



Japan Institute of Actuaries
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**Climate change
and
life insurance**

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The wider context: living in the “Anthropocene”

- **Cause**

Human behaviour is dramatically changing the atmosphere, biosphere and socioeconomic landscape

- **Consequences**

Climate change, loss of ecosystems and biodiversity, plastic pollution, obesity, antimicrobial resistance, poverty and inequality etc.

- **Attributes**

Many irreversible aspects, happening faster than the ecosystem can adapt, leading to disruption and higher volatility

- **Life liability insurance impact**

Projections of future morbidity and mortality are becoming more challenging



**This presentation
focuses on
climate change and
life insurance liabilities.**

Climate Change and life insurance

AGENDA

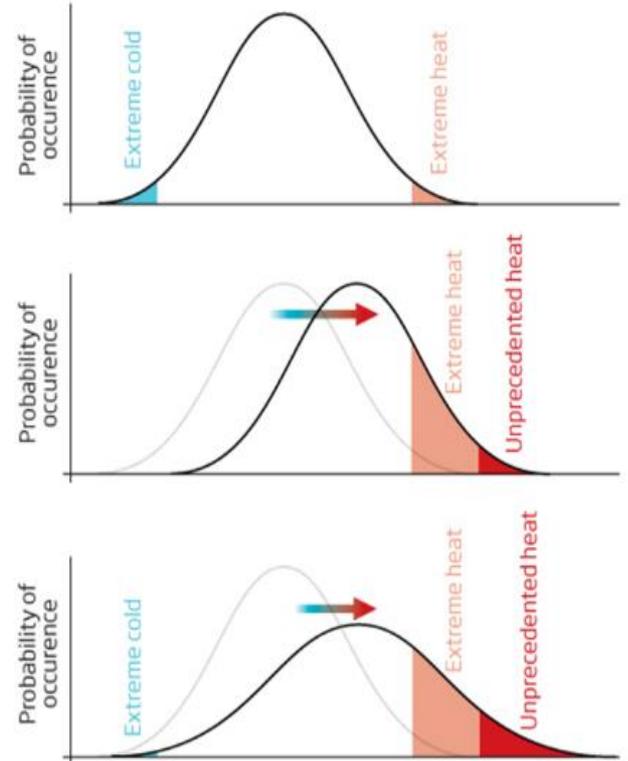
- 1 Outcomes of climate change and their relation to health**
- 2 Expected impacts on life insurance
- 3 Quantification

Climate change impacts: extreme heat

- Higher average temperatures – day and night
- Higher probability of extreme heat, with also more days of unprecedented heat
- Southern hemisphere: combination of temperature and humidity making parts of the region uninhabitable
- Northern hemisphere: milder winters disrupt natural defence cycles against certain insect pests
- Heat aggravates some existing conditions and can lead to more cardiovascular and pulmonary events

Mitigation

New building and constructions norms, green spaces, public health interventions, air conditioning, migration...
But also less cold-related deaths!

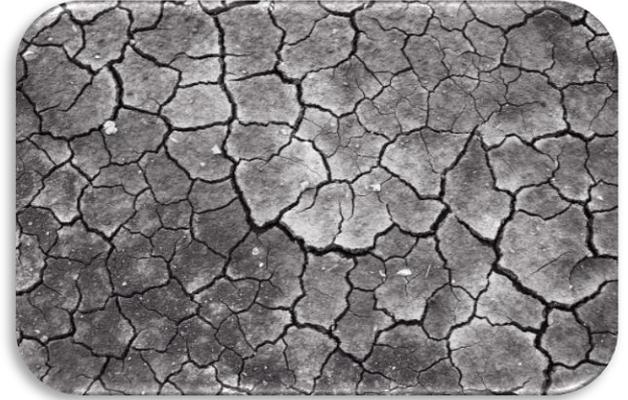


Climate change impacts: severe weather

- Several natural catastrophes such as windstorms, floods and droughts are known to be exacerbated by climate change
- Flooding and heavy rainfall can contaminate drinking water or food
- Combination of direct losses of life as well as long-term detrimental impacts on human well-being
- Famine, social unrest, displacement/forced migration, lower water quality...
- Less resources for education, health systems

Mitigation

Building and construction standards, water management, land, soil and forest stewardship, political stability...



