

Climate change's impacts on life and health insurance

Aki Ono
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Executive Summary



Aki Ono

Expert Consultant
 Financial Market & Digital
 Business Research Department

Researchers are increasingly analyzing climate change's impact on morbidity and mortality rates, in some cases focusing on how climate change relates to specific medical conditions. Life and health insurers also are beginning to undertake such analysis. Climate change could have a major impact on Japanese life insurers' earnings models. Life and health insurers need to build a data platform to amass data and leading-edge knowledge.

Climate change's health impacts

Climate change will affect public health and lifespan over the long term. Its direct impacts include increased mortality and wider spread of vector-borne diseases due to extreme heat (see table). Its indirect impacts include more cases of diseases due to air pollution or degradation of water quality and even mental health impacts from factors such as job losses and forced migration. The WHO projects that climate change will result in 250,000 additional deaths per year from causes such as malnutrition, malaria, diarrhea and heat stress between 2030 and 2050¹⁾.

NOTE

1) "Climate change and health", World Health Organization, October 30, 2021

In the insurance industry, climate change will affect health insurance claims and whole life insurance payouts. Life and health insurers will consequently have to take climate effects into account when designing products, but their diversity in

Climate change's impacts on life and health insurance

Climate change impacts	Examples of health impacts
Frequent extreme heat	Heat-related illness/death (e.g., heatstroke, dehydration, heart failure, kidney failure)
Air pollution from forest fires	Asthma, cardiovascular disease
Frequent natural disasters	Serious injuries, disrupted access to medical care due to disasters
Water/food supply impacts	Increase in malnutrition, diarrheal diseases, cholera
Changes in vector ecology	Increase in vector-borne diseases (e.g., Lyme, dengue, West Nile virus)
Environmental degradation	Forced migration, mental health impacts

Source: NRI, based on Centers for Disease Control and Prevention's Climate Effects on Health and California Legislative Analyst's Office's *Climate Change Impacts Across California Health*

terms of product lines, geographies and local insurance penetration rates means that climate change impacts must be assessed not only on the actuarial level but also on a company-by-company basis. Additionally, climate change could affect even sales strategies given the risk of it causing economic deterioration that could hurt insurance sales.

Because impacts on morbidity and mortality rates will affect life and health insurance underwriting, regulators also have started to assess climate-related risks. In 2018, the International Association of Insurance Supervisors (IAIS) published a paper²⁾ that cited changes in mortality profiles and demographics as physical risks of climate change that are facing life and health insurers. The paper also highlighted the risk of extreme heat exacerbating pre-existing health conditions.

2) *Issues Paper on Climate Change Risks to the Insurance Sector*, IAIS, July 2018

Life and health insurers' analysis of climate risks still in early days

Analyzing climate change's impacts on life and health insurance underwriting is challenging for several reasons. First, climate change is a long-term process that will unfold at a variable pace over decades or even a century. Second, identifying statistically significant correlations requires huge amounts of data. Third, impacts differ in severity depending on the composition of insurers' respective business portfolios. Consequently, life and health insurers' climate risk assessments have so far been limited to specific risks in specific geographies, such as US and Australian heat waves and air pollution in China.

Analysis of climate change's impact on specific medical condition

Meanwhile, scientific and actuarial organizations are analyzing relationships between climate change and morbidity/mortality rates, largely in the aim of making policy recommendations on appropriate responses to climate change. In the US, one example of such analysis is a study on the relationship between climate change and kidney stones in South Carolina³⁾. Kidney stones affect 9% of the US population and account for \$10bn of healthcare expenditures annually. Using historical (1997-2014) kidney stone and NASA land temperature data, the study's authors quantified climate change's impact on kidney stone presentations under two scenarios⁴⁾: (1) +2°C and (2) +4°C increases in global mean temperature by 2085-89. They estimated that heat-related kidney stone cases would increase

3) Kaufman, J., Vicedo-Cabrera, A.M., Tam, V. et al. "The impact of heat on kidney stone presentations in South Carolina in a under two climate change scenarios", January 10, 2022.

