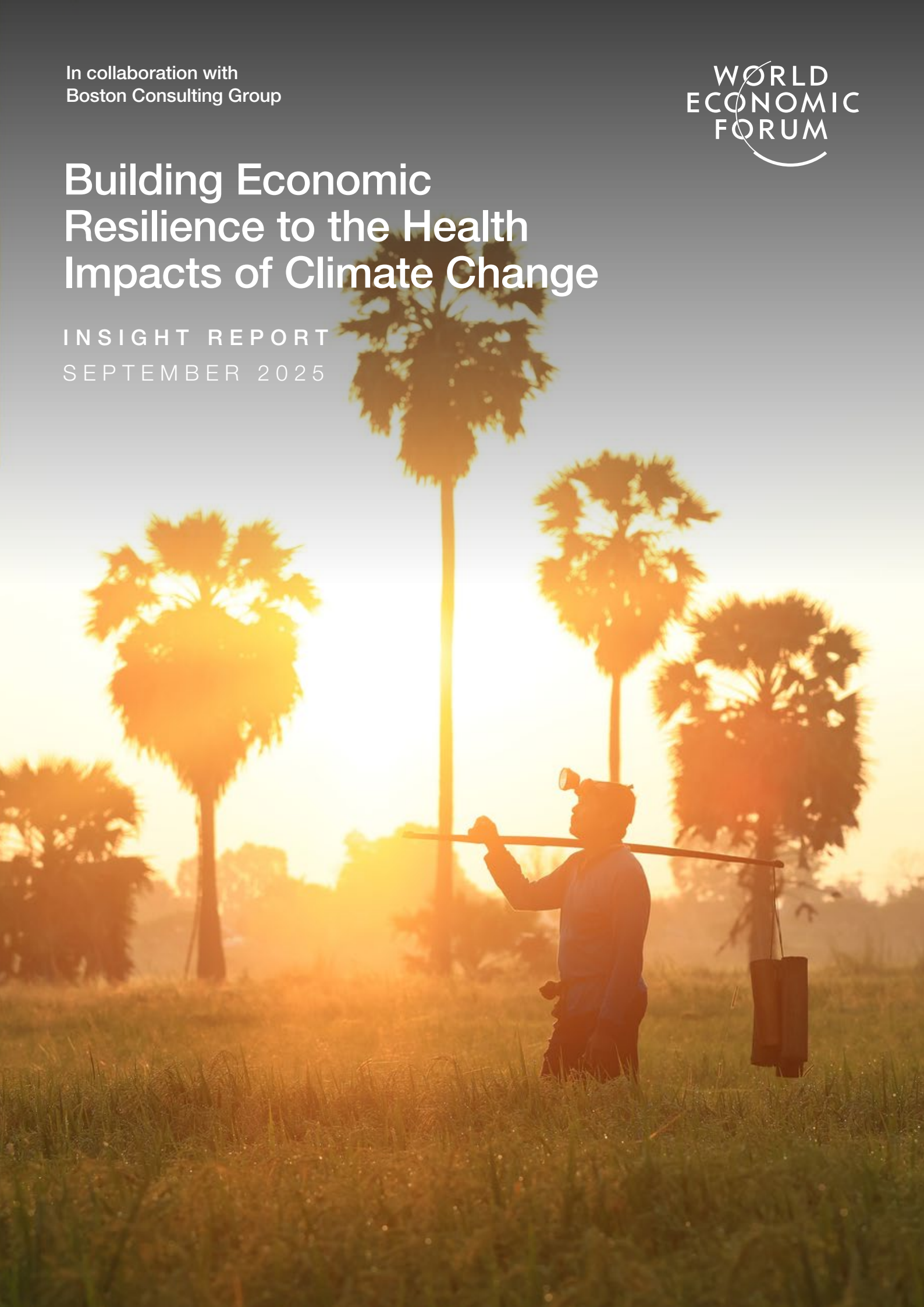
In collaboration with
Boston Consulting Group

WORLD ECONOMIC FORUM

Building Economic Resilience to the Health Impacts of Climate Change

INSIGHT REPORT

SEPTEMBER 2025



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Foreword

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The impact of climate change on global health presents an urgent and complex challenge. Rising temperatures, extreme weather events and environmental degradation are not just environmental issues – they directly threaten human health, business operations and global economic stability. The heaviest burdens will fall on communities with limited infrastructure, healthcare access and emergency preparedness – particularly in developing countries, which currently account for 90% of deaths from weather-, climate- and water-related hazards.[1] From the increasing prevalence of heat-related illnesses, the spread of mosquito-borne disease and the rise of food insecurity linked to crop failure, climate-induced health risks, hereinafter referred to as climate-health risks, are accelerating, and will have profound implications for supply chains, workforce productivity and financial markets if significant action isn't taken.

This report provides a detailed analysis of the risks and opportunities facing four critical economic sectors: food and agriculture, the built environment, health and healthcare, and insurance. These industries sit at the core of the nexus of climate change and public health. Strengthening food systems, rethinking urban infrastructure, improving healthcare responses and reshaping insurance models are essential steps towards mitigating risks and building resilience. Companies that fail to adapt will face increasing operational disruption, workforce vulnerabilities and financial liabilities, while those that build resilience will unlock opportunities for innovation, competitive advantage and long-term growth.

The private sector plays a pivotal role. As the largest employer and controller of capital and supply chains, it is uniquely positioned to set new industry standards and ensure workforce health amid increasing climate change. The cost of inaction is rising. Bold, systemic action, however, can protect communities and future proof operations.

The World Economic Forum, in collaboration with Boston Consulting Group (BCG), recognizes that addressing these challenges requires cross-sector collaboration, forward-thinking leadership and decisive action. This report serves as an initial view of how businesses can accelerate solutions that create a healthier, more resilient and more prosperous global economy. **Now is the time to lead through concrete investments and scalable solutions that protect people, businesses and the planet**.

Executive summary

The impact of climate change on health is already significant, and will only grow in magnitude.

Estimates suggest that, if left unaddressed, climate change could result in 14.5 million excess deaths by 2050,[2] concentrated in the most disadvantaged regions and populations globally. In these regions, deaths from extreme weather events have been 15 times higher over the past decade.[3]

Climate-health impacts also threaten business resilience. Today, less than 5% of global adaptation funding targets health protection[4] – a dangerous gap that also presents an opportunity for private-sector action.

This report defines a Climate and Health Business Framework and applies it to four highly exposed sectors to identify specific climate-health risks and opportunities for each.

- **Food and agriculture:** By 2050, an estimated 24 million additional people will face hunger.[5] Agricultural workers are expected to face growing climate-health risks. This report estimates a likely, mid-range scenario of $740 billion in worker availability losses between 2025 and 2050. Businesses that invest in resilient and precision agriculture practices and modified working practices will be best positioned to meet growing global needs for consistently available, healthy foods.

- **Built environment:** Over half the world's population live in urban areas,[6] and most buildings and infrastructure are poorly adapted for climate extremes such as heat or air pollution. Construction workers are particularly vulnerable; this report projects a likely, mid-range scenario that the industry will lose at least $570 billion due to worker availability losses between 2025 and 2050. Climate-resilient design and retrofits have the potential to safeguard communities and yield economic benefits.

- **Health and healthcare:** The health and healthcare sector is expected to face at least $200 billion in worker availability losses in a likely, mid-range scenario from 2025 to 2050. It will also bear an additional $1.1 trillion treatment burden due to climate change by 2050,[7] necessitating a shift towards preventative care. There is tremendous opportunity for companies to lead this transformation and build resilience by creating new climate-resilient medicines and robust care pathways, and improving public health engagement.

- **Insurance:** Climate change is driving up claims in health, life and casualty coverage, with Swiss Re forecasting 0.75% excess mortality annually by 2050.[8] Meanwhile, only approximately 8% of people in low-income communities are covered by health insurance.[9] Insurers can support and accelerate resilience by offering innovative products, improving forecasting capabilities and incentivizing risk reduction.

Taken together, worker availability losses across food and agriculture, built environment, and health and healthcare are projected to exceed $1.5 trillion between 2025 and 2050 (see Annex for methodology), underscoring the magnitude of the climate-health challenge. While institutions in each sector can act, no sector can tackle the climate-health challenge alone. Success depends on enabling coordinated action – through supportive policies, interoperable climate-health data systems and innovative financing to mobilize capital. These foundations can help ensure long-term, scalable resilience.

The cost of inaction on climate-health risks is enormous, yet there are opportunities for businesses to adapt, build resilience and create economic and social value, differentiation and sustainable growth. This report calls on business leaders to act now to safeguard their operations and secure a healthier future for all.

1 The economic impact of climate-driven health conditions: a framework for action

Climate-health impacts are a profound humanitarian issue that also carry significant economic implications for businesses worldwide.

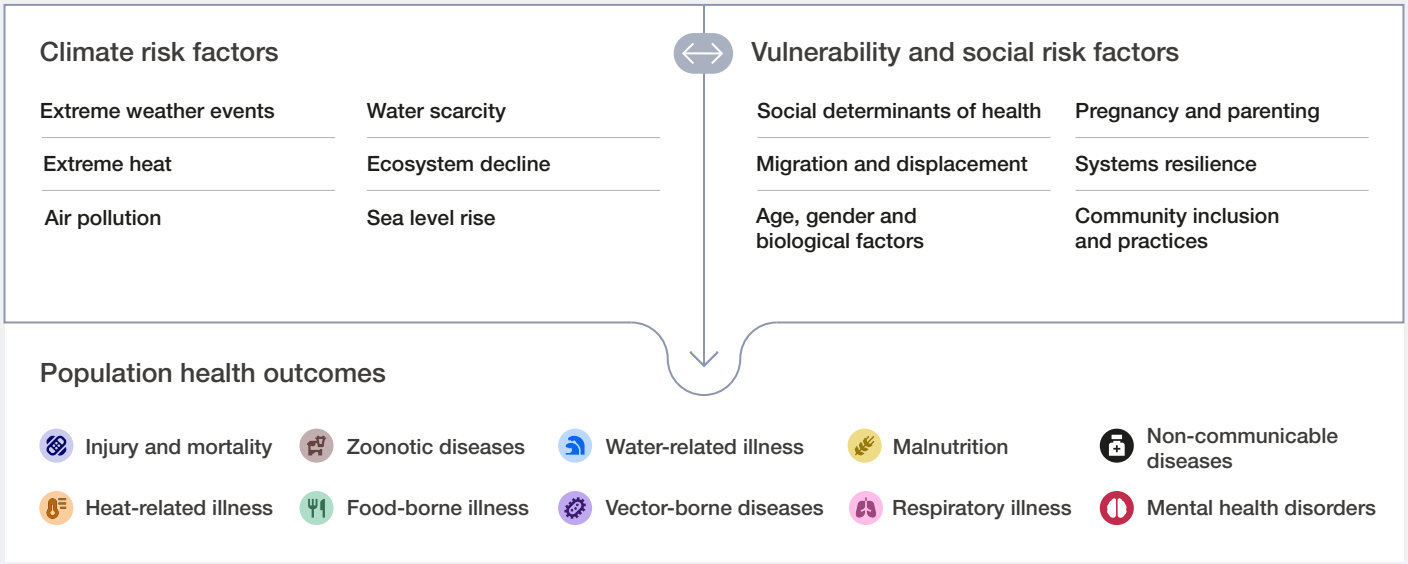
1.1 The impact of climate change on health

Climate change is already impacting population health.

Climate change is not just an environmental concern – it is also a health issue. Chronic climate stressors undermine the foundations of good health (e.g. clean air, safe water, stable temperatures, sufficient food, secure shelter), while extreme weather events directly threaten health. Without adaptation, these stressors could result in 14.5 million excess deaths and $12.5 trillion in economic losses by 2050.[10]

Figure 1 lists 10 critical population health outcomes identified by the World Health Organization (WHO) that are expected to worsen with climate change.

FIGURE 1 **How climate affects population health outcomes**



Source: World Health Organization (WHO). (2021). *Climate change and health: vulnerability and adaptation assessment.*

more heat-related deaths occurred among women than men in Europe between 30 May and 4 September 2022.

The health impacts of climate change are compounded by existing health vulnerability factors.

Climate-driven health risks are disproportionately felt by the most vulnerable and disadvantaged, including women, children, the elderly, poor communities, migrants or displaced persons, and those with underlying health conditions.[11] For example, between 30 May and 4 September 2022, Europe saw 56% more heat-related deaths among women than men.[12] Human vulnerability is also either exacerbated or mitigated by governments', communities' and the private sector's ability to provide infrastructure and services to support health. Climate-driven health risks and vulnerability factors are interconnected and often compounding, as a lack of resources makes it harder for affected groups to adapt, creating a vicious cycle in which climate shocks deepen existing health and economic inequalities.

Together, chronic and acute climate risk factors and existing health vulnerabilities will lead to worse population health outcomes (see Figure 1).

Injury and mortality: Weather events (e.g. hurricanes, floods, wildfires) cause direct injuries and fatalities. Developing countries are disproportionately affected, accounting for over 90% of deaths due to weather, climate and water hazards.[13]

Heat-related illness: Heatwaves lead to heatstroke and secondary effects like cardiovascular stress in vulnerable populations such as outdoor workers, women, the elderly, urban residents and those with underlying health conditions (including pregnancy). Although global warming may lower cold-related mortality, it is widely accepted that this impact will not compensate for the rise in heat-related deaths.[14]

Zoonotic diseases: Ecosystem degradation (e.g. deforestation, habitat loss) brings humans, livestock and wildlife into closer contact, increasing the likelihood of animal-to-human disease transmission and outbreaks of zoonoses such as Ebola and COVID-19.[15]

Vector-borne diseases: Warmer climates and shifting rainfall patterns expand and shift the range and seasonality of disease-carrying mosquitoes, ticks and other vectors, boosting the spread of malaria, dengue, Zika, Lyme disease and other illnesses while disrupting protection and control.

