 (33 deaths per 100,000); however, mortality from fossil fuel-derived $PM_{2.5}$ in this group increased 13% between 2010 and 2022, from 8.0 to 9.1 per 100,000. Meanwhile, mortality from fossil fuel-derived $PM_{2.5}$ decreased by 40% in Very High HDI countries. Medium HDI countries, which are still heavily dependent on fossil fuels but have not yet adopted efficient air pollution emission controls face the highest mortality from fossil fuel-derived $PM_{2.5}$ (43 deaths per 100,000).

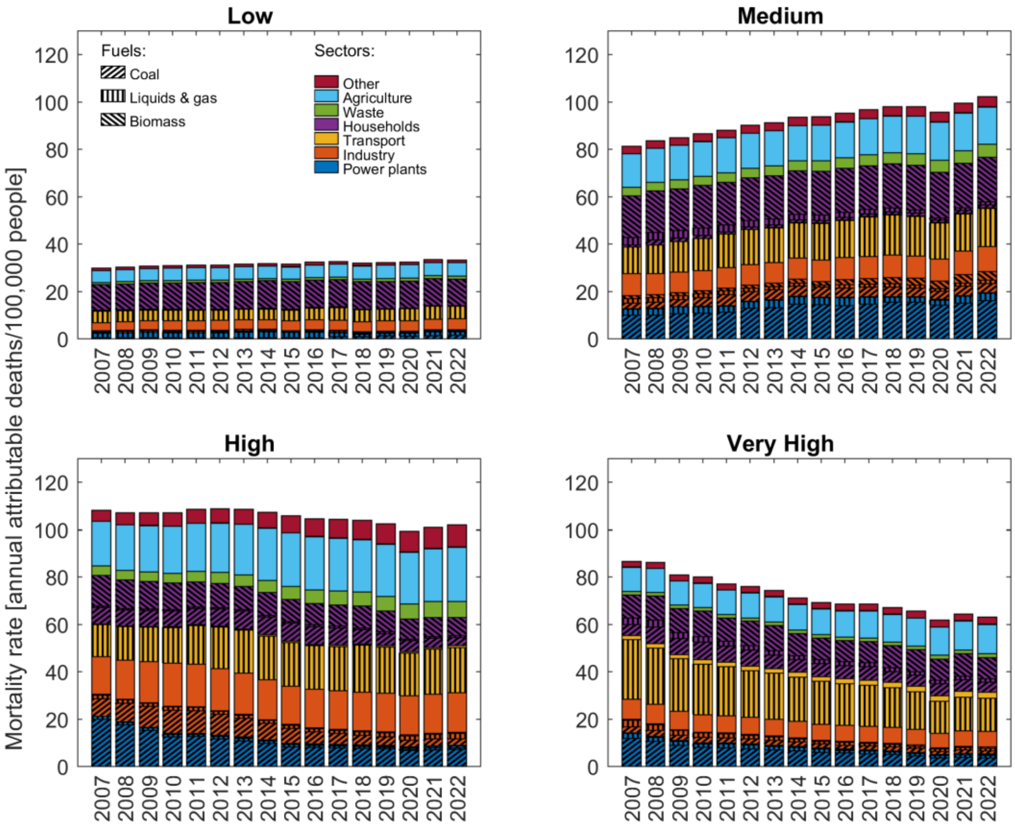


Figure 7: Annual mortality rates attributable to $PM_{2.5}$ exposure from 2007–22, by fuel, sector, and HDI country-level.

Indicator 3.2.2: household air pollution

Headline finding: in 2022, household use of dirty fuels and inefficient technologies for cooking and heating resulted in 2.3 million deaths and accounted for 7% of global CO_2 emissions.

The persistent use of dirty fuels and inefficient technologies in the household sector leads to high levels of exposure to indoor $PM_{2.5}$ air pollution (including the highly-toxic black carbon) (indicator 3.1.2).[215] This indicator uses a Bayesian hierarchical model to estimate exposure to household air pollution by source of emission in 65 of the countries most dependent on dirty fuels and inefficient technologies for cooking and heating.[216]

The use of polluting fuels for cooking and heating across these countries led to national-level average household indoor $PM_{2.5}$ concentrations of 410 μg/m^3 [95% CI 351-469] in 2022, vastly exceeding the WHO's 5 μg/m^3 air quality guideline annual level. This was a very small decrease (0.5%) from 2020. Rural households are most affected, with an average of 511 μg/m^3 [95% CI 443-579], compared with 149 μg/m^3 [95% CI 125-173] in urban households in 2022.[217,218] Using previous estimates that people in these countries spend about 60% of their time indoors,[217,219,220] exposure to this air pollution would result, on average, in 78 [95% CI 72-84] deaths per 100,000, with a rural average of 84 [95% CI 78-90] and an urban average of 60 [95% CI 54-66]. For the 65 countries studied, this would have resulted in 2.3 million deaths in 2022, a slight decrease (0.03%) from 2020.[218]

The use of biomass, charcoal, and coal for cooking and heating across the 65 countries emitted about 2.69 Gt of CO_2; with 2.21 Gt of CO_2 from rural areas and 0.48 Gt from urban areas. This accounts for approximately 7% of global CO_2 emissions.[221] The burning of charcoal, coal and unsustainably harvested biomass in households resulted in 0.94 Gt of CO_2; 0.72 Gt of CO2 emitted in rural areas, and 0.22 Gt in urban areas. This accounts for approximately 2.3% of global energy-related CO_2 emissions,[221] which remains a substantial contribution.

3.3: Food, agriculture, and health co-benefits

Food systems account for up to 30% of global GHG emissions, with the agricultural sector being a major contributor. Many of these emissions are related to unhealthy diets, leading to high levels of morbidity and mortality. This group of indicators monitors GHG emissions from the agricultural sector, and the potential health gains from a transition to low-emission diets.

Indicator 3.3.1: emissions from agricultural production and consumption

Headline finding: Global agricultural GHG emissions increased by 36% from 2000 to 2022, with red meat and dairy responsible for 55% of agricultural emissions in 2022.

Agricultural emission sources include fertilisers, manure, rice paddies, enteric fermentation in ruminants, and peatland drainage. Using observed data and statistical models, this indicator shows that, while global average agricultural emissions per person remained stable at approximately 0.9 tCO_2e from 2000 to 2022, total emissions reached an all-time high in 2022, up by 36% from 2000 and 2% from 2021, with red meat and dairy responsible for 55% of them. Improvements in agricultural efficiency were undermined by faster increases in red meat consumption.

Agricultural emissions per person in Very High-HDI countries increased by 8% between 2000 and 2022, reaching 1.2 tCO_2e per person, 74% higher than in Low-HDI countries. Of these, 39% come from red meat consumption. High HDI countries follow next, with 1.0 tCO_2e emissions per person (40% from red meat). Emissions per person are similar in Low and Medium HDI countries (0.8 and 0.7 tCO_2e), with 52% and 67% associated with the consumption of red meat, respectively. In Low HDI countries, notably sub-Saharan Africa, red meat-related emissions are mainly driven by inefficient agricultural practices and natural constraints that lead to low productivity and high emission intensity of animal rearing, rather than high consumption.

As food systems become increasingly strained by environmental changes (indicator 1.4), dietary shifts towards less polluting, more resource-efficient foods and food production systems will be needed.[222]

Indicator 3.3.2: diet and health co-benefits

Headline finding: Between 2021 and 2022, deaths related to unhealthy diets increased from 148 to 150 per 100,000 people, reaching 11.8 million, including 1.9 million deaths from excessive red meat and dairy intake.

Diets high in animal-source foods are not only a major driver of greenhouse gas emissions (indicator 3.3.1), but they also impact health.[223,224] Red and processed meat are risk factors for non-communicable diseases, and excessive intake of animal-source foods also contributes to weight-related morbidity and mortality.[225,226]

This indicator is based on a comparative risk assessment of diet and weight-related diseases using risk-disease relationships from meta-analyses of epidemiological cohort studies, updated data on food intake, body weight, and population numbers, and projections of cause-specific mortality.[227,228]

Between 2021 and 2022, diet-related deaths increased from 148 to 150 deaths per 100,000 people (+265,000 deaths), to 11.8 million attributable deaths. These included an increase from 23 to 25 deaths per 100,000 attributable to red meat and dairy intake (+8.7%), reaching 1.9 million deaths.

The largest proportional increases in total attributable deaths came from high meat intake (+85,000; 6%), followed by excessive intake of refined grains (+ 115,000; 5%). The relative increases in diet-related disease burden were greatest in High HDI countries (+4 deaths/ 100,000; 2.5%), followed by Low HDI (+1 deaths/100,000; 1.5%), Very High HDI (+3 deaths/100,000; 1%), and Medium HDI (+1 deaths/100,000; 1%) countries (Figure 8).

The health impacts of imbalanced diets have increased further between 2021 and 2022, with particularly large increases from excessive intake of meat and refined grains. Greater efforts, including dedicated food policies, will be needed to help citizens adopt diets that are healthier and more climate-friendly.[224,229,230]

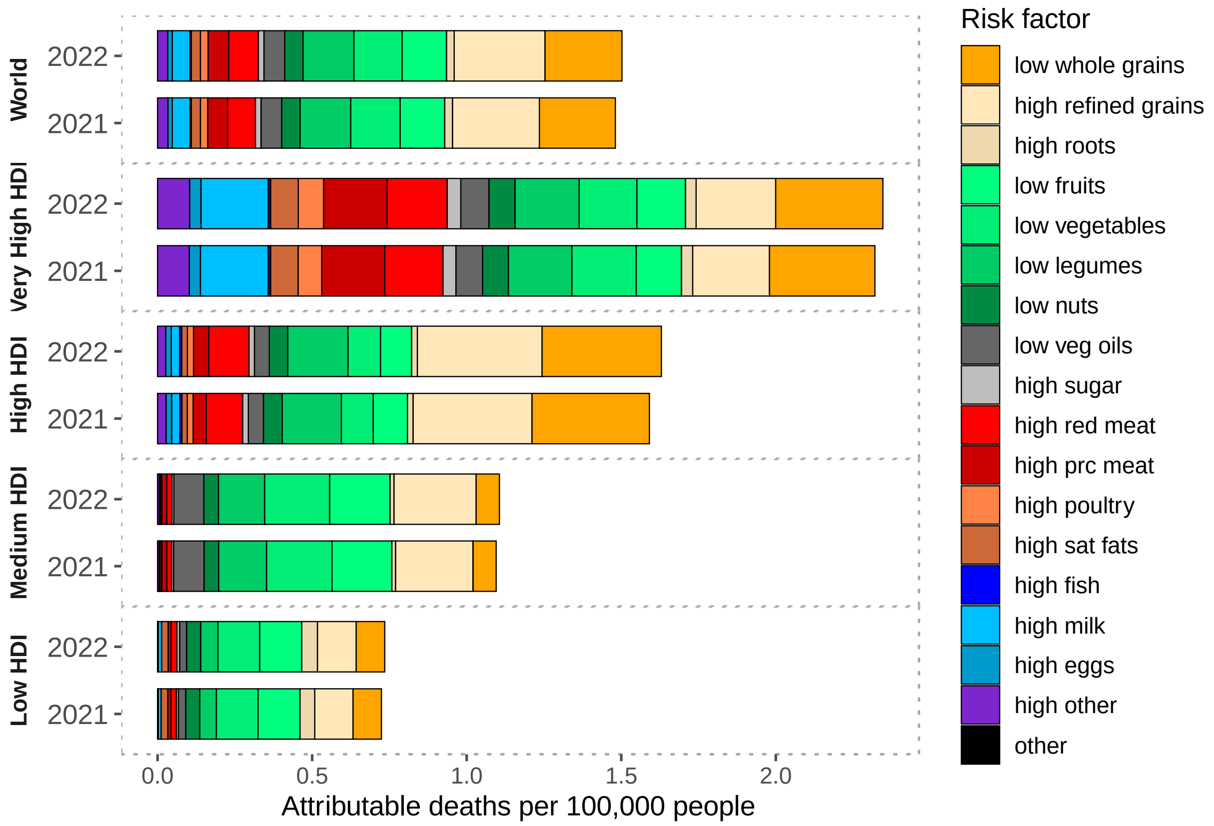


Figure 8: Deaths attributable to imbalanced diets by development region, year, and risk factor. Risks factors include direct risks from imbalanced dietary composition, as well as indirect ones from imbalanced energy intake of food groups.