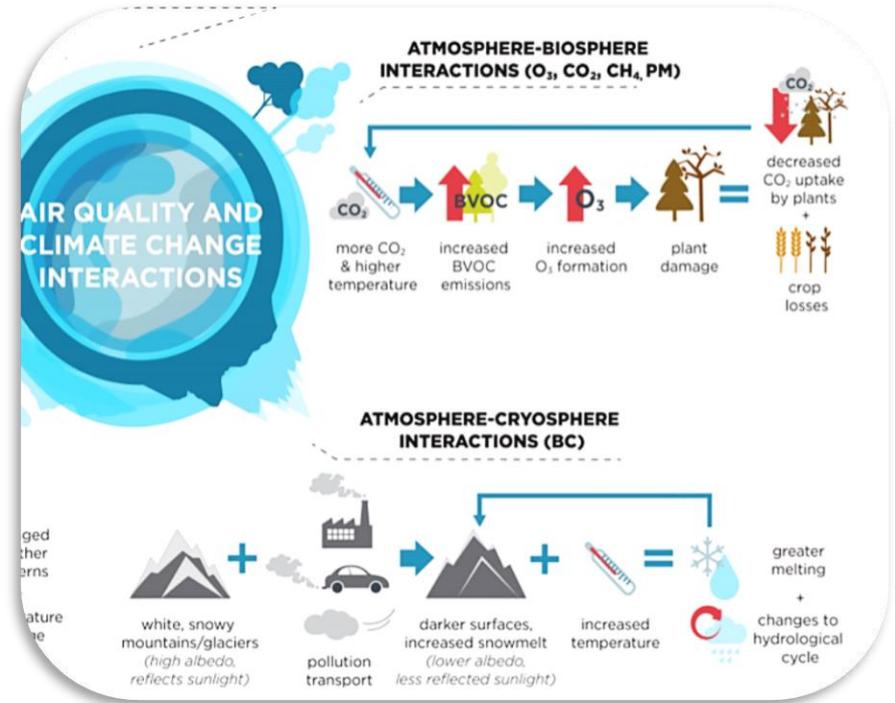
Poorer segments of the population and developing countries are over-exposed to the downsides of severe weather.

Climate change impacts: air pollution

- Complicated, circular interaction
- Burning fossil fuels creates pollutants
- Particulate emissions can drop on polar regions, leading to less sun reflection
- Warmer sub-arctic regions encourage plant growth, which darkens the Earth's surface leading to more global warming
- Wildfires (more frequent with climate change) cause increases in airborne particles and gaseous air pollutants

Mitigation

Cleaner energy sources, political interventions...



Climate change impacts: infectious diseases

- Distinguish between common source (e.g., contaminated water) and propagated outbreaks (spreading from person to person or via intermediate hosts).
- Changes in temperature, precipitation patterns and extreme weather events can promote the spread of pathogens, parasites, and (vector-borne) diseases
- Dependencies on socio-demographic influences, drug resistance and nutrition, deforestation, agricultural development, water projects, urbanisation, global development, land use...

Mitigation

Public health infrastructure and programs to monitor, manage, and prevent the spread of diseases. Research into emerging and “orphan” diseases.



21 Million

Cases of Malaria globally could be attributable to climate change in 2030, according to WHO.

