HONG KONG ASSURED LIVES MORTALITY 2022

Issued in 2025

ACTUARIAL SOCIETY of HONG KONG
香港精算學會

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1 Foreword

It is with great pleasure that the Actuarial Society of Hong Kong (ASHK) present to the industry the new Hong Kong Assured Lives Mortality Table 2022 (HKA22). We would like to begin by expressing our heartfelt gratitude to all involved parties who contributed to the success of this project.

This mortality table project was a collaborative effort with the Hong Kong Federation of Insurers while General Reinsurance AG (Gen Re) was commissioned to carry out the study.

Thirteen companies have participated in this study and according to the in-force number of policies statistics at the end of 2021 from the IA, this represented a market coverage of 94%[1], strengthening the credibility of the table (our previous mortality table, Hong Kong Assured Lives Mortality Table 2018 (HKA18) has a market coverage of 86%). The participating companies (in alphabetical order) are listed as follows:

- AIA International Limited
- AXA China Region Insurance Company Limited
- BOC Group Life Assurance Company Limited
- China Life Insurance (Overseas) Company Limited
- China Taiping Life Insurance (Hong Kong) Company Limited
- Chow Tai Fook Life Insurance Company Limited
- FWD Life Insurance Company (Bermuda) Limited
- Hang Seng Insurance Company Limited
- HSBC Life (International) Limited
- Manulife (International) Limited
- Prudential Hong Kong Limited
- Sun Life Hong Kong Limited
- YF Life Insurance International Limited

We thank our participants for their invaluable contribution in preparing, checking and submitting data for this table. We understand that this process can be time-consuming and challenging, and we appreciate the dedication and attention to detail of all staff involved in this process. We acknowledge the effort everyone put into answering queries and fixing data issues, which led to multiple data submissions for some cases.

[1] Insurance Authority, Annual Statistics for Long Term Business 2021, L13 Total In-Force Business

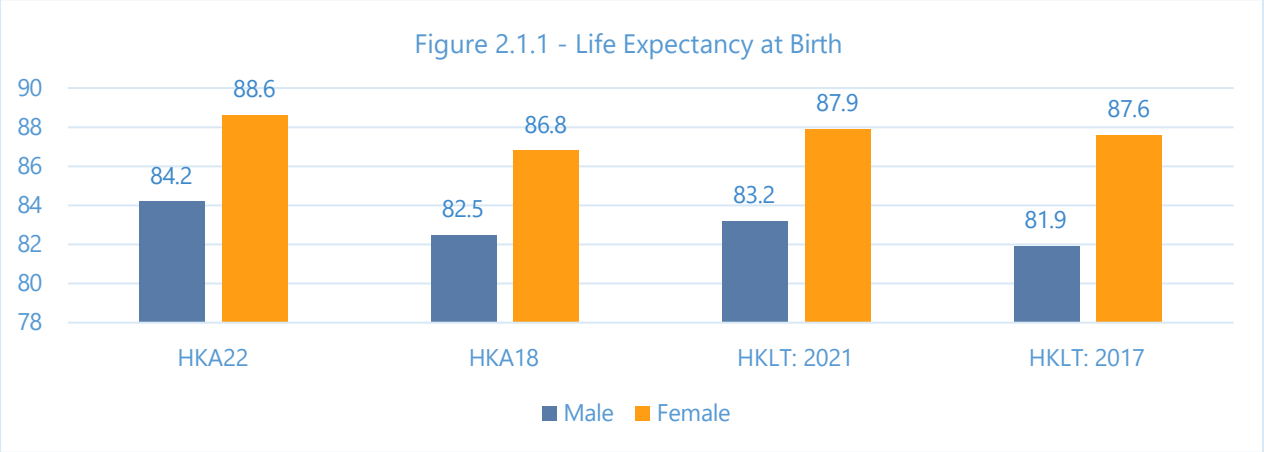
2 Executive Summary

The HKA22 is the 5th assured lives mortality table published by the ASHK for the Hong Kong industry. Similar to HKA18, the previous assured lives mortality table, the study period of this edition is 8 years, covering the period of 2014 to 2021, with the mid-point being end of 2017.