Indicator 3.4: tree cover loss

Headline finding: In 2023, global tree cover loss increased to over 28 million hectares (up 27% from 22 million in 2022), with unprecedented wildfire-driven losses in Canada.

Trees and forests are carbon sinks and biodiversity reservoirs, providing essential ecosystem services that protect public health.[231] Tree cover loss, particularly in urban areas, increases heat exposure and reduces air quality, while deforestation can increase the risk of zoonotic infections.[232,233]

Between 2001 and 2023, the cumulative annual tree cover lost reached 487 million hectares, of which 28 million were lost in 2023 alone – the third highest level recorded since 2001. Of the losses in 2023, 31.9% were due to wildfires, 28.5% to logging, and

23.4% to shifting agriculture. Very High HDI countries experienced the highest-recorded level of tree cover loss in 2023, reaching approximately 16 million hectares—up from 11 million in 2022. Annual tree cover loss remained relatively unchanged between 2022 and 2023 in Medium and Low HDI countries, at around 3 million hectares in each group, as well as in High HDI countries, at about 6 million hectares (Figure 9).

Many countries experience substantial increases in tree cover loss between 2022 and 2023, following years of relatively stable levels, including Nicaragua (+140.0%), Australia (+60.3%), Indonesia (+57.6%), and Lao PDR (+38.5%). Canada saw the biggest absolute increase, losing 8.57 million hectares (an increase of 272%, and representing 30.3% of global losses), mostly due to wildfires (accounting for 76.4% of its tree cover lost in 2022). The health implications of these losses are profound, particularly for Indigenous communities whose lands contain 36% of intact global forests.[234]

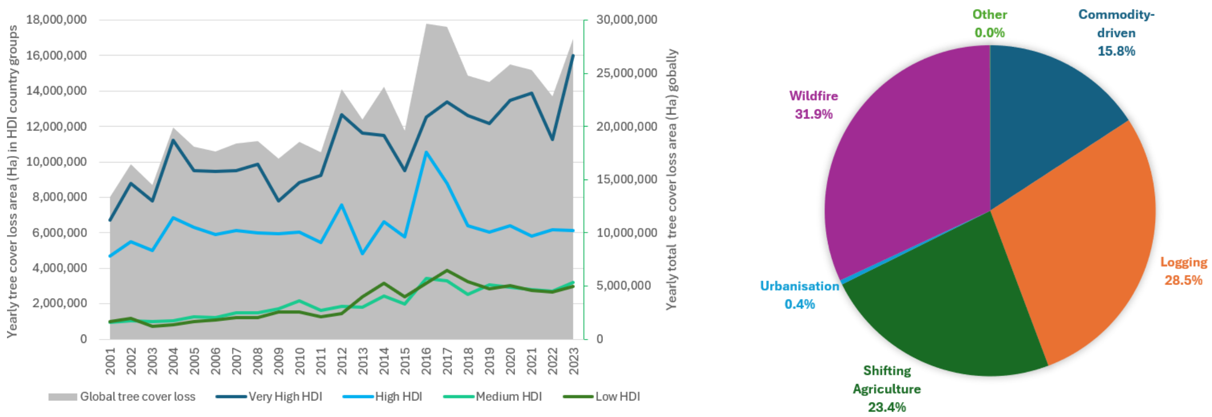


Figure 9: Left: Annual loss of tree cover in different HDI country groups (left axis) and globally (right axis). Right: global driver of tree cover loss in 2023.

Indicator 3.5: Healthcare Sector Emissions and Harms

Headline finding: following spikes in emissions related to the COVID-19 pandemic, healthcare-associated GHG emissions fell by 12% between 2021 and 2022, to 4.2% of global emissions.

The healthcare sector, which accounts for approximately one-tenth of global GDP,[235] contributes to polluting emissions through its activities. This indicator quantifies healthcare sector emissions of GHGs, ozone and $PM_{2.5}$ using a top-down spend-based method employing the environmentally-extended multi-region input-output (EE-MRIO) model EXIOBASE and health expenditure data, alongside epidemiological models of air pollution-related health damages. For the first time, it also estimates emissions by GHG Protocol Scope 1 (direct on-site emissions); Scope 2 (purchased energy); and Scope 3 (value chain).[236]

Healthcare contributed 4.2% of global GHG emissions in 2022 (2.15 Gt CO_2e), falling for the first time since 2016 (12% reduction from 2021), although remaining 20% higher than in 2016 (Figure 10). Associated $PM_{2.5}$ and ozone pollution also fell back to 2020 levels, accounting for approximately 4 million disability-adjusted life-years (DALYs) lost. Of all healthcare GHG emissions, 8.5% each are Scope 1 and Scope 2, with Scope 3 making up the remaining 83%. The reduction in emissions in 2022 was led by post-COVID decreases in health expenditure and by falling carbon intensities of electricity, especially in China and the US, which together contributed 63% of global healthcare emissions and 30% of the decrease. Low and Medium HDI countries, where expansion of health services is a priority, contributed just 4% of the total. To achieve decarbonisation and healthcare quality goals, health systems must tackle their emissions while improving healthcare access and quality. By prioritising improvements in energy efficiency, reducing inappropriate care, and selecting goods with fewer emissions, immediate benefits to care quality with fewer emissions can be realised.

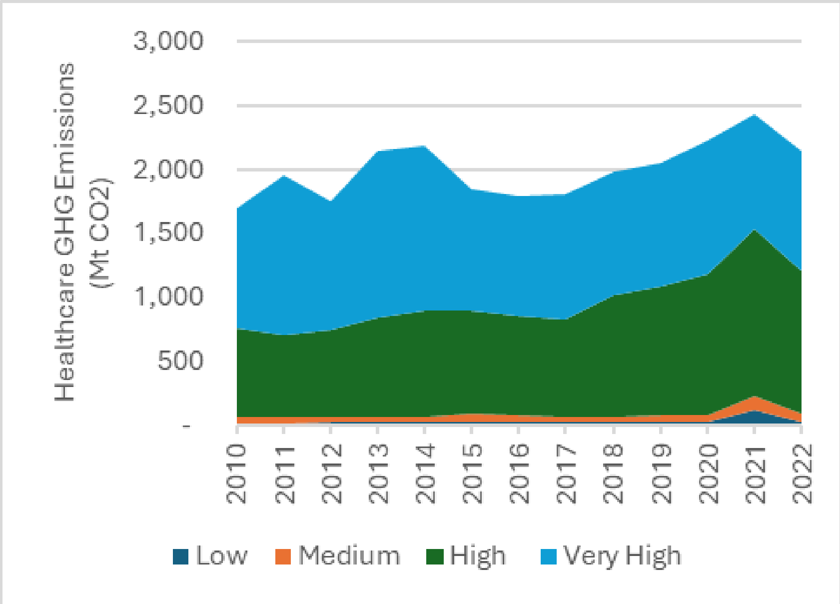


Figure 10: Total annual greenhouse gas(GHG) emissions from the healthcare sector from 2010 to 2022, by HDI country group.

Conclusion

This section highlights both persistent challenges and emerging opportunities at the intersection of climate change mitigation and public health. The continued growth in global energy-related emissions driven by fossil fuel use, the increase in coal use for electricity in many countries, and the widespread reliance on highly-polluting fuels for household energy (particularly in lower HDI countries), and the slow progress in decarbonising road transport, increasingly threaten people's health. Similarly, the burden of diet-related diseases linked to high meat and refined grain intake is rising, as is global tree cover loss, with detrimental implications for biodiversity and human health.

Yet, the opportunities for protecting health and addressing climate change are evident in the continuous decrease in the share and carbon intensity of fossil fuels in the total energy supply, and the increasing global uptake of modern renewable energy. Progress in reducing the use of harmful solid biomass in households and the global decrease in deaths attributable to fossil fuel $PM_{2.5}$ are encouraging. The potential for progressing mitigation while improving health outcomes through cleaner cooking solutions, shifts towards healthier diets, and increasing healthcare appropriateness, highlight the critical need for accelerated and equitable transitions across all sectors to safeguard public health while achieving climate goals.

Section 4: Economics and Finance

Climate change continues to pose profound risks to the global economy, with escalating impacts on health, wellbeing, and social stability. Physical damages and sectoral disruptions, particularly in agriculture and tourism, are driving direct economic losses, while health-related impacts reduce labour productivity and increase healthcare costs.[237,238] Extreme weather is rendering more assets uninsurable (Panel 4), and as climate volatility intensifies, financial institutions and governments face mounting costs of inaction, often without adequate policy frameworks or investment strategies for long-term resilience.[239,240] Without accelerated mitigation and adaptation action, climate change could erode 19% of the global income by 2050, with a likely range of 11% to 29%, depending on the severity of physical impacts and economic vulnerabilities.[3] Left unaddressed, these pressures risk deepening poverty and inequality, especially in countries facing structural vulnerabilities.

COP29 provided an opportunity to advance international climate finance. While some procedural progress was made on the New Collective Quantified Goal, the agreed US$300 billion annually fell far short of developing countries' demands.[241] A loose commitment to mobilise US$1.3 trillion annually lacks guarantees for concessional or grant-based funding, while accountability mechanisms remain undefined. Similarly, although the Loss and Damage Fund launched at COP28 attracted new pledges at COP29, disbursement mechanisms and donor commitments remain opaque.[242,243] Little progress has been made in delivering the US$1 billion pledged at COP28 for climate and health.[244] The situation has worsened through 2025, with the global climate finance landscape showing signs of fragmentation and retreat, as international commitments weaken in the face of rising anti-climate populism and nationalism.[245,246]

This section tracks indicators across three areas critical to the economic transition towards a healthier, low-carbon future: the economic costs of climate-related health impacts; progress in restructuring economies for health and sustainability; and the alignment - or misalignment - of financial systems with these objectives. A new indicator on adaptation finance also monitors the growing shortfalls in funding.

4.1: The economic impact of climate change and its mitigation

As climate change-related health impacts grow, so do the associated economic losses. The following indicators monitor the economic losses associated with delayed climate action, which further undermine the socioeconomic conditions foundational to good health.

Indicator 4.1.1: economic losses due to weather-related extreme events

Headline finding: in 2024, weather-related extreme events caused US$ 304 billion in global economic losses, 58.9% increase from the 2010-2014 annual average.

As extreme weather events become more frequent and intense in the changing climate, their health and economic impacts are also increasing. In 2024, the United States alone experienced 27 separate events that each caused over US$1 billion in damages.[247] This indicator monitors economic losses from extreme weather events using data from Swiss Re.[248]

In 2024, weather-related extreme events caused US$ 304 billion in global economic losses, representing 0.27% of global GDP, and of which 55.7% were uninsured. Losses in 2024 were 58.9% higher than the 2010-2014 annual average. From 2010-2014 to 2020-2024, average annual economic losses from extreme weather increased by 38% in real terms, to US$ 264 billion, and the percentage of global losses that were uninsured fell from 67.0% to 54.2%. While 52.1% of losses in Very High HDI countries were insured in 2024, 2.9%, 0.9%, and 7.2% of those in Low, Medium, and High HDI countries, respectively, were insured. Hence much work is still needed to close the insurance protection gap, and to prevent the inequitable distribution of the economic burden of climate change onto lower HDI countries.

Indicator 4.1.2: costs of heat-related mortality

Headline finding: the average annual monetised costs of global heat-related mortality for those over age 65 for 2020-2024 were US$ 261 billion, an increase of 208% from 2000-2004.