Climate change impacts: water and food

- Droughts, floods and severe weather together with changing CO₂ levels are harming crop yields
- Higher temperatures and elevated CO₂ levels have an impact on the development of some species of weeds, insects and other pests
- Increase in humidity and temperature favours bacterial and fungal contamination of food
- Loss of pollinators impacts food availability and quality
- Poleward shift of highly productive agricultural areas with winners and losers
- Flooding and heavy rainfall can contaminate drinking water or food

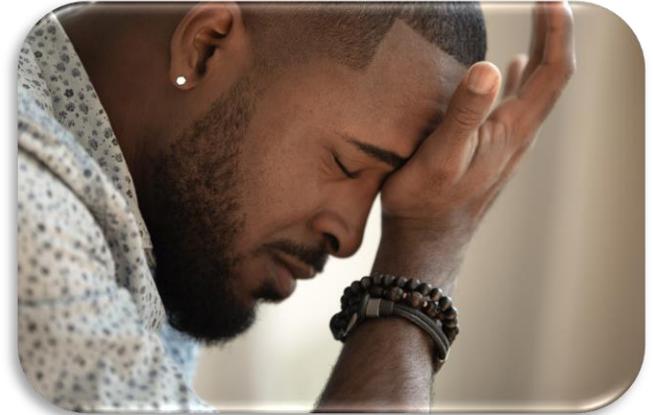
Mitigation

Technological improvements, investments in public infrastructure, education campaigns.



Climate change impacts: indirect impacts

- Mental health can suffer from events caused or aggravated by climate change, but also from a sense of helplessness in the face of such a large problem
- Transition risk: periods of uncertainty and changes in economies – like shifts to new industrial sectors – can leave sub-populations in financial distress
- Risk of rising conflicts within and between countries (“water wars”, yellow vests...)
- Migration and displacement undermine the provision of medical care and are detrimental to the health of the affected
- More people in low-elevation coastal zones will experience floods, storms and rising sea levels, all of which stunts economic growth especially in developing countries



Focus on Japan

- **Increase of mean precipitation** by more than 10% over the 21st century, increase in heavy precipitation events, increase in the frequency and intensity of extreme weather events such as tropical cyclones, and increase in the number of extreme hot days exceeding 35°C
- **Projected sea-level rise** throughout the 21st century, increasing threat to 46% of population and 47% of industrial output through storm surges, typhoons, and coastal erosion; increased likelihood of inundation and intrusion of ground water aquifers
- **Natural system impacts** include potential temporary increased yield in grain harvests in Hokkaido but 40% decrease in rice yields in central and southern Japan; northern and upwards shift of animal and plant species; declines in snow cover and sea-ice extent; increased occurrence of exotic, invasive species, pests, and diseases (expansion of dengue fever into Hokkaido); and earlier cherry blossom.



<https://www.ghibli.jp/works/totoro/#frame>

The impact of climate change in Japan concerns the economy, ecosystem and culture.

Climate Change and life insurance

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What does climate change mean for life (re)insurance?

- The relevance depends on the **type of product**: for instance, vector-borne infectious diseases are generally not relevant for mortality covers
- The relevance depends on the **region** of the world: for instance, poor air quality is more likely to be a problem in some parts of Asia than in Western Europe
- People who can afford life insurance have a **better socioeconomic status and health** than average (impact of medical underwriting)
- Younger, older and poorer people are less likely to have insurance cover
- There are exceptions: wealth can protect against malnutrition, but not against poor air quality (as easily). Mental health is a very relevant concern for all parts of the population.



We expect a **lower impact** of most climate change aspects on the insured population compared to the general population.

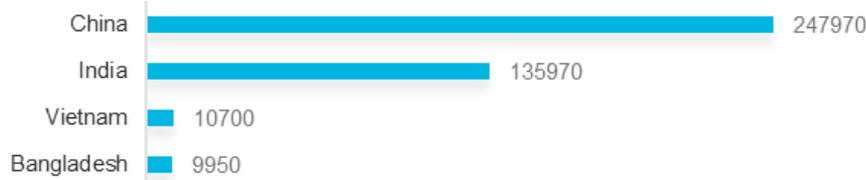
Life (re)insurance exposure is different from general population

Between 2030 and 2050, climate change is expected to cause approximately 250 000 additional deaths per year, from malnutrition, malaria, diarrhoea and heat stress.