Water-related illness: Changes in temperature and precipitation create favourable conditions for the spread of waterborne pathogens like cholera, typhoid and dysentery, as flooding contaminates water supplies while droughts concentrate pollutants.

Food-borne illness: Higher temperatures and humidity accelerate the growth of pathogens (for example, salmonella, E. coli and norovirus) and, combined with supply chain disruptions and flooding, increase the risk of food contamination.

Malnutrition: Droughts, flooding, heat stress and other climate impacts reduce agricultural yields and quality, disrupting food supply chains, ultimately leading to higher rates of food insecurity and malnutrition (including undernutrition and obesity).

Respiratory illness: Rising temperatures, wildfires and the burning of fossil fuels contribute to particulate pollution and ground-level ozone (smog) formation, which can cause respiratory tract infections and other non-communicable diseases such as pneumonia, asthma, chronic obstructive pulmonary disorder and lung cancer.

Non-communicable diseases: Climate-induced factors such as extreme heat, air pollution and poor diets linked to food insecurity increase the rates of pregnancy complications, adverse birth outcomes and chronic illnesses like cardiovascular disease, diabetes, kidney disease and even some cancers.

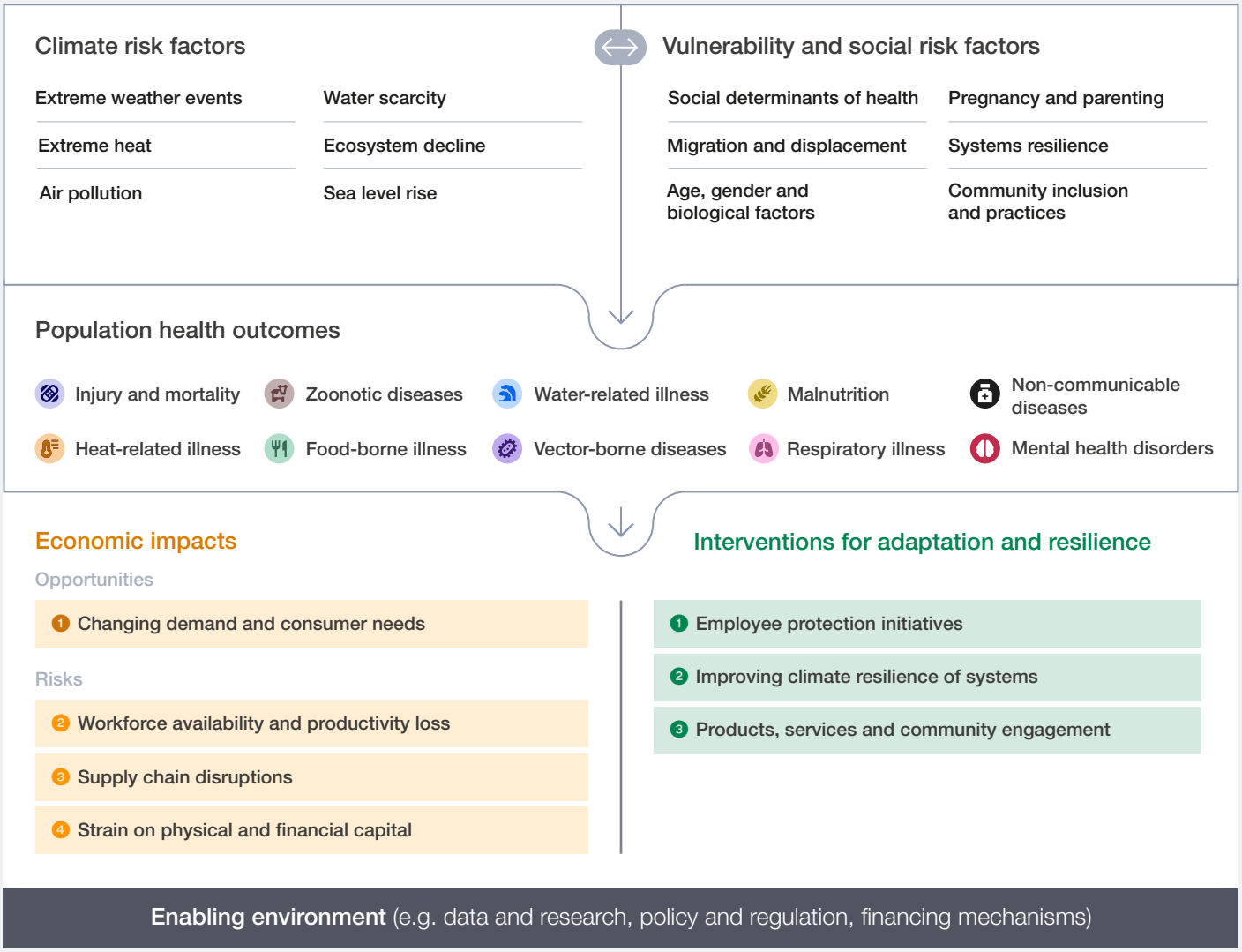
Mental health disorders: The trauma and stress of climate-related disasters, displacement and livelihood instability are leading to increases in mental health issues, including anxiety, depression and post-traumatic stress disorder (PTSD). Beyond disasters, rising temperatures are linked to increased stress, aggression and physical harm.

1.2 The economic consequences of the health impacts of climate change

This report focuses on the economic consequences of climate-health risks. Good health is fundamental to economic productivity, while poor health slows economic growth and can entrench poverty and inequality.

The Climate and Health Business Framework (Figure 2) provides a structure for assessing the interconnections between climate hazards, health risks, their economic impacts on business, and interventions to build resilience.

FIGURE 2 **The Climate and Health Business Framework**



> Climate-health risks will impact all economic sectors. Adaptation and resilience strategies can protect the health of a business's workforce and consumers.

Economic impacts: climate-health risks present both opportunities and risks for business

Economic opportunities

- **Changing demand and consumer needs:** Businesses that innovate rapidly to meet increased demand for health-protective goods and services – for example, climate resilient buildings, artificial intelligence (AI)-powered climate monitoring systems or healthier foods – can gain a competitive advantage, creating value while improving health outcomes for customers and communities.

Economic risks

- **Workforce availability and productivity loss:** More frequent extreme heat or disease outbreaks can have significant productivity impacts due to increased staff absences and presenteeism. Across economies, talent pools may shrink as those with chronic conditions exit the labour force.
- **Supply chain disruption:** Businesses reliant on complex global supply chains are more exposed to risks from ill health. An epidemic affecting the productivity of upstream suppliers can delay shipments or cause shortages of raw materials or components. Such disruptions increase costs, reduce efficiency and lessen capacity to meet customer demand.
- **Strain on physical and financial capital:** Increased health risks translate into higher costs of doing business and place more demand on corporate assets – for example, through rising insurance premiums, greater medical liabilities and escalating pressure on physical facilities that support healthcare.

Interventions: to capture opportunities and mitigate risks, businesses can take steps to adapt and build resilience

Climate-health risks will impact all economic sectors. Adaptation and resilience strategies can protect the health of a business's workforce and consumers, supporting both operational continuity and future growth. These efforts should complement, but not replace, ongoing decarbonization and climate mitigation initiatives, which are beyond the scope of this report. There are three distinct types of intervention:

- **Employee protection initiatives:** Investing in worker protection mitigates the risk of worker illness and lowers the direct cost of lost worker productivity.
- **Improving climate resilience of systems:** Improving operational processes and efficiency helps businesses prevent and respond to climate-driven health disruptions, supporting business continuity.
- **Products, services and community engagement:** These provide health-protective products and services that meet communities' changing needs while enabling businesses to capture economic opportunities.

1.3 Enabling environment

While private-sector leadership is essential, the most successful climate-health strategies require complementary action across business, government and civil society. Specifically, three systemic enablers can help unlock and scale the multisector strategies outlined above:

1 A strong policy and regulatory framework for climate-health action

Governments can play a pivotal role in cultivating climate-health resilience. Clear policy signals and responsive occupational safety standards, such as labour protections for extreme heat, can guide private-sector investment. Consistent enforcement, coupled with incentives for compliance, can embed adaptation to climate-health risks as a standard business practice.

2 A deeper, more interoperable climate-health data landscape

Robust, shared data systems are critical to understanding and managing climate-health risks. Public and private actors can co-invest in research and data-sharing infrastructure – from disease early-warning networks to real-time heat monitoring. Advances in AI can enhance these systems by facilitating faster detection of emerging threats at lower costs.

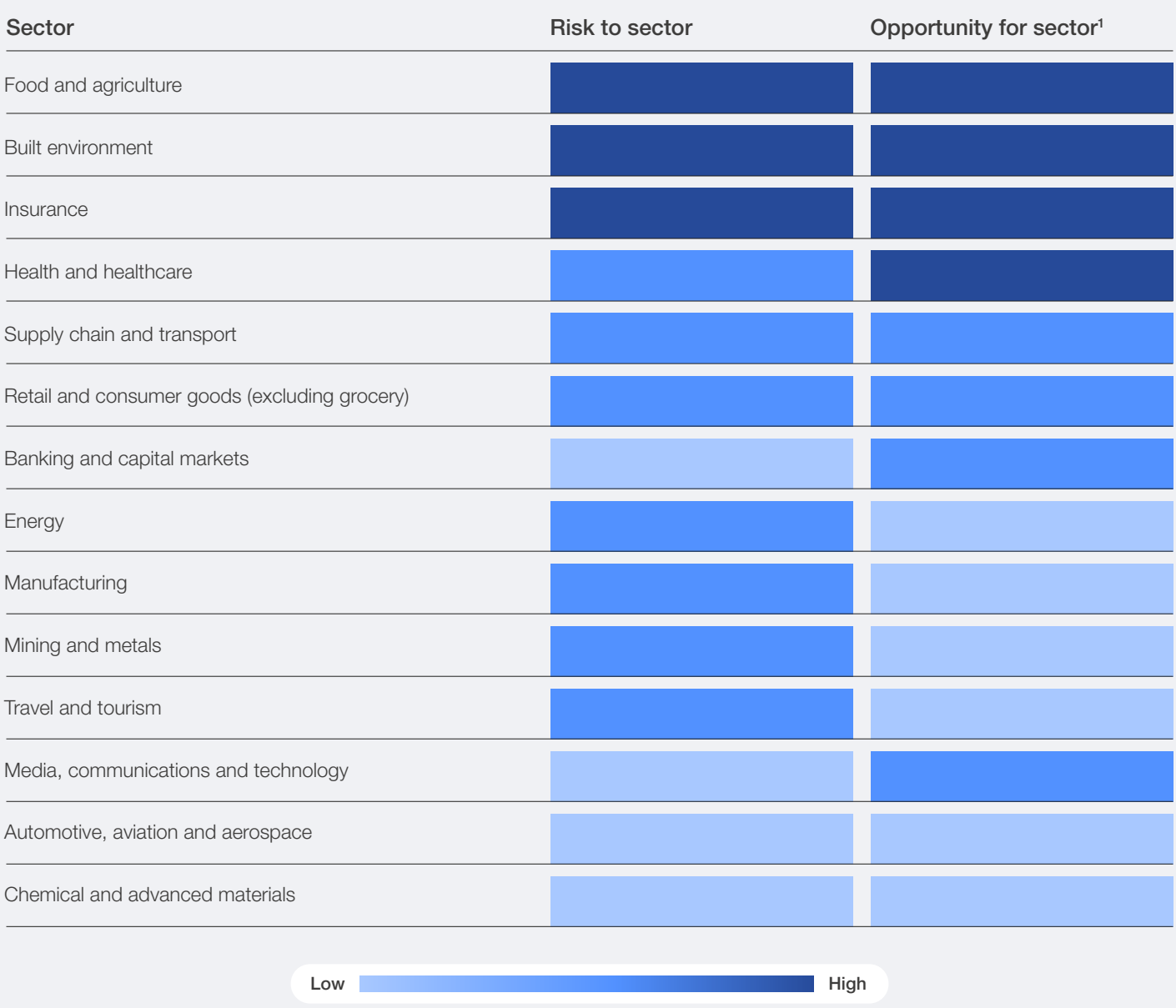
3 Innovative financing mechanisms to fund climate-health resilience

Collaborative financing models can spread the economic risks of adaptation and accelerate investment. Public-private partnerships, bringing together insurers, banks, governments, philanthropic institutions and businesses, can harness tools like co-funding, tax incentives, grants and resilience bonds to drive investment.

