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CLIMATE CHANGE:
What does the future hold for health and life insurance?

February 2024

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What does the future hold for health and life insurance?

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Foreword

Most people, if asked what climate change looks like, would conjure up a wildfire or a flood and the damage caused to homes and the environment. We have not yet, as a society, put a human face on the climate crisis and sufficiently prioritised the implications for our health.

But the same storms that destroy homes cause injuries and fatalities. Changing climate and weather patterns drive not only nature and biodiversity loss but also cause food insecurity and spread infectious diseases. Extreme high or low temperatures bring illness and threaten lives and livelihoods. These and other climate-related stresses greatly affect people's mental health.

Although life and health insurers have not been significantly impacted by climate change to date, that will not remain the case as climate events become more frequent and severe. How should life and health insurers approach the evolving set of climate-related health risks? The research findings captured in this report offer a roadmap.

First, we need to fully understand the potential impacts of climate change on health. There are morbidity risks and mortality risks, and within each, threats can be categorised into four groups: acute, chronic, transition and litigation.

There are noticeable adverse effects for children and the elderly, who are more susceptible to illnesses. Other vulnerable groups, such as low-income segments of the population, also require special consideration. Low-income people are more exposed to extreme weather events, food and water shortages, and health hazards – challenges which are amplified by limited access to healthcare. It is therefore of paramount importance for any solutions, including those offered by insurers, to prioritise inclusion.

The report offers recommendations for insurers: to urgently close data gaps on climate-related health risks; to innovate, in particular with parametric products; and to prioritise prevention, such as through impact underwriting, which incentivises behaviours that reduce risks. With these measures, insurers can make a significant contribution to protecting public health in the face of climate change.

Jad Ariss
Managing Director

Executive summary

2023 was the warmest year on record. Between April and July, many parts of North America, Southern Europe and Asia experienced extreme heat. In Canada, wildfires consumed over 120,000 km² of forests, resulting in a historic release of 290 megatons of carbon and 'code red' and above air quality alerts in several U.S. states.

In the insurance industry, understanding of the risks related to climate change is mostly concentrated in property and casualty (P&C) business lines as well as investments. While the short-term consequences for health and life (H&L) insurers have so far been modest, it may be erroneous to assume that it will remain that way in the longer-term considering the increasing frequency and severity of climate events and shifts underway. Quantifying H&L insurers' climate-related risk exposure comes with many challenges. This report attempts to dissect the current landscape by reviewing emerging global evidence on epidemiological shifts induced by climate change and mapping it against the current experience and insights of H&L insurers. More specifically, the report:

- Offers a framework for understanding the potential impact of climate change on health;
- Provides an overview of research on the topic;
- Presents observations from H&L insurers and affiliated experts on current and future risk exposure;
- Narrows down the 'problem areas' that H&L insurers can address.

The impacts of climate change on health and life insurers have been modest so far but may escalate as climate events become more frequent and severe.

The issue at hand is framed using evidence that links climate events – directly or indirectly – to health impacts, ranging from premature deaths to dementia. Furthermore, global warming has started to disrupt natural ecosystems, leading to poorer crop yields and spreading of vector-borne diseases to regions that were previously unaffected. With over 40% of the global population living in climate-vulnerable locations, an unfettered escalation of current shocks and patterns may have significant ramifications not just for health, but also on the social determinants of health through social unrest, displacement and economic hardship. Consequently, health risk protection could be compromised, and the shocks felt by H&L insurers may grow in intensity.

The report classifies climate-related risks into four categories in relation to mortality and morbidity – acute, chronic, transitional and litigious – and provides an overview of the latest scientific evidence. It goes on to provide a comprehensive snapshot of how these risks manifest. Acute risks stem from the impacts of extreme heat, wildfires, floods and severe storms on mortality and morbidity. In 2022, extreme heat in Europe resulted in an additional 62,862 deaths, which were concentrated in Italy, Greece, Spain and Portugal. Age emerged as a significant predictor of climate-related mortality, with notable increases in death rates observed among those aged over 80 – this age bracket accounted for nearly four times as many deaths as the 65–79 bracket, and over seven times more than those aged 0–64 years.

Chronic risks encompass those emerging from prolonged exposure to adverse climate and environmental patterns. A seven-year study (2010–2017) in two large Indian cities concluded that long-term exposure to air pollution, which is partly a manifestation of climate change, substantially increased the incidence of type 2 diabetes.

Transition risks may result in good or poor outcomes. On the one hand, investment in clean energy may mitigate chronic risks as air quality is improved. On the other hand, the transition from coal to fossil gas, such as shale gas, may

also lead to adverse health outcomes. For instance, abnormally low birth weights have been observed in communities located near fracking sites, where methane leaks occur. This suggests that trade-offs need to be thought through and managed carefully.

The desk research is complemented by practical insights gathered from 41 key informants spanning 17 global H&L insurance companies as well as experts on how they experience and view climate change and its impact on health, both now and in the future, through a widely used insurability framework based on actuarial, market and societal criteria. Most respondents do not perceive climate change as exerting any immediate impact on the liabilities associated with H&L insurance, nor do they anticipate short-term consequences for insurability and affordability. Nevertheless, there is consensus that this could change over the long term, although the level of impact may be tempered by multiple factors. These include geographic location, population profile, socio-economic status, policy preparedness and health system resilience. There is also consensus that the insured population may be better off when it comes to many of these variables compared with the general population. For instance, they may be more affluent, have white-collar jobs, fewer comorbidities and more able to adapt thanks to better infrastructure. So, while at the population level it can be argued that the losses are neither independent nor predictable (and would, therefore, defy insurability), the peculiarities of the health insurance market may help to overcome some of the challenges.

A lack of data that maps climate events and patterns against incidences of mortality and morbidity hinders insurers' ability to measure these risks.

The absence of consolidated, granular and longitudinal data that can be used to map climate events and patterns against incidences of mortality or morbidity is perceived to be a major hurdle to measuring risks. There is strong consensus that, as a basis for assessing the consequences of climate change for insurability or product design, H&L insurers need to resolve the actuarial gaps in understanding by consolidating data and intelligence from P&C business lines, health providers, policymakers and climate scientists.

Similarly, the current level of knowledge does not lend itself to underwriting health risks specifically linked to climate change. In addition to methodological constraints in risk attribution, from a societal perspective such underwriting also inherently conflicts with the insurance industry's sustainability and inclusivity goals. For instance, favouring those who are better able to adapt to extreme heat through air conditioning risks, excluding those who may be most in need. There is overwhelming agreement among interviewees that prevention is the preferred way to preserve insurability; for example, impact underwriting that incentivises greener lifestyles, public education and coordination on early warning systems (EWS).

'Problem areas' for H&L insurers include attributing the health-related risks of climate change to insureds using population-level data. There is currently no evidence to definitively state that climate-related risks are influencing the existing array of H&L insurance products. However, this non-effect is highly likely to be due to the lack of consistent and complete data. Based on these observations, the report puts forward the following three recommendations for H&L insurers:

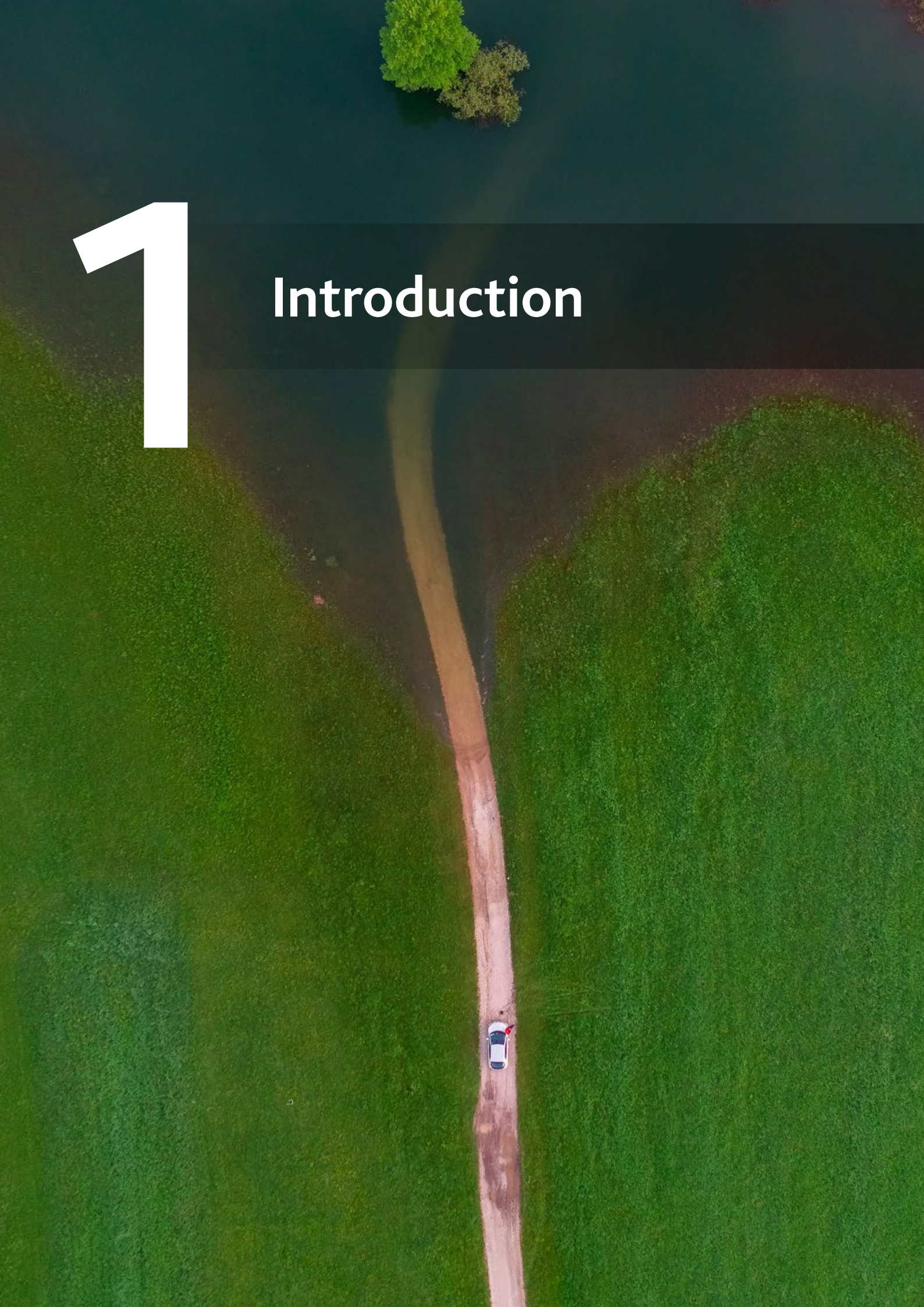
Assemble data prospectively: To improve understanding of future risks, H&L insurers must draw from a wider set of stakeholders to assemble multi-sectoral data to understand areas of vulnerabilities. This may include assessing not only the likelihood of heatwaves in a given region, but the number of elderly, frequency of power cuts and existing morbidities to develop forward-looking climate and health scenarios.

Invest in innovation: The innovative use of parametric insurance has garnered attention and holds valuable lessons for the future. But parametric initiatives would require H&L insurers to homogenise the risk and quantify its volume and frequency to decide whether shouldering the risk of a mass 'trigger' event is within their appetite, without making premiums unaffordable. Regulatory considerations would also be critical, considering the novelty of innovative approaches.

Play a bigger role in the policy environment: Insurers can play an important role in strengthening public understanding of the full spectrum of health risks related to climate events and implement simple and accessible messaging in their communications with customers. There is also a need to broaden understanding of climate-related health impacts within the insurance industry that goes well beyond Nat Cat and other climate-linked shock events.

Insurers can expand their contributions in this space by building the stock of data on climate-related health risks, developing innovative products and strengthening public understanding.

Public-private collaborations can be stepped up to create an ecosystem of preventative strategies and related actions to implement them. Examples include teaming up to build EWS and evacuation protocols, or strengthening clinical professionals' training on climate-sensitive health diagnoses. Insurers can also make and incentivise greener investments in health- and care-related assets that would reduce health-related risks; these may include creating green spaces and roofs to reduce overheating of buildings.