- Malnutrition, malaria: predominantly in Africa
- Diarrhoea: predominantly children / people without access to clean drinking water
- Heat stress: more severe for the elderly

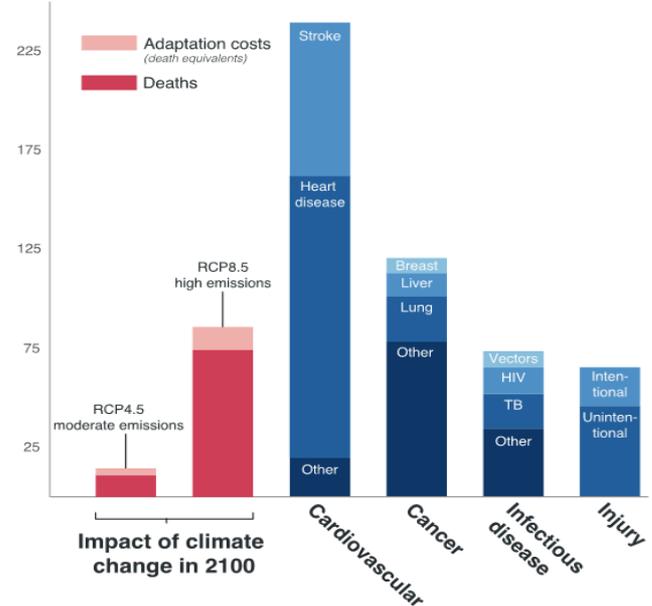


Deaths due to climate change by 2050¹⁾



1) Source: The Lancet

Deaths per 100,000 population



A complex topic with lots of unknowns influencing the long-term impacts

- Climate change is an extremely **complex** topic with lots of moving parts and interactions
- The signal of climate change in biometric insurance data is challenging to see amid the **volatility** of other components
- One of the biggest unknowns is the extent of **adaptability** in the human population:
 - Already seen in different reactions to heat waves in different parts of the US today
 - Lessons learnt from previous events such as 2018 heat wave in Japan lead to actions for reducing future impacts
 - 1st heatwave of a given year claims more victims than last heatwave, so adaptability works on very short time scales!
- The time horizon for the projections is very long and covers demographic changes and related health trends that are hard to predict
- Existing (medical, actuarial) literature not sufficient for insurance purposes, need to make strong assumptions



Transition risk for life insurance

- Transition linked to decarbonisation is a major topic for societies, markets and investments
- Public spending might be diverted from prevention and healthcare
- Reduction in GDP, unemployment and economic depression are related with increases in suicides and higher disability claims
- Improvements in individual behaviour such as more physical exercise and better diets could have positive outcomes
- Overall, the transition period is expected to be of secondary importance for life (re)insurance compared to the long-term view.



The International Actuarial Association writes that because of “*the sensitivity of mortality and morbidity rates to unemployment and mental health, transition risk may have more material impacts on a life insurer’s risk profile than physical risks in the short term.*”

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The “double materiality”: outside-in vs inside-out

Outside-in view

- How do the various aspects of climate change influence our business?
- Medical literature on link between climate change impacts and mortality and morbidity exists, but not easy to quantify
- Challenge to identify baseline for stress because of quality and availability of death certificates
- Large number of variables (granularity, demographics, adaptation...)
- Actuarial literature and peer disclosures are largely qualitative so far
- Consensus seems to be on heat as the main relevant driver for mortality projections

Inside-out view

- How do our activities contribute to climate change?
- By its nature, life insurance “does no harm” and its products do not directly generate greenhouse gases etc.
- Life insurance covers contribute to the ability of families and communities to re-build after a negative event.
- Because of the alignment of interest between (re-)insurer and insured for life and health products, protecting clients from the impacts of climate change is an opportunity, and a driver for the industry to combat climate change.