1.4 Economic sectors of focus for this report

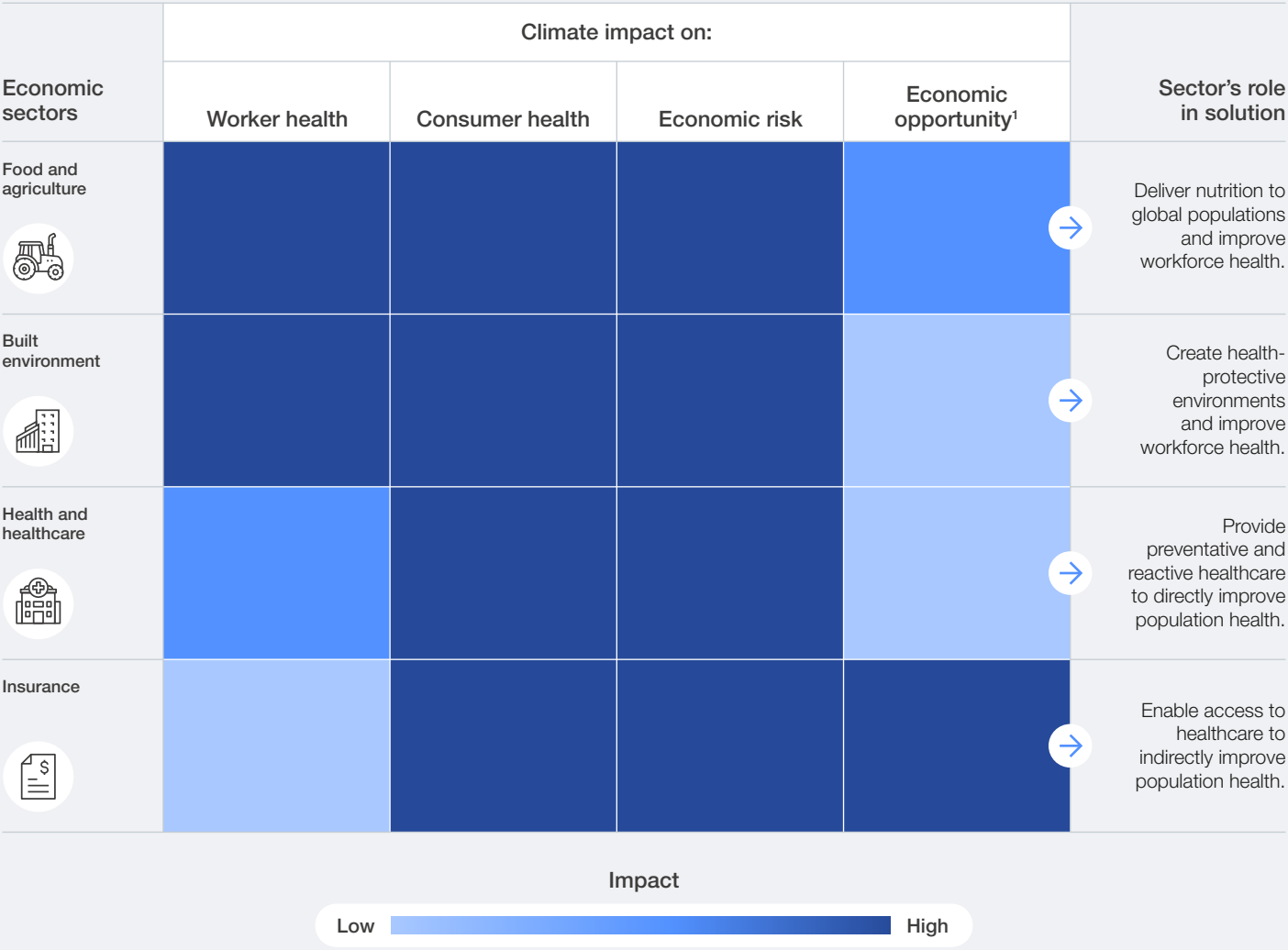
This report applies the Climate and Health Business framework to four heavily affected economic sectors. Figure 3 depicts the initial analysis determining the extent to which individual sectors are affected by climate-health risks and opportunities for building resilience. Food and agriculture, the built environment, health and healthcare, and insurance stand out as having especially high risks and opportunities, presenting a strong business case for adaptation and resilience strategies (Figure 4). For each of these four sectors, this report identifies specific health impacts, economic impacts and priority interventions to guide action.

FIGURE 3 **Climate-health impacts on economic sectors**



Note: 1. Opportunity for a sector refers to its potential to generate economic value while contributing to meeting a social need.

FIGURE 4 | **Unique role of the focus sectors**

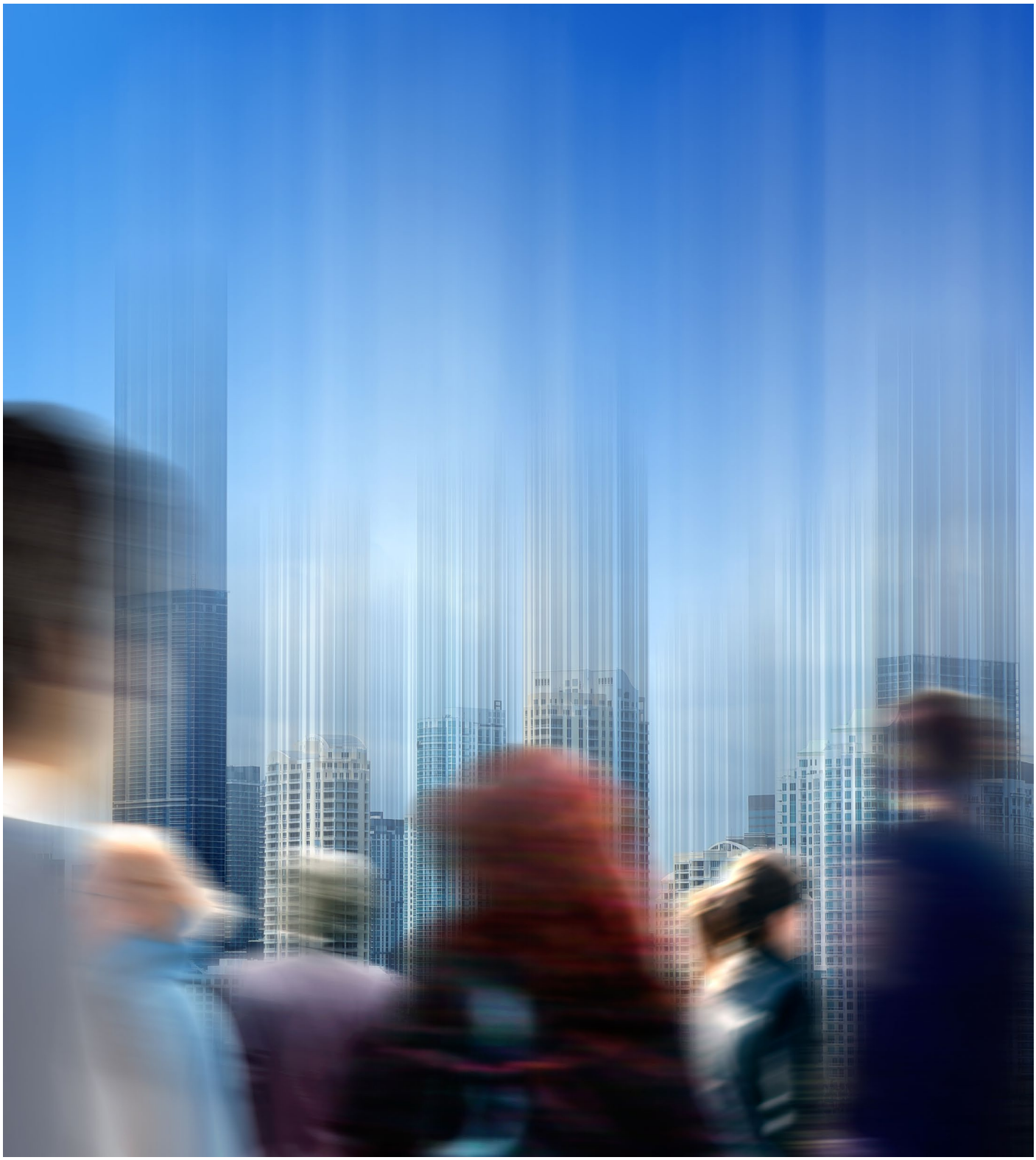


Note: 1. Opportunity for a sector refers to its potential to generate economic value while contributing to meeting a social need.

Potential changes in worker availability have been projected from 2025 to 2050 across the food and agriculture, built environment, and health and healthcare sectors, focusing on seven climate-related health conditions (heat-related disease and mortality, dengue, malaria, diarrheal diseases, nutritional deficiencies/malnutrition, ozone-related illness and death, and air pollution from ozone and particulate matter). The insurance sector was excluded from this specific analysis because its workforce has minimal direct exposure to climate-health risks. Health and economic impacts at the sector level are calculated using each sector's share of employment, which likely understates the true burden of climate-health impacts for these focus sectors, in which workers face disproportionate exposure to climate-health risks. The full methodology is included in the Annex.

2 All-sector recommendations

Despite differences in climate-health risk exposure, protective actions are both relevant and applicable to all industries.



The health impacts of climate change cut across all sectors – no industry is immune. The eight interventions outlined in this section are applicable to most sectors in the broader economy.

In many cases, businesses will be able to go further, prioritizing actions that address their specific contexts.

FIGURE 5 **All-sector interventions**

Employee protection initiatives

1. Implement **occupational health safeguards** for workers in high-risk zones, e.g. personal protective equipment.
2. Provide climate-responsive **employee health coverage** options, e.g. health plans for heat risk.

Improving climate resilience of systems

3. Implement **risk monitoring and early warning systems** following a comprehensive climate-health risk assessment.
4. Invest in **climate-health research** to create data sources to identify the root causes of climate-related illnesses.
5. **Protect critical systems**, including both built and ecological infrastructure, to reduce vulnerability.

Products, services and community engagement

6. Establish **preparedness and response plans** for climate-related health emergencies.
7. **Educate workers and communities** on climate-related health hazards and proactive strategies to mitigate risks.
8. Scale **health-protective products and services** that reduce long-term health burdens across the value chain.

1 Implement occupational health safeguards in high-risk zones

In regions vulnerable to climate impacts, implementing proactive safeguards can significantly reduce illness and mortality. This could include providing workers with medical care, implementing cooling solutions and modifying work practices. These interventions reduce medical care costs and protect workers, minimizing productivity losses.

2 Provide climate-responsive employee health coverage

Expanding employee health benefits to cover relevant climate-driven conditions strengthens resilience by ensuring a healthier and more productive workforce.

3 Implement risk monitoring and early-warning systems

Continuous tracking of indicators – including meteorological data, disease outbreak data and workforce health metrics, identified through a prior risk assessment – can enable businesses to anticipate and reduce health and operational risk before crises escalate.

4 Invest in climate-health research

Advancing science and developing solutions for challenges linked to climate-health is a multisector imperative. By investing in research, businesses can help identify the root causes of climate-health risks and develop new treatments, technologies and preventative strategies.

> Businesses can play a role in building climate-health literacy across their workforce and communities.

5 Protect critical systems

Climate change is eroding the systems people depend on for food, shelter and health, for example through degraded farmlands and vulnerable infrastructure. Businesses can invest in strengthening both built and ecological infrastructure to reduce vulnerability and support the resilience of the broader sector and its supply chains.

6 Establish preparedness and response plans

Businesses should prepare for climate-related health emergencies and the changing profile of climate risk, e.g. by training workers and spreading awareness of specific climate-health protocols.

7 Educate workers and communities

Businesses can play a role in building climate-health literacy across their workforce and communities. Through training, workshops and clear guidance, companies can empower people to take informed action on their own health. Healthier communities experience fewer workplace illnesses as well as a more stable labour force and customer base, making education a key strategic investment to enhance systemwide resilience.

8 Scale health-protective care products and services

As climate-health risks intensify, businesses will need to create and scale products that both prevent ill health and enable faster, more equitable access to care. These could be achieved through innovations that address the root causes of climate-exacerbated disease, as well as new tools to diagnose and treat emerging conditions.

The following sections dive deeper into the unique health and economic challenges faced by the focus sectors. Once businesses have applied the climate-health framework to identify their biggest risks and opportunities, the next step is to develop specific interventions to protect health, build resilience and, in many cases, create value.

3 Food and agriculture

Climate change threatens health by disrupting global food systems, risking crop loss and harming workforce health.

BOX 1 **Food and agriculture key takeaways**

- The food and agriculture sector provides nutrition for all and employs nearly a billion people globally (roughly 30% of the total labour force).[16]
- The sector is at the front line of climate-health risks. By 2050, climate change could cause up to a 35% decline in production across staple and non-staple crops,[17] a 20% rise in malnutrition rates[18] and increases in food-borne illnesses and mental ill-health. Demand could increase by 50% over the same period, however.[19]
- Agricultural workers face significant climate-health risks, including extreme heat, vector-borne disease, zoonoses and respiratory disease. This report estimates that the global agriculture workforce will face at least 130 million disability adjusted life years (DALYs), resulting in at least $740 billion in lost output from select climate-health illnesses, from 2025 to 2050.
- Businesses have the opportunity to protect health by meeting demand for nutrient-dense food products and climate-resilient cultivation. Strengthening resilience in food systems and protecting workers are vital actions for global health.

3.1 The food and agriculture sector

The food and agriculture sector plays a fundamental role in sustaining human life, health and well-being.

The sector comprises a wide range of interconnected activities, grouped into four segments: agricultural technology, agriculture, livestock production, food processing, and distribution and retail.

Agricultural workers make up roughly 30% of the entire global labour force[20] and are present in all regions. The sector faces significant challenges, including declining crop nutrient density and the increasing cost of agricultural inputs. Without sufficient action, climate change will increase risks to crop yields, labour conditions and input availability. Strengthening resilience in food systems is vital for global health.

3.2 Health impacts

Climate change threatens global food production, putting 24 million additional people at risk of hunger by 2050 under Shared Socioeconomic Pathway 2 (SSP2).[21]

TABLE 1 **Top climate-driven health risks for food and agriculture consumers**

Malnutrition

High temperatures and extreme weather destabilize crop yields, increasing the prevalence of malnutrition, thereby exacerbating the severity of other diseases.

Food-borne illness

Higher temperatures increase pathogen growth rates, and extreme weather events raise the risk of food contamination.

Mental health

Food disruptions and rising food prices lead to anxiety and other mental health issues, especially in low-income populations.

Agricultural and food-processing workers are often engaged in labour-intensive outdoor work with low pay or security, and are therefore particularly vulnerable. Modelling shows that, globally, the agricultural workforce is projected to incur at least 600,000 deaths and 130 million DALYs from 2025 to 2050 due to select climate-health risks.

TABLE 2 | **Top climate-driven health risks for food and agriculture workers**

Malnutrition

Subsistence farmers are at greater risk of malnutrition as they are more dependent on their own (or highly localized) crop yields, which are increasingly volatile due to climate change.

Vector-borne diseases

Agricultural field workers are at an increased risk of vector-borne disease, as post-drought irrigation or excess rainfall creates stagnant water pools, increasing the risk of mosquito-borne diseases.