4) The scenarios are RCP 4.5 and RCP 8.5 (respectively +1.7-3.3°C and +3.2-5.4°C vs. preindustrial baseline) in the UN Intergovernmental Panel on Climate Change's *Fifth Assessment Report*. I refer to them herein as the +2°C and +4°C, scenarios respectively.

2.2% under the +2°C scenario and 3.9% under the +4°C scenario, resulting in associated excess emergency-room charges of \$57mn and \$99mn, respectively, in 2085-89 relative to 2010-14. Such analysis is useful for assessing potential changes in medical conditions' prevalence and treatment costs over multi-decade timeframes.

Analysis of climate change's impact on mortality rates

Researchers are analyzing not only climate change's impact on specific medical conditions but also its correlation with mortality rates. Club Vita, a UK data analytics company involved in accumulating and pooling data on longevity patterns in collaboration with workplace pension funds, has published life expectancy projections by gender based on three scenarios it formulated itself⁵⁾. It projects that a 65-year-old UK male, for example, has a remaining life expectancy of 23.8 years under its Green Revolution scenario but only 17.8 years under its Head in the Sand scenario. Green Revolution assumes society successfully adapts to climate change whereas Head in the Sand assumes no such adaptation.

5) *Hot and Bothered? - How climate change might affect UK longevity*, Club Vita, July 2018.

Another example is the Climate Impact Lab⁶⁾, a collective of experts affiliated with US universities and think tanks. It is analyzing climate change's impact on mortality rates with an emphasis on incomes and adaptation to climate change⁷⁾. Under a +4°C scenario, the Climate Impact Lab projects that by 2099 annual deaths per 100,000 population will increase by 107 in low-income countries while decreasing by 25 in high-income countries. The decrease in mortality rate in high-income countries is attributable to climate change mitigation, most notably air conditioning. The Climate Impact Lab's research has found that the elderly (65+) and people with less experience in dealing with extreme temperatures are more vulnerable to hot and cold temperatures. Climate change could alter insurance payout profiles.

6) The Climate Impact Lab is supported by UC Berkeley, the Energy Policy Institute at the University of Chicago et al. Its team includes over 30 climate scientists, economists, computational experts, researchers, analysts and students.

7) "Valuing the Global Mortality Consequences of Climate Change Accounting for Adaptation Costs and Benefits", April 21, 2022

Actuaries Climate Risk Index

The American Academy of Actuaries and three other North American actuarial organizations⁸⁾ developed the Actuaries Climate Risk Index (ACRI) to track the relationship between climate and both human and economic losses. In doing so, they compiled weather and loss data for 84 North American regions from 1961 through 2016 and constructed a model that explains the losses as a function of four environmental variables (rainfall, high temperature, low temperature and

8) The three are the Canadian Institute of Actuaries, Casualty Actuarial Society and Society of Actuaries. Source: *Actuaries Climate Risk Index Preliminary Findings*, American Academy of Actuaries, January 2020

wind speed). The ACRI's first version, unveiled in January 2020, was limited to analysis of property losses because of data constraints. This limitation is slated to be rectified by a second version scheduled to be released in 2023. The second version will use additional data sources, including the US National Centers for Environmental Information's database of billion-dollar weather and climate disasters, in the aim of remedying existing data omissions and parameterizing the model. It will also newly incorporate the impact of fatalities and other human casualties. Such an index, coupled with insurers' own data, should facilitate forecasting of future losses.

At first blush, climate change's prospective impact on morbidity and mortality rates may appear insignificant, but it would have a major impact on Japanese life insurers' earnings models. The Japanese insurance industry needs to build a data platform that amasses and manages public and private data, including their own internal data, from a medium- to long-term standpoint.

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Inquiries to : Financial Market & Digital Business Research Department
Nomura Research Institute, Ltd.
Otemachi Financial City Grand Cube,
1-9-2 Otemachi, Chiyoda-ku, Tokyo 100-0004, Japan
E-mail : kyara@nri.co.jp

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