1 Introduction

Introduction

1.1 Background

There is mounting evidence that climate change adversely impacts human health and that this impact is increasing. 2023 was the warmest year on record, with human-induced global warming intensified by natural climatic patterns such as the El Niño warming phase of El Niño-Southern Oscillation (ENSO).[1] During July 2023, regions including the Southwestern U.S., Mexico, Southern Europe and China experienced extreme heatwaves, and the Southern U.S. issued heat alerts for 100 million people.[2] By the end of July, wildfires had consumed over 120,000 km² of Canadian forests, constituting the largest burned area in Canadian history and resulting in a historic release of 290 megatons of carbon emissions.[3] These wildfires led to the poorest air quality ever recorded in Washington D.C. and prompted multiple states to declare 'code red' and above air quality alerts.[4]

In addition to direct fatalities from extreme heat and weather events, climate impacts are known to exacerbate a range of morbidities, from allergies to dementia.[5] Furthermore, the gradual warming of the climate (the 10 hottest years on record have all occurred since 2010) is not only causing greater variability in weather but also having broader repercussions on natural ecosystems. This has led to reduced crop yields and the spread of vector-borne diseases to regions that were previously unaffected.[6] All in all, it is estimated that 3.3–3.6 billion people live in climate-vulnerable locations worldwide.[7] In addition to the ramifications for health itself, climate change risks also affect the social determinants of health through geopolitical frictions, social unrest, displacement and economic hardship, all of which are intensified in an increasingly inhospitable planet.

1.2 The policy context

Estimates of future increases in mortality directly resulting from climate change vary widely, ranging from 250,000 to 3.4 million deaths per year.[8] This underscores the difficulty of quantifying the impact of climate change on human lives. Despite this uncertainty, however, the toll is likely to be formidable, especially when direct impacts are considered alongside the broader implications of climate change on co-morbidities, including adverse effects on mental health.[9]

Climate change will exert a huge toll on human health, via direct fatalities from extreme weather events as well as adverse effects on morbidity.

In 2009, *The Lancet* described climate change as 'the biggest global health threat of the 21st century'.[10] Since then, extensive research has provided evidence of the impact of climate change on both human and natural systems. These findings have been consolidated by the Intergovernmental Panel on Climate Change (IPCC), which provides the foundation for the global Conference of Parties' (CoP) climate change negotiations under the United Nations Framework Convention on Climate Change (UNFCCC).

1 Copernicus 2023a.
2 World Weather Attribution 2023.
3 Copernicus 2023b.
4 Choi and Shveda 2023.
5 Zhang et al. 2023.
6 Thomson and Stanberry 2022.
7 Intergovernmental Panel on Climate Change (IPCC) 2022c.
8 World Health Organization (WHO) 2023; Vulnerable Twenty Group 2022.
9 American Psychiatric Association 2023.
10 *The Lancet* 2009.

1.3 Relevance of this study

In 2023, global surface temperatures reached 1.32°C above the 1850–1900 average, making it the hottest 12 months in the past 120,000 years.[11] Projections of global greenhouse gas (GHG) emissions by 2030, based on nationally determined contributions (NDCs) as of October 2021,[12] will probably lead to temperatures that will breach the 1.5°C target of the Paris Agreement and will make it harder to limit warming below 2°C. A recent report by the World Meteorological Organization (WMO) confirms the assumption that global average temperatures will exceed – at least temporarily – the 1.5ºC benchmark by 2027, leading to a potential worsening of extreme weather events.[13]

While increasing climate impacts have sharpened the focus on climate action within the scientific and policymaking communities, it has also given increased impetus for healthcare professionals to study its human toll. However, existing research is uneven across various health outcomes and geographic regions, and estimating future outcomes presents significant challenges owing to a few factors:[14]

- The effects of climate change on health are wide-ranging and causal mechanisms are often poorly understood. For example, mortality due to drowning in flood waters may be straightforward to attribute to a single climate event, but mortality due to cardiovascular disease (CVD) linked to wildfires over time may not.

- Mortality statistics are typically based on information recorded during death certification by healthcare professionals, with climate events rarely identified as causes of death. Likewise, when it comes to morbidity, wildfires and droughts are known to cause significant increases in lung and kidney diseases, resulting in a higher number of hospital visits. However, these health episodes are seldom directly attributed to climate change but are primarily viewed through a clinical perspective such as manifestation as an asthma attack.[15]

- Alterations in climate patterns can create new areas of vulnerability. This includes the potential for a higher (or occasionally lower) occurrence of vector-borne diseases at higher altitudes and latitudes due to global warming. For instance, shifting climate patterns have increased the number of months conducive to malaria transmission in the highlands of the Americas by 31.3% between the decades of 1951–1960 and 2012–2021.[16]

- Finally, on a systemic level, the absence of relevant data and consistent collection methodology both within and between countries complicates the attribution of health outcomes and mortality to climate change.[17] Equally, the extent of future risks associated with climate change will be influenced by the diverse responses of health and care systems, which can vary significantly by nation.

While it is plausible that climate adaptation strategies (within limits) or, in some cases, climate patterns themselves may reduce mortality and morbidity in certain regions, some cohorts such as the elderly, young children, pregnant women and those who are socio-economically disadvantaged, are highly vulnerable. In a global study of all deaths related to climate change, the numbers were strikingly disparate, with 130, 75 and 92 deaths per million occurring in low, lower-middle- and upper-middle-income countries, respectively, compared to just 18 deaths in high-income nations.[18] The lower mortality in high-income countries reflects, in part, the level of investments in early warning systems (EWS) and emergency preparedness, combined with relatively resilient health systems.[19] While low- and middle-income countries have also implemented EWS, especially for tropical cyclones,[20] in many cases the size of the exposed population coupled with high levels of poverty and weaker health systems have left them disproportionately exposed to adverse outcomes. Furthermore, the impacts of climate change on chronic diseases (elaborated in section 3) may mean that its true effects on the health prospects of today's young and working-age populations may be much greater than current figures estimate. This gives further impetus to expanding understanding and consolidating the emerging evidence rather than basing assumptions on historical patterns.

The size of the exposed population, high poverty levels and weaker health systems make low- and middle-income countries more exposed to climate-related health impacts.

11 Climate Central 2023.
12 NDCs are at the heart of the Paris Agreement and the achievement of its long-term goals. They embody efforts by each country to reduce national emissions and adapt to the impacts of climate change.
13 WMO 2023a.
14 Berrang-Ford et al. 2021.
15 Harvard T.H. Chan (n.d.); McKibben 2023.
16 Romanello et al. 2022.
17 The Geneva Association and AXA 2021.
18 Swiss Re 2023a. Golnaraghi 2012.
19 Golnaraghi 2012.
20 Ibid.

Now, more than ever, the science of climate change and its associated risks have become pivotal considerations for societal welfare and economic prosperity, as well as for the insurance industry, given that climate-related losses are increasing at an unprecedented rate. By the middle of 2023, insured losses from climate events amounted to USD 50 billion, compared to an annual average of USD 18 billion over the past decade.[21] Until now, most focus on the effects of climate change, nature and biodiversity loss on the insurance industry has been directed towards property and casualty (P&C) business lines.[22] While the short-term consequences for health and life (H&L) insurers have been modest so far, it may be erroneous to assume that this will continue in the longer-term for the reasons discussed above.[23]

This report is a timely opportunity to take stock of what is known and what remains unclear regarding the impact of climate change on health, viewed through the prism of risk and insurability. It does so by mapping existing knowledge on climate change and epidemiology industry experts' experience and insights to identify problem areas that can be acted upon. The primary objectives of this report are as follows:

- Offer a framework for understanding the potential impact of climate change on health.
- Provide a high-level overview of climate change research and its impact on health outcomes.
- Present observations from H&L insurers and affiliated experts on future risk exposure and the resulting effects on the nature and availability of insurance products.
- Narrow down the 'problem areas' that H&L insurers can address in the future.

The report hereafter is divided into three further sections. Section 3 outlines a framework for defining climate-change-related risks in relation to mortality and morbidity, and provides an overview of the latest scientific findings on the health-related impacts of climate change. Section 4 summarises practical insights gathered from 41 key informants spanning 17 global H&L insurance companies and associated experts on how they view such risk and its consequences for insurability. Section 5 suggests areas for consideration for H&L insurers going forward.

21 Swiss Re 2023b.
22 The Geneva Association 2018, 2021a,b,c, 2022a,b. Authors: Maryam Golnaraghi et al.
23 The Geneva Association 2022a.

2 Climate change, health and health systems

Climate change, health and health systems

2.1 The impact of climate change on health: A comprehensive view

Earth's intricate climate system is complex and chaotic and can pose risks to human health. These risks manifest through the emergence of new diseases, both directly and indirectly, as well as the exacerbation of existing health burdens. Understanding the far-reaching impacts of climate change on health requires not only an examination of global warming, but also of its effects on the natural environment and the ecosystems that sustain human life.

Rising temperatures affect the behaviour, physiology and life cycles of insect vectors and pathogens as well as the behaviour of animal and human hosts. The ability of organisms to adapt to a warming climate can shift their responses to temperature and alter their tolerance limits. This, in turn, has significant implications for the geographic distribution of certain diseases. Vectors may cease to transmit certain pathogens, or they may become carriers of new ones as climate-induced changes bring vectors and disease reservoirs (long-term animal hosts of an infectious disease) into close proximity with human hosts. Any imbalance in this ecosystem can be further exacerbated by activities such as deforestation, which heightens the potential for conflicts over habitat, fostering the emergence and increased transmission of zoonotic diseases such as Zika, Avian flu, Ebola and Lyme disease.[24]

Climate change also leads to adverse health outcomes, some of which are immediate and others more long term. These encompass injuries and fatalities resulting from extreme weather events; infectious diseases (including air, water and vector borne); heat-related illnesses; respiratory conditions; chronic diseases; malnutrition stemming from climate-induced disruptions to food systems; mental health issues after extreme weather events; and anxiety related to the long-term consequences of unmitigated climate change.

The framework outlined in Table 1 offers a classification of acute and chronic climatic events and their possible health outcomes.

24 AXA 2023.

TABLE 1: THE DIRECT AND INDIRECT INFLUENCES OF EXTREME WEATHER EVENTS AND GRADUAL CLIMATIC SHIFTS ON HUMAN HEALTH[25]

		Health outcomes					
Climatic conditions	Type	Cardiovascular diseases	Allergies	Diarrheal diseases	Malnutrition	Vector-borne diseases	
Extreme events (acute)	Heat extremes	✔	✔		✔	✔	
	Wildfires	✔	✔		✔	✔	
	Flooding		✔	✔	✔	✔	
	Severe weather	✔		✔			
Slow-changing events (chronic)	Droughts			✔	✔	✔	
	Rising temperatures	✔	✔	✔		✔	
	Sea level rise			✔	✔	✔	
	Water availability & quality			✔	✔	✔	
	Ecological changes		✔	✔		✔	
	Environmental degradation		✔		✔	✔	
	Air pollution	✔	✔			✔	
	Food supply	✔		✔	✔		

Source: The Geneva Association

TABLE 2: OBSERVED IMPACT OF CLIMATE CHANGE ON HEALTH AND WELL-BEING BY REGION

	Impacts on health and well-being			
	Infectious diseases	Heat, malnutrition and other	Mental health	Displacement
Global	●	●	●	●
Africa	●	●	○	●
Asia	●	●	●	●
Australasia	●	●	●	Not assessed
Central and South America	●	●	Not assessed	●
Europe	●	●	●	●
North America	●	●	●	●
Small Islands	●	●	○	●
Arctic	●	●	●	●
Cities by the sea	○	●	Not assessed	●
Mediterranean region	●	●	Not assessed	●
Mountain regions	●	●	○	●

Confidence in attribution to climate change

● High or very high ● Medium ● Low ○ Evidence limited, insufficient

Source: IPCC[26]

25 The health conditions listed are for illustrative purposes only and may include others. Extreme weather refers to hurricanes, thunderstorms, blizzards etc.