Zoonoses

Farmers are at a greater risk of contracting zoonoses due to close contact with wild and farmed animals and their waste. Food processors are also at greater risk due to exposure to animal products.

Heat-related illness

Both outdoor field workers and indoor food-processing workers are at risk from extreme heat, given the lack of adequate cooling or ventilation. The agricultural sector is expected to account for 60% of global working hours lost to heat stress in 2030.[22]

Respiratory illness

Farmers and transporters are more likely to suffer from respiratory illnesses due to exposure to pesticides and particulates, including dust from dry soils and mould spores. These illnesses are exacerbated by extreme weather events that contribute to worsening air pollution.

These challenges are magnified for smallholder farmers, who manage 84% of the world's farms[23] and represent 500 million households globally.[24]

Typically operating without adequate labour protections, health systems, technical training or modern equipment, subsistence and smallholder farmers face heightened risks from extreme heat, vector-borne diseases and declining crop yields. They are susceptible to a vicious cycle: poor health lowers productivity, leading to food insecurity and income loss, which in turn worsens health outcomes. Breaking this cycle requires targeted investment in health infrastructure and education to build a resilient farming system.

3.3 Economic impact

> Lost worker availability in the food and agriculture sector caused by climate change-driven health risks is expected to amount to at least $740 billion from 2025 to 2050.

Proactive companies have a clear opportunity to gain a competitive advantage by developing products and services that align with shifting customer needs. Processors that can maintain consistent, high-volume production will be able to command premium prices, secure favourable contracts and build stronger relationships with buyers seeking supply reliability.

Nutrient-dense crops can attract a larger share of the global market. Meanwhile, reducing food waste (currently about 25% of produce[25]) can increase availability while boosting revenue and reducing emissions.

This analysis (based on seven key climate-related health conditions) shows that lost worker availability in the food and agriculture sector caused by select climate change-driven health risks is expected to amount to at least $740 billion from 2025 to 2050 (see Annex for methodology).

Rising worker illness rates reduce worker productivity. Labour shortages in agriculture are particularly costly, as tasks like harvesting are time-sensitive. During the peak season in Nigeria, for example, malaria-infected farmers harvest only roughly 40% of their crops, compared to nearly 100% for healthy farmers.[26]

Worsening worker health and disease outbreaks disrupt supply chains by reducing labour availability and restricting transport and trade. Downstream industries like processing and retail are especially vulnerable to supply shocks as they rely on just-in-time inventory systems, face perishable product losses and experience higher consumer demand volatility.

Health risks also place additional strain on capital. Upstream, declining productivity caused by illness or heat can reduce attention on land, livestock and equipment maintenance, resulting in short-term losses (for example, more pests and disease) and long-term asset degradation, lowering value.

Downstream actors face volatile input costs and may need to hold larger inventories or seek insurance to manage supply shocks. For example, during the COVID-19 pandemic, Campbell's Soup stockpiled 50% more key ingredients than usual to build a 90-day buffer.[27]

3.4 Interventions

Businesses can protect the health of their employees (and their bottom line) against climate change by mitigating worker risks and pursuing emerging opportunities for growth.

TABLE 3 **Food and agriculture interventions**

	Food and agriculture value chain			
	Agritech	Agriculture and livestock production	Food processing	Distribution and retail
Interventions for consumers 	1 Develop **climate-resilient and nutrient-dense** crops.	3 Replace **non-native crops and livestock** with native crops found in local diets and livestock better suited to the regional climate.	5 **Optimize processing and storage** of food to minimize food waste, incidence of food-borne disease and malnutrition.	
	2 Scale **alternative calorie production methods**, e.g. lab-grown proteins, insects.	4 Manage **farm waste and run-off to** improve soil quality and prevent cross-contamination.	6 Develop and produce **nutrient-dense food** to improve nutrition.	7 Encourage **behavioural change** through pricing and marketing to improve consumption habits.
Interventions for the workforce 		8 Apply **agroecology methods** to improve soil health, boost nutrition and lower air pollution from soil erosion.		
		9 Improve **irrigation and drainage systems** to control mosquitoes and reduce vector-borne disease.		
		10 Apply **precision agriculture techniques** to reduce farmers' exposure to chemicals and lower input costs.		
		11 **Modify working practices** to reduce heat stress, avoiding peak heat hours outdoors and using cooling solutions indoors.		
		12 **Change livestock handling and farming practices** to improve animal health and reduce human exposure to zoonoses.		

1 Develop climate-resilient and nutrient-dense crops

Advances in technology such as breeding, hybridization and genome editing have enabled the development of crops and livestock that withstand climate stressors such as heat, drought and flooding, boosting yields. Syngenta, for example, invests $1.4 billion annually in research and development (R&D), with drought tolerance representing a key focus.[28] Syngenta's Agrisure Artesian corn hybrids deliver yield gains of 12% under severe and extreme drought.[29]

BOX 2 New techniques for agricultural resilience and food security

Agrobiomics is developing products to boost agricultural yields in land affected by salinity, drought or heat stress using biological solutions. Their bio-stimulant solution induces resilience in crops against drought and salinity stress, resulting in an average 35% increase in yield for rice under saline stress and 10% increase for soybeans under moderate drought when applied as seed coating. While climate change is accelerating the loss of arable lands globally, this solution can help ensure food security and nutrition while also contributing to soil regeneration.

2 Scale alternative calorie production methods

As climate change strains traditional agriculture, alternative food production methods become more competitive. Vertical farming, insect protein and lab-grown meats offer climate-resilient solutions that use less land and water in controlled environments. In the UK, for example, vertical farming of strawberries yields five times more fruit per square metre than traditional forms of farming, uses 50% less water and cuts carbon emissions by 90% per kilogram.[30]

3 Replace non-native crops and livestock

Shifting to native crops better suited to forecasted weather patterns can improve nutrition and climate resilience. Many of these crops are drought-resistant and require fewer inputs because they are naturally adapted to local soil and climate conditions. Farmers in Kenya transitioning from conventional to indigenous vegetables experienced a net gain of $4,000 per acre – an increase of 335%.[31] Using better-adapted livestock breeds and species can also be more climate-resilient. These "heritage varieties" are also often more nutrient-dense, helping combat malnutrition while contributing to a more sustainable and resilient food system.

4 Manage farm waste and runoff

Improperly managed agricultural waste and runoff can degrade soil, pollute waterways and spread disease. Implementing buffer zones and practices such as composting can help protect public health and ecosystems.

Converting waste into biogas is a high-impact solution. Rather than sending manure to landfills, farmers can use anaerobic digesters to generate renewable energy and reduce emissions, creating additional revenue as well as health and carbon mitigation co-benefits. Smithfield Foods and Dominion Energy, for example, are investing $500 million to scale biogas systems on US hog farms. The initiative simplifies manure management, provides farmers with new income and is expected to cut emissions by 2.5 million tons annually.[32]

5 Optimize food processing and storage

Advances in food processing and storage – including improved cold-chain logistics, solar-powered refrigeration and smart sensors – can enhance food safety, reduce waste and boost access to fresh, uncontaminated food. Nigeria's ColdHubs start-up installs solar-powered walk-in cold rooms in markets and farms, extending the shelf life of fruits and vegetables from 2 days to 21 days and cutting post-harvest losses by 80%.[33]

6 Develop and produce nutrient-dense foods

To combat malnutrition, food processors can enhance the nutrient density of foods by using more nutrient-dense inputs or fortifying products. As an example, Nigerian food companies and farmers have embraced vitamin A-enriched cassava (a biofortified staple), with more than one million farming households growing the biofortified cassava five years after it was introduced. Biofortified cassava is highly profitable, with farmers who are growing or using the enriched product seeing profits of 79-190%.[34]

7 Encourage consumer behaviour change

Driving all consumers to make healthier food choices (e.g. by promoting more seasonal, climate-resilient and locally sourced food) should be a priority for the sector. This enhances nutrition security for the consumer and creates resilience against wider supply shocks for food businesses.

❝ Farmers in Kenya transitioning from conventional to indigenous vegetables experienced a net gain of $4,000 per acre – an increase of 335%.

BOX 3 | **Shifting consumer behaviour towards healthier, more sustainable diets**

According to the United Arab Emirates' National Nutrition Strategy, over 80% of adults do not consume the recommended five servings of fruit and vegetables a day.[35] As such, **Majid Al Futtaim's** grocery retail business, Carrefour, launched the Choose Better initiative to promote healthier and more sustainable diets through labelling, education and incentives. The Choose Better programme aims to address the nutritional gap by offering affordable, clearly labelled healthy options. The initiative focuses on three key pillars: "better for you", "better for the planet" and "better for communities", encouraging informed purchases that benefit individuals, the environment and local economies. Majid Al Futtaim was the first retailer in the region to introduce environmental ratings and display embodied carbon footprint, driving a business uplift of up to 8%.

8 Apply regenerative landscape methods for health

Agroecology, land restoration and conservation practices like cover cropping, reduced tillage and rotational grazing restore soil structure and biodiversity, helping to preserve moisture and reduce wind erosion and dust pollution that harm respiratory health. Healthier soils also improve plant health, supporting nutrition. Beyond health, agroecology also offers economic and environmental benefits; scaling agroecology to 40% of global cropland could cut 600 million tons of emissions.[36]

Boston Consulting Group (BCG) analysis projects that the shift to regenerative landscape methods will yield a 15-25% return over 10 years, though profits are likely to fall 30-60% over a 3-5 year transition period, before rebounding with 70-120% higher returns post-transition.[37]

9 Improve irrigation and drainage systems

Irrigation and drainage management can significantly reduce vector-borne disease risks for outdoor workers by removing stagnant water that enables mosquito breeding. These measures offer a short time to value, quickly lowering disease risk and boosting worker productivity. A project in Sri Lanka that cleared canals and improved water flow led to near elimination of malaria in a local village during a 1990s outbreak. The efforts reduced incidence of the disease from 46% to just nine cases between January 2001 and November 2002 following intervention. Such engineering must be paired with continuous vector control and monitoring to lock in the benefits.

10 Apply precision agriculture techniques for health

Digital and precision agriculture technologies improve yields while reducing chemical use, lowering worker exposure to pesticides and fertilizers, and cutting costs. Instead of treating entire fields, farmers can target specific areas, limiting respiratory risks and environmental impact.

> "BCG analysis projects that the shift to regenerative landscape methods will yield a 15-25% return over 10 years.

The most advanced solutions include weeding robots and AI-driven crop protection systems, which use cameras to spot weeds, pests or disease, reducing chemical inputs by up to 70%.[39] More affordable solutions for smallholders include advisory SMS (short message service) that can guide planting timing or notify farmers of pest threats, delivering a return on investment (ROI) of up to 10:1.[40]

These interventions can increase yields within a single harvest cycle, in addition to benefitting the climate, biodiversity and community health.

11 Modify working practices for heat

Adapting working practices in agriculture and processing to limit heat exposure and improve worker protection is essential. Despite cultural and structural barriers (for example, low technical education and capacity for transformation), many solutions are low-cost and quick to implement, such as shifting working hours to cooler periods, improving ventilation and cooling in indoor spaces, and providing personal cooling and hydration tools.

For example, a vineyard in Florence reduced productivity losses by 30% by starting shifts two hours earlier (6am-3pm instead of 8am-5pm), demonstrating the value of simple, scalable and low-cost solutions.[41]

12 Change livestock handling and farming practices

Improving livestock handling reduces zoonotic disease risk and protects production. Livestock farmers face high exposure and should be a priority for low-cost measures like personal protective equipment (PPE), disinfection and vaccination that can drastically reduce infection risk. For example, consistent glove use, masks and handwashing can reduce the annualized risk of cryptosporidiosis infection from roughly 30% to 1% for dairy farmers.[42] Enhancing animal health through husbandry approaches, reduced overcrowding, regular vet care, and monitoring and early disease detection can significantly decrease the spread of disease. Finally, preventing farmland expansion into forests is crucial to minimize human/livestock/wildlife interaction.

4 The built environment

Strengthening the resilience of the built environment can protect human health and well-being.

BOX 4 | **Built environment key takeaways**

- The built environment sector faces rising health risks due to climate change. These risks are exacerbated by urban heat islands (UHIs), infrastructure that's not tailored to current or projected climate conditions, and poor ventilation, affecting both urban populations and workers.
- The construction industry, employing approximately 8% of the global workforce,[43] is particularly vulnerable. The health consequences of heat and extreme weather are leading to productivity losses, delivery delays and property devaluation. This report estimates that construction workers will face at least 30 million DALYs, resulting in at least $570 billion in lost output from select climate-health illnesses between 2025 and 2050.
- Much of the world's existing infrastructure (including buildings) was not originally designed for today's climate extremes. This increases the risk of injury and mortality, threatening community safety.
- At the same time, climate-resilient building and urban design present significant opportunities for the sector. Resilient buildings can command higher rents, reduce insurance costs and attract premium tenants.
- Demand is growing for adaptation measures like green infrastructure and advanced retrofits, which can boost durability, cut operating costs and offer a competitive edge. As climate risks intensify, innovators in this space will be well-positioned to lead.

4.1 The built environment sector

8%

of the global workforce is made up of the construction industry.

Today, over half of the world's population – 4.2 billion people[44] – live in urban areas. The built environment shapes the spaces where people live and work, playing a critical role in determining health outcomes.

The sector spans urban planning, architecture, construction, operations and maintenance. Construction alone employs about 8% of the global workforce,[45] building homes, commercial spaces and critical infrastructure. This is a global industry, with growth increasingly centred in developing regions.

The sector faces significant challenges, with climate change adding additional pressures. Persistent labour shortages, particularly in the developing world, lead to heavy reliance on migrant labour. The sector is highly sensitive to macroeconomic conditions and input material prices (e.g. of steel, cement, lumber).