Some ideas for life actuaries looking at climate change

- Read existing literature, e.g. from the IAA or IFoA
- Look at the products that your company writes and the markets where you are active
- Agree on a suitable projection time horizon
- List direct and indirect impacts of climate change and rank them by order of importance for your company – this may be a function of time and change over the projection horizon
- Limit the scenario discussion to a very few relevant impacts
- Define the adverse scenario to be used as reference, e.g., based on IPCC
- Try to establish biometric assumptions for the chosen top impacts under the scenario calibration
- Understand the level of uncertainty in the calculations



SCOR conducts its own studies to assess and quantify impacts

- At SCOR, a dedicated working group on the life side assembled literature and overview over “state of the art” (peers, competitors, consultants, supervisors, actuarial bodies etc.)
- Experts including medical doctors and actuaries were polled about the most relevant market/product combinations in light of SCOR’s portfolio, geographical activity and insured population
- A projection of adverse scenarios and a quantification for SCOR’s portfolio was carried out, focussing in a first step on US heat and China air pollution.



- In 2020, the French supervisor ACPR ran a voluntary market-wide climate change scenario exercise, in which SCOR participated.
- On the life side, adverse scenarios for air pollution and infectious diseases were prescribed until 2060.
- The insights learned during this exercise were very valuable to inform SCOR’s own view on climate change and life liabilities.

External sources: WillisTowersWatson

- In 2021, WTW published a series of white papers called “The mortality impacts of climate change”
- Focus is on the UK
- The single out air pollution and temperature as the most relevant impacts
- They conclude that “*none of the climate drivers considered here are particularly material in isolation, and that even in combination the impacts are small. This should give comfort to life insurance companies that the liability side impacts of climate change risk will probably be very small.*”

For context, under the best estimate scenario the remaining expectation of life for a 30-year old individual is 54.5 years; under the worst-case scenario, the remaining expectation of life for that same individual is approximately 20 days shorter.

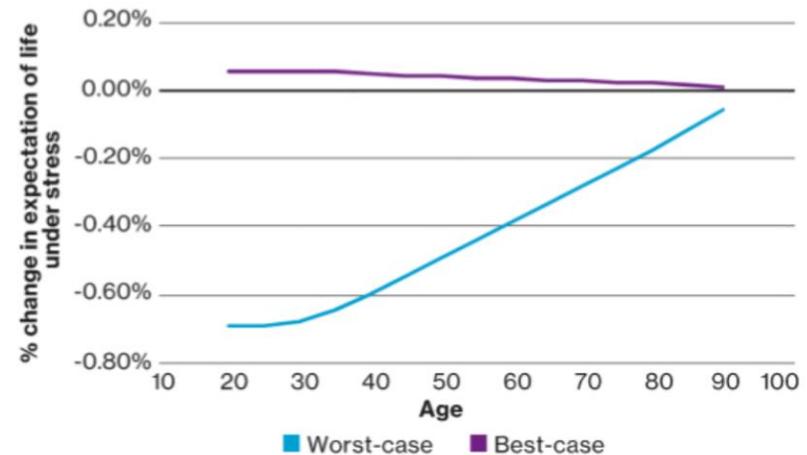


Figure 3. Proportional change in expectation of life relative to the base scenario for the best- and worst-case scenario for combined climate drivers

Conclusion

Climate change impact on human health and life is complicated

We need to specify the driver and the region to have a meaningful discussion.