26 IPCC 2021, 2022a,b.

	Health outcomes						
	Respiratory diseases	Cancer	Injuries & displacement	Heat-related illnesses	Other chronic illnesses	Degenerative diseases	Antimicrobial resistance
	✔	✔		✔		✔	
	✔	✔	✔	✔		✔	
	✔		✔				✔
			✔	✔			
				✔	✔		
		✔	✔	✔	✔	✔	✔
			✔				
		✔			✔		
	✔		✔	✔			✔
	✔	✔	✔				✔
	✔	✔			✔	✔	✔
		✔	✔			✔	

A dramatic rise in adverse health effects due to climate change is expected across all regions, as illustrated in Table 2. However, the worsening of heat-related perils and displacements in Asia and Africa and of health prospects across all categories in North America indicate that vulnerability transcends regional boundaries and levels of development, and the worse may be yet to come. While it is plausible that economically affluent groups will have better capacity to adapt, the poor, old and vulnerable population remain at risk in all regions.

2.2 Categorisation of climate-related risks

This section navigates the complexities of the various risks posed to health by climate change. It subdivides these risks into four categories that may affect H&L insurance (and may even spill over to other lines of insurance), both now and in the long run:

- **Acute risks:** Mortality, accidents and injuries, and health emergencies caused by changes in the frequency and severity of extreme weather events due to climate change.
- **Chronic risks:** Mortality and morbidity risks that emerge over a longer duration, resulting from slow-changing climatic trends.
- **Transition risks:** Resulting from climate transition policies, technological solutions or market responses to mitigate climate change that either enhance or hinder health.
- **Litigation risks:** Health-related legal challenges arising from the negative externalities of climate change.

It should be noted that litigation risks are elaborated on only briefly and are not a central consideration in this report.

2.2.1 Acute risks

Acute climate risks encompass the impact on both mortality and morbidity arising from changes in the severity and frequency of extreme weather events like floods, severe storms, wildfires and extreme heat due to climate change. Their toll on health often takes the form of trauma, injuries, infectious diseases (e.g. cholera spread through contaminated water) and exacerbation of existing conditions. Mortality and morbidity risks associated with these extreme events may be further increased by the destruction of healthcare facilities, disruption to healthcare professionals' ability to work, damage to clean water and sanitation infrastructure, and restraints on mobility, all of which hinder access to timely diagnosis and care. Examples of health impacts that are acute in nature are presented in Box 1.

Box 1: The impacts of extreme weather on mortality and morbidity

Extreme heat

Exposure to extreme heat is linked to mortality and morbidity from a range of causes, including (but not limited to) non-accidental and injury-related deaths, heat strokes, adverse pregnancy outcomes, acute kidney injuries, disruptions to sleep patterns and mental health, as well as the exacerbation of pre-existing cardiovascular and respiratory conditions.[27]

- **Summer 2003 and 2022 extreme heat in Europe:** 71,449 excess deaths were recorded between June and September 2003 during Europe's worst heatwave in recorded history. However, despite the rapid implementation of various mitigation strategies such as heat-health warning systems, record-breaking temperatures in 2022 resulted in a further 62,862 deaths due to heat-related complications.[28] Mediterranean countries were the worst affected, with Italy, Greece, Spain and Portugal respectively reporting 295, 280, 237 and 211 deaths per million inhabitants. Age emerged as a significant predictor of mortality, with notable increases in death rates observed among those aged over 80, accounting for nearly four times as many deaths as recorded for the 65–79 bracket and over seven times more than those aged 0–64 years.[29] Such findings on the age sensitivity of risks are further supported by a recent analysis by *The Lancet* which concluded that, in 2020, heat-related mortality among people aged over 65 had increased by 85% compared with the period 1990–2000.[30]

- **Summer 2021 heat dome in Canada:** In late June 2021, an unprecedented heatwave struck the Pacific Northwest region of North America. The 'heat dome' (a persistent area of extremely high pressure) shattered all-time maximum temperature records by more than 4.6°C across the region, with Canada reporting temperatures in some areas up to 20°C above the norm, as well as a new national record temperature of 49.6°C in Lytton, British Columbia (the same town was engulfed by a wildfire the following day).[31] Government sources confirm that 619 people lost their lives due to heat in the summer of 2021,[32] making it the deadliest extreme weather event in Canada's history.[33]

- **2023 extreme heat in the U.S.:** The threat posed by extreme heat is estimated to drive up healthcare costs by USD 1 billion each summer, as an increasing number are hospitalised for heat-related conditions.[34] A study conducted by the Virginia Commonwealth University and the Center for American Progress projects that the rise in extreme heat could result in nearly 235,000 emergency room visits and over 56,000 additional hospital admissions across the U.S. each summer.[35] Another study from 2023 highlights the compounded risks associated with prolonged electrical blackouts coinciding with heatwave conditions. Using three major U.S. cities as case studies, mortality rates are shown to more than double, with up to 50% of the urban population requiring medical attention.[36]

- **Extreme heat-related risks in China:** A study of future projections of extreme heat using four climate change scenarios concludes that heat-related excess mortality would be concentrated in central China and in the densely populated Southeastern coastal regions.[37]

- **Impact of extreme heat on workers:** Construction workers exposed to hot environments or extreme heat can be at risk of heat-related illnesses and injuries. In the U.S., the construction industry accounts for 36.8% of occupational heat-related mortality nationwide, with construction workers, over a 10-year period, at 13-times-higher risk of heat-related fatality compared to workers in other industries.[38] The effects of excessive heat have also been linked to adverse outcomes in indoor workers. Studies from garment factory workers in Bangladesh have observed a significant increase in heat strain – up to 53–60% higher than average between May and August.[39]

27 Wong 2023.
28 Francisco de Souza 2023.
29 Ballester et al. 2023.
30 Romanello et al. 2023.
31 Government of Canada 2022.
32 Government of British Columbia 2022.
33 Government of Canada 2022.
34 Luhby 2023.
35 Woolf et al. 2023.
36 Stone et al. 2023.
37 Liu et al. 2023.
38 Acharya et al. 2018; International Labour Organization 2019.
39 Chowdhury et al. 2017.

Wildfires

- **2019–2020 wildfires in Australia:** 2019 was Australia's warmest and driest year on record. The period October 2019–February 2020 saw bushfires that were unprecedented for their scale and destructive impact. The fires directly caused 417 fatalities, 1,305 emergency asthma cases, and 1,124 cardiovascular and 2,027 respiratory hospitalisations.[40] In one survey, 17% of respondents sought medical attention for poor mental health as a result of the fires.[41] Research has determined that climate change increased the likelihood of such an event by 30%, mainly driven by the increase in temperature extremes.[42] The same research also warns that even a temperature rise of 2°C (the upper limit set by the 2015 Paris Agreement, discussed in section 2.2) would make similar events at least four times more likely.[43] Another study, led by Monash University, anticipates that more than 2,400 lives will be lost to bushfires in Australia by 2030, with healthcare costs from smoke-related deaths reaching AUD 110 million.[44]

Tropical cyclones and severe weather

- **Hurricane Harvey:** Flooding causes acute injuries and deaths due to drowning and is associated with increases in acute respiratory infections, diarrhoea, skin infections, post-traumatic stress disorder (PTSD), anxiety, depression and long-term pregnancy complications. The extent and duration of flooding corresponds strongly with adverse health outcomes.[45] In August 2017, for example, Hurricane Harvey stalled over Texas and caused extreme precipitation, resulting in extensive flooding lasting up to a week. This flooding impacted the health of the local population both directly and indirectly due to the release of toxic chemicals from damaged petrochemical plants in the impacted region.[46] Long-term mental health impacts have also been observed in survivors of Hurricane Katrina, which devastated New Orleans in August 2005.[47]

- **Severe weather-related power outages:** A study has revealed that power interruptions throughout the U.S. are linked to the rising frequency and severity of extreme events. The longest and most frequent outages are in underprivileged communities, often with large proportions of Medicare beneficiaries who depend on electrically powered medical equipment.[48]

Source: The Geneva Association

2.2.2 Chronic physical risks

These risks describe the mortality and morbidity impacts of slow-changing climatic trends. These include health risks caused by vector-borne diseases, scarcity of drinking water and air pollution, which is partially a manifestation of climate change. Box 2 provides illustrative examples of health-related impacts arising from these gradual climatic and environmental changes.

Box 2: Health-related impacts of slow-changing climatic trends

Air pollution

- **Heart disease:** A recent study of 3.7 million adults in California found that long-term exposure to air pollution was associated with an increased risk of acute myocardial infarction (cardiac arrests), ischemic heart disease mortality and cardiovascular disease mortality, with more pronounced impacts in communities with lower socio-economic status.[49]

- **Respiratory illnesses:** Government action to significantly reduce all measured air pollutants during the 2008 Summer Olympic and Paralympic Games in Beijing resulted in a reduction in respiratory mortality due to improvements in air quality.[50]

40 Borchers Arriagada et al. 2020.
41 Rodney et al. 2021.
42 Oldenborgh et al. 2021.
43 Ibid.
44 Davey 2023.
45 Ramesh et al. 2023.
46 Center for Biological Diversity 2017.
47 Davis et al. 2010.
48 Suran 2023.
49 Alexeef et al. 2023.
50 Breitner et al. 2021.

- **Type 2 diabetes:** A seven-year study (2010–2017) in New Delhi and Chennai of 12,000 men and women found that long-term exposure to air pollution substantially increased the incidence of type 2 diabetes. The study found that every 10 µg/m³ increase of the annual average level of particulate matter ($PM_{2.5}$), a metric used to measure toxicity in air quality, led to a 22% increased risk of diabetes.[51]

- **Mental health:** A longitudinal study of the use of mental health services by 5,024 dementia patients aged 65 or older in South London has demonstrated a strong correlation with residential air pollution exposure. It concludes that efforts to reduce pollutant exposures in urban settings might reduce the need for mental health services in people with dementia.[52]

- **Compounding impacts of air pollution and extreme heat on heart disease:** A recent study looked at more than 202,000 heart attack deaths between 2015 and 2020 in China, concluding that the combination of extreme heat and air pollution may significantly increase the risk of having a fatal heart attack, especially among older individuals. For instance, it found that only two consecutive days of temperatures between 28°C and 37°C increased the likelihood of a fatal heart attack by 18%. More concerningly, this figure rose to 74% when temperatures ranged from 35–43°C over four days.[53]

- **Antibiotic resistance:** A recent study has identified significant correlations between particulate matter ($PM_{2.5}$) air pollution and antibiotic resistance. Globally, antibiotic resistance derived from $PM_{2.5}$ caused an estimated 0.48 million premature deaths and 18.2 million years of life lost in 2018.[54]

- **Asthma:** Air pollution and increased frequency, duration and severity of pollen exposure, dust storms, wildfires and thunderstorms contribute to the onset, progression and severity of allergic rhinitis, asthma and other chronic respiratory conditions, with children particularly affected.[55] A recent study found that prenatal/early-life exposure to air pollution ($PM_{2.5}$) is linked to decreased lung function later in childhood.[56]

Rising temperatures

- **Vector-borne diseases:** Warming and other manifestations of climate change – including changes in rainfall and humidity – have important implications for vector-borne diseases through their effects on the behaviour, physiological characteristics and life history of both vectors (e.g. mosquitoes, ticks and lice) and pathogens (e.g. dengue, Lyme disease and typhus, respectively) as well as the abundance and behaviour of reservoir and definitive hosts (e.g. deer and humans). The latitude and altitude ranges of many vectors and associated pathogens are already expanding.[57]

- **Long-term health repercussions of drought:** Drought exposure in infancy raises later-life disability rates by 3.5–5.2%, especially for physical and mental disabilities in males.[58]

- **Health effects of milder temperatures:** Milder temperatures may positively influence health by reducing the incidence of seasonal flu that has a particularly adverse health impact on the elderly and individuals with multi-morbidity. On the other hand, a milder climate has been associated with rising tick populations and concomitant Lyme disease in Canada.[59]

Recurrent flooding

- **Incidence of cancer:** Frisbie et al. conclude that rising sea levels and consequent chronic flooding in countries such as Bangladesh may lead to a higher concentration of arsenic in drinking water (which already exceeds WHO standards), especially where 97% of the population relies on water from wells.[60] This potentially increases the risk of cancer across the population.