In 2024, record-breaking high temperatures resulted in record-breaking heat-related mortality and associated economic losses globally. This indicator calculates the monetised value of age-structured heat-related deaths by combining years of life lost (YLL) with the value of a statistical life-year (VSLY). The global economic value of heat-related deaths of people over age 65 rose to US$ 344 billion in 2024 – the highest level since 2000, and 306% higher than the 2000-2004 annual average. Average annual costs during 2020-2024 were US$ 261billion, 208% higher than in 2000-2004. Low HDI countries saw a greater growth from 2000-2004 to 2020-2024 than the global average, at 235%, with growth of 224% in Medium, 270% in High, and 160% in Very High HDI countries.

Indicator 4.1.3: loss of earnings from heat-related labour capacity reduction

Headline finding: Labour capacity reduction due to heat exposure led to US$ 1.09 trillion in global potential income losses in 2024, 39% of which occurred in the agricultural sector.

Heat exposure can make work less productive or more dangerous (indicator 1.1.3). Associated reductions in labour capacity result in income losses. In turn, loss of livelihoods can undermine the socioeconomic determinants of physical and mental health. This indicator uses the International Labour Organization (ILO)'s wage data to quantify the potential loss of earnings resulting from potential heat-related labour capacity loss estimates from indicator 1.1.3.[249]

In 2024, heat exposure resulted in a record-high global potential loss of income worth US$1.09 trillion, equivalent to 0.99% of global GDP - breaching for the first time US$ 1 trillion, following a 17% growth from 2023. These losses were unequally distributed, reaching an average equivalent to 5.3% and 4.3% of GDP in Low and Medium HDI countries, respectively (up from 4.8% and 3.8% in 2023), compared with 1.3% and 0.7% of GDP in High and Very High HDI countries, respectively. The agricultural sector was most affected, with 39% of all global losses, and an average of 74% and 65% of the potential losses in Low and Medium HDI countries, respectively. The global construction sector saw 28% of all losses.

Indicator 4.1.4: costs of the health impacts of air pollution

Headline finding: In 2022, the monetised value of air pollution-related mortality was US$ 4.84 trillion, equivalent to 4.7% of global GDP.

This indicator estimates the monetised value of the years of lost life (YLLs) from exposure to anthropogenic $PM_{2.5}$ (as per indicator 3.2.1).

The value of these losses was US$ 4.84 trillion in 2022, equivalent to 4.7% of global GDP – down by 4.7% since 2021. While absolute losses were highest in Very High HDI countries (US$ 2.31 trillion), these fell 33% since 2007, in line with more stringent air quality control. However, absolute losses rose by 72%, 121%, and 154% since 2007 in Low, Medium, and High HDI countries, respectively. Relative to GDP, average losses in 2022 were highest in Medium and High HDI countries at 8.3% and 7.3% of GDP, respectively, compared to 3.3% of GDP in Very High HDI countries. Losses were only 3.2% of GDP in Low HDI countries in 2022, reflecting a lack in industrialisation rather than a transition to clean technology, and that these estimates do not account for household air pollution-related deaths.

4.2: The transition to net zero-carbon, health-supporting economies

A rapid and safe transition away from a fossil fuel-dependent global economy is key to a healthy future. This transition can bring major health benefits. To do so, it must also avoid unintended and inequitable consequences. This section monitors progress in enacting this economic transformation in employment, company strategies, stranding risks, exposure, resilience and transboundary emissions, highlighting current inequities in the transition.

Indicator 4.2.1: employment in low-carbon and high-carbon industries

Headline finding: Direct and indirect employment in renewable energy grew 18.3% in 2023 to 16.2 million employees, while direct employment in fossil fuel extraction decreased 0.7% to 9.06 million.

Employees in the fossil fuel sector often face greater health risks than in the renewable sector,[250,251] and the renewable energy sector can provide more local job opportunities per unit of investment.[252] This indicator uses data from the International Renewable Energy Agency and IBISWorld to compare direct and indirect employment in renewable energy with direct employment in fossil fuel extraction.

In 2023, 16.2 million people were directly or indirectly employed in the renewable energy industry- an unprecedented annual 18.3% rise since 2022, and a 60.4% increase since 2016 (6.1 million jobs). Of the employees in 2023, 65% were in Asia (46% in China). The solar photovoltaic sector had the biggest increase in employment (45%) in 2023, reaching 7.1 million jobs. Direct employment in fossil fuel extraction decreased 0.7% to 9.06 million jobs between 2022 and 2023 – a drop of 31.2% (4.11 million jobs) since 2016 (Figure 11).

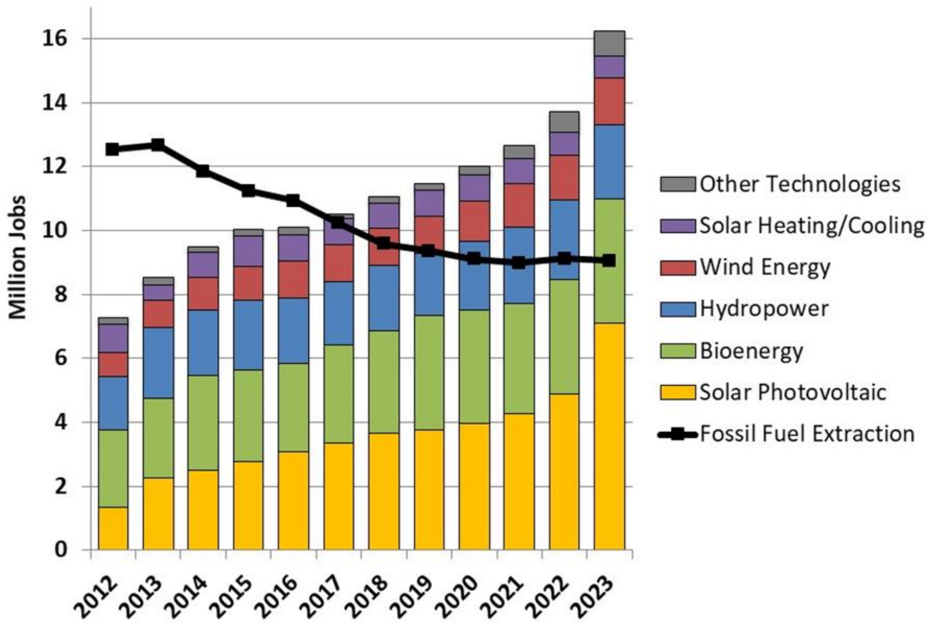


Figure 11: Annual direct and indirect employment in the renewable energy sector and direct employment in fossil fuel extraction from 2012 to 2023.

Indicator 4.2.2: compatibility of fossil fuel company strategies with the Paris Agreement

Headline finding: the strategies of the 100 largest oil and gas companies, as of March 2025, put them on track to exceed their share of production consistent with 1.5°C of heating by 189% in 2040, up from 183% in March 2024.

The world is likely experiencing the early years of a decade with average temperatures exceeding pre-industrial levels by 1.5°C – the limit countries committed to pursuing in the Paris Agreement. Fossil fuel burning has been the biggest driver of global temperature increase to date.[201] This indicator uses data from Rystad Energy to assess the extent to which the world's largest 100 oil and gas (O&G) companies (responsible for 78% of projected production in 2040) are contributing to breaching this threshold.[253] Projections are based on current announced commercial activities and strategies, regardless of commitments and pledges.

Since the Paris Agreement came into force (November 2016), the total production projected by 2040 from the top 100 O&G companies increased by 41.4%, with 85% of these companies increasing their planned production. As of March 2025, these 100 companies were on track to exceed their share of production compatible with 1.5°C of heating by an average of 189% in 2040 (up from 183% in 2024) (Figure 12). Of these 100 companies, 81 are projected to more than double their share of 1.5°C-compatible production levels by 2040, and 27 will more than quadruple them. Of the ten largest projected producers, eight are state-owned national O&G companies (NOCs), together projected to account for 34.0% of global O&G production in 2040 (Saudi Aramco, NIOC (Iran), Gazprom, PetroChina, QatarEnergy, ADNOC, Kuwait Petroleum Corp (KPC), and Rosneft). The US alone is projected to produce 22.7% of the world's total oil and gas by 2040, twice as much as any other nation, and 10.6% more than was projected based on 2024 strategies – a reflection of its shift to policies that threaten the health and survival of people in the US and worldwide.

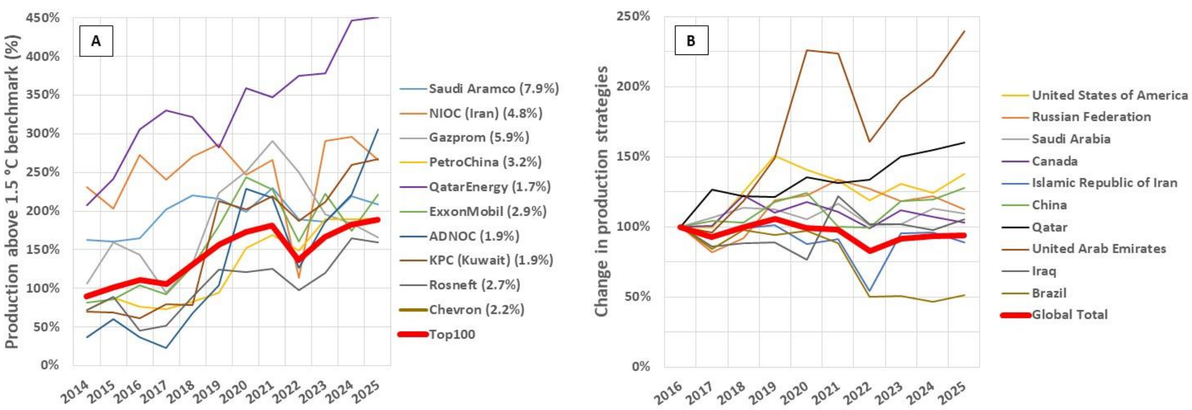


Figure 12: Compatibility of production strategies of the 100 largest oil and gas companies with the Paris 1.5°C climate target in 2040 (panel A) as projected between 2014-2025. Also shown are the variation in annual excess production of the ten largest O&G companies (by 2040 projected production) in 2030 and 2040. Percentages in brackets in the legend represent average 2018-2024 global market share. Panel B shows changes in production strategies in 2040 according to country of production since the Paris Agreement came into force in 2016 for the 10 largest producing countries as projected in 2025, and also the global total.

Indicator 4.2.3: stranded coal assets from the energy transition

Headline finding: In line with persistent coal investments, the value of global coal-fired power sector assets projected to become stranded in 2030 grew from US$ *16 billion in 2023 to US$ 22.4 billion in 2024.*

Continued investment in fossil fuels is incompatible with commitments set under the Paris Agreement,[254,255] hampering GHG mitigation, causing air-pollution-related deaths, and worsening economic losses.[256,257] It also leads to stranded assets as fossil fuel units must cease operating before their economic lifespan ends. Using Global Energy Monitor data, this indicator tracks the extent to which investments are changing the value of coal-fired power assets at risk of stranding, calculating the value of assets that are expected to be stranded in the year 2030, as a benchmark.

From 2023 to 2024, the persistent investment in coal assets that are incompatible with a safer future pushed the value of current coal-fired power assets that will be stranded in 2030 on a path to the 1.5°C goal to grow from US$ 16 billion to US$ 22.4 billion.[258] From 2023 to 2024, the share of stranded assets expected in 2030 in Very High, High, and Low HDI countries declined by 3.4, 9.6, and 0.2 percentage points, respectively, while the share in Medium HDI countries nearly doubled, rising from 14.4% to 27.7%. According to 2024 projections for assets at risk of stranding in 2030, 48.7% are in High HDI countries (largely in China), with 23.5%, 27.7%, and 0.1% in Very High, Medium, and Low HDI countries, respectively. The cumulative economic loss in the upcoming ten years, from 2026 to 2035, is expected to be US$ 222.4 billion, up from US$ 168.7 billion for 2025-2034. These results underline the importance of refraining from opening further coal-fired power plants to protect the economy from growing stranded losses.

Indicator 4.2.4: country preparedness for the transition to net zero

Headline finding: from 2023 to 2024, the global average preparedness for the low-carbon transition decreased by 3.43%.