In this study period, we collected over 60 million of exposure and 105 thousand claims. This represents an increase of 25% in exposure and 38% in claims from the previous study HKA18. We continue to see improvement in mortality experience in Hong Kong compared with previous studies.

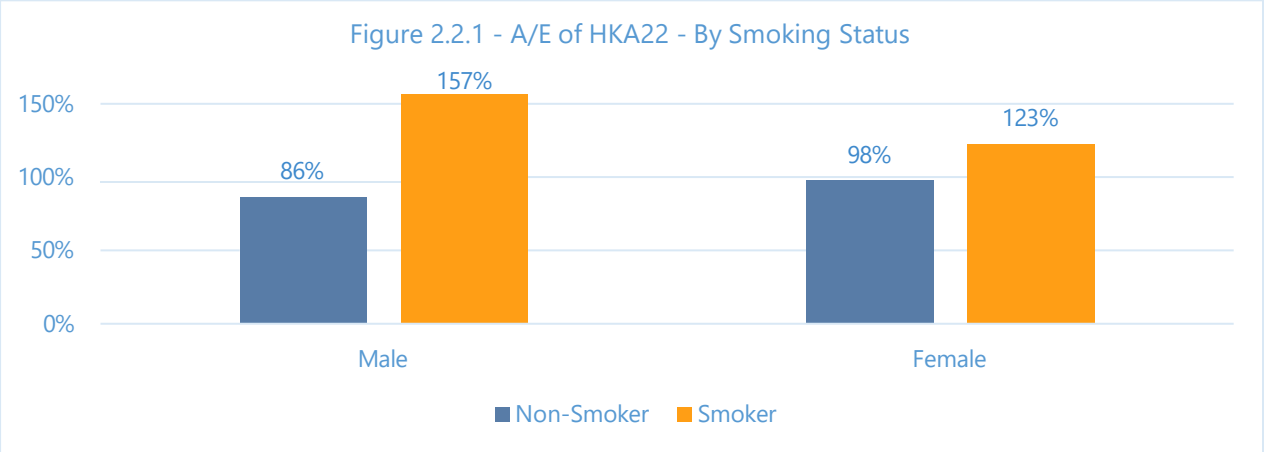
2.1 Life Expectancy

Life expectancy at birth has further improved to Age 84.2 for men and Age 88.6 for women. To compare with results of the general population, we have included results for 2017 (mid-point of HKA22) and 2021 (end of study period). Please note that population results have been taken from Hong Kong Life Tables 2016-2046 (HKLT)[2].



2.2 Smoker Differential

The smoker differentials in this study are broadly in line with previous studies. The difference in mortality rates between smokers and non-smokers is more significant for men than for women.

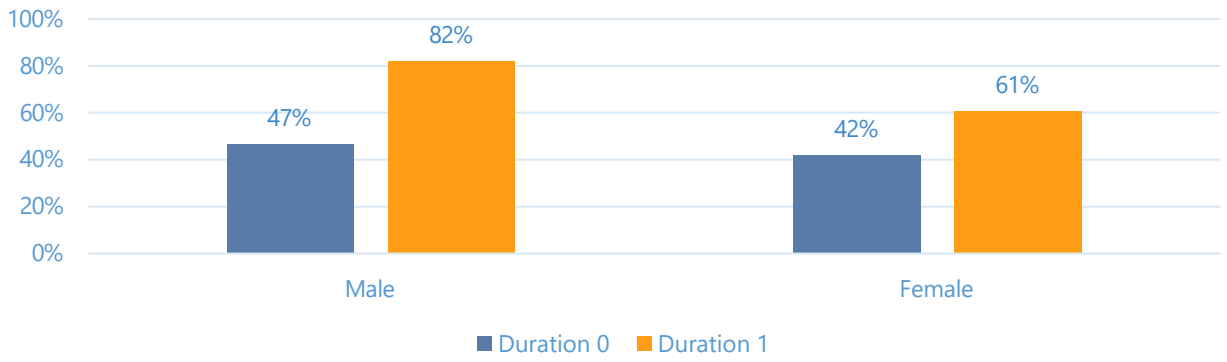


[2] Census and Statistics Department, the Government of the HKSAR - Hong Kong Life Tables 2016-2046

2.3 Selection Effect

The observation of a consistent selection effect for duration 0 and duration 1 indicates effective underwriting practices over the study period. There is residual selection effect beyond duration 1 but not as significant as duration 0 and duration 1.