Source: The Geneva Association

51 Mandal et al. 2023.
52 Ronaldson et al. 2023.
53 Christensen 2023; Xu et al 2023.
54 Zhou et al. 2023.
55 Nadeau et al. 2010; Padula et al. 2015; Eguiluz-Gracia et al. 2020; Lee et al. 2023; Paudel et al. 2021; Neophytou et al. 2023.
56 Neophytou et al. 2023.
57 Thomson and Stanberry 2022.
58 Dinkelman 2017.
59 National Collaborating Centre for Environmental Health 2023.
60 Frisbie et al. 2024.

2.2.3 Transition risks

Climate transition will bring a range of health benefits, including improved air quality; healthier, more plant-based dietary patterns (by reducing consumption of meat, which can be carbon and methane intensive); and increased physical activity (cycling over driving). But at the same time, depending on how the transition is managed, there could be environmental risks associated with the deployment of new climate technologies, potentially resulting in significant long-term health consequences.[61] The implications of transition risks on mortality, morbidity and longevity may vary depending on the nature and speed of these changes. Therefore, balancing positive and negative externalities may require comprehensive adjustments to policy, legal frameworks and technology usage. Box 3 contains some examples of climate transitions, outlining the positive health outcomes as well as the health risks they may present.

Box 3: Health-related opportunities and risks of selected climate transitions

1. Fossil fuels to renewable energy

- **Opportunities:**
  - The WHO estimates that outdoor air pollution, often caused by the burning of fossil fuels, kills around 7,000,000 people every year.[62] In the U.S., clean energy policies could substantially reduce particulate matter and ozone levels, thus preventing approximately 175,000 premature deaths by 2030, with 22,000 fewer deaths annually thereafter.[63] Solar power, for example, has been shown to lead to cleaner air, reduced water usage and less water pollution, decreasing the risk of heart disease, asthma attacks and premature deaths.[64]

- **Risks:**
  - In the U.S., 58% of excess deaths are attributable to air pollution arising from the burning of fossil fuels. In India, this number is 26% (this is expected to increase in the future as demand for energy rises), largely due to the continued prevalence of biofuels.[65] While some might consider biofuels an improvement on fossil fuels in terms of greenhouse gas emissions, they may carry a heightened risk of mortality and morbidity through their contribution to air pollution, particularly for children.[66] Wider negative externalities may also include a rise in crop prices as they are diverted for biofuel production, which may fuel food insecurity.[67]

2. Coal and oil to fossil gas (natural gas)

- **Opportunities:**
  - Fossil gas is thought to be cleaner than other fossil fuels (like oil and coal), as it emits less CO_2 and other pollutants such as fine particulates.[68]

- **Risks:**
  - While such a transition is favourable from a health perspective, it is not without risks. For instance, leaks during the production and combustion of fossil gas can result in emissions of methane, a greenhouse gas more potent than CO_2.[69] As well as indirectly affecting human health through accelerated global warming (see section 3.1), methane leaks, including those in homes with gas stoves, have also been linked to adverse health outcomes. Other examples include abnormally low birth weights in communities located near fracking (hydraulic fracturing for shale gas) sites where methane leaks occur.[70] While diversifying energy sources may be a credible option in the near term for energy security, long-term evidence points towards replacing such options with renewable sources.

61 The Geneva Association 2022b.
62 WHO 2018.
63 Ibid.
64 Palmetto (n.d.)
65 Haines and Ebi 2019.
66 U.S. Environmental Protection Agency (EPA) 2023a.
67 Chakravorty et al. 2015; Ahmed et al. 2021.
68 About 117 pounds of CO_2 are produced per million British thermal units (MMBtu) of natural gas compared with more than 200 pounds of CO_2 per MMBtu of coal and more than 160 pounds per MMBtu of distillate fuel oil. U.S. Energy Information Administration 2022
69 United Nations Economic Commission for Europe (n.d.)
70 Manke 2020.

3. Fossil fuels to nuclear energy

- **Opportunities:**
  - The transition to nuclear power from fossil fuels has seen significant advancements in air quality, resulting in fewer risks associated with air pollution. According to NASA Goddard National Research Lab, historically, nuclear power may have prevented up to 1.8 million deaths from air pollution.[71]

- **Risks:**
  - Research indicates a wide range of health-related risks associated with every stage of the production process of nuclear power – from leaks during mining, to explosions and leaking of radioactive particles during power generation, to the decommissioning of nuclear power plants. For example, accidents and explosions at nuclear power plants are shown to increase the risk of cancer,[72] while contaminated water can pose long-term risks if strict handling protocols are not followed.[73] In addition to accidents, the long-term storage of such waste bears significant health and security risks.[74]

4. Clean transportation

- **Opportunities:**
  - The transition to clean transportation, including zero-emission electric vehicles (ZEVs), improved public transport and strengthened walking and cycling habits, could avoid 120,000 premature deaths in the U.S. alone by 2030, and 14,000 deaths every subsequent year.[75] A recent study in California has shown that an increase of just 20 ZEVs per 1,000 people within a zip code significantly reduced asthma-related emergency visits by 3.2%.[76] Equally, swapping driving for walking, cycling or public transport can improve public health by decreasing the risk of chronic disease through reduced air pollution and increased physical activity, potentially averting costs to health systems.[77]

- **Risks:**
  - The health impacts of mining the materials needed for the manufacture of EV batteries – due to the release of toxic materials like lithium into soil and water – have already been seen in China, the largest producer of these materials.[78] Increasing the use of public transport limits these health risks more effectively than swapping a gas car for an EV.

  - In the absence of effective public safety and public health policies, the risk of personal injury from cycling and walking, or the risk of transfer of infectious diseases on public transport systems could increase.

Source: The Geneva Association

Some transitions have had an overwhelmingly positive outcome with few, if any, important health risks. The move from gas to electric cookers is one such example. Leaks from gas stoves have been linked to childhood asthma due to emissions of nitrogen oxides,[79] as well as to cancer risk through pollutants including benzene,[80] whereas electric stoves carry no such risk. Similarly, the growing trend away from processed meat and ultra-processed foods towards plant-based diets both reduces emissions[81] and benefits health by reducing the risk of heart disease and other morbidities.[82]

However, some climate-positive transitions can have negative side effects for human health if not well managed. The pace of transition may also vary by socio-economic status, leaving less affluent countries more exposed; for example, much of the exploration and mining of vast quantities of critical materials required for manufacturing new systems for the energy transition may occur in poorly regulated countries or poor communities. For these reasons, consideration of health-related issues in all aspects of climate change mitigation and adaptation policies is essential. Yet recent evidence suggests that just 0.2% of bilateral and multilateral climate adaptation funding supports initiatives that are primarily health related.[83]

71 Nuclear Energy Institute (n.d.)
72 National Cancer Institute 2022.
73 EPA 2023b.
74 Bian et al. 2021.
75 Haines and Ebi 2019.
76 Grinshpun 2023.
77 Haines and Ebi 2019.
78 Standaert 2019.
79 Blum 2023.
80 Michanowicz et al. 2022.
81 Da Silva et al. 2021.
82 McManus 2021.
83 WMO 2023b.

2.2.4 Litigation risks

The threat of increased morbidity and mortality to current and future generations as a result of anthropogenic climate change is becoming a catalyst for climate litigation in various courts around the world, with plaintiffs attempting to either compel action on climate mitigation or to prevent actions that exacerbate risks. Research indicates that in the U.S. alone, health-related considerations linked to anthropogenic climate change have played a pivotal role in 139 cases filed to date.[84] Moreover, a comprehensive global review of publicly reported climate litigation cases from 1990–2020 confirms a noticeable upward trend in cases where health concerns were explicitly or implicitly utilised, particularly within high-income countries.[85] From an insurance perspective, these risks noticeably affect general insurers, who are beginning to shoulder the financial burden of health-related risks.[86] Box 4 presents examples of climate litigation cases with a major health angle.

Box 4: Climate litigation cases in which health-related issues are central or a major driver

KlimaSeniorinnen v. Switzerland.[87] This ongoing case against the Swiss government deals with the effects of climate change on the elderly. The applicants, an association of senior women as well as four individual women over the age of 80, argue that increasing temperatures due to climate change result in severe health risks and increased mortality, especially for older women, including the applicants. In March 2023 it became the first ever climate case to be heard before the European Court of Human Rights. The decision is pending.

Anton Foley et al. v. Sweden.[88] In a more recent case, a group of Swedish youths argues that climate change impacts in the period up to 2100 will have severe consequences, especially on human health. They expect to be particularly affected because, according to Sweden's average lifespan, they can expect to be alive during this time. Specific impacts cited include longer and more intense heatwaves leading to mild and severe health effects; shorter and milder winters increasing the spread of tick-borne diseases; and changing precipitation patterns causing health problems related to flooding.

Herrera Carrion et al. v. Ministry of the Environment et al.[89] Nine young women from Ecuador claimed that gas flaring is unlawful as it leads to severe health impacts and damage to the environment, including contributing to global warming. Initially, the Court of First Instance dismissed the action due to insufficient evidence but, upon appeal, the Provincial Court of Justice of Sucumbíos accepted the action. It declared that the Ecuadorian State had ignored the plaintiffs' right to a healthy environment and health by promoting polluting activities and refusing cleaner, energy-efficient technologies. The court ordered an updated plan for gradually eliminating gas flares, starting with those located near populated areas with the next 18 months, and setting a deadline to progressively remove remaining gas flares by December 2030.

Milieudefensie et al. v. Royal Dutch Shell plc.[90] This landmark case discusses the serious global, national and regional health risks posed by climate change, as well as for the Netherlands and Europe specifically. The judgement of the District Court of the Hague accepted that Shell's global CO_2 emissions exceed those of many nations and entail great health and increased mortality risks. The court acknowledged some uncertainty about how climate change will manifest in the region but stressed that this does not invalidate 'the prediction that climate change due to CO_2 emissions will lead to serious and irreversible consequences' for the plaintiffs.[91]

A report by the Asian Development Bank (ADB)[92] catalogues a range of climate litigation cases on the grounds of health and the preservation of healthy environments from countries ranging from India to the Philippines. These cases underscore the increasing intensity with which climate change and associated adaptation or mitigation is being viewed through the prism of public health and is fast becoming a global phenomenon.

Source: The Geneva Association and Joana Setzer (London School of Economics)

84 McCormick et al. 2018.
85 Toolan 2022.
86 The Geneva Association 2021a,b,c. Authors: Golnaraghi et al.
87 KlimaSeniorinnen v. Switzerland 2016.
88 Foley et al. v. Sweden 2022.
89 Herrera Carrion et al. v. Ministry of the Environment et al. 2020.
90 Milieudefensie et al. v. Royal Dutch Shell plc. 2019.
91 Ibid.
92 ADB 2020.

2.3 Climate shocks and the role of health systems

It is clear that climate change has a significant impact on health, which can be further calibrated (upwards or downwards) by the broader operating environment.

The resilience and capacities of health systems play a pivotal role in tempering the health risks posed by climate change, with considerable variation among countries. A nation's preparedness level significantly affects its ability to absorb initial shocks before they spill over to the wider ecosystem. The aftermath of any such shock, its impact and the scale of the affected population largely hinges on three key domains:

- ***Policy***, including progress towards universal health coverage (UHC) or developing EWS.
- ***Financial and technical competence***, including workforce availability, training, and investment in infrastructure and supply chains.
- ***Accessibility of healthcare***, i.e. the factors that determine the availability, affordability and quality of care needed.