Transitioning towards a net zero GHG economy is essential for safeguarding public health and ensuring long-term societal well-being. To prepare, countries need to reduce their overreliance on fossil fuels, strengthen their institutions, build local capacities, and establish governance structures that enable a just and equitable shift. This indicator assesses countries' transition preparedness through a composite indicator that incorporates 25 institutional, economic, societal, and technological factors, weighted to derive a final preparedness score ranging from 0 to 1.

Contrary to the urgent need to improve preparedness, the global average preparedness score fell from 0.520 in 2023 to 0.502 in 2024 (-3.43%). While countries with higher HDI scores generally also had higher absolute preparedness scores, there were decreases in preparedness across all HDI groups. Countries with a High or Very High HDI experienced the most significant decline in preparedness scores, from 0.476 in 2023 to 0.447 in 2024 (-6.17%) for High HDI countries, and from 0.740 to 0.718 (-2.98%) for Very High HDI countries. Countries with a Medium HDI saw an average decrease from 0.322 to 0.318 (-1.41%), while Low HDI countries saw a decrease in average preparedness score from 0.201 in 2023 to 0.198 in 2024 (-1.89%). These findings outline an alarming trend in global preparedness for the low-carbon transition and demonstrate the inequalities in preparedness among countries at different stages of development.

Indicator 4.2.5: production-based and consumption-based attribution of CO_2 and $PM_{2.5}$ emissions

Headline finding: From 2019 to 2023, Very High HDI countries remained *net importers of goods and services whose production caused net CO_2 and $PM_{2.5}$ emissions in lower HDI countries, accounting for 4.0% and 5.4% of global emissions in 2023, respectively.*

Countries can induce harmful emissions of GHG and air pollutants beyond their borders, through their consumption of imported goods and services. To capture these transboundary environmental impacts, this indicator uses an environmentally extended multiregional input–output model[259,260] to quantify countries' contribution to CO_2 and $PM_{2.5}$ emissions, examining production-based accounting (which attributes emissions to the country where they physically occur) and consumption-based accounting (which assigns emissions to the country where the final consumption of goods and services takes place).

Between 2019 and 2023, the overall differences between consumption- and production-based emissions for CO_2 and $PM_{2.5}$ among different HDI country groups remained mostly unchanged. Very High HDI countries were the only group with more consumption-based than production-based emissions for both CO_2 and $PM_{2.5}$ (in 2023, consumption-based: 46.9% and 25.2% for CO_2 and $PM_{2.5}$; production-based: 42.8% and 19.8% respectively). This indicates that a substantial share of emissions originated from the consumption of goods and services in Very High HDI countries – many of which were produced abroad, particularly in lower HDI countries. As a result, Very High HDI countries generated a net balance of emissions outsourced through international trade, amounting to 4.0% of global CO_2 and 5.4% of global $PM_{2.5}$ emissions in 2023. Low HDI countries displayed a different pattern. While they had slightly higher consumption-based over production-based CO_2 emissions (rising from 0.3% of the global emissions in 2019 to 0.5% in 2023), they exhibited lower consumption-based than production-based $PM_{2.5}$ emissions (increasing by more than double, from 0.9% in 2019 to 2.0% in 2023 of the global total), potentially reflecting limited capacity to regulate air pollution in domestic production processes. These findings highlight the responsibility of those in Very High HDI countries to address unsustainable consumption patterns which often generate harm in those living in lower HDI countries, and the imperative for an equitable and just decarbonisation of global supply chains.

4.3: Financial Transitions for a Healthy Future

The transition to a clean and healthy future demands a fundamental redirection of established financial flows. This section monitors progress in reallocating global finance to support sustainable economies through investments, subsidies, and bank lending, and introduces a new indicator to track how well health-related adaptation funding aligns with identified needs.

Indicator 4.3.1: clean energy investment

Headline finding: Global clean energy investment grew 10% in 2023 to US$ 1.9 trillion, exceeding fossil fuel investment by 73%.

Investing in clean energy is essential for both mitigating climate change and for reducing air pollution. Reaching net-zero emissions can lead to economic growth, which can, in turn, lead to further investment in clean energy.[261] Drawing on data from the IEA, this indicator monitors trends in global investment in energy supply, electricity grids and energy efficiency.[262]

Global clean energy investment reached US$ 1.88 billion in 2023, an increase of 10.4% since 2022 and 72.9% higher than fossil fuel investment of US$ 1.09 billion. Clean energy investment has grown 55.9% since the Paris Agreement was signed in 2016 while fossil fuel investment has fallen 4.9%. However, fossil fuel investment still attracted 36.6% of global energy investment in 2023. Power sector investment in solar photovoltaic (PV) technology reached US$ 480 billion in 2023, more than all other generation sources combined, while global investment in electricity grids and storage grew 14% to US$ 415 million in 2023. However, investment in energy efficiency and end use decreased 1.3% to US$ 646 million. Clean energy investment exceeded fossil fuel spending in China and other Advanced Economies by 161% in 2023, but lagged fossil fuel spending in Emerging Market and Developing Economies (EMDE) outside China by 38%, where clean energy spending only accounted for 17.4% of the global total. To keep 1.5 °C within reach, global investments in renewables, grids and storage needs to triple by 2030 to double capacity, spending on energy efficiency needs to triple to double the rate of improvement.[262]

Indicator 4.3.2: net value of fossil fuel subsidies and carbon prices

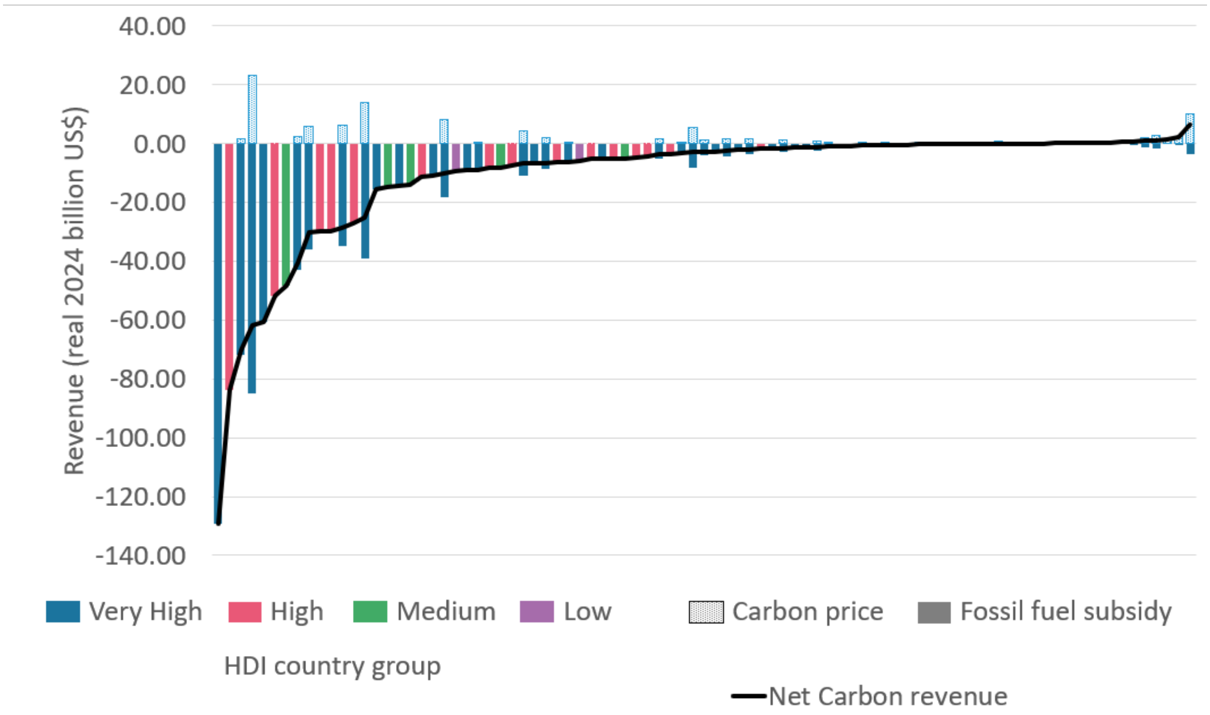
Headline finding: 83% of the 87 countries reviewed had a net-negative carbon price in 2023, generating a net fossil fuel subsidy of US$ 956 billion. Of these, 15 countries allocated more funds to net fossil fuel subsidies, than to health.

Carbon prices promote the transition to cleaner and healthier fuels, while fossil fuel subsidies hinder it.[263,264] This indicator compares carbon price revenues and fossil fuel subsidies, and calculates net carbon prices and revenues across the 87 countries responsible for 93% of global CO_2 emissions.

In 2023, countries issued US$1,063 billion in fossil fuel subsidies, nearly ten times the US$107 billion raised from carbon price revenues, and generating a net fossil fuel subsidy of US$956 billion (Figure 13). This is the second-highest annual net subsidy recorded, after only 2022, when the energy price spike that followed the invasion of Ukraine pushed fossil fuel-reliant countries to allocate US$1,436 billion in net subsidies, and it still exceeds more than three times the US$300 billion committed in support of the most vulnerable countries within the New Collective Quantified Goal on Climate Finance (NQCG).[265] In 2023, only 15 countries produced a net-positive carbon price (i.e., net carbon tax) – all but one of which were Very High HDI countries (Figure 13) – while 72 (83%) had a net-negative carbon price (i.e. net fossil fuel subsidy). Six countries exceeded US$50 billion of net subsidies each (Russia, Iran, Japan, Germany, Saudi Arabia, and China). In 49% of countries the equivalent of over 10% of their health budgets was allocated to net fossil fuel subsidies, while 17% allocated more to net fossil fuel subsidies than to health. Five countries (Iran, Libya, Algeria, Venezuela, and Uzbekistan) spent more than double their health budgets on net fossil fuel subsidies.

Growing global geopolitical and economic instability threatens to drive further spikes in fossil fuel prices. Urgently decreasing the reliance on fossil fuels is key to prevent these shocks from affecting countries’ energy security, or forcing increased national spend in fossil fuel subsidies. Doing so would simultaneously free up resources in support of the clean energy transition, and for activities that reduce inequities and improve health and wellbeing.[254,266]

A



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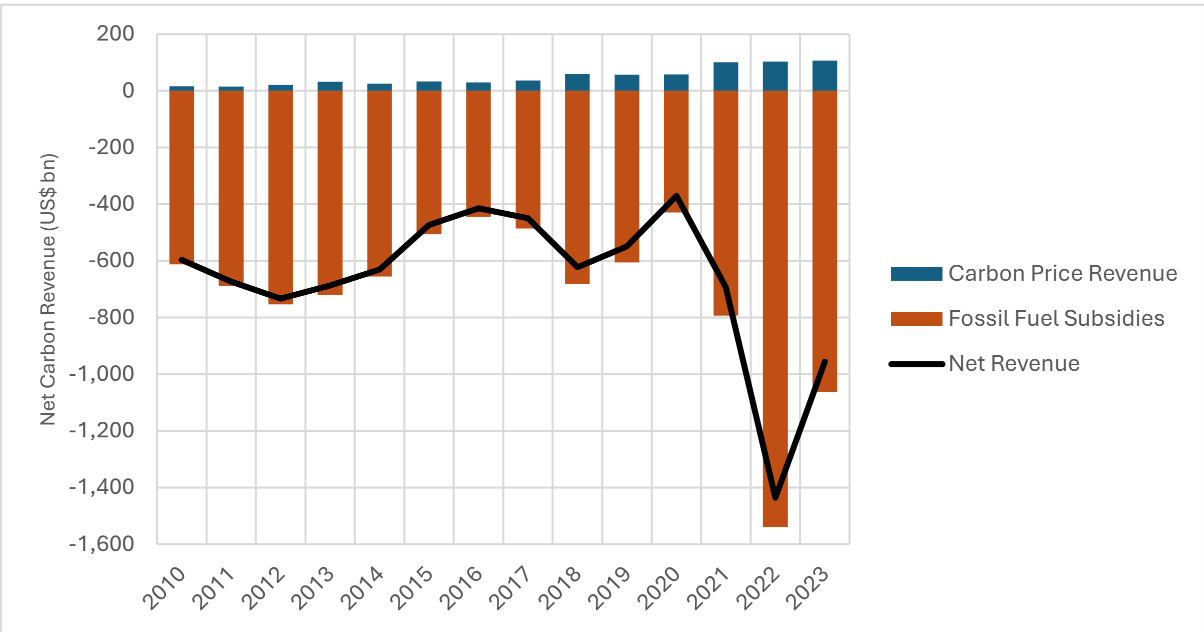


Figure 13: Fossil fuel subsidies, carbon prices and net revenue

(A) Revenue in 2023 from Fossil fuel subsidies, Carbon prices, and net total revenue by country and HDI group. (B) Global total carbon price and fossil fuel subsidy revenue (bar chart) and net total revenue (line graph) from 2010 to 2023

Indicator 4.3.3: fossil fuel and green sector bank lending

Headline finding: Private bank lending to the green sector increased 13% from 2023 to 2024, reaching US$ 532 billion— meanwhile, fossil fuel lending surged 29% to US$ 611 billion.