Figure 2.3.1 - A/E of HKA22 - By Duration



2.4 Cause of Death

The distribution of cause of deaths is again broadly similar to previous studies. One observation for this study period is that Suicide became the top cause of death for the <25 age group, with the proportion being exceptionally high for the years 2016 to 2018. For more details, please refer to Section 6.2-6.4.

Table 2.4.1 - Top Cause of Death - By Gender and Age Group

Age Group	Gender\Rank	1	2	3
<25	Male	Suicide	Neoplasms	Accidents
	Female	Suicide	Neoplasms	Accidents
25-45	Male	Neoplasms	Suicide	Cardiovascular
	Female	Neoplasms	Suicide	Respiratory
>45	Male	Neoplasms	Respiratory	Cardiovascular
	Female	Neoplasms	Respiratory	Cardiovascular

3 Methodology

To derive the new industrial mortality table HKA22, we used data based on the following criteria, which are consistent with HKA18 except for the last point:

- **Individual Life Policies:** Only policies that provide pure mortality coverage, without any accelerated benefits (e.g., critical illness (CI) policies where a CI claim reduces the death benefit), were included.
- **Standard Risks**: Over 98.6% of policies provided by all participating companies are standard lives.
- **Policy Duration**: Only policies with a duration of 2+ years were adopted, as selection effect after the first two policy years are limited.
- **Fully Underwritten Policies**: Experience from fully underwritten policies was used. For clarity, fully underwritten policies refer to those underwritten through a full underwriting form, including both classes of insureds underwritten with and without medical check-ups.
- **Data Period**: Data from all participating companies for the period 2014 to 2021 was used. An 8-year study period was chosen to balance credibility with updated experience, similar to the HKA18 approach.
- **Hong Kong Residents**: Only the experience of Hong Kong residents was used. Residence indicators were provided by all participating companies for this study. Overall, 88.7% of standard life policies are for Hong Kong residents. This differs from the HKA18 report, where the graduated rates included both Hong Kong and non-Hong Kong residents due to the lack of residency indicators from many companies.

3.1 Graduated and Crude Mortality Rates (Ages 2 to 85)

Graduation is the process of obtaining smoothed mortality rates from crude mortality rates. We used crude mortality rates for ages 2-85 for graduation, as the data in this age range is deemed reasonably credible. This age range is consistent with that used in the HKA18 report.

In this study, we applied the natural cubic spline graduation with variable knots for ages 2 to 85. The graduation method is described in section 3.4.

Comparisons between graduated rates and crude rates are shown in the following graphs. Overall, the graduated rates provide a good fit while balancing the smoothness of the rates.