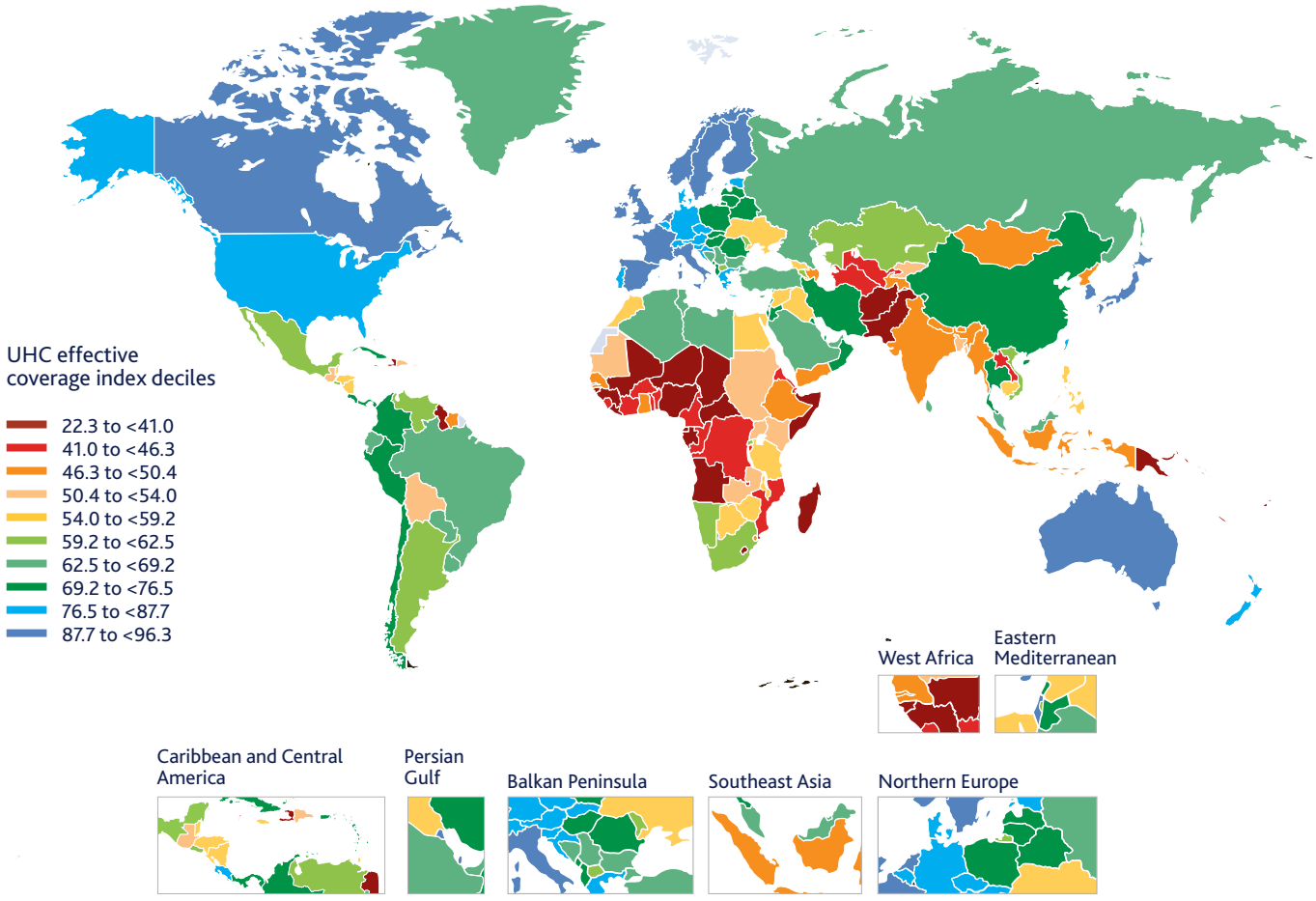
The resilience and capacities of health systems play a pivotal role in tempering the health risks posed by climate change.

An analysis by the World Economic Forum (WEF) and Oliver Wyman estimates that, globally, health systems are likely to face an additional USD 1.1 trillion burden due to climate change, with the leading causes being floods, droughts, heatwaves and infectious diseases.[93] In the context of healthcare infrastructure vulnerability, a recent study systematically investigated flooding risk of nearly 700 U.S. hospitals on the Atlantic and Gulf Coasts from Category 1–4 storms as climate change worsens and sea levels rise. The study concluded that even relatively weak hurricanes could flood most of the hospitals in urban coastal areas and that the sea level rise expected within this century due to climate change significantly increases flooding risk by 22%.[94] Such are the complexities that compound the challenge of precisely delineating the health risks posed by climate change across settings.[95]

Although understanding of the resilience of healthcare systems in the face of climate-related shocks is still in its infancy, proxy data suggests that regions and countries with weaker health systems are less equipped to mitigate these shocks. A report by the Global Health Security (GHS) Index following the COVID-19 pandemic – an event that may be analogous to some climate-related shocks – identified significant vulnerabilities in health systems. Importantly, even in high-income countries where systems are perceived as more resilient, funding for emergency responses was found to be dangerously low.[96] Likewise, the UHC index, which assesses the current coverage and accessibility of healthcare services on a global scale, underscores a stark divide between wealthier regions and nations (Europe, Australia, Canada, Japan, Singapore and South Korea) and the rest of the world, as depicted in Figure 1. Therefore, it can be reasonably inferred that in settings where health systems lack the capacity to address routine healthcare demands and have significant health protection gaps, the likelihood of elevated climate-related health risks is notably heightened. This does little to ease concerns regarding the accessibility of care during climate-related health emergencies or abilities to predict the shock that may spill over to H&L insurers.[97]

93 WEF 2024.
94 Tarabochia-Gast et al. 2022.
95 WHO 2022.
96 GHS 2021.
97 GBD 2019 UHC Collaborators 2020.

FIGURE 1: PROGRESS TOWARDS UNIVERSAL HEALTH COVERAGE



Source: Global Burden of Disease (GBD) UHC Collaborators[98]

98 GBD 2019 UHC Collaborators 2020.

3 Implications for health and life insurance

Implications for health and life insurance

Having explored the influence of climate change on broader epidemiological trends, this section focuses on the specific implications for H&L insurance. In particular, it addresses two high-level questions:

- Is climate change currently influencing existing H&L insurance products, such as life, health and long-term care insurance?
- Are there specific considerations that may affect the future insurability of these insurance products?

Unlike the population-level evidence presented in section 3, academic and grey literature addressing the impact of climate change on H&L insurance liabilities remains limited. To overcome this limitation, this section relies on a combination of available literature and data obtained from interviews with 41 key informants representing 17 global re/insurance companies, as well as affiliated experts in North America, Europe and Asia.

The interviews were conducted using an open-ended topic guide, allowing for a thorough exploration of issues and the identification of opportunities and challenges associated with H&L insurers. This topic guide explores four key areas:

- The ongoing impact of climate change on H&L insurance products
- Sources of concern related to insurability (including specific health conditions and regions of interest)
- Climate considerations in the design of H&L insurance products
- Considerations within the insurance value chain to enhance preparedness for future climate-related risks.

3.1 The current impact of climate change on H&L insurance products

Most interviewees do not perceive climate change as exerting any immediate impact on the liabilities associated with H&L insurance products, nor do they anticipate short-term consequences for their insurability and affordability. Nevertheless, there is consensus that this situation might change over the long term. This expectation arises from the increasing scale, intensity and frequency of climate events, particularly with global temperatures likely to surpass the 1.5°C threshold by 2027.[99]

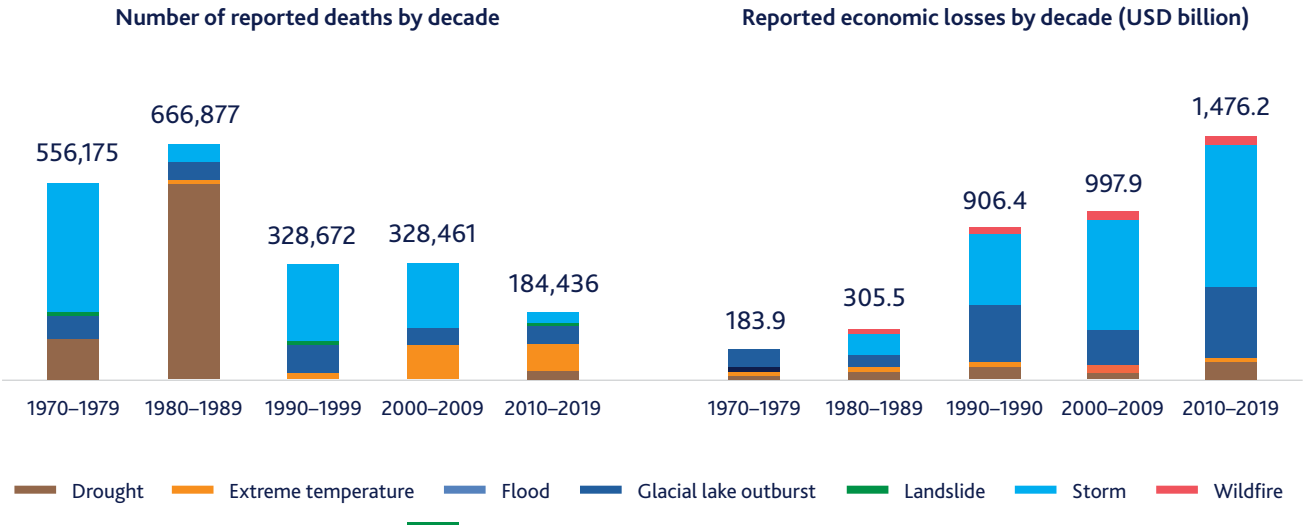
The current impact of climate change on health and life insurance is perceived as limited but there is consensus that this may change in the long term.

An analysis by the WMO supports these assertions, estimating that extreme climate events have caused more than 2 million deaths in the last 50 years and incurred economic losses of USD 4.3 trillion (see Figure 2).[100] On the one hand, it is reassuring to observe that mortality rates have decreased over time with greater adaptability and warning measures. On the other hand, 90% of the burden of death has disproportionately fallen on developing countries where populations continue to grow, making the outlook for future risk exposure concerning. There is also little to suggest that such a positive global mortality trend will continue. As can be seen in Figure 3, the frequency of extreme events has increased significantly over the last 40 years, especially for storms, floods and extreme temperatures.[101]

99 WMO 2023a.
100 WMO (2023c) states that there were a total of 22,608 deaths in 2020 and 2021 and USD 0.4 trillion in damages, which are not included in Figure 2.
101 United Nations Office for Disaster Risk Reduction (UNDRR) 2020.

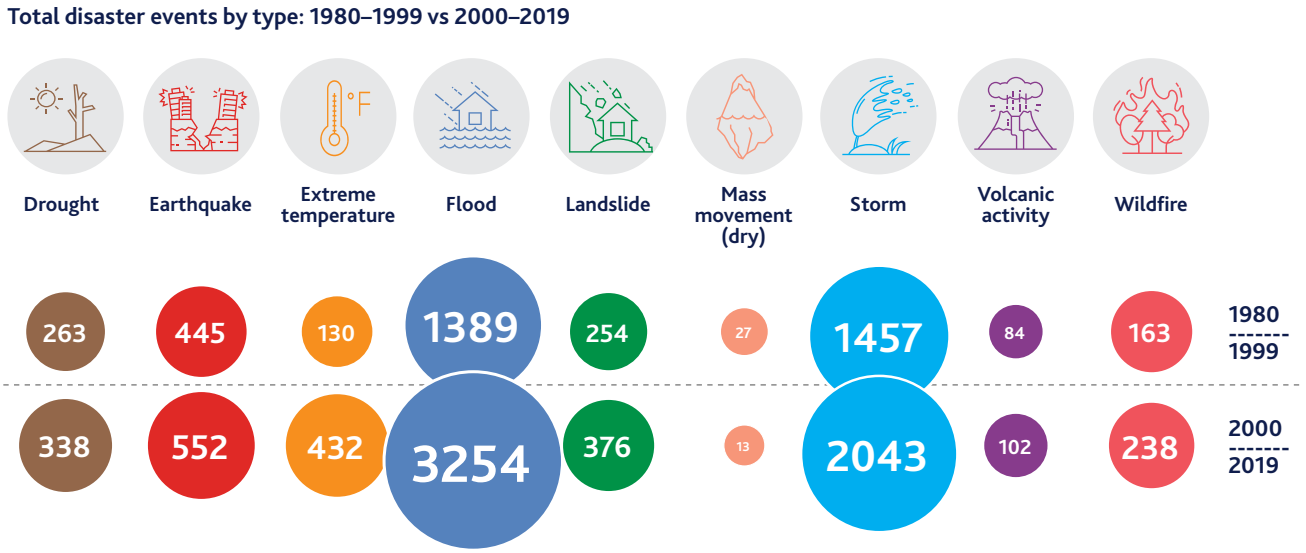
Data from the key informant interviews corroborates this evidence and strongly highlights the (acute) risks of extreme events that can significantly affect all population segments. Frequent concerns particularly extend to Southern Europe, notably Spain, and specific areas in the U.S. that are vulnerable to extreme events as well as those situated closer to the equator. Equally, chronic risks from prolonged exposure to adverse climate patterns (for example poor air quality as a result of wildfires) can affect the whole population. The emergence of new vector-borne diseases is also seen as a rising threat from unfettered environmental degradation and melting permafrost linked to climate change.

