In Part 1 of our article on the Dread Disease Survey, published in December 2015, we presented purchase behaviour, claims analysis and actual versus expected ratios observed in our survey, with transverse comparisons among markets. In this article we will cover more disease-specific evidence and a regional analysis for China, a big market with high geographical heterogeneity.

All incidence rates presented in disease-specific analyses were age-adjusted, using the age distribution (ages 20-64) of the whole survey portfolio. For China’s regional analysis, China’s own age distribution (ages 30-60) was used instead.

Unlike a life policy, Dread Disease insurance covers a large group of conditions. Even cancer is a mix of more than 100 types, with varied risk factors and trends. A further investigation of the major conditions is important to understand the combined trend. Four conditions are selected for further analysis in this article.

**Female breast cancer**

Figure 1 shows that, during the period 2004-2012, the incidence rate of female breast cancer increased from 0.41 per 1,000 to 0.58 per 1,000, or 41%, in the China market. The deterioration in Hong Kong was even more significant, from 0.86 per 1,000 to 1.24 per 1,000, or 45%. The declining birth rates could be one of the reasons as multiple delivery history and longer breastfeeding, by altering the status of female hormones, may lower the risk of breast cancer. Hong Kong has one of the lowest birth rates in the world. In China it is observed that the six provinces or cities with the lowest total fertility rates are ranked the top six with the highest breast cancer incidence rates in our survey.

Screening may also increase the incidence rate of breast cancer. Different from screening for cervical cancer, where most malignant findings are at pre-cancer stage and an early treatment may reduce the cancer risk in the future, positive findings during breast cancer screening are often at the actual cancerous stage and have a direct impact on claim cost. However, screening may produce some diagnoses of cases that would not progress to end-stage cancer during a lifetime. In China...
the screening rate for breast cancer is still low compared with other markets, as the government does not subsidize regular screening cost.

We observe a decrease in breast cancer incidence in Singapore and Malaysia over the last few years. However, according to data released by the National Registry of Diseases Office (NRDO) of Singapore, the population rate during the period 2010-2014 was 8% higher than that during 2005-2009.4 These controversial findings need to be further investigated.

Thyroid cancer

Thyroid cancer is a female-predominant cancer with a threefold difference. During the period 2004-2012, the incidence rate of thyroid cancer among females increased from 0.08 to 0.29 per 1,000 in China, an annual increase by 18.7%. However, the rate just fluctuated or slightly increased in other markets (see Figure 2). In some provinces or cities in China, the incidence rate has reached 0.8 per 1,000 in 2012. We believe that the sharp trend in China is due to the following reasons:

- The human body provides a big reservoir for thyroid cancer. Approximately 10% to 30% of people may have evidence of thyroid cancer in their bodies, even at young or middle ages. However, most of them are indolent cases, which would not trigger any symptoms during a lifetime if not detected (i.e. over-diagnosis).\(^5,6,7\)
- Ultrasound-based screening for thyroid cancer is a popular trend. During such screening, the positive rate ranges from 0.3% to 2.6%.\(^8,9,10,11\)
- There is no pre-cancerous stage for thyroid cancer. Almost all cases detected are classified as cancer.
- There is no exclusion of early-stage thyroid cancer in the standard cancer definition in the Chinese market.

It is worth noting that males are also affected by screening. During the same period, the male incidence rate of thyroid cancer in China increased from 0.02 per 1000 to 0.09 per 1000, an annual increase of 22.6%. According to autopsy studies, prevalence of thyroid cancer among males is only slightly lower than among females.\(^12,13,14\)

The current difference between males and females might be caused by a lower screening rate among male insured lives. If more males undergo screening, the incidence gap between the two genders may be narrowed.

Our survey only captures data up to 2012. Population data suggests that the trend has continued since then. For example, in Shenzhen the number of thyroid cancer cases more than doubled from 2012 to 2014.\(^15\)

In Hangzhou, thyroid cancer replaced breast cancer as the most common female cancer in 2014.\(^16\) The rate in our survey in 2012 was still less than one-sixth of the rate in Korea.\(^17\) Without intervention, further deterioration in thyroid cancer incidence may become a heavy burden for the industry.
The thyroid cancer problem is largely a behavioural risk, and there is no evidence that it will be limited to China and Korea only. In Singapore and Malaysia, the standard definitions exclude small thyroid cancer (less than one or two centimetres) given that there is no involvement of lymph nodes. This does not fully avoid the risk, as about half of the cases from screening have already invaded local lymph nodes and may be considered as stage III.\textsuperscript{18,19,20,21}

The Hong Kong market has no standard definition, and companies there are exposed to different levels of risk.

**Stroke**

According to Figure 3, China continues to have the highest stroke incidence rates among the surveyed markets for both genders, but it seems that the increasing trend has stopped, with stroke incidence declining from 2010 for males and from 2009 for females. Due to the lack of population-based statistics in China, it is too early to conclude that this is a lasting trend. Data from the next survey will help to clarify this.

