

Japan tsunami causes largest-ever life insurance catastrophe



Japan has the largest and most sophisticated life insurance industry in the world. The powerful M9.0 earthquake and tsunami that caused significant damage throughout the Tohoku region of Japan on 11 March also triggered an unprecedented number of life insurance claims and will change the nature of mortality risk management throughout the world. **Mr Andrew Coburn** of **Risk Management Solutions** discusses the horrific destructive disaster which may result in the largest life insurance payout in history.

The Tohoku event caused record loss levels across many different lines of insurance.

Risk Management Solutions estimates that the total insurance loss is likely to be between US\$21 and \$34 billion. The large majority of this loss (\$18 to \$26 billion) is estimated to stem from a wide range of property and non-life lines, including residential property and cooperative insurance, domestic and international commercial and industrial, direct and contingent business interruption, marine cargo and hull, aviation, agricultural, and auto insurance lines.

A major humanitarian disaster

Although the event was highly destructive and expensive, the 11 March earthquake is above all a major humanitarian disaster. There are 14,100 confirmed deaths, and another 12,400 people missing, totalling 26,500 lost individuals. Over 440,000 people have been displaced from their homes by the earthquake, tsunami, and radiation alert.

Only a few of these casualties were due to the damage and destruction caused by the earthquake ground shaking. Usually in earthquakes the main cause of injury and death is building collapse, but in Japan the strong seismic design of major structures and the high level of preparedness in

the general population mitigated the potential casualty rate from the ground shaking. Detailed analysis suggests that shaking-alone fatalities constituted only hundreds out of the many thousands lost.

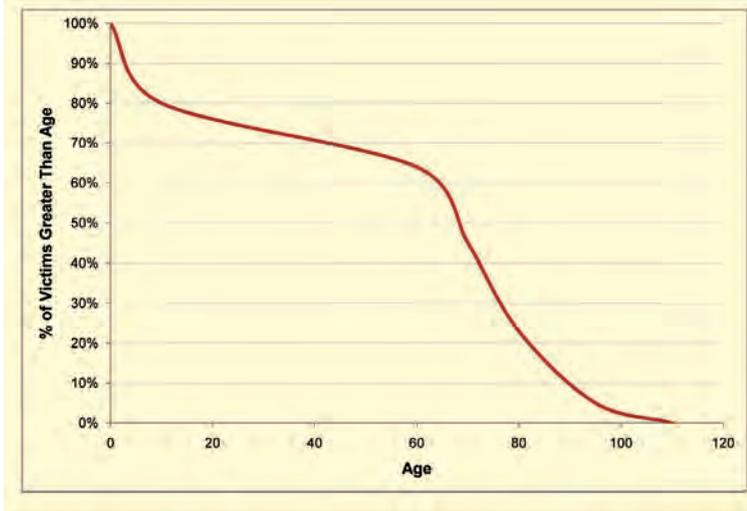
Tsunami main cause of loss of lives

The vast majority of loss of lives resulted from the tsunami. Several large towns and many smaller towns and villages were inundated by waves of water.

The Japan Meteorological Agency reported tsunami wave heights of more than 7.3 meters (24 ft) at the Japanese coast. In the many inlets and bays along the coastline of Honshu, the waves were channelled higher and fiercer until they hit towns inland.

Tsunami protection barriers were overwhelmed and water raged through populated areas. Those close to the shore experienced sea surges many meters high. There are reports of waves washing people off the roofs of three storey buildings. Buildings were destroyed under the force of the water and inhabitants drowned or were crushed. Many individuals were swept far back out to sea by the cycles of waves and strong suctioning forces of the receding wave.



Figure 1: Age distribution of Japanese tsunami victims

Although casualties from the tsunami were recorded as far as 2 km (1 mi) inland, the large majority of people killed and injured were within 500 m (1600 ft) of the coast.

Most of the victims were elderly. The UN estimates that 64% of the casualties were over 60 years old, 45% were aged 70 or older, and 23% were aged 80 or older.

Japan generally has one of the oldest demographics in the world, and this region had a higher than average concentration of retirees. The high age of the victims is also a reflection of the vulnerability of the elderly to this type of disaster and of their greater physical inability to escape hazardous situations.

Most people caught in the tsunami drowned, but many suffered injuries including trauma caused by impact from debris. Reported injuries include fractures of the limbs, head injuries, crush injuries, and lacerations, as well as wounds or traumatic injuries that were complicated by infections from exposure to the heavily polluted seawater.