FIGURE 2: MORTALITY AND ECONOMIC LOSSES FROM WEATHER, CLIMATE AND WATER EXTREMES (1970–2019)



Source: WMO[102]

FIGURE 3: INCREASING FREQUENCY OF EXTREME WEATHER EVENTS



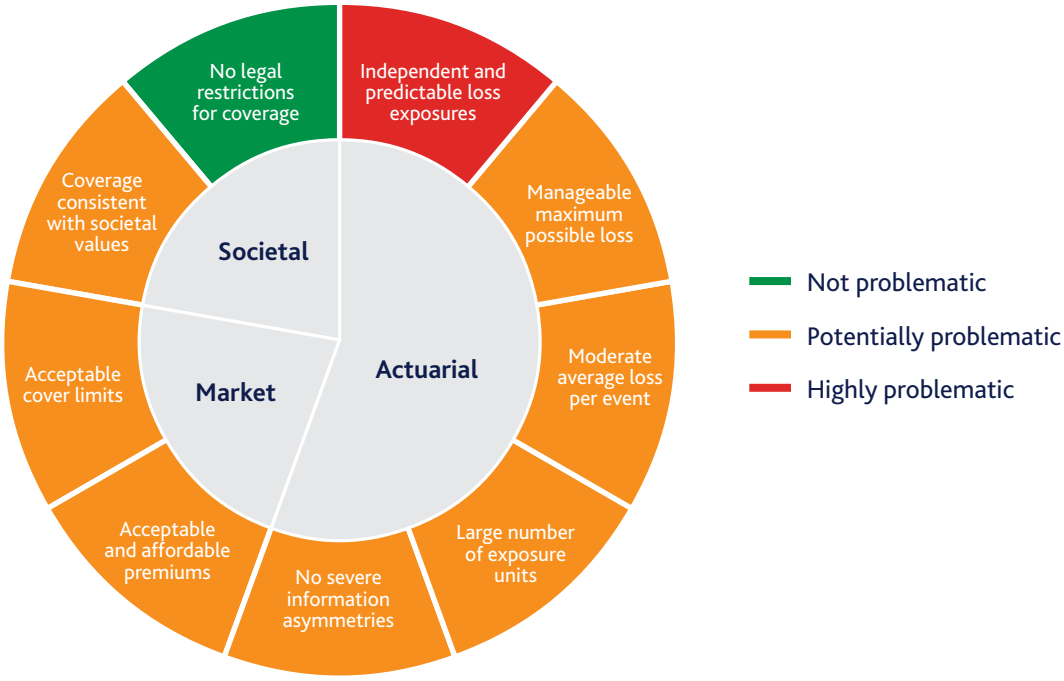
Source: UNDRR[103]

102 WMO 2023c.
103 UNDRR 2020.

3.2 The impact of climate change on the future availability, structure and pricing of H&L insurance products

Having established that H&L insurability is not currently a matter of concern, interviewees were then asked to discuss specific considerations that may affect the insurability and, consequently, the availability, structure and pricing of products in the future. The aggregated findings are presented below, taking into account a well-established insurability framework.[104] While the novelty of the topic may limit a granular analysis, the subsections below attempt to map the key informant observations against some customary actuarial, market and societal criteria of insurability to understand the issues at hand. The vast majority are actuarial considerations.

FIGURE 4: CRITERIA OF INSURABILITY



Source: The Geneva Association, based on Berliner[105]

3.2.1 Actuarial considerations

A) Are loss exposures independent and predictable?

Insurability requires that losses are reasonably uncorrelated and predictable. This fundamental criterion of insurability is not met with climate-change-induced H&L risks, as suggested by the findings presented in section 3. However, some idiosyncrasies of the health insurance market may mitigate this challenge.

The ways in which the effects of extreme events are experienced by individuals, society and, subsequently, healthcare and insurance providers, are interconnected but non-linear, involving a complex set of variables. Moreover, such variables may differ markedly in their characteristics between the insured and general populations, with most of the evidence on climate-related health risks currently being generated from the latter. These include socio-economic status, which significantly influences access to voluntary insurance and health services as well as level of adaptability (for example, owning an air conditioner to counter extreme heat); age and the presence and severity of comorbidities; and location (including within countries/large states) and occupation, which will have implications for infrastructure quality and the concentration of white-collar workers (which in turn may have a shielding effect). It may be argued that insurers, on the whole, operate in settings where relevant variables may be more advanced than the general picture. This also suggests that the amount of risk that may spill over to H&L insurers following any given climate shocks will vary significantly depending on the configuration and interactions between each of these variables.

104 The Geneva Association 2020, 2023. Author: Kai-Uwe Schanz.
105 The Geneva Association 2020; Berliner 1982.

Given such intricacies, it is challenging to predict a clear-cut impact of climate change on H&L products. For longevity products, this may manifest as a slowing in improvements in life expectancy, allowing life insurers to release reserves due to reduced longevity risks. The effects on morbidity and long-term care products are harder to predict. On the one hand, certain risks may increase due to the rising cost of care as chronic conditions are worsened by climate change. On the other hand, some types of risks may decrease, at least in the short to medium term, as new climate patterns in some regions may bring about more favourable conditions for health, such as fewer seasonal flu outbreaks during milder winters, in addition to medical advancements in early prevention and diagnosis. Regardless of the uncertainties, the prevailing perspective is that any impact, whether positive or negative, is unlikely to occur suddenly. Instead, it is perceived as a shift in trends that is highly unpredictable in terms of timing and intensity.

The unpredictability of losses, incompleteness of data and lack of standardised methodologies for interpreting it make it difficult to quantify potential risk exposure.

The unpredictability of loss is further compounded by the incompleteness of data and lack of standardised methodologies for interpreting it (elaborated further in point B). For instance, attributing injuries and some fatalities to extreme events like hurricanes is not always possible, making it harder to form a global perspective of the nature and quantity of potential risk exposure. Similarly, for chronic risks, indicating that the patient's cause of death was exacerbated by many years of exposure to rising levels of beyond-safe air pollution, for example, is seldom observed. In the absence of coherent data analytics, predicting the level of future exposure remains highly problematic.

B) Is the maximum possible loss manageable and the average loss per event moderate?

The current evidence suggests that losses have been manageable to date, partly because of insurers' diversified portfolios. But the outlook for insured losses is highly uncertain. The foremost challenge revolves around data, with many observations underscoring its fragmented and incomplete nature. These limitations manifest in various ways.

Firstly, there are limitations with the current International Classification of Diseases (ICD) coding system, which underpins how data is recorded and analysed globally in healthcare. This deficiency is evident in the way in which deaths are classified, such as labelling a case of heat-related stroke as 'stroke'.[106] ICD codes do not typically leave space for crucial context that might indicate climate-related morbidity or mortality. In the case of a patient suffering from an asthma attack caused by long-term pollution exposure, clinicians may be inclined to classify it as simply an 'asthma attack', disregarding the underlying cause. The application of ICD codes also varies by country, and, in many cases, insurers may not be privy to coding information. Consequently, there are fundamental structural and practical obstacles in health data collection, which will need attention.

Some recent advancements in ICD codes try to address some of these deficiencies. These updates are beginning to incorporate a restricted set of clinical outcomes that could result from climate- and environment-related hazards, encompassing conditions such as heat exhaustion, pollution-related ailments, hypothermia and allergies caused by airborne substances. If effectively integrated at the service delivery level, these developments could enhance the precision with which mortality and morbidity data is collected and conveyed to insurers. This may also help to model average losses. However, even if some of the technical problems related to ICDs are resolved, H&L insurers may struggle to form a fuller picture for the following reasons:

- Even with the best coding practices, it may not be straightforward to isolate the exact cause of mortality or morbidity following a single climate event, unless it is a large-scale, acute shock. This is due to the multitude of variables that could have influenced a particular clinical outcome, which may lead to the risk being overlooked or overstated.

- There is currently insufficient longitudinal data to assess the risks of climate change to H&L insurance products. The limiting factor here is the duration of the data collection period, which will depend on the length of time insured individuals stay with any given insurer. This also influences the extent to which the randomness of loss can be understood, an issue touched on in point A .

- Insurers often contribute only partially to the complete health data story. In group plans, for instance, certain risks may not have been fully underwritten. This could involve pre-existing conditions like diabetes or respiratory illnesses that are prevalent among the insured but may not be known to the insurer – something that potentially worsens informational asymmetries (also see point D). These conditions can significantly influence health outcomes in the event of climate shocks.

- Claims data may not consistently reflect cases linked to climate exposure, particularly when health

106 Longden et al. 2020.

insurance interacts with public healthcare. For instance, a health insurance policyholder may be treated at a public-sector facility, whether because of an emergency or because their private policy excludes cover for certain morbidities covered by statutory health schemes. In this case, the insurer would not have access to this part of the policyholder's claims history, thus complicating the assessment of healthcare utilisation patterns.

More generally, claims data may not always be a good proxy to understand future losses. There may be a lag in securing the data, or data may originate from places not affected by climate events, especially in cases where people are displaced following a climate event.

Seasonal patterns also significantly influence health insurance claims. While this may aid predictability to some degree for certain ailments, distinguishing the impact of climate-related factors from pre-existing seasonality can be challenging, unless the focus is on isolated, singular, acute climate events. Consequently, determining the extent of maximum and average losses in the medium to long term is a complex undertaking. This complexity is particularly pronounced when assessing loss associated with morbidity and mortality resulting from prolonged exposure to adverse climate patterns (i.e. chronic risks), in contrast to understanding the immediate impact of mortality caused by acute events.

Climate change is expected to lead to dryer and warmer summers in many parts of the world such as the Netherlands. We have consistently seen increased solar radiation. We have also seen a spike in the cases of skin cancer. Linking the two directly has some way to go, but mapping climate patterns with health trends may help us to start forming a broader view on potential risks.

Gijs Kloek, Achmea

Although the lack of data granularity and completeness may pose challenges to assessing loss potentials, a minority of informants suggest that existing datasets could suffice to begin forming a broader 'trend' perspective. They stress the need for more effective usage of the available data, attributing the inadequacy partly to the absence of integrated analytical techniques. Such techniques would have to incorporate further types of data, such as behavioural data or satellite imagery, that can be mapped against health trends.

On a positive note, the long time horizons associated with life insurance products such as income protection or pensions give H&L insurers adequate time to react to losses and keep them manageable. As such, any sudden fluctuations caused by climate events in a given year may be offset by the length of the policy term. For instance, excess mortality risks from heatwaves during one particular summer may be offset by lower temperatures over a 20-year period. However, this assumption only holds true if acute risks evolve in a manner that does not necessitate the repricing of products in the short term. Life insurers also benefit from their large and diversified portfolios, enabling them to absorb sudden shocks from broader risk pooling, which incidentally also enables them to operate in areas that may be perceived as 'risk prone'.

However, there are more uncertainties associated with morbidity and long-term care insurance products. On the one hand, timely mitigation strategies, such as improved air quality from renewable energy, may reduce rates of cardiovascular disease. On the other hand, inadequate or non-existent policy responses could exacerbate them. Such products could also take advantage of existing short-term pricing cycles to accommodate any observable fluctuations, and consequently losses, as they often work on an annual basis.

C) Is the number of exposure units sufficiently large?

This criterion requires that risks should be spread over a sufficiently large number of independent exposure units (i.e. policyholders), which can form an insurance pool. While there are potentially many exposure units in H&L insurance, their exposures may vary widely in their characteristics, making it hard to estimate loss. In other words, a large risk pool may not always buffer future losses if the units are not homogenous.