Strengthening the resilience of the built environment can protect human health and well-being through sustainable design, adaptive infrastructure, responsive planning and climate-responsive policies.

4.2 Health impacts

Amid increasing climate stress, the design and condition of the built environment directly impact the health of the population. As global temperatures rise, risks to both urban populations and sector workers are growing – especially in poorly planned areas (such as informal settlements in low-income cities) and among vulnerable labour groups.

TABLE 4 **Top climate-driven health risks for built environment consumers**

Heat-related illness

Urban areas with abundant concrete and limited green spaces trap heat, creating UHIs. During heatwaves, people in neighbourhoods without significant tree cover or cooling centres experience higher rates of heat stroke and mortality (particularly the elderly or those without air-conditioning).

Injury and mortality

Infrastructure that's not designed for today's extreme weather is more vulnerable to storms, floods and other hazards, exposing communities and inhabitants to increased risk of injury or death.

Respiratory illness

Urban heat and pollution (or smog) worsen respiratory health. This is compounded by poor ventilation and prolonged high temperatures. The UHI effect, in conjunction with transport-related air pollutants, has been found to increase hospital respiratory admissions.

Construction workers in urban environments face the most direct health risks, including exposure to poor air quality, mosquitoes, extreme heat and severe weather. It's anticipated that the construction workforce will incur at least 120,000 deaths and 30 million DALYs worldwide from 2025 to 2050 due to select climate-health risks.

TABLE 5 **Top climate-driven health risks for built environment workers**

Vector-borne diseases

Stagnant water pools on construction sites create mosquito breeding grounds, increasing the risk of vector-borne disease.

Injury and mortality

Extreme weather (high winds and storms, extreme heat) heightens hazards for construction workers, increasing the risk of accidents and fatalities on construction sites.

Respiratory illness

Construction workers are exposed to air pollution and particulates (urban smog), which increase the risk of respiratory disease. This effect is exacerbated by climate change and extreme heat.

Heat-related illness

Rising temperatures increase the risk of heat stress for outdoor workers. Physically intense work and the UHI effect both exacerbate this risk. The construction sector is expected to account for 19% of global working hours lost to heat stress in 2030,[46] despite making up roughly 8% of the global workforce.[47]

Migrant and temporary workers – who make up a significant share of the global construction workforce – are especially vulnerable due to informal or poorly regulated environments. Often living in inadequate housing and working in high-exposure jobs, these workers face elevated climate-health risks exacerbated by limited access to healthcare, lack of insurance and weak labour protections. Those in insecure employment (such as undocumented persons, temporary visa holders, the informally employed or contract workers) may avoid reporting illness or injury due to language barriers or fear of repercussions, leaving many climate-related health issues unaddressed.

4.3 Economic impact

> Climate-resilient infrastructure can often drive premium prices. For example, in Alabama, climate-resistant homes built to a beyond-code standard command a 7% price premium.

The growing need to protect urban populations from climate-related health risks is driving increased demand for climate-resilient infrastructure – presenting an economic opportunity for the sector. Growing awareness of the health risks posed by non-resilient infrastructure is fuelling investment in climate-resilient urban planning, architecture, design and construction. Climate-resilient infrastructure can often drive premium prices. For example, in Alabama, climate-resistant homes built to a beyond-code standard command a 7% price premium.[48]

Demand is also increasing for health-protective retrofitting of existing structures, including air conditioning, passive cooling and air filtration.

These new business opportunities, however, need to be balanced with the economic risk posed by the impact of climate change on health. Construction will see the greatest impact, particularly due to productivity loss and supply chain disruptions. It's projected that the cost of worker availability losses caused by select climate change-driven health risks will amount to at least $570 billion from 2025 to 2050 (see Annex for methodology).

Increased health risks will also lead to higher health and safety compliance costs and increased expenditure on re-recruitment/training due to staff turnover.

Climate-driven health impacts are also disrupting supply chains, limiting output and disrupting trade. Disease outbreaks and climate-related health emergencies reduce workforce availability, limiting material production and delivery. Supply chain disruptions cause delays and cost increases, especially in import-reliant regions like the US and Europe.

Climate-driven health impacts will also put significant strain on financial capital in the sector. Increased localized health risks may lower land and property values, reducing capital returns as buildings become less fit for use (e.g. apartment blocks vulnerable to extreme heat). Properties at high risk of climate-health events (flooding, wildfires, heat) are becoming less attractive to buyers and investors. As an example, there has been a 4% decrease in house prices for Las Vegas homes that experience an additional 1 microgram per cubic metre of PM2.5 (particulate matter) air pollution due to wildfire smoke.[49]

Commercial real estate in vulnerable regions may also face higher vacancy rates or require costly adaptations (such as cooling systems) to meet new regulations. This creates climate-related credit risks for financial institutions and physical stranded asset risk in commercial real estate.

4.4 Interventions

To mitigate these economic impacts, the built environment sector can invest in interventions across the value chain to protect employee and consumer health, and to capture new opportunities.

TABLE 6 **Built environment interventions**

	Built environment value chain			
	Urban planning and zoning	Architecture and design	Construction	Real estate, operations and maintenance
Interventions for consumers 	1 Increase the use of **local nature-based solutions** to improve the resilience of buildings and infrastructure to extreme weather (e.g. afforestation to reduce flood risk).		5 **Construct and maintain climate-resilient buildings and infrastructure** based on local climate risk (e.g. elevated foundations, passive cooling).	
	2 Expand areas of real and usable **green space** (e.g. city parks, green rooftops and urban farming) in cities and new developments.	3 Develop new Leadership in Energy and Environmental Design (LEED)-style voluntary standards for **health-resilient buildings**.		
		4 **Install or retrofit cooling systems and ventilation** across the built environment, including housing.		
Interventions for the workforce 			6 **Protect construction workers and maintenance staff** with PPE (e.g. respirators) and better health and safety training.	
			7 **Modify working practices** for outdoor workers to avoid heat stress, e.g. avoid peak heat hours, provide mandatory breaks.	
			8 Improve site design and maintenance to **eliminate stagnant water** to reduce mosquito-borne disease.	

> Proximity to parks or greenery can boost property values by 8-20% and attract premium tenants who value healthier, more sustainable environments.

1 Increase the use of local nature-based solutions

Nature-based solutions (NBSs), e.g. restoring wetlands or planting trees, can provide storm protection and help reduce the severity of floods. While NBS projects have historically been publicly/government-led, incorporating NBS can lead to significant economic benefits for private developers, including lower construction and maintenance costs, reduced flood insurance premiums and enhanced property values. Properly designed and regularly maintained wetlands reduce vector-borne disease risk when designed with flowing water and predator habitats. A sustainable drainage system scheme in Lamb Drove, Cambridgeshire in the UK uses techniques like permeable paving to manage rainwater without a conventional piped drainage system. It saves £314 in capital costs per home, cuts maintenance costs by 20-25%, increases biodiversity and improves the quality of water discharged from the site.[50]

2 Expand areas of real and usable green space

Urban green spaces can improve air quality, reduce heat stress and enhance well-being. For private actors, green space investments can also offer a return. Proximity to parks or greenery can boost property values by 8-20%[51] and attract premium tenants who value healthier, more sustainable environments.

3 Develop new Leadership in Energy and Environmental Design (LEED)-style voluntary climate resilience standards

Voluntary certifications such as WELL (for occupant health), Resilience Action List (RELi) (for resilience) and the Insurance Institute for Business & Home Safety's (IBHS) FORTIFIED (for disaster resilience) encourage resilient, health-focused building design, enabling developers and architects to attract premium tenants. Many insurers are also offering

> Every $1 spent on designing above-code buildings saves $4 in future disaster losses.

premium discounts for buildings that meet certain benchmarks. For example, homes in Alabama built to FORTIFIED Gold standards can get discounts of 45-55% on the wind portion of property owners' insurance.[52] It is important to note, however, that voluntary standards need incentives or mandates to scale effectively.

4 Install or retrofit cooling systems and ventilation

Indoor cooling and ventilation are vital for preventing heat stress as temperatures rise. Climate-smart building design and passive cooling strategies like shading, natural ventilation, reflective roofing and insulation lower indoor temperatures without mechanical cooling. Retrofitting buildings for better cooling also offers significant additional benefits. The Empire State Building retrofit, for example, reduced energy use by 38%, saving $4.4 million annually.[53]

Air conditioning is currently the main approach for mitigating the health effects of high temperatures. This can, however, create a maladaptive feedback loop where higher AC use leads to more emissions, exacerbating global warming. High-efficiency units can help reduce costs and emissions, but scale-up must be conducted carefully to avoid strains on electrical grids.

5 Construct and maintain climate-resilient buildings and infrastructure

Climate-adaptive design, such as floodable ground floors, wind-resistant structural reinforcements and fire-resistant construction in wildfire zones, reduces building failure risk, safeguards health and limits business disruption, inventory losses and liability.

The US National Institute of Building Sciences reports that every $1 spent on designing above-code buildings saves $4 in future disaster losses.[54] The use of climate-resilient materials can also improve overall resilience, as traditional materials degrade faster or fail under new extremes.

As clients and investors increasingly prioritize resilience, developers who incorporate these features will gain a competitive edge and the ability to command premium pricing. Moreover, while upfront costs may be higher, they can often be offset by long-term savings in maintenance and insurance.

BOX 5 Enhancing heat-resilient urban planning

Arup, a global engineering and design firm, supported the Asian Development Bank's development of digital tools and analytics and the design of heat-resilient urban environments. A prototype Climate and Health Portal – an integrated platform that brings together data, research and insights to support evidence-based urban planning – represents a key output. Arup designed the portal's digital framework and interface to ensure accessibility and impact, and, in parallel, conducted a detailed urban heat mapping study in a pilot city using advanced modelling tools such as UHeat and Terrain. The resulting heat stress and risk maps enabled targeted impact analysis and the prioritization of mitigation strategies, helping cities better prepare for rising temperatures.

> Avoiding peak heat hours, implementing mandatory breaks and establishing other acclimatization policies can help outdoor workers avoid heat stress.

6 Protect workers with PPE and better training

Construction workers and maintenance workers require targeted interventions similar to those discussed in the food and agriculture chapter. Specialized PPE includes cooling apparel (neck wraps, phase-change cooling vests), ventilated helmets, ultraviolet (UV)-protective clothing (for extreme heat) and N95 or P100 respirators for smoky or high-pollution days. Studies have found that construction workers in Hong Kong had significantly lower heart rates and reported less exertion and heat stress when they wore cooling vests rather than normal work attire.[55]

Risk of injury, mortality and preventable disease can also be reduced through improved training programmes to educate workers on recognizing heat illness symptoms, safe work-rest cycles, hydration practices and emergency procedures for extreme weather. Investing in worker health reduces productivity loss from illness and enhances retention in an industry with chronic labour shortages.

7 Modify working practices

Avoiding peak heat hours, implementing mandatory breaks and establishing other acclimatization policies can help outdoor workers avoid heat stress and unnecessary exposure. As discussed in the earlier food and agriculture chapter, these types of changes are cost-effective to implement, and in many cases, regulators have stepped in to set minimum standards. For example, the United Arab Emirates bans outdoor construction work during midday from 15 June to 15 September each year.[56] While this can incur overtime costs, it prevents worker illness and the associated productivity losses.

BOX 6 Enhancing worker safety amid rising temperatures

GS Engineering and Construction implements robust heat safety protocols to protect construction workers from increasing climate risks. Work is prioritized during cooler hours, and mandatory breaks are scheduled based on the heat index – every hour for 10 minutes at 31°C and 15 minutes at 35°C or higher, exceeding global standards. On-site rest areas feature portable fans and air conditioners to maintain low-temperature zones, while cooling vests and ice packs are distributed during high-heat periods. Adaptive measures like these are increasingly important in the construction sector as outdoor workers are exposed to more hazardous environmental conditions.

8 Improve site design and maintenance

Preventing the accumulation of standing water in uneven ground and containers can greatly reduce mosquito breeding and the risk of vector-borne disease. Embedding mosquito control into site design and housekeeping (for example, designing draining systems and removing receptacles that gather water) and conducting regular maintenance and inspections are key examples of best practice. In Dar es Salaam, Tanzania, a pilot programme to clear blocked drains and eliminate stagnant water around a construction area achieved an 88% decrease in the odds of malaria infection in the nearby community within six months.[57] Low-cost adaptations of this kind offer significant economic benefits by preventing disease outbreaks that can reduce productivity or halt work.

5 Health and healthcare

Amid increasing climate change, the gap in healthcare support will lead to worsening public health outcomes overall.

BOX 7 | **Health and healthcare key takeaways**

- Healthcare represents approximately 10% of global gross domestic product (GDP),[58] but faces a growing challenge from climate change. Climate-health needs are increasing, and the sector will need to transform to deliver better preventative care. Without significant adaptation, the climate-related disease burden could result in additional cumulative treatment costs of $1.1 trillion by 2050.[59]
- Healthcare professionals face elevated risks of infection, injury and mental health strain. This report estimates that at least 8 million DALYs will occur from 2025 to 2050, resulting in at least $200 billion in lost output due to a set of climate-health illnesses.
- Current products and treatments will also come under pressure as heatwaves accelerate product spoilage and epidemics disrupt production. There are, however, also opportunities to protect health and create value; projections suggest the dengue vaccine market, for example, will expand at a compound annual growth rate (CAGR) of 11.2% from 2021 to 2030, reaching $1.3 billion.[60]
- To build resilience, the health and healthcare sector needs to scale climate-adaptive care, retrofit facilities, develop climate-smart drugs and protect workers.