Redirecting finance from fossil fuels to green sectors is essential to realising climate and health goals. To achieve the net zero transition, estimates suggest that 70% of green energy investment would need to come from private sources, with debt-based instruments playing a growing role.[267] Using Bloomberg data, this indicator tracks private bank lending towards fossil fuels (including for exploration, production, operation and marketing activities in oil and gas) and green investments (including for renewable energy, energy efficiency, green buildings and infrastructure, agriculture, and forestry, clean water and waste management).

Green lending increased 13% between 2023 and 2024, reaching a record-high US$ 532 billion. Several European banks - including Nordea, UBS, Deutsche Bank, BNP Paribas and Barclays - have reduced fossil fuel lending since the Paris Agreement entered into force, some by over 50%, in part reflecting stronger regulatory pressure.[268–270] However, half of the top 40 fossil fuel lenders have increased lending since the Paris Agreement. Fossil fuel lending reached a five-year high of US$ 611 billion in 2024, up by 29% from 2023, and exceeding green lending by 15%. Between 2022 and 2024, banks lent US$1.6 trillion to fossil fuel activities—US$117 billion more than for green investments. The Net-Zero Banking Alliance lost 22% of its asset coverage between December 2024 and January 2025 after several U.S. banks exited over regulatory and fiduciary concerns.[271] Accelerating the transition to a healthier future will require policies steering lending away from fossil fuels and towards green investments.

Indicator 4.3.4: health adaptation finance flows and disclosed needs

Headline finding: between 2020–2022, countries received US$84 million in principal bilateral health adaptation finance, alongside an additional US$166 million from the Green Climate Fund (GCF)— substantially less than the annual financing needs disclosed by only 28 countries.

This indicator tracks sovereign bilateral finance directed primarily towards health-related climate adaptation in countries classified as Least Developed (LDC) or Developing by the UNFCCC. It also examines the health adaptation needs that countries have explicitly quantified in their National Adaptation Plans (NAPs) and Nationally Determined Contributions (NDCs).[272,273] On the supply side, it captures sovereign , private, and philanthropic bilateral flows reported to the OECD,[274] supplemented with fund-level data from the GCF.[275]

Between 2020 and 2022, bilateral commitments to health-focused adaptation projects totalled US$84 million. Approximately 89% of this funding was delivered on concessional terms, mainly through grants. When including cross-cutting bilateral transfers, of which health is a part, the total funding was US$ 4.7 billion. In addition, the GCF provided US$ 166 million between 2021 and 2022 (or US$ 341 million when including cross-cutting adaptation projects where health adaptation was not necessarily the primary objective).

Among the 64 LDCs or UNFCCC-designated Developing countries that submitted costed NAPs and NDCs as of 21 March 2025, only 28 (44%) included quantified estimates for health adaptation needs. Collectively, these countries reported annual health adaptation needs exceeding US$7 billion for the 2025–2030 period. These figures reflect only the subset of projects and measures for which cost estimates were explicitly provided, and are thus likely to underestimate the broader scope of health-related adaptation needs—especially given many developing countries, including many small island developing states, have yet to submit costed estimates. This limited disclosure of quantified health needs underscores persistent data and capacity constraints that may hinder the effective planning and prioritisation of health adaptation strategies. Regardless, the gap between identified needs and currently available financing remains substantial. Bridging this gap—by raising collective ambition, improving data systems, and more systematically integrating health into adaptation planning—will be critical to protecting lives and building resilience in a warming world.

Panel 4: Uninsurable Futures? Climate Change, Health Risks and Failing Safety Nets

The financial mechanisms underpinning disaster recovery - principally insurance - are facing escalating pressure as climate change intensifies the frequency and severity of extreme weather events.

The growing scale and unpredictability of extreme weather have driven record-breaking insured losses. In 2023, global insured losses from natural catastrophes totaled US$108 billion, marking the fourth consecutive year surpassing the US$100 billion threshold.[276] Total economic losses reached US$280 billion, indicating that approximately 60% of global exposures were uninsured - costs that must be absorbed by individuals, businesses, and governments. The protection gap is even wider in Low and Medium HDI countries: in Africa, for example, only about 7% of disaster losses are insured, compared to over 57% in North America.[276]

This gap extends beyond property loss. Public health systems are increasingly absorbing the costs of uninsured climate damages. From heat waves and floods to disease outbreaks, healthcare infrastructure faces mounting pressure, yet insurance coverage remains minimal. Though data are limited, disasters like Hurricane Maria in Puerto Rico and Cyclone Idai in Mozambique show how uninsured healthcare costs – including emergency care, hospital damage, mental health services - are often absorbed by strained public systems, or go unaddressed altogether. This further undermines healthcare capacity, compromising health and leaving systems even more vulnerable to future climate impacts. The resulting self-reinforcing feedback loop ultimately risks generating irreparable damage to healthcare systems.

While increasing insurance coverage is critical to enable systems to recover from climate shocks, the growing impacts of climate change further erode the insurance model, which depends on accurate risk estimates. In the United States, this is already manifesting in substantial premium increases, with average rates rising by 33% between 2020 and 2023, and even more in high-risk areas: flood insurance premiums have increased by some 500% in high-risk coastal regions, while premiums more than doubled in wildfire-exposed zones in California over the past decade.[277] These increases reflect an industry-wide shift toward the recalibration of risk models - moving from historical loss patterns to forward-looking climate projections - prompting insurance withdrawal from increasingly risky markets. As these dynamics unfold, growing shares of uninsurable assets - properties in floodplains, wildfire zones, and coastal areas - pose systemic risks to the broader economy. When insurers deem these areas too risky, households, municipalities, and entire sectors are left dangerously exposed. The resulting economic repercussions compound social inequities and exacerbate health vulnerabilities. These shifts raise a critical question: can insurance remain a reliable safety net, or is it approaching a threshold of widespread uninsurability?

Urgent, integrated strategies are essential to preserve insurance as a pillar of climate resilience. Integrating insurance with social protection, early warning systems, resilient health infrastructure, and anticipatory financing can close critical gaps. Public-private partnerships, regional risk pools, and index-based health insurance offer promising yet underused solutions. Not-for-profit and government-run insurance schemes that prioritize coverage over profit, particularly in high-risk and underserved regions, also represent important alternatives. Transparent data on insured and uninsured losses can pinpoint where gaps are widest and policy action is most urgent. Though increasingly constrained, the insurance industry remains vital to climate resilience - but it must be complemented by systemic reforms and innovative solutions to remain viable in a rapidly warming world.

Conclusion

The escalating economic costs of climate change are becoming ever more visible, with profound implications for human health and societal stability. In 2024, weather-related extreme events caused over US$ 304 billion in losses, while heat-related mortality and declines in labour productivity drove combined losses exceeding US$ 1.29 trillion (indicators 4.1.1-4.1.3). The monetised cost of air pollution mortality reached US$ 4.85 trillion in 2023 (indicator 4.1.4) – equivalent to more than the entire GDP of Germany (the world's third largest economy)[278] the same year – underscoring how environmental degradation translates directly into economic harm. These impacts fall disproportionately on lower- and middle-income countries, deepening existing global inequities.

While clean energy investment surpassed fossil fuel spending by 73% in 2023 (indicator 4.3.1), and renewable energy employment exceeded employment in fossil fuel extraction by 79% in 2023 (indicator 4.2.1), structural financial barriers persist. In 2023, the wealthiest countries continued to outsource 4.0% of global CO_2 emissions to less wealthy nations through embodied emissions (indicator 4.2.5). Net fossil fuel subsidies remained close to US$ 1 trillion, and bank lending to fossil fuel projects rose sharply by nearly 30% in 2024 (indicators 4.3.2-4.3.3). This sustained financial support is enabling the expansionary strategies of fossil fuel companies, whose projected production is set to exceed 1.5°C-compatible levels by 189% by 2040 (indicator 4.2.2). Such financing undermines climate goals, perpetuates fossil fuel dependence, and increases the risk of stranded assets, already valued at US$ 22.4 billion in the coal sector alone for 2030 (indicator 4.2.3). Meanwhile, country-level preparedness for the low-carbon transition is deteriorating (indicator 4.2.4), compounding systemic vulnerabilities. Critical financial mechanisms remain insufficient: health-related adaptation finance reached only US$ 3.8 billion, far below the US$ 45 billion needed for 2025-2030 (indicator 4.3.4).

To reverse this trajectory, a decisive and coordinated realignment of financial flows is essential. Delivering on emerging international commitments, such as the New Collective Quantified Goal on climate finance, and operationalising the Loss and Damage Fund with clear mechanisms for equitable disbursement, will be critical to bridging the growing gap between escalating climate impacts and financial support. A decisive redirection of capital towards health-promoting, climate-resilient investments, grounded in the principle of equity, is essential to safeguard global health and foster economic resilience and social stability.

Section 5: Public and Political Engagement with Health and Climate Change

The previous sections demonstrate that the threat climate change poses to people's health is reaching unprecedented levels, and these impacts are set to continue worsening given delays in meaningful action. They also demonstrate that the adaptation and mitigation policies needed to address climate change, could simultaneously deliver major benefits for people's health.[279] This requires key societal actors at all levels of governance – including governments, corporations, civil society, and the wider public – to engage with health and climate change, and put health at the forefront of climate action.[218,280,281]

This section tracks engagement with health and climate change by actors in the public and political domain on who the transition to a net zero and healthy future depends. It tracks engagement by the media, scientists, the public, governments, international organisations, and corporations. It also sheds light on the growing role of climate change litigation in driving action on health and climate change (Panel 5).

Panel 5: Litigation as an emerging tool to advance action for a healthy future

Climate change is threatening the human right to a clean, healthy, and sustainable environment, adopted by the UN General Assembly in 2022.[282] It is also threatening the human right to health , and children's rights to life, survival and development, and to health and health services.[283,284] With mitigation and adaptation measures failing to adequately respond to this threat, people and organisations increasingly turn to the courts to push for greater climate action.[285] As the United Nations Environment Programme states, "litigation is central to efforts to compel governments and corporate actors to undertake more ambitious mitigation and adaptation goals."[286] In recent years, climate litigation has been brought to national, regional, and international courts and tribunals by different groups – including citizens, civil society organisations, and even governments of countries most impacted by climate change.