Respondents acknowledge the heterogeneity of exposure across different geographical regions, both within and across countries as well as by health conditions. This makes it hard to identify any specific sources and quantity of loss within a risk pool.

Emerging economies are particularly exposed, and adaptability and capacity play a significant role here compared to developed economies like the U.K. We know in India that improving air quality to meet WHO guidelines would add four years to life expectancy on average.

Deepak Jobanputra & Kate Anderson, Vitality UK

Morbidity rates are sensitive to economic downturns, and it is possible that disability income (DI) trends might be impacted by more frequent and severe weather events and associated health consequences, including injuries, socio-economic stressors, healthcare strain and mental illnesses such as PTSD, anxiety and depression. Slowly changing climatic conditions can also pose health challenges, such as working in suboptimal temperatures or increased perception of stress at work.

Georgiana Willwerth & Chris Falkous, RGA

Moreover, the nature of exposure may itself be subject to change. For instance, the increasing risks from specific regions can be alleviated by climate adaptation or mitigation strategies as well as medical technology, such as prompt diagnosis and treatment. Similarly, for large insurers, losses from a particular region can to an extent be absorbed through regional or even global diversification. Finally, significant socio-economic disparity, both within and across countries, warrants a cautious approach when identifying the quantity and nature of exposure across risk pools.

First and foremost, climate change poses an economic threat that increases social inequity. This in turn further increases the challenge to make H&L products accessible and inclusive.

Melissa Leitner, Swiss Re

Hence, while it can be argued that there are potentially many exposure units, it is not presently possible to substantiate this claim without robust data. The units are highly heterogenous and subject to change

D) Is there severe informational asymmetry?

The insurer and the insured should have access to the same information about the risk. If this is not the case, risk assessment may be inaccurate and adverse selection may occur.

The current body of information combining health and climate risks and insurance is limited. Consequently, very little is known about how much more information may be held by the policyholder about their climate-related health risks and the implications for insurability.

However, one reasonable extrapolation may be that an element of informational asymmetry (in favour of the insured) is likely to be present when diseases and care episodes are covered by more than one insurer, e.g. statutory versus supplementary or complementary voluntary health insurance, or within group plans.

Considering the absence of data on informational asymmetry, discussions with interviewees largely focused on the need to improve the quality of prevailing 'information' about climate change and health, both on the demand and supply sides, to narrow information deficits. Observations on information heavily focus on the need for marketing and communication functions to forge a stronger and more compelling narrative focused on 'healthy planet and healthy people' to raise the profile of climate-related risks and change mindsets. This is already in progress for investment products like green funds and sustainability-based products in P&C insurance. However, it has yet to significantly impact the liability side of H&L insurance.

More importantly, even within the insurance industry, the general perception of climate change's impact on health is limited to mortality. However, the issues are far more complex, with indirect effects on mortality and morbidity giving significant cause for concern. A multitude of data sources will be required to examine all types of risk, and improved education, awareness, coordination and knowledge sharing among health, life and P&C lines of business is needed to reduce information deficits and asymmetries. In the U.S., for instance, hurricanes and storms have had implications beyond P&C insurance when power cuts forced many to resort to home generators, inadvertently causing carbon monoxide poisoning.[107]

Insurers are only just starting to look into their own carbon footprint and supply chain practices; these efforts are also being driven by reporting requirements. There is a real opportunity and a pressing need for insurers to engage more with the impacts of climate change. The most important task is to deepen our understanding of the risks and to get insurers on board with this idea. Convincing distribution channels and consumers is equally important. However, the product offering is not yet very broad.

Alexander Krauskopf, German Association of Actuaries (DAV) and Deloitte

One key focus is to assess exposure to the stressors of climate warming. H&L insurers may look to the P&C industry for an indication of the physical stresses that may impact a particular region and modify P&C risk scenarios to reflect H&L considerations (e.g. health impacts of an extreme heat event exacerbated by a power grid failure).

Winston Wisehart, Stewart Ashkenazy, Leonard Reback, MetLife

3.2.2 Market considerations

There is currently very little insight into what would be an acceptable premium or a cover limit for climate risk in H&L insurance policies. So far, such considerations have not played a prominent role in the design and pricing of H&L insurance products. The interviews conducted for this report suggest that climate-related health risks are viewed as gradual events with no immediate impact on the underwriting portfolio. Consequently, there is no perceived urgency in addressing affordability and availability issues. The prevailing view is largely that discussions about climate-related liabilities primarily focus on P&C insurance lines, with many agreeing that evidence on climate-related liabilities for H&L insurers is limited and discussions on methodologies for assessing climate-related H&L risks are relatively nascent.[108] Many respondents emphasise the need to prioritise data-gathering tools to improve

107 Damon et al. 2013.
108 The Geneva Association 2022a.

understanding of the risks first, before revisiting product design or pricing considerations for market readiness.

There is a case for greater blanket sensitisation, mitigation and education regarding people's environmental actions. We are aiming to adopt such green behaviours across all lines of business. For instance, rewards should be offered for planting trees, not buying trainers. Healthy behaviours can be monitored through wearable tech, but monitoring green behaviours that overlap with healthy behaviours is necessarily a much bigger endeavour.

Domenico di Napoli, Generali

However, certain areas of development merit attention, most notably risk prevention and reduction. Many key informants endorse the promotion of wellness programmes aimed at preventing chronic illnesses, which align with climate-friendly activities. These programmes offer incentives and rewards for making healthier choices, which serve health objectives while reducing morbidity and mortality (acute and chronic) risks associated with climate change. Additionally, this approach provides H&L insurers with opportunities to engage with customers through early warning and advisory systems (e.g. 'drink more water', 'stay indoors' and 'wear sunscreen' alerts, such as Australia's well-known 'Slip, Slop, Slap!' initiative). While the potential benefits of these schemes are clear to all interviewees, some also express concern around success metrics and potential risks (e.g. excessive outdoor activity in heat or pollution).

Parametric insurance is another noteworthy market innovation. Under this model, payouts are triggered when specific, measurable and predetermined criteria (e.g. extreme heat or pollution levels) are met. Such features may also be paired with additional risk prevention strategies, including enabling remote work during extreme heat or cold (to reduce exposure), providing water coolers or ensuring access to fresh water. Many respondents feel that these products hold promise, though they are cautious about the practicalities of implementing them.

Discussions about the optimal balance between premiums, payouts and triggers are essential. For example, in the context of extreme heat income protection insurance, at what temperatures do we trigger payouts? Should it be set at 38°C or or 46°C? How low is the bar? How high is the bar? Is it too unrealistic? In instances where payouts are critical to the health and well-being of a vulnerable population, we must also ask whether insurance is the most useful and appropriate route, or whether we should also be bundling it with other risk protection mechanisms and financial tools, such as emergency assistance and loans. Insurance is not a panacea and should always be viewed as one tool among many.

Sarah Ebrahimi, Blue Marble

Parametric insurance for heat: A case study from India

BlueMarble's 'extreme heat insurance' is the latest innovation designed to address heat-related perils through parametric underwriting. This product, developed in partnership with the Arsht-Rock Foundation and the Self-Employed Women's Association (SEWA), aims to assist workers in emerging countries to recover lost wages due to climate-driven extreme heat events and help women tread the fine line between protecting their health and ensuring their family's financial security. SEWA, a long-standing Indian trade union with a membership of 2.5 million women, collaborates with Blue Marble, an impact insurtech company specialising in creating socially meaningful and commercially viable insurance solutions for underserved populations.

In India's informal sector, women often work in dangerously hot conditions, resulting in preventable suffering such as rashes, infections, burns and chronic heart and kidney diseases. This parametric insurance solution is activated when specific extreme heat conditions expected to result in adverse health outcomes are met. Upon activation, payments are directly credited to SEWA members' bank accounts to compensate for projected income loss due to unsafe working conditions caused by extreme heat.

Lost income is compensated at approximately USD 3 per day when extreme heat events occur, thus relieving the financial burden on participants. The initiative also prioritises adaptation strategies, such as providing water coolers at home or enabling remote working when possible. This approach represents a novel combination of prevention and risk protection, offering a comprehensive solution to the challenges posed by extreme heat in the informal sector of India.

Source: Baughman McLeod et al.[109]

3.2.3 Societal considerations

There is minimal insight into how the integration of climate considerations in existing H&L products would be received by consumers and policymakers, as well as how such products may be governed. The interviewees express overwhelming support for improving understanding and management of the actuarial risks first to realistically gauge public reaction and policy response. However, one significant societal consideration stands out – the ethical challenges of underwriting climate risk in the context of health, especially for the most vulnerable regions and individuals. The difficulty lies in maintaining accessibility, affordability and inclusivity for those who often need insurance the most, while simultaneously ensuring actuarial soundness in risk assesment. This creates an

109 Baughman McLeod et al. (n.d.)

inherent dilemma for insurers: they must be financially prudent in managing risk, yet also uphold their objectives of providing social protection and adhering to broader environmental, social and governance (ESG) principles. Consequently, increased data utilisation becomes essential for market segmentation and risk comprehension but could also result in excessive exclusions or higher premiums that could undermine social protection.

As insurers, it is crucial that we accurately assess and underwrite health-related risks, especially in light of the increased frequency of climate-related events. In this context, we strongly encourage our customers to lead a healthy and eco-friendly lifestyle that benefits both themselves and the environment. By doing so, we can help to prevent the negative impacts of climate change and ultimately create a healthier and more sustainable world. However, it remains a challenge for us to evaluate the impact on taking up eco-friendly measures by our customers as traceability is much harder in H&L products compared with P&C.

Adriana Lecu, Allianz

Regional risk-based underwriting generated mixed opinions among key informants. In some cases insurers may be able to supply insurance affordably in riskier places because of some diversification and cross-subsidy operating within the system. However, some believe that more explicit region-based underwriting could lead to unfair discrimination and might attract regulatory interventions. They argue that access to risk reduction and preventive measures is unevenly distributed, disproportionately impacting the poor or vulnerable. Others perceive regional risk-based underwriting as a viable option, citing examples where this is already underway. Nonetheless, they do concede that implementing a region-based strategy comes with challenges, primarily due to resistance from local populations. Insurers in the U.S., for instance, are engaging with local communities to construct water reservoirs in flood-prone areas, thereby ensuring that affected populations have access to clean water. Despite the benefits, landowners in these regions have been reluctant to participate, fearing that their properties may be devalued if designated as prone to flooding. Other informants argue that certain adaptation strategies are problematic, such as the promotion of air conditioners. These actions may therefore contradict overarching climate mitigation strategies.

We say a lot about adaptation: in hot countries like Singapore, air conditioners are ubiquitous. But is this really sustainable in the long run and what kind of innovative solutions could our industry and government imagine together?

Meng Meng, SCOR

There's a need for a clearer supervisory quantitative framework on how climate risks may impact life and health insurance on the passive side of the business, considering increasing requirements to include these in risk assessments.

Jordi Balcells, VidaCaixa

We should keep downward pressure on prices and make insurance as affordable as possible without compromising the sustainability of the product. This will require a move towards prevention and early diagnosis.

Eduardo Sanchez Delgado, MAPFRE

It is reasonable to infer that underwriting climate risks for health and life insurance is not only subject to actuarial and market barriers, it also poses strategic challenges for insurers related to their societal and environmental objectives.

Ultimately, in the absence of a clear risk assessment methodology, many participants assert that the most viable approach to facilitate insurability is through risk reduction and prevention. This approach is similar to the wider concept of 'impact underwriting', which provides insurance coverage based on analyses of policyholders' behaviours and rewards actions that reduce or prevent risks. This concept is already a central consideration in many non-life lines of businesses. A form of impact underwriting is being employed by some H&L insurers, too, whereby they incentivise consumers to adopt healthy behaviours that align with climate-friendly practices. These encompass activities such as swapping driving for walking or cycling; addressing obesity through increased physical activity; offering discounts on gym memberships or healthy or plant-based meals; and taking precautions in extreme conditions to prevent avoidable deaths, diseases or accidents. However, some interviewees highlight the absence of metrics to assess the impact of these activities on an individual's resilience to climatic conditions (extreme events and slow trends).