Accurate death counts have been difficult even for the authorities to ascertain, as lists of missing persons may never be fully reconciled. Where whole communities were lost, the records and reports of missing persons were difficult to compile. It is possible that insurance policies and other financial products may also go unclaimed where large numbers of the beneficiaries were also lost.

High penetration rate

Life insurance companies are now making payouts for death benefits on individual life and group life policies, and death and injury compensation on personal accident insurance.

However, with the localised, severe impact of the tsunami wiping out entire communities in some coastal areas, it is possible that some proportion of the policies will never be claimed. Workers' coverage and health care insurance are provided by the Japanese government, so these are not payouts that are borne by the insurance industry.

Across Japan as a whole, a very high proportion (approximately 90%) of households has at least one life insurance policy, with the average family holding more than four life cover policies. The total amount of life coverage for

an average insured person in Japan exceeds US\$300,000.

Life insurance coverage falls off rapidly with older age, and the older profile of the victims means that life insurance coverage among the deceased will be lower than the national population average.

Individual life policies have the largest exposure

Individual life is, by far, the largest exposure of all life and health lines, with group life and group personal accident exposure significantly less. The coastal plains were home to a lot of manufacturing and commercial activity, and many of the factory workers and municipal employees affected by the tsunami are expected to have group life and personal accident coverage for some level of benefit.

Personal accident policies, which are usually group policies purchased through an employer, only cover earthquake and tsunami injury if they have an additional endorsement (the Earthquake and Similar Disaster Coverage). An estimated 25% of personal accident policies have this endorsement.

Life insurance industry loss estimates

Overall the life insurance industry is likely to face several hundreds of thousands of claims arising from the deaths and injuries in the catastrophe, across all the different lines. RMS estimates that the total sum of the benefits paid out will be between \$3 billion and \$8 billion.

This makes it the largest life insurance payout in history, comprising many more individual claims, and is likely to be significantly larger than the previous record of payouts resulting from the World Trade Centre loss in 2001, when life insurance payouts totalled an estimated \$3.5 billion.

Release of annuity reserves

As many of the victims were of retirement age, they had private pensions.

The life insurance industry provides annuity coverage to individuals with private pension plans and corporate pension plans to supplement their state pensions. The annuity reserves released by the premature deaths of the victims will offset some of the death benefit payments incurred to life insurers, although the annuity providers may not necessarily be the same companies as those paying out the death benefits.

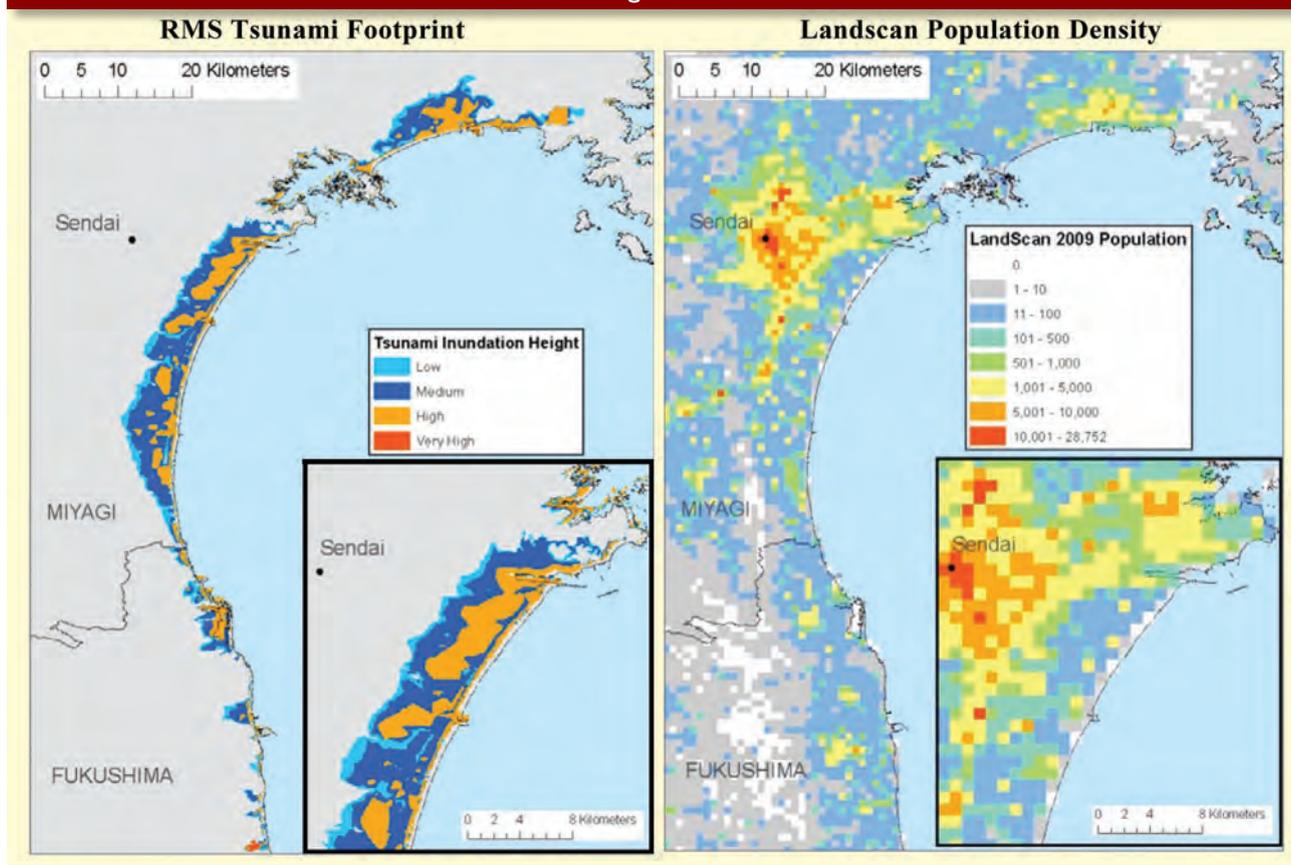
RMS estimates that the total annuity reserves released from the premature mortality of the victims will be within a range of \$0.6 billion to \$2.6 billion, however this is not discounted from the death benefit payouts assessed in the overall RMS loss estimate.

