Catastrophic risks along the Epidemic risk value chain
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Epidemic and Pandemic risks are among the global risks for catastrophic mortalities along with Cyber risks, War or any Accidental risks, Hazards and Icebergs. Other risk types are shock events, which include Natural Catastrophic risks of the environment and infrastructures.

There are epidemic risks dating back more than ten years which bear the risk of outbreaks or spreads to other countries. Most of these have their origins in Africa and Asia, although the best-known case, the Zika virus, had its origins in Brazil, spurred by deforestation. The largest breakout was the Haiti Cholera, which broke out around 2010 and has caused more than 10'000 deaths so far. A virus which has made a comeback is the Measles, which has caused over 4'500 deaths in Congo alone since its breakout there in 2011. Measles is a virus which occurs in other countries as well due to lack of vaccinations and medications.

This shows that the risk of epidemic and pandemic diseases is embedded in the value chain from zoonotic diseases to human infectious diseases. Is is an important factor knowing the six different WHO phases from the Influenza in birds, through the spread from animals-to-humans and humans-to-humans. Once, an epidemic is spread into different countries, the pandemic is on its way. And a pandemic can be life-threating such as Ebola or with an event for an expensive pandemic such as Human influenza or HIV, which is not cured until today.

And there are other factors for life-threatening diseases. Let's take a look at the damage of Hurricane Maria in 2017. Puerto Rico was hurt with a power grid damage after the hurricane. Due to lack of clean water and missing access to medication, the Associated Press reported cases of leptospirosis, which is a bacterial infection following the damage of the infrastructure of an area hit by a hurrican. It has been one month after Hurricane Maria struck Puerto Rico, that 25 percent of its 3.4 million citizens lacked clean water and 80 percent still lived without electricity.

Modeling and measuring pandemic risks are based on historical data. And in comparing the access to data, pandemic and epidemic data is available other than data for more modern global risks such as cyber risks. And yet, the observation of the emergence and re-emergence of pandemics and the research on the understanding of pandemics is more than important for the impact of pandemics on the society and capital markets. Insurers need to observe the developments to fully understand the risks and its impact to the business and to develop strategies to address the risks.

One important factor within the value chain is the fact, that pathogens, diseases and viruses can spread from animals or humans to the food chain through global transportation and the extraction of resources.

What will we face in the future when viruses learn to propagate in a new host. This gives the reason that insurers need to focus on the whole value chain for epidemic and pandemic risks.

PANDEMIC IS THE MOST SIGNIFICANT THREAT IN THE LIFE INSURANCE INDUSTRY

- Reported Present Epidemics
- Diseases and outbreaks still medically not cured with a high risk to a pandemic disease

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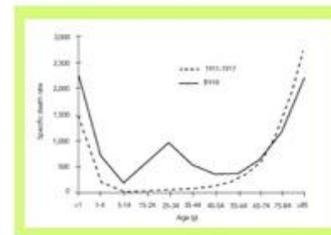
MODELING

- $R(0)$ = Basic Reproduction Number
  - = mean of secondary infections caused by a primary infection in a totally susceptible population without intervention
    - Transmission
    - Virulence – measured by Case Fatality Ration (CFR)
    - Length of each stage of the disease
  - $R(0) > 1$ -> infection is highly likely to spread
  - $R(0) < 1$ -> infection will not spread into a pandemic
- Infectious diseases have an impact on different age groups
- Pre-condition heath have an impact of the severity of the disease
- Epidemiological models understand the dynamics of the spread of a pandemic

Age Impact of Seasonal versa Pandemic Influenza

Source: SCOR Global Life – Capital Modelling