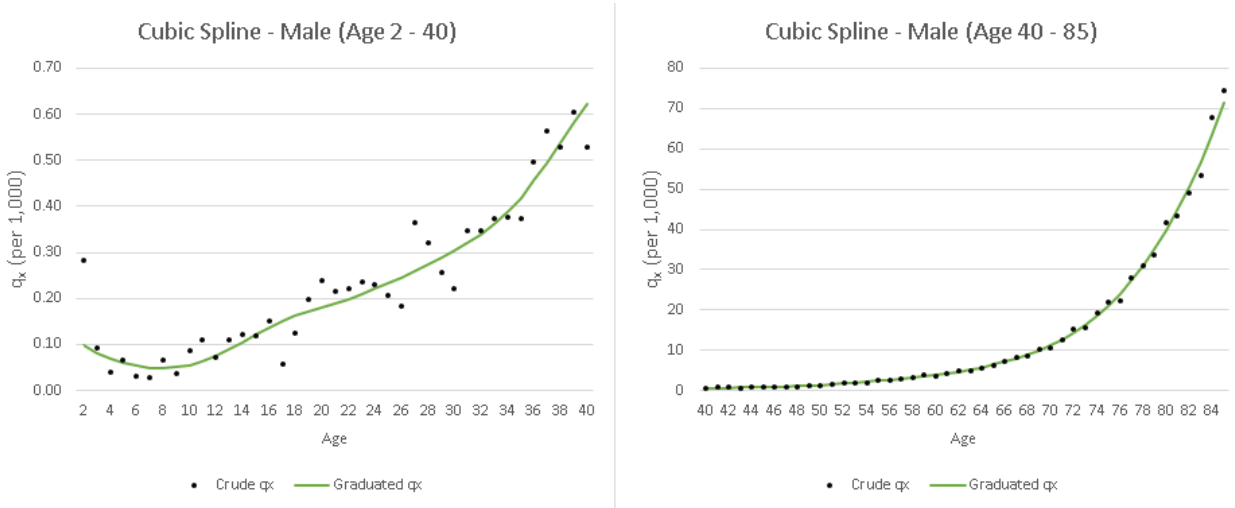


Figure 3.1.1 - Comparison between Graduated Rates and Crude Rates - Male

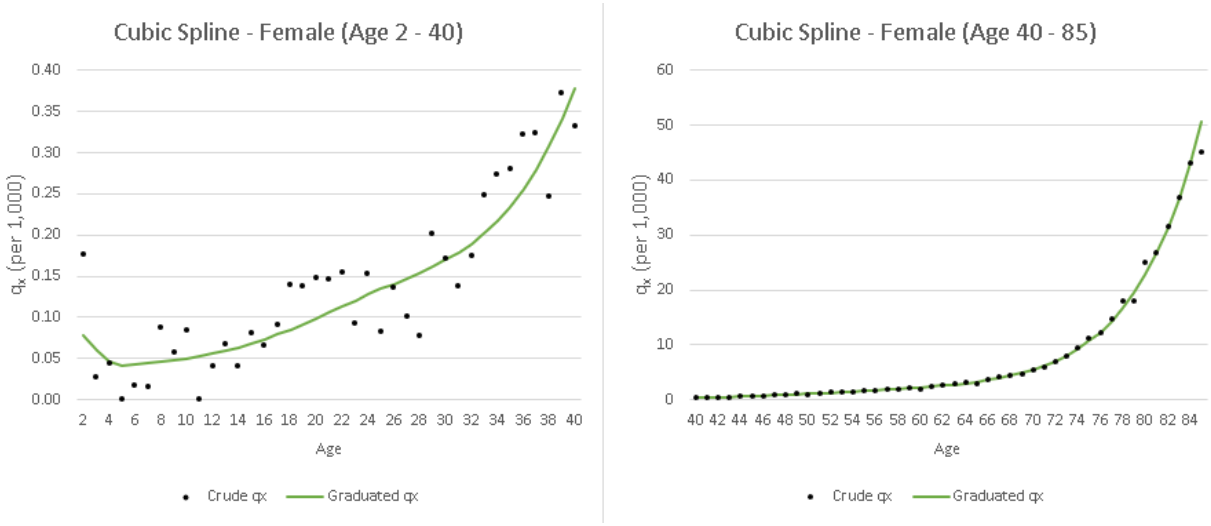


Figure 3.1.2 - Comparison between Graduated Rates and Crude Rates - Female

Using the graduated rates, we derived the number of expected claims and compared them to the actual claims using crude rates. The number of expected claims relative to actual claims is 100% for both male and female graduated rates.

3.2 Low and High Ages (Below 2 and Above 85)

Due to sparse data at the low and high ages, the graduation could not be extended to these age groups, consistent with the HKA18 report. The table below shows the exposure mix percentages for low and high ages by gender.