The health impacts of climate change are increasingly becoming the focus of climate litigation, particularly litigation that challenges governments for failing to address climate risks.[285] This can be seen in the landmark case brought against Switzerland by a group of older Swiss women, known as the *KlimaSeniorinnen Schweiz*, for failing to meet GHG emissions reduction targets.[287] In April 2024, the European Court of Human Rights ruled that Switzerland had violated the human rights of these women by failing to adequately address climate change. Evidence on the health impacts of climate change – including evidence provided by the *Lancet Countdown* – was crucial to this outcome, as the court's decision was based on the specific heat-related harms to older women.[288]

The health impacts of climate change have featured in other high-profile cases. In the case brought against the Dutch government by the Urgenda Foundation in 2015, the Dutch Supreme Court upheld the government's duty to reduce GHG emissions, citing the risks climate change poses to public health.[289] Similarly, the successful legal challenge launched by a group of young people against the German government due to the country's insufficient targets for reducing GHG emissions focused on evidence regarding the different health impacts of climate change, which they argued violated their right to life and physical integrity as set out in the German constitution.[290] Public health evidence is also part of ongoing international tribunals, such as the request for advisory opinion submitted to the International Court of Justice (ICJ) on defining state obligations and the repercussions of climate-related harm, which includes written contributions from the World Health Organization (WHO).[285,288]

Recent climate litigation has focused on a wide range of health impacts of climate change, such as heat stress, respiratory ailments, the spread of infectious disease, extreme weather events, and food and water security, among others.[291,292] Climate litigation has also begun to consider the mental health impacts of climate change.[285] This can be seen in the recent South African 'Cancel Coal' case in which a youth-led group challenged the South African government's plans to add more coal-fired power stations to the national grid.[293] The claimants used evidence about the impacts of climate change on both their mental and physical health, with the High Court ruling in their favour at the end of 2024.[285]

The growing focus on health outcomes in climate litigation has been used, in particular, to make the case that governments' failure to address climate change is a violation of people's human rights, with evidence on health impacts helping to demonstrate the effects of climate change on specific human rights, such as the right to life, to private and family life, to health, and to culture.[288,291] This has highlighted the need to better understand how public health evidence can be used to establish the links between climate change and specific human rights; in which legal settings such evidence can be used; and the types of evidence required to make legal claims, particularly with the challenge of attribution.[291,292,294] The rise of climate sceptical political parties in many high-emitting countries means that the courts undoubtedly will be a crucial arena for individuals and independent organisations to hold governments and corporations accountable, and advance health-protecting climate action. The scientific community has a key role to play in ensuring the generation of evidence tailored to support these critical efforts.

Indicator 5.1: media engagement

Headline finding: in 2024, 24.8% of climate change articles mentioned health, up from 23.5% in 2023. However, total coverage of health and climate change fell by 15%.

The news media is a crucial source of information about climate change, shaping public engagement and the political agenda.[295,296] This indicator tracks coverage of health and climate change in articles published in 60 newspapers from 35 countries, using keyword searches of newspaper databases. It covers five languages and all WHO regions.

Average newspaper coverage of health and climate fell 15% between 2023 and 2024, from 204 articles per source, to 173. This is connected to a trend of decreasing media engagement with climate change since the peak in 2021, with the number of articles on climate change falling from 68,281 in 2021 to 41,221 in 2024. The proportion of climate change articles that reference health, however, increased slightly between 2023 and 2024, from 23.5% (12,658 of 53,867 articles) to 24.8% (10226 of 41221 articles) – this is, however, still below the peak of 26% in 2020 (11,549 of 44,482 articles). Additionally, more articles explicitly referenced fossil fuels between 2023 and 2024 (from 3,859 to

6,627) suggesting newspapers are increasingly connecting the health impacts of climate change to the burning of fossil fuels.

Indicator 5.2: individual engagement

Headline finding: individuals' proactive engagement with health and climate change is increasing, with the average global Google search index increasing from 49.4 in 2023 to 59.9 in 2024, with the world's most affected countries dominating the trend.

There is growing evidence that health framings of climate change can increase people's support for climate policies and pro-environmental behaviour.[297–299] This can be a critical driver for individual and community-led action, especially amidst waning engagement from political leaders (Panel 6). Hence, greater public engagement with health and climate change has the potential to strengthen climate action.[300,301]

The first part of this indicator tracks people's interest in climate change and health by tracking visits to climate change and health articles on English Wikipedia, which receives around 50% of global Wikipedia visits.[302] It finds that visits to dedicated content on the effects of climate change on health on English Wikipedia declined in 2024, though there was no change in wider engagement with climate change content. Interest in the links between health and climate change, measured by clicks from a health article to a climate change one, also fell in 2024 by 20%.

The second part of this indicator, new to this year's report, tracks online proactive individual engagement with health and climate change, by analysing health and climate change searches on *Google,* the most visited website in the world.[303] Google searches tend to reflect broader but less in-depth engagement with health and climate change compared to Wikipedia visits.[304] This indicator performs health and climate change keyword searches in *Google Trends* data, to track the monthly normalised Google search rate of "climate change health" globally between January 2014 and December 2024 in English, Spanish, and French.[305] Data are presented as a search index, where 100 represents the maximum number of searches for the given term in the timeseries.

There has been growing engagement with climate change and health using the Google search engine since 2020, with average global search index increasing from 49.4 in 2023 to 59.9 in 2024 (Figure 14). The lowest rates of engagement occur in Very High HDI countries (average search rate of 2.2) compared to High HDI (7.8), Medium HDI (13.6) and Low HDI countries (6.0). Engagement in High HDI countries is led by several SIDS (e.g. Marshall Islands with a search rate of 50, Fiji with 39, and Tonga with 37), who see disproportionate impacts of climate change on local health outcomes.

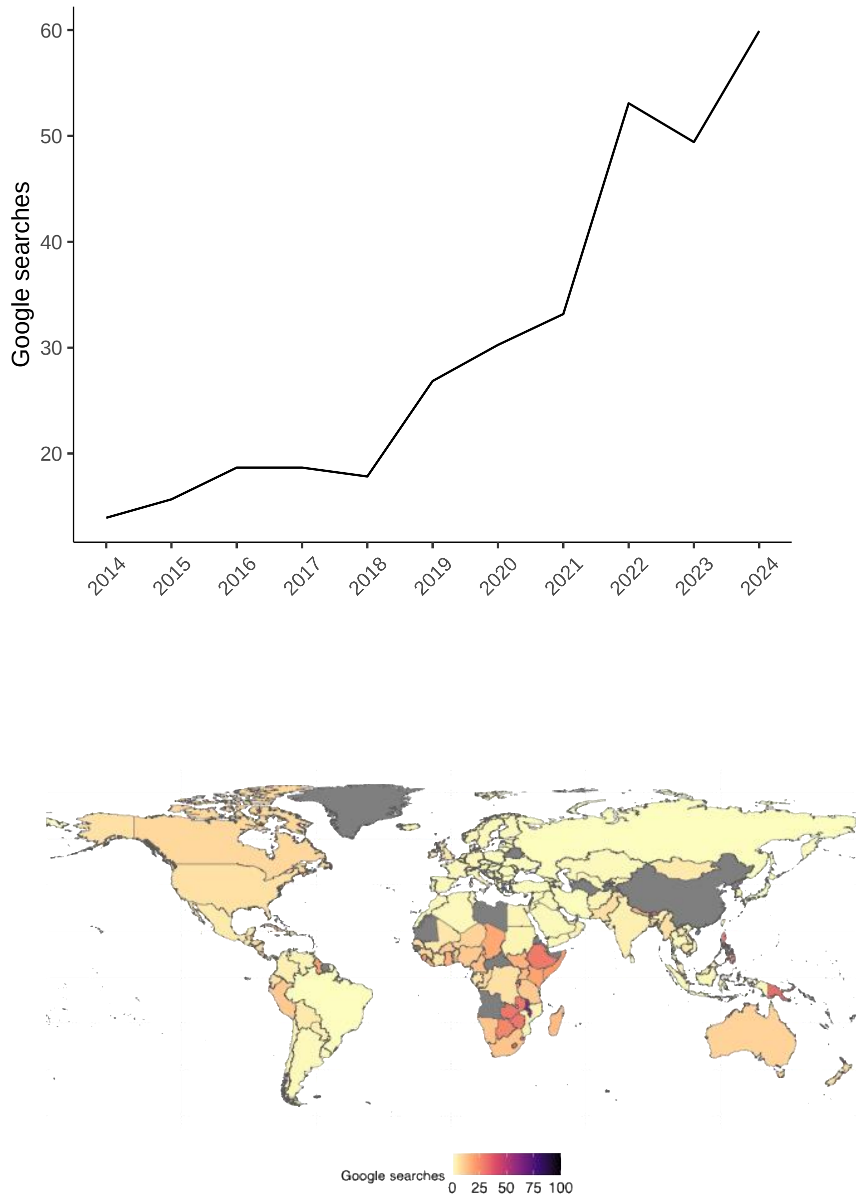


Figure 14: Normalised number of annual search rates of health and climate change from Google Trends in English, French, and Spanish (top)globally by year between 2014 and 2024; and (bottom) by country in 2024.

Panel 6: Leading the transformation from the bottom-up: community-led action for a healthier future

Delivering the necessary progress to promote health and survival in the face of climate change requires meaningful action from the system-wide, to the individual level. When national government engagement wanes (indicator 5.4.1), action by sub-national governments, corporations, civil society organisations, communities and individuals can contribute to keeping the planet within inhabitable limits. Community-led actions are those spearheaded by self-organised individuals within a community, working together for a common goal.[306] Rooted in local societal, cultural, and economic contexts, they can promote equity, empower local actors, and strengthen climate resilience.[307–311] Tailored to local needs, they are more likely than top-down interventions to maximise health benefits, bypass the limitations of implementing top-down solutions,[306,311] and can help avoid unintended harms like gentrification or increased inequalities.[311] Community-led actions can also foster agency, increase attachment to the local environment, and promote social interactions, all of which help reduce the mental health impacts of climate change and increase awareness.[312,313] These grassroots activities can grow into formal organisations, with national or international influence.

Many laudable examples exist. In Poland, a small group concerned about air quality grew into a nation-wide movement (Polish Smog Alert), contributing to saving some 10,000 lives annually through improved air quality. Through bans on coal burning, this simultaneously translated to reduced GHG emissions.[314] In Nepal, community forests user groups have grown into a state-sponsored and legally-mandated initiative, under which local communities, including Indigenous Peoples, manage 37.7% of national forests -- augmenting carbon sinks, enhancing food access, and improving livelihoods.[315] Across the Sahel, farmers have implemented Farmer Managed Natural Regeneration, a technique pioneered in the 1980s and now supported by multiple NGOs. These farmer-led interventions resulted in increased tree coverage, crop yields, drought resistance, and access to traditional medicines -- contributing to improved health outcome and poverty reduction. In Niger alone, it resulted in 500,000 additional tons of cereal produced annually, improving food security for 2.5 million people, and generating $17 - 21 million in income in the Maradi Region.[316]

Children and young people stand to lose the most from climate change. However, they can be effective actors for change, supporting a future that meets their needs and preferences, and ensuring lasting change. UNICEF has committed to supporting youth engagement in climate action, while the UNESCO Youth Climate Action Network, launched at COP25, brings together over 105,500 young people from 184 countries, including 38 youth networks advancing climate action.[317]

Despite their capacity to enact change, community-led initiatives depend on the willingness and possibilities of local actors.[318] Without adequate resources, they can be short-lived and of limited impact, or inadvertently exacerbate inequities if underserved community members are less able and not supported to engage.[312,313,315]

To ensure their equitable, lasting, and scalable impact, community-led projects need sustainable funding and logistical support. Partnerships with governments can help, but they can sometimes compromise independence.[319] Independent funders and NGOs can be key to ensuring the longevity, independence and impact of community-led efforts.

Concerningly, grassroot movements can be targets for threats, persecution or attacks in breach of the Aarhus Convention, particularly when engaging in protests or civil disobedience. In 2024, the UN Special Rapporteur on Environmental Defenders under the Aarhus Convention reported a concerning increase in the “repression and criminalization of environmental defenders engaged in peaceful protest and civil disobedience”.[320] Beyond deterring communities from engagement in environmental activism, these attacks pose a grave danger to those who do.[320] A Global Witness report found that 196 activists were killed in 2023 (57% in Latin America),[321] with minoritised and indigenous groups disproportionately affected.

Protecting environmental defenders in line with international conventions is critical to enabling community-led interventions, and provide a fertile ground for grassroots initiatives to deliver life-saving progress on health and climate change.