3.3 Narrowing down the problems

The observations above draw attention to a sizeable gap between understanding of the health-related risks emanating from climate change at the population level, which is extensive, and the feasibility of attributing these risks specifically to the insured population. The problem areas can be summarised as follows:

- H&L insurers often work with subsets of the general population that are unique in socio-economic profile. Applying population-level data to such subsets can be problematic. Additionally, insurers are themselves operating within the parameters of health and care systems.

- Historic claims data is incomplete and past experience is often an inadequate reflection of future needs given the dynamic nature of climate change and health. A sound assessment of insurability may only be possible if data sources are pooled across insurance business lines and other sectors in a consistent manner, well before broaching the topic of insurability.

- Expert interviews overwhelmingly indicate that the use of traditional underwriting techniques to assess health risks emanating from climate change is currently not an option. This is due to methodological constraints as well as inherent conflict with industry-wide ESG goals.

- For now, most respondents view risk reduction and prevention as the preferred way forward to preserve insurability.

Data: Trials and tribulations

To better understand the long-term impact of climate change on health, greater cohesion is necessary to marry together fragmented data pools, from healthcare providers, researchers and policymakers. We need to prioritise collating medical and meteorological data across various regions for forecasting of population-level health outcomes. Only then can we begin to deduce what the impacts may be on life & health insurers over time.
Prachi Patkee and Adam Strange, Swiss Re

Insurers have vast amounts of data that go back several decades. However, this will not be granular enough to determine if the main reason for a claim was climate change related. There is significant pressure on insurers to try to quantify the exact cost of climate change on our experience, but the information is not available and taking the time to investigate each claim to obtain that level of granularity is impractical, costly and may lead to wrong conclusions. Instead, it may be more meaningful to look at climate risk in the context of all-cause mortality and morbidity trends and supplement with qualitative analysis to determine how significant a contributing factor climate risk is to overall experience.
Maria McGowan, ManuLife

For us as reinsurers, our clients must first provide the data. In some regions this has been mapped against weather data, which may facilitate an understanding of the high-level trends. P&C insurers are already doing this for natural catastrophe data, but with health and life insurance we are limited to trend analysis in its broadest sense. The number of variables at play makes it challenging to pin morbidity and mortality down to specific climate events.
Achim Regenauer, PartnerRe

While there has been a significant focus on the negative health risks associated with climate change, other developments have the potential to act as partial offsets. Many experts believe AI can have a transformative impact in healthcare, assisting providers in a variety of patient care and intelligent health systems. AI algorithms are being trained to analyse vast amounts of medical data and identify patterns and relationships, which may ultimately improve disease diagnostics and patient outcomes.
Winston Wisehart, Stewart Ashkenazy, Leonard Reback, MetLife

In theory, we can match claims data to weather data to track longitudinal patterns. But how can we trust that the data used is reliable? Whose data would be best?
Domenico di Napoli, Generali

Heatwaves are a particular concern in Spain, so we need to establish robust regional baselines to deal with them. While Spain is generally good at coding health claims data, relying solely on historical data to predict future effects is no longer sufficient. Instead, we must move towards scenario analysis, mapping historical data to climate patterns and trends to obtain a longitudinal perspective.
Eduardo Sanchez Delgado, MAPFRE

It would be helpful to do more research to better understand the causes and effects underlying climate change to better quantify the associated costs and drive decisions. [...] Considering behavioural data could also usefully enhance discussions with policymakers.
Daniel Meier, Swiss Re

For a comprehensive picture of health trends in a climate context, four things need to align: specific and precise knowledge of the geographical distribution of insureds, knowledge of the existing clinical status of populations, understanding of regional supply-side factors, and consistent and detailed health utilisation data. Getting granular data is often problematic where insurers play a complementary and supplementary role to statutory schemes as such data may be incomplete.
Joanne Buckle, Milliman

The data does exist: from weather data spanning the past 150 years to extensive claims data. Granted, not all insurers possess granular diagnostic data due to outdated systems. However, it is possible to anticipate the future development of claims for certain illnesses depending on future climate events.
Alexander Krauskopf, German Society of Actuaries (DAV)

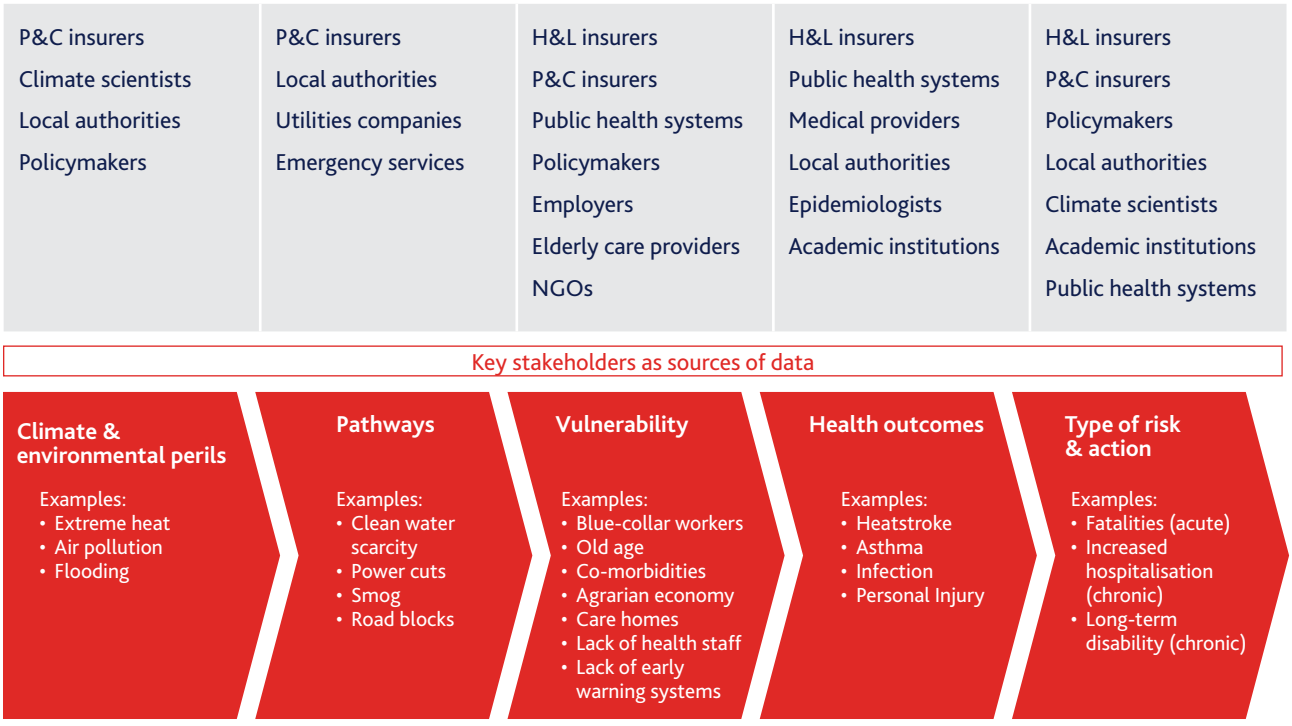
4 The way forward

The way forward

4.1 Assembling data prospectively

H&L insurers are part of a broad ecosystem that creates and manages risks. In order to improve understanding of future risks, insurers need a wider set of stakeholders to draw on. One solution might be an assessment of climate-related health outcomes to develop forward-looking climate and health scenarios. The framework illustrated in Figure 5 aims to break down the physical, economic, demographic and social vulnerabilities stemming from a given climate peril and map them against possible health risks. A region-specific climate peril may be used as a starting point (left-most red column), followed by identification of the physical pathways through which the peril may manifest and the development of a more granular picture of existing vulnerabilities and health outcomes in the region. This would require input from multiple expert sources and data sets from across the public and private sectors, as well as collaboration between H&L and P&C insurers, policymakers, government authorities, health experts, healthcare provider groups and climate scientists to designate meaningful preventive and risk reduction actions.

FIGURE 5: A FRAMEWORK FOR UNDERSTANDING REGIONAL CLIMATE-RELATED HEALTH VULNERABILITIES



Source: The Geneva Association

4.2 Investing in innovation

Innovative options may include parametric insurance that allows risk sharing with policyholders and nudges towards risk prevention, but certain conditions must be met to determine effectiveness. H&L insurers would need to be able to homogenise the risk (e.g. the risks of heatwave-induced adverse health events among factory workers) and quantify it in terms of volume as well as frequency. Insurers must also decide whether shouldering the risk of a mass 'trigger' event based on a temperature or pollution threshold falls within their risk appetite, without making premiums unaffordable. Such initiatives can also be paired with strategies to lessen the intensity of the anticipated risk. Existing platforms including large group plans for blue-collar workers in factories and/or by engaging local authorities involved in developing climate resilience could lend themselves well to such experimentation.

Parametric policies for climate risks in H&L insurance: Some practical considerations

- The implementation of parametric insurance in H&L insurance may significantly vary by country or state and based on the interpretation of 'payment triggers' by regulators.
- Payment triggers may include Nat Cat events, pollution and weather conditions (precipitation, temperature, drought).
- All triggers must be clearly understandable and measurable by all involved parties.
- The nature of risk being shared with policyholders will determine who administers the policy and how:
  - Extreme-temperature-related loss of income may come under general insurance, despite the health considerations and negative/positive externalities.
  - Extreme-temperature-related loss of life or health may come under life or health insurance.
  - There are no known examples of parametric insurance products that combine P&C and H&L benefits due to regulatory considerations, even though a given 'trigger point' could generate needs in both lines of business.
- Payment triggers can be set in different ways:
  - A singular trigger, such as temperature exceeding 40°C.
  - A combined trigger, such as temperature exceeding 40°C plus defined risk factors such as pregnancy or existing comorbidities to target payments. This requires good baseline data.
- Ensuring that there is no excessive enrichment or impoverishment in payouts is key to achieving regulatory support.
- There are trade-offs between the type of trigger used. Singular triggers are administratively easier to manage but can result in larger-scale payouts; combined and targeted triggers may help contain loss ratios but may also be prone to adverse selection.

4.3 Playing a bigger role in the policy environment

Even though H&L insurers are just one part of the health and care ecosystems, limiting any spillover shocks they stand to absorb would mean actively engaging with the wider environment in several ways:

- Insurers can play an important role in building awareness. External sensitisation may include initiatives that strengthen public understanding of health risks in the face of climate events, and simple and accessible messaging to underscore them in communications with customers. This may include early warnings about limiting exposure to a certain hazard or alert systems for extreme heat, floods, allergens or pollutants, alongside information about associated health consequences and advisory actions.

- Public-private collaboration can help build coordinated and effective communication channels. This may include jointly creating EWS or consistent evacuation protocols that everyone can follow, e.g. for heatwaves in private health or elderly care facilities. Insurers may draw some inspiration from vigilance heat-health EWS in France and Europe more broadly.[1]

- Partnering in initiatives to strengthen emergency preparedness and looking at trends that may lead to chronic health risks. Insurers may support the building of cooling shelters during extreme heat episodes; enable the training of emergency and paramedic services; safeguard water quality in places prone to flooding or droughts; and work on improved usage of ICD codes by health providers that may help to add climate contexts to health or mortality episodes and strengthen primary care and prevention.

- Incentivising investment or investing directly in modifying existing living environments to improve climate resilience. For instance, many H&L insurers have significantly invested in assets to support integrated care facilities such as clinics, hospitals and aged care facilities. They may also work with third-party providers offering such services. Examples include creating or encouraging green spaces, green roofs and vegetation to reduce overheating of buildings; installing in-home filtration to reduce air pollution from wildfires;[2] investing in better insulation from extreme cold; and establishing contingency monitoring systems for vulnerable populations such as the elderly living in care homes or alone in a private residence.

Developing a comprehensive view of climate-related risks from a H&L insurance perspective still has a long way to go. This report attempts to consolidate the status quo and help identify the unknowns to understand what could be done next. While it is impossible to predict exactly what the future holds, the report makes it clear that complacency could be dangerous, considering the warning signs witnessed already. While it may take time to address the many data limitations, H&L insurers have an immediate opportunity to step up their role in preserving insurability for a future that could seriously test human resilience.

110 Golnaraghi 2012.
111 Cheng et al. 2016; Park et al. 2017.

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