Age Group	Male	Female
Age < 2*	0.6%	0.5%
Age 2-85	99.3%	99.3%
Age 85+	0.1%	0.2%

*Policy duration < 2 for age below 2

Table 3.2.1 - Number of Exposures - By Age Group
(duration 2+, standard risk, fully underwritten, Hong Kong residency)

For ages below 2, we referred to the population infant mortality rates from the Hong Kong Annual Digest of Statistics issued by the Census and Statistics Department of Hong Kong SAR while determining the rate level, aligning with the methodology used in the HKA18 report. The final assumption for the age 0 mortality rate was set as the average late-neonatal plus post-neonatal (7 days to under 1 year) mortality rate from 2014 to 2021.

For ages above 85, extrapolation was performed using crude rates for ages 60 to 85. Ultimately, the Gompertz model was selected for both male and female extrapolation. For the rationale behind selecting the Gompertz model, please refer to section 3.4 - Graduation Methodology.

Please refer to the charts comparing the crude rates and the extrapolated mortality rates for these high ages.

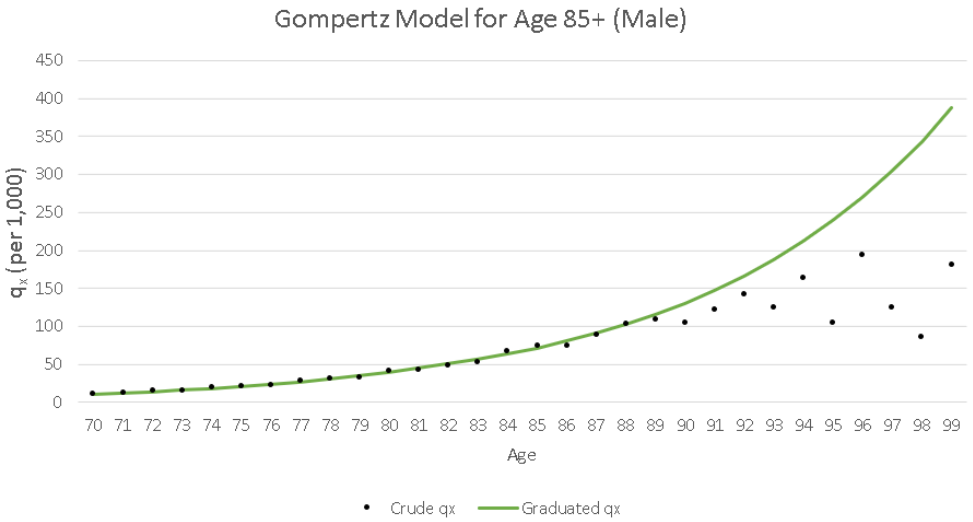


Figure 3.2.1 - Comparison between Crude Rates and Extrapolated Rates - Male

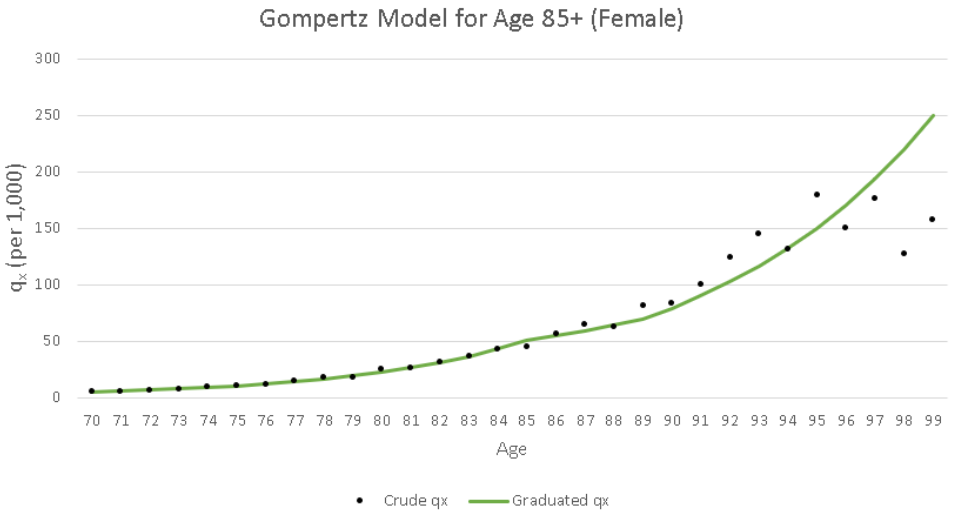


Figure 3.2.2 - Comparison between Crude Rates and Extrapolated Rates - Female

The upper age limit of HKA22 is set at age 100, where the mortality rate is assumed to be 100%. This approach is taken due to data limitations for ages beyond 100, practicality, conservatism and to provide consistency with previous mortality tables.