However, according to the World Health Organization (WHO), socioeconomic factors seem to outweigh classic risk factors in predicting stroke trends.\textsuperscript{22} Affluence leads to increased intake of fat, sugar and meat. More and more people are switching from manual labour to sedentary work. The rate of obesity and diabetes increases accordingly and drives the stroke risk higher. When economies reach a certain level, people’s health awareness and lifestyles may improve; at the same time, early interventions to prevent risk factors from evolving into stroke have become widely accessible, and as a result stroke risk may start to decline.

The Malaysian market also presented a decreasing trend. The trends in Hong Kong and Singapore markets are not clear.

**Heart attack (myocardial infarction)**

Myocardial infarction (MI) incidence rate is the highest in Malaysia, followed by Singapore and China. Incidence in Hong Kong is significantly lower than in other markets (see Figure 4). In China, the heart attack incidence rate was steadily increasing throughout the period 2004-2012.

Malaysia, Singapore and Hong Kong experienced a decrease in the last few years of the period. It is worth noting that the trend observed in the Singapore market is inconsistent with population statistics released by the NRDO, which suggests an increase of heart attacks during 2009-2013. NRDO reported that the increase of MI during 2009-2013 was mainly from Non-ST-Segment Elevation Myocardial Infarction (NSTEMI), the less severe type of MI. By contrast, ST-Segment Elevation Myocardial Infarction (STEMI) was decreasing. NRDO commented that the use of troponins has contributed to this.\textsuperscript{23}
MI incidence and trend are affected by various reasons. Risk factors – such as hypertension, raised cholesterol and diabetes – may increase the risk. Use of troponin to replace CK-MB as the primary biomarker for heart muscle damage increases the detection rate but not the real risk, due to the higher sensitivity of troponin. Moreover, in recent years clinical physicians have tended to rely heavily on lab tests for MI diagnosis. As the sensitivity of troponin assays has increased, the specificity has decreased. Current assays may detect troponin released from a variety of cardiac stresses other than MI (e.g. congestive heart failure, pulmonary embolism, renal failure, etc.). Such non-

MI troponin elevations are linked to poor overall prognosis, but are not real MI cases. Troponin assays also detect more MI cases due to myocardial oxygen supply-demand mismatch, which is caused by such conditions as shock and anaemia, especially when the patients have an underlying coronary artery stenosis. There is no plaque rupture but rather the stable coronary stenosis reduces the physiological reserve of coronary circulation. Such cases are called type II MI, and are common among ICU patients.\textsuperscript{24}

Regional analysis for China market

China is a huge country with significant differences in environment, economic level and lifestyle by region. These directly or indirectly cause the variations of Dread Disease and death risk within the country. In our analysis, the worst experience for males was from the three northeastern provinces (Heilongjiang, Jilin and Liaoning) and some northern provinces (Henan, Hebei and Inner Mongolia). The incidence rate in Heilongjiang, the highest, is more than two times the lowest rate observed in Shanghai. Eastern provinces, the richest region of China, have very good experience as a whole (see Figure 5).

For females, the provinces with the worst experience heavily overlap with those for males. However, eastern provinces’ experience is not as good as for males. The highest incidence rate, which is observed in Jilin, is only 68% higher than the lowest, which is from Ningxia (see Figure 6).

Further breakdown analysis reveals that in northeastern provinces insurance companies have poor experience in many major claim causes, such as lung cancer, liver cancer, heart attack and stroke, and breast cancer. Jilin also has the highest incidence rate of thyroid cancer for females, followed by Shanghai and Zhejiang.

If we include the Hong Kong data in our comparison, Hong Kong’s male experience for cancer, heart attack and stroke is among the lowest of all regions. On the other hand, female cancer incidence in Hong Kong, especially breast cancer, is among the highest. Considering the fact that Hong Kong is the most developed city of the country, we believe the impact of affluence on the Dread Disease risk is different for males and females.
Among all the claim causes, nasopharyngeal cancer is the most endemic one. In southern provinces (Guangdong, Guangxi and Hainan) and Hong Kong, the incidence rate is about 10 times that in northern areas.

The regional differences in the Chinese market have two implications. First, an insurance company operating in a certain region should understand that a deviation in experience from the market average could be caused by the regional origin of the business rather than factors normally impacting the quality of the business, such as field underwriting, medical underwriting and so forth. While companies cannot differentiate the pricing of the product, they may want to focus in their underwriting of risks from a certain region on the diseases that are more prevalent there. Secondly, more and more Hong Kong companies are writing business from mainland Chinese customers. The mixture of residential origin may have a big impact on their experience.

**Conclusion**

Dread Disease business is complex, as it covers a wide range of conditions rather than a single one. These conditions may be caused by different factors and thus present varied weight and trend. A general observation is that efforts made to detect diseases at an earlier or less severe stage has resulted in more claims, but many of them do not fulfill the spirit of Dread Disease cover. Progress in medical diagnostics will continue to have an impact on our experience, and the industry will continue to catch up with reasonable definitions and/or exclusions to avoid escalating claim costs and to keep the product concept viable. Chinese experience is also heavily influenced by the regional variance in claim experience and a careful explanation of company results is important. Bearing all this in mind is important for our pricing, product design and operational practice.
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Endnotes
12 See endnote 5.
13 See endnote 6.
14 See endnote 7.
18 See endnote 8.
19 See endnote 9.
20 See endnote 10.
21 See endnote 11.

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