5.3: Scientific engagement

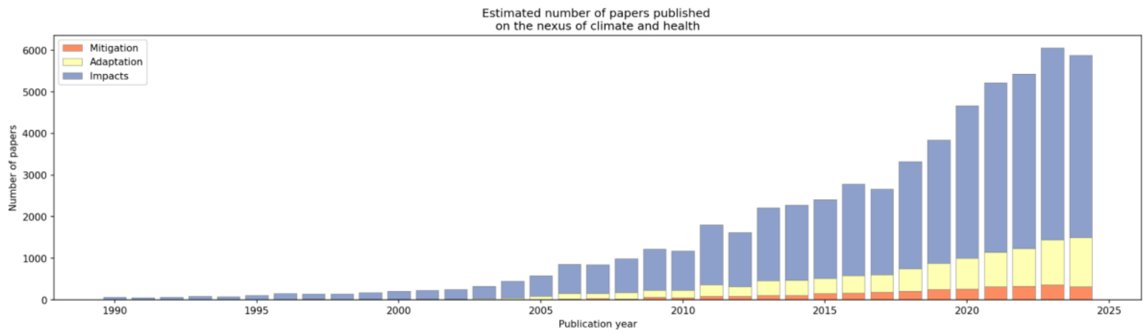
Peer-reviewed articles published in academic journals are the main source of scientific evidence for governments, international organisations, the media, civil society, and the public, playing a crucial role in driving climate action.[322,323] The following indicators monitor engagement with health and climate change in the scientific literature.

Indicator 5.3.1: scientific articles on health and climate change

Headline finding: The number of scientific articles on health and climate change published in 2024 declined by 2.2% compared to 2023 – but remained higher than for every other year.

This indicator uses a machine-learning approach to monitor and classify peer-reviewed journal articles on health and climate change.[324] It finds that between 1990 and 2024, there was a rapid expansion in the scientific literature on health and climate change, with 56,998 articles published (Figure 15). In 2024, 5,776 such articles were published, a 2.2% decrease from 2023 (5,908 articles). Of the articles published across 1990-2024, 80% (45,849) focus on health impacts of climate change, with adaptation (16%, 9,301) and mitigation (6%, 3,290) receiving less attention. However, articles covering adaptation increased to 20% of all health and climate change publications (1,184 of 5,776) in 2024.

Of the 56,998 articles to date, 64% (36,509) reference at least one geographic location in their title or abstract, and 37% (21,337) mention more than one location. Of these, most cover Very High (49%, 20,868) or High (27%, 11,741) HDI countries, with only 15% (6,573) covering Medium, and 8% (3,519) covering Low HDI countries. This global inequality in scientific knowledge production is further reflected in the institutional affiliations of the authors. Of the 286,161 authorships, 75% (216,050) were matched to a specific country. Of these, 72% (30,096) publications have at least one author based in a Very High HDI country and 28% (11,576) in a High HDI country, compared to 11% (4,667) in Medium and 6% (2,443) in Low HDI countries.



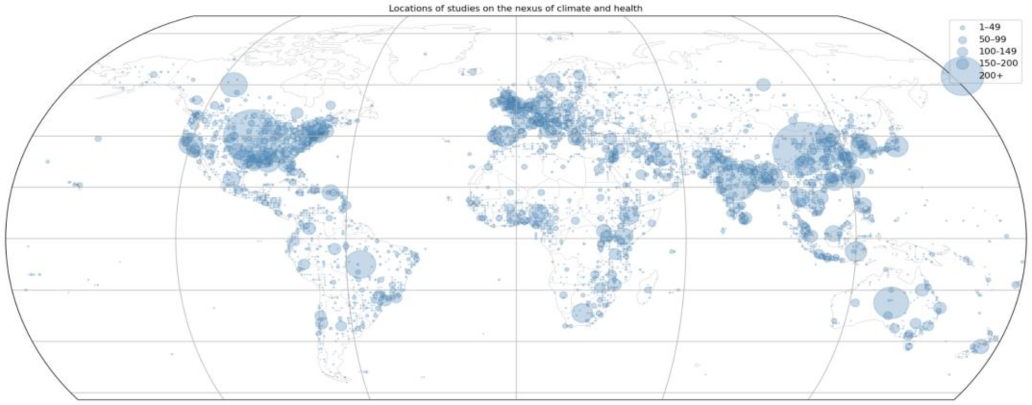


Figure 15: Number of scientific articles on health and climate change (a) by year between 1990 and 2024; and (b) by location in 2024.

Indicator 5.3.2: scientific engagement on the health impacts of climate change

Headline finding: 56% (26,158) of the 46,810 scientific publications covering the health impacts of climate change since 1990 focus on events in which changes in climate variables can be attributed to human influence. However, the number of such studies fell 14.7% between 2023 and 2024 .

This indicator tracks scientific publications on health impacts resulting from changes in precipitation or temperature, in cases in which those changes in the studied location can be attributed to human influence on the climate using global climate models (i.e. attributable studies).[325] [325]

Of the 46,810 articles concerning the impacts of climatic changes on health published between 1990 and 2024, 62% (29,157) mention at least one location with attributable trends, of which 90% (26,158) specifically focus on climate drivers. However, the number of attributable studies published in 2024 (2,140) declined by 14.7% from 2023. The proportion of attributable studies and the distribution of examined climate drivers has remained relatively constant over time, with changes in temperature (23,031), precipitation (11,925), and humidity (11,492) being the most examined variables. Most evidence on health outcomes focuses on mortality and morbidity (18,510), infectious (13,134), and cardiovascular diseases (11,382).

5.4: Political engagement

To tackle climate change and protect human health, it is essential that governments and political leaders engage with the health dimensions of climate change.[326,327] The following indicators track political engagement of national leaders and key international organisations with health and climate change.

Indicator 5.4.1: government engagement

Headline finding: government engagement with health and climate change continued to decrease in 2024, with only 30% of countries mentioning health and climate change in their UN General Debate (UNGD) statement, down from 62% in 2021.

National governments address the UN General Assembly in the UNGD each year, making statements to present and discuss their political priorities.[328,329] This indicator monitors engagement of national governments with health and climate change by tracking references to health and climate change in their annual UNGD statements.

Following the 2021 peak, when a record 62% of countries (120 of 194) discussed health and climate change in their UNGD statements, engagement declined for three consecutive years. In 2024, only 30% of countries (57 of 192) referenced the health-climate change relationship. The drop in engagement occurred across all regions, although engagement remains highest among the countries least responsible but most affected by climate change – particularly African nations and SIDS, which represented 32% (18 of 57) and 30% (17 of 57) the governments discussing health and climate change, respectively. Their statements included calls for more financial support for adaptation measures in the most vulnerable countries.

The second part of this indicator tracks engagement with health in the Nationally Determined Contributions (NDCs), instruments under the Paris Agreement in which countries are mandated to document increasingly ambitious contributions towards international climate commitments every 5 years. While countries are due to update their NDCs in 2025, many have provided updates from previous rounds, or are still delivering delayed ones.[330–332]Out of the eight updated NDCs submitted in 2024, 88% (7) referenced health. This represents a major increase from the 26% of NDCs submitted in 2023 (9 of 35 NDCs). Across the NDCs and updated NDCs submitted between 2015 and 2024, Very High HDI countries were the least likely to mention health in their NDCs (54%, 91 of 169) compared to Low (96%, 67 0f 70), Medium HDI 94% (85 of 90), and High HDI countries (88%, 86 of 98).

While critical to climate action, many recently-elected heads of state have cast doubt over the scientific consensus on the anthropogenic influence of climate change, and the existential dangers climate change represents – most notably in the US, but also in countries like Argentina and Hungary. Climate sceptic political parties are also gaining force in Italy, France, Germany and Brazil, amongst others. Protecting climate action from populist responses will be critical to ensure progress towards a liveable future.

Indicator 5.4.2: engagement by international organisations

Headline finding: the proportion of tweets by international organisations referencing health co-benefits of climate mitigation continued to increase in 2024, reaching a record-high of 25% of X posts in November 2024.

International organisations (IOs) – including UN agencies, international financial institutions, and supranational bodies – play an increasingly important role in driving climate action and engagement with health and climate change.[333–335] This indicator monitors engagement with health co-benefits of climate mitigation on the official X (formerly Twitter) accounts of IOs, which remains a key platform for these organisations' public communication.[336,337]

This indicator tracks engagement with health co-benefits of mitigation using a dataset of English-language X posts made between 2010 and 2024 from 39 international organisations that have an operational focus on climate mitigation or adaptation across different sectors (e.g., security, development and humanitarian, or trade and finance). There was a slight increase in engagement with the health co-benefits of climate mitigation between 2023 and 2024 from 19.7% (10,069 of 51,113 posts) to 20.2% (8,293 of 41,048 posts), with a record high in engagement occurring in November 2024 with 24.6% of posts (911 of 3,705) referencing health co-benefits of mitigation. Engagement by IOs has increased across the 15-year period.

Indicator 5.5: corporate sector engagement

Headline finding: In 2024, only 51% of companies referred to the health dimensions of climate change in their UN Global Compact Reports, down from 63% in 2023.

As major contributors to GHG emissions, corporations play a crucial role in the transition to a net zero, healthy future.[338] The UN Global Compact (UNGC) encourages businesses to adopt environmentally and socially responsible policies, the implementation of which they report in annual Communication of Progress (GCCOP) reports. Over 25,000 companies from 167 countries have signed up to the UNGC, making it the largest global corporate sustainability initiative.[339] Despite criticism for enabling greenwashing, evidence suggests companies' involvement in the UNGC is associated with improved sustainability performance.[340–342] This indicator tracks corporate sector engagement with health and climate change through references to health and climate change in companies' GCCOP reports.

While 63% of companies (2,833 of 4,487) referenced the health-climate change relationship in their 2023 GCCOP reports, the highest level of engagement since the UNGC was established, this proportion dropped to 51% (3,984 of 7,793) in 2024. This fall followed over a decade of increasing corporate sector engagement with health and climate change (between 2014 and 2024), and occurred in all regions and across all sectors.

With less pressure from key political figures, some of the world's biggest organisations have relaxed their climate commitments. Notwithstanding these findings, surveys suggest that most business executives still strongly endorse a rapid shift to renewable energy, and in Europe most companies support science-aligned climate policies from countries.[343,344] This suggest that some companies might be responding to political narratives in their official reporting, while support for climate action is strong.

Conclusion

This section tracks engagement by key societal actors that are crucial for driving climate action that protects people's health. As we noted in last year's report, engagement with health and climate change across these different actors has generally increased, since 2016 when the Paris Agreement came into effect.[218] However, despite the rapidly escalating climate risks, there are concerning signs that engagement may have peaked across several indicators, and is now declining. This can be seen with the media, governments, and the corporate sector, which all showed signs of backsliding in 2024. These trends provide growing evidence of a backlash to climate action around the world, which can be seen with the election of populist far-right governments in several high-emitting countries that propagate climate scepticism and fuel opposition to mitigation policies.[345–348]

In addition to backsliding across these societal domains, the public and political indicators continue to point to substantial global inequities. Scientific evidence generation is still concentrated on higher HDI countries, rather than those most exposed to the health impacts of climate change; while engagement with health and climate change is led by lower HDI countries, those most at risk of health impacts of climate change, rather than by the higher HDI countries most responsible for GHG emissions. This dangerous combination of backsliding and inequality in public and political engagement with health and climate change risks further delaying the climate action needed to protect the most vulnerable around the world from increasingly evident health impacts of the climate crisis.