5.1 The health and healthcare sector

The health and healthcare sector accounts for roughly 10% of global GDP and is responsible for keeping populations healthy and productive.[61]

The health and healthcare sector is broadly divided into two main industries: the development and sale of pharmaceuticals and medical devices, and patient care and treatment. Healthcare is a major global employer, comprising 65 million doctors, nurses, midwives and other patient practitioners.[62] The pharmaceutical and medical device industries globally employ 8 million and 2 million people, respectively.[63,64]

Health resources, however, are very unevenly distributed, with high-income countries accounting for almost 80% of global health spending in 2021.[65] Furthermore, the WHO projects a global shortfall of 18 million healthcare workers by 2030, with the widest gaps expected in regions with fast-growing health needs.[66] Without action, climate change will leave a depleted healthcare sector with the burden of poorer population health.

Demand for many critical products from the pharmaceutical and life sciences industry will undoubtedly rise – particularly for preventive care measures like vaccines as well as screening and early detection of climate-sensitive chronic diseases such as cardiovascular disease.

The sector will need to use all available tools and solutions to build resilience in the years ahead, adapting medicinal products and transforming care delivery to safeguard public health.

5.2 Health impacts

5%

rise in hospital admissions for each 1°C temperature increase above 29°C in Hong Kong.

In addition to the chronic, long-term health impacts caused by climate change, acute impacts driven by extreme weather also hinder the sector's ability to deliver care. Chapter 2 outlined the many ways climate change causes chronic ill health – the burden of which falls on the healthcare sector. Acute climate events add further strain, disrupting both preventative and reactive care delivery through infrastructure damage, resource shortages and emergency resource diversion. For example, hospital admissions rise by about 5% for each 1°C temperature increase above 29°C in Hong Kong.[67] Typically, those most in need are less able to access care quickly, which leads to worse health outcomes and often costlier overall treatment.

Frontline healthcare workers face direct exposure to climate-driven health risks, including psychological strain, infection, injury and mortality. This report estimates that healthcare workers will experience at least 50,000 deaths and 8 million DALYs from 2025 to 2050 globally due to select climate-health risks.

TABLE 7 | **Top climate-driven health risks for healthcare workers**

Mental health

Heightened patient treatment demand and severity increases workload and exposure to trauma, intensifying stress and burnout for healthcare practitioners. Hospital care workers who cared for COVID-19 patients were found to be 1.3 times more likely to suffer from depression, anxiety and PTSD.[68]

Zoonoses and infectious disease exposure

Healthcare professionals have an increased risk of contracting climate-related illnesses that spread from human contact due to exposure to infected patients.

Injury and mortality

As extreme weather events increase, first responders and frontline workers, especially in vulnerable regions, face higher risks of injury and death.

5.3 Economic impact

The WHO projects a global shortfall of 18 million healthcare workers by 2030, with the widest gaps expected in regions with the fastest-growing health needs.

Increasing rates of ill health across the globe will fuel demand for climate-focused treatments. Healthcare providers will face growing demand for treatment of chronic climate-related illnesses, with an emphasis on preventive care. Extreme weather events will also lead to an increased need for emergency care services.

Rising rates of climate-related conditions will also drive demand for medical treatments and technologies such as cooling therapies and wearables.

Surging demand will also increase the strain on physical capital (like care facilities). Climate-driven disease surges (for example, dengue outbreaks) can overwhelm patient care facilities and prevent them from effectively addressing their existing non-climate-related health caseload. Increased physical capacity may therefore be required to meet population needs during epidemics or heatwaves. This can require significant financial investment.

Unless significant action is taken, it's projected that the cost of lost worker availability in the healthcare sector due to select climate change-driven health risks will amount to at least $200 billion from 2025 to 2050 (see Annex for methodology). Rising worker illness rates reduce labour productivity due to presenteeism, absences and mortality. The COVID-19 pandemic, for example, resulted in $200 million in productivity losses due to healthcare worker morbidity and mortality in the KwaZulu-Natal and Western Cape provinces in South Africa during the first year.[69]

This reduction of labour productivity will worsen patient outcomes, creating a detrimental cycle of reduced care and increased strain on the sector. Consider that the loss of healthcare workers to Ebola during the 2014 epidemic is estimated to have increased maternal mortality by 38% in Guinea, 74% in Sierra Leone and 111% in Liberia.[70]

Climate change-driven illness will increasingly disrupt health and healthcare supply chains due to reduced labour availability and restrictions on transport and trade. Worker illness and disease outbreaks disrupt trade and reduce productivity at manufacturing sites, limiting output and weakening health supply chains. For example, illness among workers in a pharmaceutical manufacturing site during the COVID-19 pandemic resulted in supply shortages of critical medical products.[71] In addition to health-related disruptions, supply chains are also vulnerable to physical climate risks – such as floods, wildfires and extreme heat – which can damage infrastructure, interrupt logistics and delay production. These disruptions are not limited to climate-health treatment – they pose a risk to all medicines. At the same time, acute climate events create unpredictable demand surges, delaying preventive and elective care while sharply increasing the need for emergency medical supplies and services. Given these challenges, building supply chain resilience should be a priority for healthcare. This report, however, does not cover broader supply chain strategies, and instead focuses specifically on interventions for safeguarding health.

5.4 Interventions

Healthcare providers and businesses can act to protect their workforce and the communities they serve while capturing new economic opportunities.

TABLE 8 **Health and healthcare interventions**

	Healthcare value chain		
	Pharmaceuticals and life sciences	**System-level care planning and administration**	**Patient care and treatment**
Interventions for consumers 	1 Develop **novel drugs, products and services**, focusing on diseases intensified by climate change.	3 **Establish care centres** in climate-vulnerable regions (including telehealth and mobile care options equipped to address climate-health risks).	
	2 Improve climate resilience of existing portfolios of **drugs, products and services**, e.g. thermal stability of drugs.	4 Retrofit estates and care facilities to **increase capacity for demand surges** and ensure infrastructure is **climate-resilient**.	
		5 **Scale up provision of preventative healthcare** to mitigate the effects of climate-related illness.	
Interventions for the workforce 			6 Implement **cooling solutions** in healthcare facilities, as well as heat stress monitoring and management.
	7 **Protect workers** with clothing/equipment and specialized training to raise awareness of growing climate health risks and reduce risk exposure.		
			8 Implement **comprehensive mental health support** for practitioners, including proactive strategies and treatment.

1 Develop novel drugs, products and services

Pharmaceutical and medical device companies can adapt their R&D pipelines to address shifting disease patterns, emerging pathogens and conditions driven by climate change. In this effort, improved forecasting will be critical to unlocking investment and scaling innovation.

Developing novel drugs, medical devices and diagnostics for climate-related illnesses is increasingly commercially attractive, with patient populations and demand growing across new markets. Similarly, care facilities can develop more effective patient treatment pathways (including community-based preventative care schemes), more efficiently treating those suffering from climate-related illnesses.

BOX 8 **Takeda and the Collective Action on Dengue initiative**

As dengue escalates due to climate change, **Takeda's** vaccine offers a critical preventive tool. Now, through active participation in the Collective Action on Dengue (CAD) initiative, Takeda is helping scale climate-resilient healthcare by aligning innovation with cross-sector coordination. The coalition, launched at the 2023 United Nations Climate Change Conference (COP28) and supported by over 30 stakeholders, cultivates collaboration across urban health, innovation and financing. Takeda contributes technical and strategic expertise, accelerating access to vaccines and strengthening health systems in climate-vulnerable regions. By working through the coalition, Takeda helps integrate vaccination into broader prevention strategies – ensuring equitable delivery, informing policy and advancing joint planning. Overall, this partnership drives scalable, sustainable dengue prevention in an era of rising climate risk.

2 Improve climate resilience of existing medical products

Reformulating drugs for heat stability and improving packaging can reduce cold-chain dependency, decrease spoilage and extend shelf life. Medical devices can be redesigned for reliability in low-resource or emergency settings with features like battery backups or solar charging. These adaptations would cut waste and costs, and serve as a competitive advantage.

Regulators can support climate resilience by updating stability guidelines to reflect future environmental conditions, ensuring medicines remain safe and effective under climate stress. It is important, however, to balance regulation increases with medicine availability, as increased regulation can have a significant impact on low-margin goods, including generics.

BOX 9

Building resilience with heat-stable pharmaceuticals

Ferring Pharmaceuticals has developed a heat-stable version of carbetocin that can help prevent dangerous bleeding after childbirth – a leading cause of death for mothers worldwide. In the largest study of its kind, involving nearly 30,000 women across ten countries, the medicine was shown to work just as well as the current standard treatment, oxytocin. Unlike oxytocin, which must be kept cold, carbetocin stays effective even in hot climates, making it ideal for use in low-income countries where refrigeration is hard to maintain. As climate change increases temperatures and disrupts cold supply chains, developing essential medicines that remain stable without refrigeration is becoming increasingly important for global health.

3 Establish care centres in climate-vulnerable regions

Healthcare must be tailored to local climate-health risks, requiring a shift in care facility locations. These sites should provide healthcare access for underserved populations, deliver preventive care and support better health outcomes with leaner, more cost-effective set-ups. Providers can also harness innovative care delivery models, including telehealth and mobile care units, to ensure flexible and continuous care during climate disruptions.

BOX 10

Integrating climate resilience into healthcare

The **Burjeel Holdings** Center for Climate and Health integrates climate resilience into clinical care for the United Arab Emirates' diverse and vulnerable populations. Serving construction workers, elderly adults, children, patients with chronic conditions and socially vulnerable groups, the centre addresses heat-related illnesses and climate-health impacts through preventative care protocols. Harnessing a cutting-edge generative AI platform, the centre will conduct proactive multilingual patient outreach via telephone, providing 24/7 climate risk alerts, hydration guidance and emergency preparedness instructions. This innovative approach will combine advanced AI healthcare technology with personalized medicine to tackle emerging climate-related health challenges.

> Expanding preventive care programmes targeting climate-sensitive conditions is essential as healthcare systems become increasingly strained due to the effects of climate change.

4 Retrofit health facilities for climate resilience and surge capacity

Upgrading existing facilities using climate-adaptive design ensures that sites can withstand climate hazards such as extreme heat, extreme weather and flooding. These practices reduce the risk of building failures, ensuring continuity of care for patients, preventing injury and mortality, and reducing liability. In addition, expanding operational capacity through flexible-use spaces allows healthcare facilities to accommodate patient surges during climate-related health crises.

5 Scale up preventive healthcare for climate-related illness

Expanding preventive care programmes targeting climate-sensitive conditions is essential as healthcare systems become increasingly strained due to the effects of climate change on population health. Prevention offers the most effective way to ease this pressure, reducing the high costs of treating more advanced conditions. Community health workers can provide education to the public on preventing climate-related illnesses through self-care pathways. Disease surveillance and screening for climate-sensitive illnesses enable early intervention for at-risk individuals.

6 Implement sustainable cooling solutions in healthcare facilities

Installing or retrofitting air conditioning and passive cooling measures can reduce the risk of heat-related illnesses for patients and staff. Where possible, low-cost passive cooling measures (for example, natural ventilation, reflective roofing and tree shading) should be prioritized to reduce indoor temperatures and energy use.

While air conditioning may be necessary in some settings, it should be deployed strategically. High-efficiency units should be used to minimize emissions and operating costs, and large-scale roll-out must consider the use of renewable energy to avoid excess greenhouse gas emissions.

7 Protect workers with equipment and training

Health providers can consider targeted measures to safeguard workers essential to health supply chains and frontline patient care. PPE should be tailored to local climate-health hazards, and include cooling apparel and respirators/masks to lower infection risk.

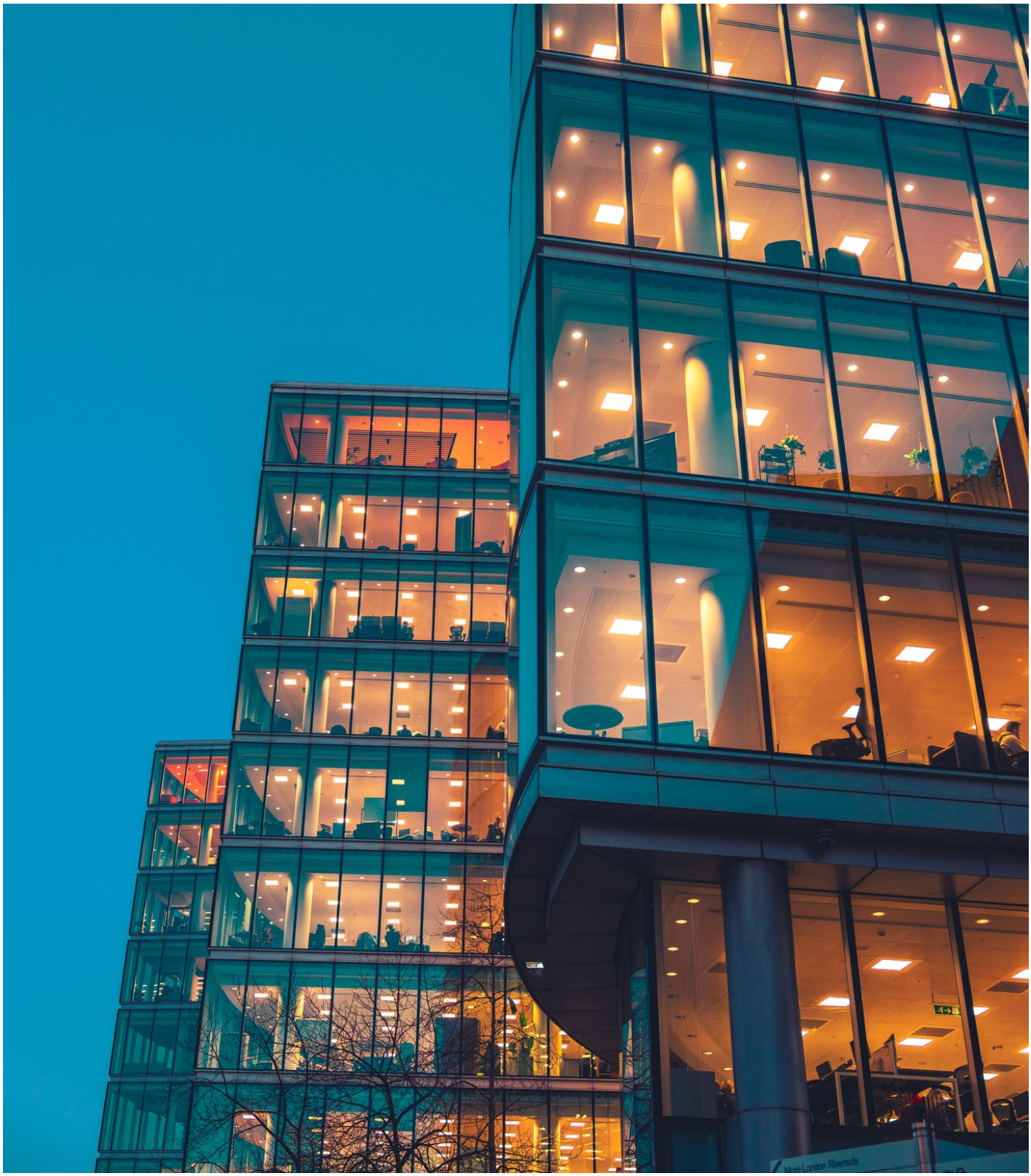
Employers should also offer targeted training to address emerging climate-related health threats like heat-related illness, vector-borne disease and respiratory issues related to air pollution. In particular, training workers involved in patient care ensures they can identify climate-health conditions quickly and respond effectively, improving care.