Climate change is unfair

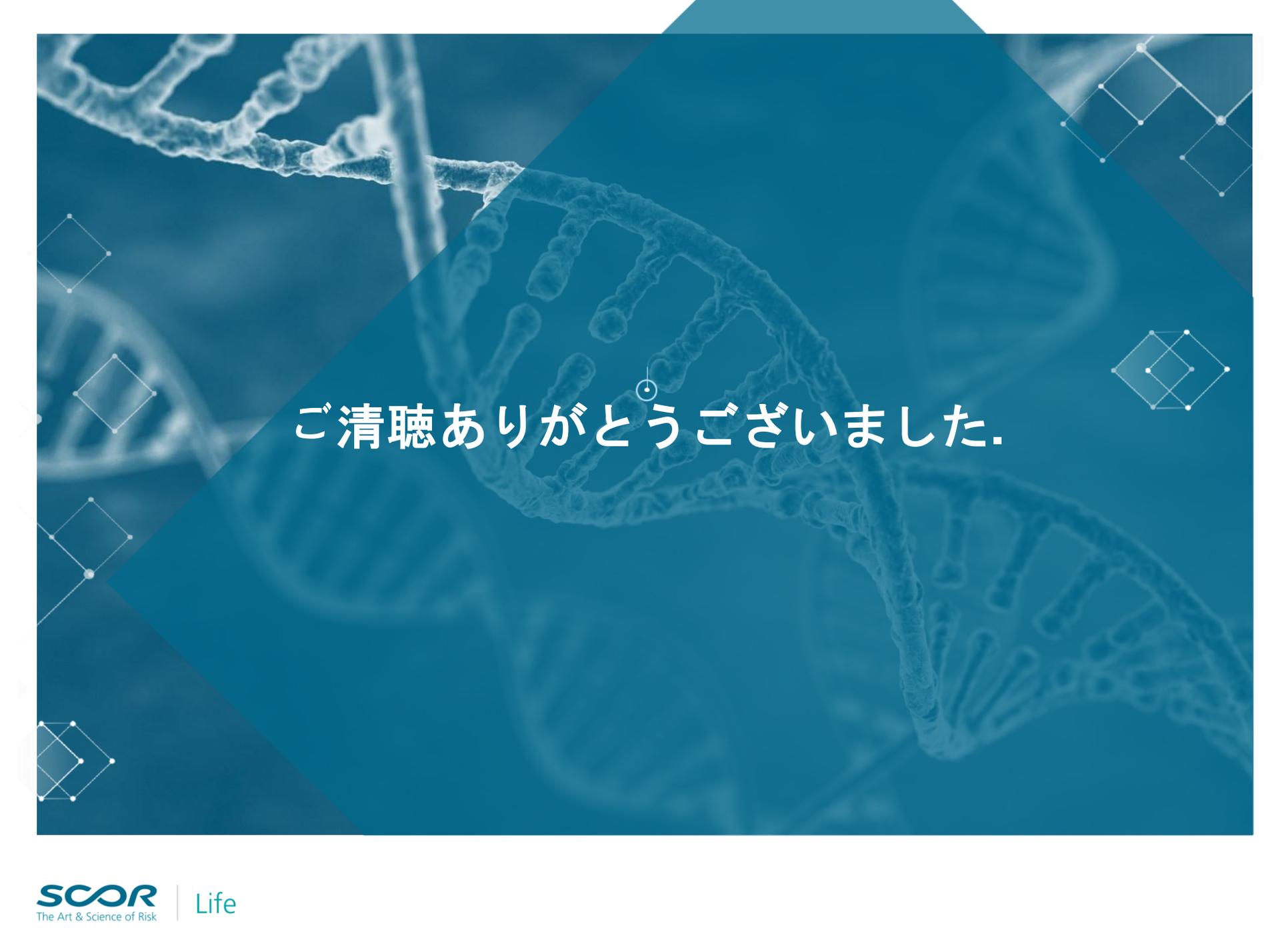
Younger, older, poorer people and developing countries are over-exposed.

Climate change is linked to life insurers values

Protecting our insureds and contributing to the efforts to contain climate change is in alignment with insurance companies' purpose and SCOR's raison d'être.

The financial impact on life insurance is likely smaller

Due to the difference between general and insured population and the typical distribution of insurance products in the world, and based on SCOR's own and external studies, the direct impacts of climate change are likely of lesser concern compared to the potential impacts on P&C and investments.



ご清聴ありがとうございました。