Conclusion: the 2025 report of the Lancet Countdown

The 2025 report of the Lancet Countdown exposes a world in turmoil, where climate change threats to human health and survival continue breaking concerning records: 60% of the indicators monitoring climate change-related health risks and their associated costs reached unprecedented levels in the latest year of data (Figure 16).[218]

Heat-related deaths reached an estimated average of 546,000 annually in 2012-2021, up by 63.2% compared to 1990-1999 (indicator 1.1.5). Heatwave exposure reached record-high levels in 2024, and high temperatures are increasingly disrupting sleep and endangering those undertaking physical activity (indicators 1.1.1, 1.1.2, and 1.1.4). In 2024, a record-breaking 60.7% of the global land experienced extreme drought, and a record 64% of global land area saw increases in extreme precipitation events between 2015-2024 and baseline, undermining water security, food security, and sanitation (indicators 1.2.2, 1.2.3 and 1.4). Exposure to dangerous levels of airborne sand and dust $PM_{2.5}$ is growing, and wildfire-derived $PM_{2.5}$ caused 154,000 deaths in 2024 (indicators 1.2.1 and 1.2.4). Weather conditions are also increasingly suitable for dengue, malaria, vibriosis, tick-borne disease, and Leishmaniasis transmission, threatening to increase the spread of these deadly diseases (indicators 1.3.4 and 1.3.5).

The direct health impacts of climate change are compounded by impacts on the socioeconomic conditions that sustain good health. Heat exposure alone caused a record-high US$1.09 trillion in potential income losses in 2024, whilst weather-related extreme events caused US$ 318 billion global losses. Insurance systems are increasingly strained, leaving more people unprotected from growing hazards (indicators 4.1.1, 4.1.3 and Panel 4). These multiple health impacts often compound each other, strain health systems, and are exacerbating the drivers of social instability and conflict (Panel 3).

Despite these growing threats, climate action remains inadequate, exacerbating the risks to people's health and survival, only 45% of countries that submitted costed NAPs and NDCs to the UNFCCC included quantified estimates for health adaptation needs. Health adaptation funding in support of the most vulnerable countries remains grossly insufficient, at only US$84 million in bilateral finance, and US$166 million from the

Green Climate Fund (indicator 4.3.4). The implementation of health adaptation efforts is also lagging: only 69% of WHO member states reported high-to-very-high health emergency management capacity in 2024 (indicator 2.2.4); and urban greenspace coverage, which provides local cooling and climate resilience, remained practically unchanged, while growing air conditioning use exacerbates climate hazards, urban heat, and air pollution (indicators 2.2.2 and 2.2.3).

Concerningly, this year's report finds a reversal of progress or a worsening of conditions for health across 58% (11 of 19) of the metrics monitoring climate change mitigation or engagement of key actors with climate change and health. Only 30% of governments referred to health and climate change in their 2024 UN General Debate statements; and references in media outlets and in companies' reports to the UN Global Compact fell further in 2024 (indicators 5.1, 5.4.1, and 5.5).

In line with weakened climate commitments, global energy-related emissions reached an all-time high in 2023 (indicator 3.1.1), and oil and gas companies keep expanding their production plans and were, as of March 2025, on track to exceeding their 1.5°C-compatible production share by 189% by 2040 – up from 183% one year before (indicator 4.2.2). Fuelling this expansion, bank lending to fossil fuel companies grew 29% between 2023 and 2024 (indicator 4.3.3), while 83% of countries provided net fossil fuel subsidies, for a global net total of US$956 billion in 2023 – second only to 2022 (indicator 4.3.2). These delays in the clean energy transition intensified climate change, and contributed to 2.52 million deaths from fossil fuel-derived outdoor air pollution, and 2.3 million deaths from dirty fuel-derived household air pollution in 2022 (indicators 3.2).

The agricultural sector is further contributing to the threats. Its emissions in 2022 were 36% higher than in 2000, with 55% resulting from red meat and dairy production - the overconsumption of which caused 1.9 million deaths (indicators 3.3.1 and 3.3.2). Largely driven by agricultural expansion, forestry and wildfires, tree cover loss increased 28% from 2022 to 2023, further contributing to climate change (indicator 3.4).

Despite these concerning findings, other indicators show that some progress is being made. Although insufficient to displace fossil fuels, renewables, now cheaper and less vulnerable to geopolitical instability, reached 12.1% of all global electricity generation in 2022 (indicator 3.1.1), employing 18.3% more people in 2023 than the year before (indicator 4.2.1). Private bank lending to the green sector increased 13% from 2023 to 2024, and clean energy investment grew 13% (indicators 4.3.1 and 4.3.3).

The healthcare sector cut GHG emissions by 12% in 2022 (indicator 3.5) and 64% of medical students globally received climate and health education in 2024 (indicator 2.2.6). The number of member states reporting having completed their National Adaptation Plans for Health increased to 60.1% of WHO member states (indicator 2.1.2), Importantly, individuals' interest on health and climate change, essential for individual and community-led action, is growing (indicator 5.2 and Panel 6).

As a growing number of world leaders threaten to reverse the little progress to date, urgent efforts are needed from the private sector, local authorities, civil society, and, importantly, individuals and communities, to both deliver and demand accelerated action. These efforts can yield immediate health benefits from cleaner air, better diets, healthier cities, and improved socioeconomic conditions. With climate change impacts growing, the health and lives of the world's 8 billion people are now at stake.

A

Indicator
Variable
Scaled Indicator Value
Sparkline
Year Range
1.1.1 Number of heatwave attributable to climate change 2020-2024
1.1.1 Average days of exposure to heatwave per person – infants 1990-2024
1.1.1 Average days of exposure to heatwave per person – adults over age 65 1990-2025
1.1.2 Annual hours per-person of at least moderate heat stress risk if undertaking light outdoor exercise 1990-2026
1.1.3 Potential work hours lost yearly due to heat exposure 1990-2027
1.1.3 Average potential work hours lost yearly due to heat exposure per person 1990-2028
1.1.4 Relative change in sleep hours lost due to heat, compared with 1982-2005 baseline 2015-2025
1.1.5 Percent of deaths attributable to heat, with respect to total number of deaths 1990-2021
1.2.1 Total person-days exposure to wildfire 2003-2024
1.2.1 Population-weighted exposure to very high or extremely high wildfire risk 2003-2024
1.2.1 Mortality due to fire originated PM2.5 2003-2025
1.2.2 Land area experiencing at least 1 month of extreme drought 1990-2024
1.2.3 % land area experiencing an increase in extreme precipitation events, compared with 1961-1990 baseline 2005-2024
1.2.4 Population-averaged number of days exposed to dust concentration levels > 45 μg/m3 2003-2023
1.2.5 Impact of extreme heat on sentiment 2006-2024
1.3.1 Climate suitability (R0) for transmission of dengue by Aedes aegypti 1990-2024
1.3.1 Climate suitability (R0) for transmission of dengue by Aedes albopictus 1990-2024
1.3.2 Global average length of transmission season for P falciparum 1990-2024
1.3.3 Climate suitability (relative R0) for transmission of West Nile virus 1990-2024
1.3.4 Predicted leishmaniasis risk 1990-2024
1.3.5 Mean number of months suitabile for Rhipicephalus tick presence and activity 1990-2024
1.3.6 Length of coastline suitable for transmission of Vibrio 1990-2024
1.4 Average global sea surface temperature 1990-2025
3.2.1 Number of deaths attributable to fossil fuel-related ambient PM2.5 2007-2022
4.1.1 Economic losses from weather-related extreme events (US$) 2015-2024
4.1.2 Average annual monetised value of heat-related mortality (US$) 2000-2024
4.1.3 Potential income loss from labour capacity reduction due to extreme heat ($bil) 1990-2023
4.1.4 Monetised value of premature mortality due to air pollution ($bil) 2007-2022
1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024
= record risk or impacts in the latest year of data
= Data not available
0 0.5 1
Range of values from most favourable to least favourable

B

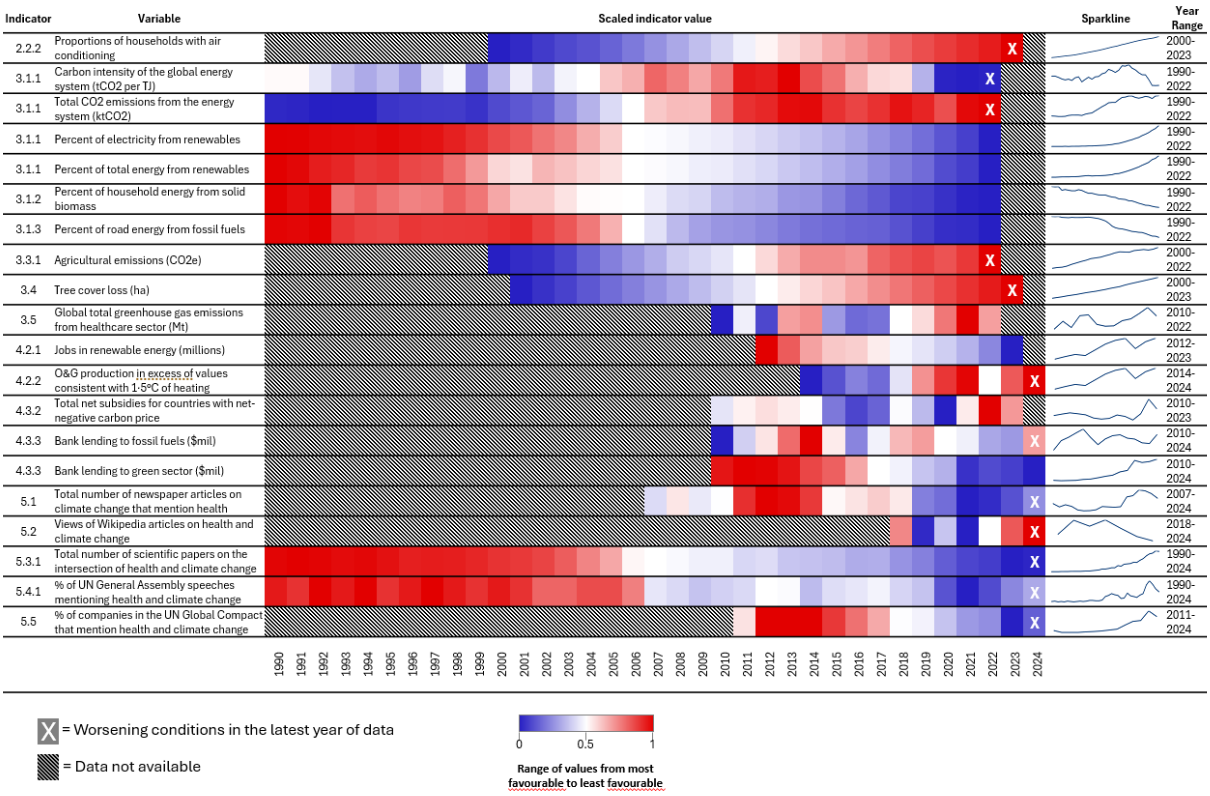


Figure 16: Summary of the evolving links between health and climate change

Summary of values of the indicators in the 2025 report of the Lancet Countdown for which quantitative data per year are available. The heatmaps present the time series for each indicator, with values linearly scaled into the range 0–1, such that 0 and 1 represent the minimum or maximum values in the time series shown (after 1991), and 0·5 represents the median. The sparklines present a line graph with the indicator value in the y-axis and the full range of years for which data are available for each indicator in the x-axis (specified in final column). The scaling and colouring are principally for visualisation. Changes can be overemphasised even if they are not statistically significant. Values do not reflect whether the level of progress made is adequate or offer a comparison between the magnitude of different risks faced. For accurate interpretation, please refer to the data presented in the indicator and in the Lancet Countdown's data visualisation platform.

(A) Indicators of health hazards, exposures and impacts (section 1 and section 4.1); higher values (red tones) denote higher levels of health hazards, exposures, or impacts within the time series; lower values (blue tones) denote lower levels of health hazards, exposures, or impacts within the time series. Asterisks denote that the indicator reached a record-high health risk or impact in the most recent year of data.

(B) Indicators reflecting responses to climate change(sections 2–5); the scaling was adjusted such that higher values (red tones) denote conditions within the time series that are less favourable towards efforts for tackling climate change and its health risks and lower numbers (blue tones) denote conditions within the time series that are more

favourable towards efforts for tackling climate change and its health risks (inverting indicator values as necessary). The pound sign indicates that actions have worsened, or resulting health risks have increased in the most recent year of data compared with the previous year.

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