8 Implement comprehensive mental health support for practitioners

As climate-related health crises intensify, frontline healthcare workers face rising mental health pressures. Employers must prioritize comprehensive support, including counselling services, peer support programmes and burnout prevention training, backed by regular monitoring of employee well-being. Proactively addressing stress, trauma and fatigue sustains practitioner well-being, reduces turnover and maintains quality of care during climate events.

6 Insurance

Without adaptive action, climate-driven health impacts could erode insurer profitability and push coverage costs higher for consumers across markets.



BOX 11 | **Insurance key takeaways**

The insurance sector, accounting for over 7% of global GDP,[72] plays a vital role in protecting people from the economic impact of ill health and subsequent financial hardship through health, life and casualty coverage.

Yet climate change threatens to erode profitability. It's forecasted that climate change will cause 0.75% excess mortality annually by 2050 under a moderate warming scenario.[73] As climate-health risks escalate, insurers face rising medical, life and casualty claims, straining capital and pushing premiums higher.

Insurers have a unique opportunity and responsibility to build resilience. By developing innovative products, building climate expertise and helping prevent climate-related illness, insurers can protect both communities and the bottom line. As enablers of resilience, insurers also play an important role in incentivizing other sectors to reduce their own risks.

6.1 The insurance sector

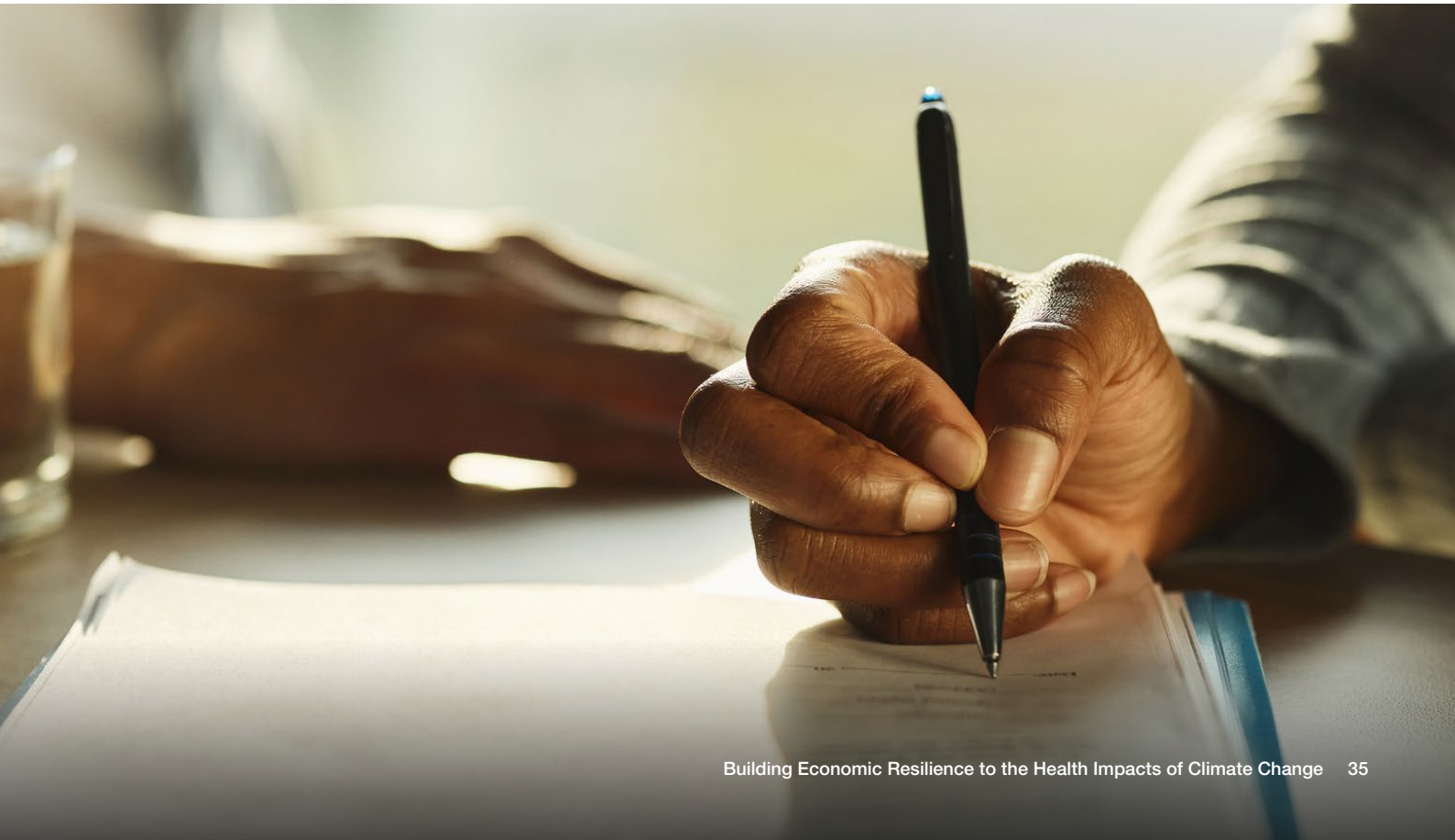
> Without adaptive action across the economy, climate-driven health impacts are likely to erode insurer profitability and push coverage costs higher for consumers.

With global insurance premiums totalling more than 7% of global GDP, the insurance sector plays a vital role in providing financial protection against climate-related public health risks for individuals, businesses and communities.[74] While property insurers have so far been most affected by physical climate risks and mounting losses from extreme weather events, climate change now poses an existential risk across all insurance lines.[75] Health, life and casualty insurance lines are particularly important for climate resilience. Coverage gaps persist, however, across both developing and developed markets.

Unlike other focus sectors in this report, the workforce for the insurance sector is not disproportionately exposed to climate-health risks, so the following analysis focuses on consumer-level interventions.

Insurance can lower individuals' risk of health impacts and support other sectors. The primary role of the insurance sector is to pool resources and evenly distribute risk, thereby reducing the financial impact of losses. The insurance sector can, however, also support other sectors in mitigating their climate exposure by sharing data, quantifying risk and incentivizing action through tailored pricing of premiums.

Without adaptive action across the economy, climate-driven health impacts are likely to erode insurer profitability and push coverage costs higher for consumers, further widening the protection gap in vulnerable markets.

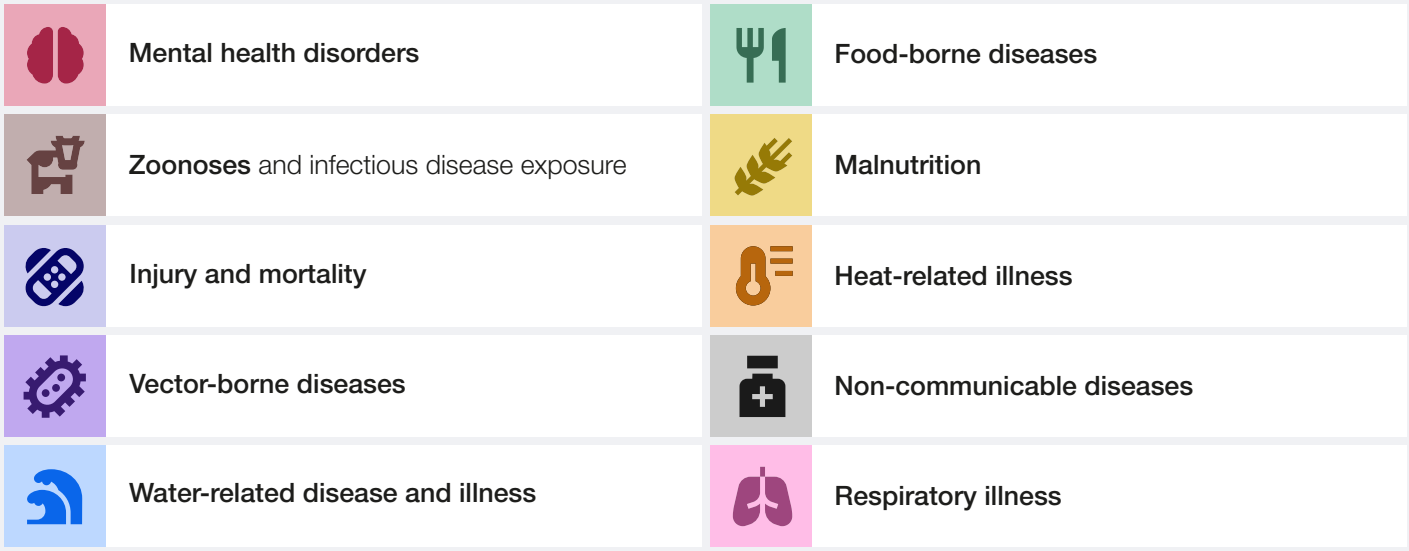


6.2 Health impacts

Insurance is a critical mechanism for enabling access to healthcare worldwide both directly (through health insurance provision) and indirectly (through life and casualty coverage). Health insurance spreads medical costs, while life and casualty insurance help cover the costs associated with poor health for sufferers and their families. Climate change is putting significant pressure on this mechanism as the risk of ill-health rises. Health threats can be divided into two categories, each with different impacts:

1. **Acute climate-driven health events:** Such instances are rising in frequency and severity as extreme weather and disease outbreaks heighten the risk of short-term illness, injury and mortality.
2. **Chronic climate-driven health shifts:** Core health inputs such as food, water, air and even sleep are degrading, increasing the long-term risk of illness and mortality for the wider population.

FIGURE 6 **Acute and chronic climate-driven health risks**



8%

of people have health insurance in low-income countries, compared to about 53% in upper-middle-income countries.

These risks are most applicable to individuals disproportionately exposed to the determinants of climate-health risks. Unlike the other focus sectors' workforces, the workforce for the insurance sector is not exposed to a heightened degree of climate risk as employment tends to be more stable, concentrated in developed regions and office-based.

The communities most at risk from climate-driven health impacts are the least likely to be insured. In low-income countries, only 8% of people have health insurance, compared to about 53% in upper-middle-income countries.[76] Underinsurance and gaps in coverage, however, are also present in high-income countries, where many individuals still face high out-of-pocket costs or lack adequate protection. For the under- or uninsured, the cost of climate-induced illnesses or disasters can be financially crippling.

In exposed regions, insurers are responding to climate risks by raising premiums, tightening coverage or even withdrawing from the market. This is creating "insurance deserts" – communities that cannot obtain affordable coverage.[77] This is a dynamic already seen in property insurance for disaster-prone areas and is likely to emerge for health and life insurance in climate-exposed regions. Growing insurance costs and coverage gaps are emerging as their own mental health challenge – in fact, 66% of US adults cite the cost of health insurance as a significant source of stress.[78]

These trends are deepening health inequalities both across and within countries. Those with the means can adapt, while vulnerable populations remain unprotected. Insurers committed to addressing climate-health challenges can act to close these gaps.

6.3 Economic impact

> Despite new opportunities, rising and unpredictable claim volumes driven by climate-health risks threaten the fundamentals of the insurance business model.

Insurers face key challenges at the intersection of climate change and public health. By offering innovative, comprehensive and cost-effective coverage, they can address these challenges and unlock growth opportunities.

- **Climate risks are driving demand for innovative insurance solutions**. In recent years, there has been a rapid expansion of climate-health insurance offerings. Additionally, insurers are working to incentivize proactive and preventative action. Providers who offer these policies are capturing an emerging market and building stronger relationships with consumers.

- **Worsening climate-health risks are prompting customers to seek more comprehensive, tailored coverage**. A Swiss Re Institute survey found that 40% of respondents were concerned about the adequacy of their existing coverage.[79] Leading insurers are broadening traditional health and life policies to address climate-driven conditions, with many offering coverage extensions for illnesses that are becoming more prevalent due to climate change. This approach can serve as a competitive differentiator.

- **Harnessing advanced data and analytics to price coverage for climate-health risks more accurately can be a competitive advantage for insurers**. Traditional actuarial models are not equipped to predict the non-linear, evolving nature of climate impacts on health. This has led to a surge in demand from insurers for improved data and risk assessment tools to reduce risk. This is an attractive opportunity for reinsurers, who can offer their advanced risk-modelling capacities and data to support insurance clients.

Despite new opportunities, rising and unpredictable claim volumes driven by climate-health risks threaten the fundamentals of the insurance business model.