Reappraising mortality risk management

The estimated levels of payouts are substantial but not likely to cause major financial difficulties for the life insurance companies exposed.

Most of the companies involved process many tens of thousands of life policy payouts each year. For the Japan life insurance industry as a whole, this represents an excess

Figure 2



mortality event of only a few percentage points above the annual average, but for smaller regional companies this could be more substantial.

For some companies, the need to meet the payout load coincides with asset devaluation and liquidity problems, with a major dip in the Nikkei and other investment instruments resulting from the earthquake.

Insurers are currently reviewing their risk management processes. An increasing number of life insurance companies are assessing their life catastrophe risk from disaster scenarios of this type. In some parts of the world, regulatory requirements such as the new Solvency II rules coming into force in Europe at the beginning of 2013 require explicit quantification of excess mortality capital reserves.

Could the event have been foreseen?

In 2006, RMS published a report – *Catastrophe Mortality Risk in Japan: The Impact of Catastrophes on Life and Personal Accident Insurance* – assessing the risk of excess mortality events in Japan that identified a range of potential threats and explored these through quantitative scenarios.

Along with threats such as industrial accidents, earthquake, infectious disease, and terrorism, tsunami was identified as a significant potential cause of mass casualty and the various coastlines where this was likely were identified, including the Sendai shoreline where the Tohoku tsunami occurred.

An illustrative scenario modeled the likely impact of a severe tsunami along the more populated southern Honshu coastline, and showed that it was possible for 37,000 lives to be lost in an event of this type.

Excess mortality risk management

Mass casualty events are rare, but possible, even in the relatively safe, developed world.

Life insurers analyse their data extremely effectively in running their day-to-day business, but mortality experience history does not encompass the extreme events that can cause unexpected loss. Traditional methods of assessing excess mortality involve extrapolation of the volatility of annual mortality but this provides a poor description of the frequency and severity of mortality that may arise from natural or man-made catastrophes. The tails of the excess mortality distributions are much fatter than purely statistical models expect.

Modern life insurers are increasingly turning to scientific models of life catastrophe to understand and manage the risk to their portfolios. In these, epidemiological models help assess the likelihood of future pandemics spreading through insured populations and causing unexpected losses.

Terrorism risk models enable companies to limit their concentrations of exposure, particularly group life insurance with many insureds working in iconic office buildings that could be the target of future mass-casualty attacks. Natural catastrophe models can be used to analyse the probability of severe meteorological and geological perils causing mass fatality events.

As life insurers become increasingly more sophisticated at managing their risk capital, even the Tohoku tsunami, causing the world's largest ever life insurance catastrophe, can be safely managed by the insurance industry.▲

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