Rising volume of claims: More frequent and severe climate events are driving up insurance claims across health, life and casualty lines. As climate-related shocks intensify, payouts will continue to climb, which could erode profitability if premiums and reserves do not keep pace. Moreover, a single extreme event can trigger many claims at once, undermining the traditional risk-pooling model. Insurers may have to raise premiums and hold more capital to cover these correlated losses, further driving up costs for consumers.

Unpredictable trend of claims: Climate volatility makes it increasingly difficult for insurers to predict future losses, define project capital allocation requirements and manage reserves effectively. Historical data are unable to predict future losses. Instead, forward-looking models are required that translate climate science into claims projections.

Life and health insurers can take cues from the property insurance sector, where forward-looking climate scenarios are used to stress test risk exposure. When it comes to climate-health risks, however, developing truly reliable forecasting tools may take years. Further capital investment will be required to develop the risk management capabilities needed to monitor and predict complex climate phenomena and avoid unforeseen costs. This evolution will be partly driven by regulators, who are increasingly pushing insurers to extend climate stress testing beyond property portfolios to include life and health lines.

6.4 Interventions

Insurers can take proactive measures across the value chain to build resilience against climate-health challenges and capture opportunities.

TABLE 9 **Insurance interventions**

	Insurance value chain			
	Product development and distribution	Underwriting	Care and prevention	Claims management
Interventions for consumers	1 Develop **tailored insurance products** and distribution platforms for underinsured and vulnerable communities.	5 Research to **understand the climate impact** on health to improve modelling of future claim frequency/severity.	7 Institute **preventative care** programmes at the individual and community level (e.g. air conditioning, food as medicine).	9 **Fast-track claims management** for objective triggers during acute events.
	2 Design **innovative products** to meet changing needs, e.g. parametric and temporary waiver insurance.	6 Integrate multimodal data (e.g. meteorological and wearables) to **dynamically determine risk and update models**, guiding premiums and coverage.	8 **Incentivize health-protective behaviours** through differentiated premiums or other structured rewards.	
	3 **Expand range of existing products/ add-ons** to encompass coverage for growing climate-health risks.			
	4 Strengthen **advisory services and educate customers** to raise awareness of growing climate-health risks and reduce risk exposure and subsequent payouts.			

1 Close the coverage gap with tailored insurance products and distribution channels

Affordable insurance products for low-income communities can expand an insurer's customer base while offering quick financial relief for climate-related health shocks. They protect vulnerable households from harmful coping strategies. For example, a Japanese insurer launched a single-day heatstroke micro-insurance policy costing around $0.73, and nearly 7,000 policies were sold on a single hot day, highlighting a new customer segment.[80]

2 Design innovative climate-health insurance products

Insurers can develop creative products for emerging climate-health risks, such as parametric insurance, which pays out in response to specific triggers (for example, temperature, air quality) – offering fast, transparent relief and specialized health riders for climate-exacerbated conditions.

Short-term cover, like the single-day heat insurance mentioned earlier, can protect informal workers exposed to high-risk conditions. In 2024, the Women's Climate Shock Insurance Programme, backed by the Self-Employed Women's Association (SEWA) and Swiss Re, provided parametric heat insurance and cash assistance to approximately 46,000 women in informal work facing extreme heat, paired with an early warning system.[81] Temporary premium waivers can also be used to support health during natural disasters, building customer goodwill and community trust.

BOX 12 **Innovative insurance solutions for treating climate-driven disease**

In response to rising heat-related health risks in Japan, **Sompo Japan** enhanced its personal accident insurance to expand the scope of the coverage for heatstroke. Initially launched as an optional benefit in 2021 for children frequently engaged in outdoor activities, the policy provided fixed payments for outpatient care, hospitalization, surgery or death due to heatstroke. The increased risks, intensified by extreme heat and ongoing mask use, led to expanded eligibility across age groups in 2022, and by early 2025, heatstroke coverage had become a standard feature. This reflects an industry-wide change among Japanese insurers, which are offering heatstroke coverage in response to growing public concern and climate-induced health challenges.

> Insurers can adopt a "shared value" approach by offering premium discounts or rewards for preventive actions that reduce climate-health risks.

3 Expand coverage within existing products

Insurers can expand traditional coverage to cover illnesses exacerbated by climate change – for example, for infectious diseases spreading into new regions (such as dengue fever in temperate zones), respiratory illnesses caused by air pollution or wildfire smoke, or climate-linked mental health conditions. Insurers in Europe may start to consider dengue fever coverage as warming temperatures allow mosquito-borne diseases to spread into new regions.[82]

4 Strengthen climate-health advisory services

Expanding advisory services can help reduce risk for current policyholders and attract new customers by raising awareness of climate-health risks. These services can be bundled with products or offered through targeted community outreach – for example, workshops or free consultations for high-risk groups.

Investing in proactive customer education can also help lower risk exposure and claims. For example, insurers can share timely alerts during extreme events like heatwaves, with personalized safety tips. Cigna Healthcare offers a zip code-based tool that US residents can use to find low-cost local support.[83]

5 Strengthen risk insights through research

Insurers can invest in research on climate-health risks to improve modelling of future claim risks and assess effective interventions. Leading insurers are increasingly collaborating with academia and global institutions to build and share expertise. Insurers can also build internal climate expertise as climate knowledge becomes vital for risk assessment, pricing and strategic decision-making.

6 Integrate multimodal data for smarter pricing

Insurers can enhance pricing accuracy by integrating real-time environmental data on factors like heat and pollution with personal health data from wearables and mobile apps. While this shift from static to dynamic risk factors could help to improve modelling and encourage preventative behaviours, linking these inputs to actual claims outcomes will be crucial in unlocking its full potential. As data systems mature, analysing claims patterns alongside environmental and biometric data will be key to identifying climate-health risk drivers and improving underwriting. In fact, integrating wearables data can cut underwriting errors by up to 50% and allow insurers to detect early signs of health issues 30% faster than when using traditional methods.[84]

7 Invest in preventive care

Insurers, especially health insurers, could support preventive care to reduce future claims. This proactive approach could include medical solutions such as vaccines, but also extends to actions like funding transport to cooling centres during heatwaves, distributing air purifiers or cooling gear, or partnering with companies that provide climate-health solutions.

8 Incentivize health-protective behaviours

Insurers can adopt a "shared value" approach by offering premium discounts or rewards for preventive actions that reduce climate-health risks. Wellness incentive models, like those used by Vitality Insurance in the UK, have proven effective, with participating employers seeing 4% lower claims costs and a 180% ROI, driven by smart incentives that drive targeted behaviour change (e.g. more regular exercise, improved nutrition, quitting smoking).[85]

9 Fast-track claims management

Insurers could streamline claims management and payout mechanisms to allow quick access to medical care or recovery funds after a climate-related disaster. Potential solutions include parametric triggers, rapid-response claims teams, cash advances and AI-based assessments for faster approvals. By speeding up payouts, insurers can help prevent health issues from escalating, delivering better outcomes for customers while boosting claims performance.

BOX 13 Insurance as a tool to protect vulnerable populations

In Delhi, India, winter air pollution often halts construction work, costing roughly 1.5 million daily-wage workers nearly two-thirds of their income.[86,87] To protect the livelihoods of these workers, the **Migrants Resilience Collaborative** and a partner reinsurance broker created a parametric insurance scheme that pays up to INR 6,000 (Indian rupees), or about $70, whenever the Air Quality Index exceeds 400 for three out of five consecutive days.[88] This provides financial relief to workers that's delivered faster than government compensation. Such interventions can ensure workers maintain both their health and their income.

Next steps: a call to action

> The business case for building resilience to climate-health risks is clear: proactive adaptation is far more cost-effective than spontaneous response to escalating disruptions.

Climate change is a present and growing risk to both human health and the continuity of all businesses. From extreme heat affecting the safety of workers to climate-driven supply chain disruption, no sector is immune. Investing early in health resilience can save lives and significantly reduce economic losses.

For business leaders, three strategic actions can guide an effective climate-health resilience strategy.

1. Understand the health risks most relevant to the workforce, customers and communities.
   - **Assess climate-health exposure across operations and supply chains:** Conduct a risk assessment to pinpoint how climate hazards could directly affect employee well-being, customer safety and community health.
   - **Prioritize the most severe and likely health threats:** Focus on risks that have the highest potential impact on health and business continuity in the specific sector and region.
   - **Use data and early-warning systems to anticipate health impacts:** Harness climate data (for example, heatwave forecasts, disease surveillance) and health information to identify vulnerable hotspots. Data-driven insights can help pinpoint which locations or groups need urgent protective measures.
2. Prioritize, plan and carry out interventions to safeguard health and build resilience.
   - **Prioritize high-impact, "no-regret" actions that protect the highest number of people and assets:** Not all interventions are equal – companies should focus on those that can reach the largest portion of their workforce or customer base and significantly reduce risk.
   - **Weigh costs against benefits and timing:** Assess each action's required investment, feasibility and time-to-value, aiming for a balance between quick wins and longer-term investments.
   - **Take advantage of co-benefits and synergies:** Companies should look for interventions that deliver co-benefits in areas like climate mitigation, sustainability or social impact.
   - **Tailor solutions to the specific business context and embed them into strategy:** Design measures that fit the organization's size and industry, and embed these into core business strategy. A small enterprise might start with simple steps (for example, flexible work hours during heatwaves), whereas a multinational can enforce higher standards across its supply chain.
   - **Avoid maladaptation that creates new vulnerabilities:** Interventions should be evaluated for unintended consequences. For example, relying solely on air conditioning to cope with heat can increase emissions or strain power grids, ultimately exacerbating climate risks.
3. Collaborate to amplify impact and cultivate systemic change.
   - **No single company can address climate-health challenges alone:** Companies can work with public agencies, non-governmental organizations, philanthropists and their peers to pool resources and learnings to avoid duplication of effort and magnify impact.
   - **Critically, companies should also collaborate across sectors:** Opportunities are plentiful – for example, agribusinesses can partner with insurers to develop climate-specific coverage for crop losses, and healthcare providers can support built environment companies with health-based designs.

A call to immediate action

The business case for building resilience to climate-health risks is clear: proactive adaptation is far more cost-effective than spontaneous response to escalating disruptions, and it builds long-term stability and competitive edge. The case for action has been laid out – in the data, the interventions and the examples of innovators already making headway. What remains is for executive leaders across all sectors to translate this knowledge into bold commitments and concrete initiatives. This is a call to action for every chief executive officer, board member and investor: **embed climate-health resilience into core business strategy today**.

Annex

Glossary

TABLE 10 **Key terms**

Key terms	Definition
Climate-focused treatment	A medical intervention tailored to conditions exacerbated by climate change
Cover cropping	Planting crops not for harvesting, but to protect and improve the soil in fallow periods
Excess deaths	A measure of the increase in the number of deaths during a time period and/or in a certain group, as compared to the expected value
Presenteeism	Individuals "present" at work but performing at below-usual levels of productivity due to illness
Smallholder farmers	Small-scale producers who operate under a small-scale agricultural model
Vector-borne diseases	Illnesses caused by parasites, viruses and bacteria that are transmitted by vectors such as mosquitoes and ticks
Zoonotic diseases	Infectious diseases that have jumped from a non-human animal to humans –may be bacterial, viral or parasitic

Methodology for selecting interventions

The interventions identified across each sector were chosen from a wider longlist of interventions, developed through an extensive literature review and consultations with a range of Forum partners, BCG topic experts and stakeholders affiliated with the Forum's Climate and Health Initiative (including but not limited to academia, non-governmental organizations and corporations). All public contributors are included in the acknowledgements to this report. The listed interventions per sector were prioritized through reference to the following factors: degree of health-protective impact, cost of implementation, feasibility of implementation, breadth of accessibility for business, time to delivery of positive impact, and ROI for businesses. There are likely to be additional or more specific interventions not discussed in this report that businesses should consider pursuing, depending on the specific climate-health risks and opportunities they face.

Methodology for modelling

This report models the economic cost of lost output due to climate-driven worker illness and death between 2025 and 2050 across three sectors: health and healthcare, food and agriculture, and the built environment. The insurance sector was excluded from this analysis due to minimal direct exposure of the sector's workforce to climate-health risks.

The analysis covers seven major health risks exacerbated by climate change: heat-related disease and mortality, dengue, malaria, diarrheal diseases, nutritional deficiencies/malnutrition, ozone-related illness and death, and illness and death from particulate matter. Other conditions mentioned in the report were not modelled due to the limited availability of data.

1. Health impacts: For each health risk, projected climate-driven deaths and disease incidence rates were sourced from scientific literature and scaled to represent those experienced by the global working-age population. Sector-specific impacts were allocated proportionally based on employment share and sourced from the International Labour Organization (ILO). Total DALYs were estimated by applying the ratio of deaths/disease incidence to

the DALYs constant for each health risk based on 2021 Institute for Health Metrics and Evaluation data. This step accounts for years of healthy life due to both premature mortality and disability. DALYs include years beyond retirement up to the WHO standard life expectancy.

2. Economic impact: The economic cost of lost output was estimated by multiplying total DALYs by the average annual value-added per sector worker. This was sourced from 2022 World Bank national accounts data, on a regional/global basis where possible, and weighted to reflect the global distribution of employment per sector. Estimates were adjusted for inflation and are presented in current 2025 US dollars.

This analysis will underestimate the true impact of climate change on worker availability as it only captures lost productivity from climate-driven illness and death. Other climate-driven effects on productivity that do not constitute an "illness" (for example, lower worker efficiency due to heat stress) or wider economic ripple effects are excluded. The analysis also estimates the impact on each sector based on the share of employment, and does not take into account the additional exposure risks faced by the focus sectors discussed in the report. As the analysis is limited to the working-age population, the future workforce availability impacts from childhood morbidity or mortality are out of scope. No new projections were generated for this study. All estimates are based on existing published literature, which may carry its own methodological and regional limitations.

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