3.3 Volatility Adjustment

In the HKA18 report, a volatility adjustment[3] was applied to the crude rates to avoid potential underpricing or under-valuation due to statistical fluctuations. This adjustment increased the crude rates to the upper limit of the 70% confidence interval, with a cap at 115% of the crude rates, thereby adding implicit margins.

When adopting a similar approach for this study, we observed that this volatility adjustment caused the younger age groups to reach the 115% cap, distorting the age shape of the actual experience. Consequently, this would result in an implicit margin of 15% for these younger age groups.

[3] Please refer to Section 4.1 Volatility Adjustment in the HKA18 report for more details

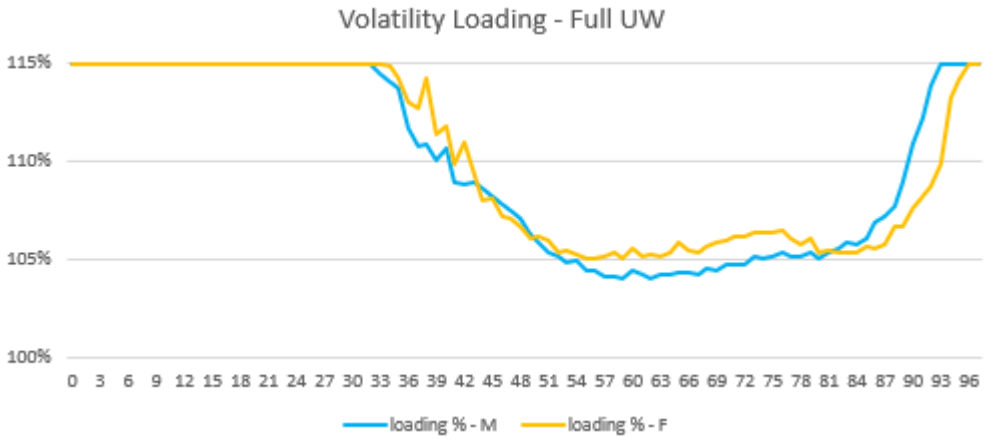


Figure 3.3.1 - Volatility Loading - By Age

We did not adopt this approach in HKA22 after considering the following points:

- **Distortion of Age Shape**: Applying these loadings would distort the age shape of the actual experience, resulting in an implicit margin of 15% for younger age groups.
- **Volatility of Crude Rates**: Crude rates inherently have a certain degree of volatility. We relied on the graduation process to smooth out fluctuations in crude rates rather than allowing for implicit margins. Additionally, eight years of data were selected to reduce fluctuations.
- **Mortality Improvements**: Graduated rates have not included any mortality improvements, and the mid-point of the dataset is at the end of 2017, creating a gap to the present time. There is evidence of continuous mortality improvement throughout the study period, and no strong evidence of mortality deterioration from the COVID experience up to 2021. Therefore, by not rolling the graduated rates to the present, some implicit conservatism is built into the HKA22 table.
- **Explicit Margins**: Where further conservatism is required, users should consider allowing for an explicit margin separately.
- **Product Considerations**: Most policies sold in the Hong Kong market are limited-pay whole life products. An implicit margin from volatility adjustment, where younger ages have a higher loading, may not be useful. For term products, it may unfairly penalize younger age groups by having an implicit margin.

3.4 Graduation Methodology

The crude death rates were graduated using natural cubic splines with variable knots for ages 2 to 85 years for both genders.

A natural cubic spline is a form of interpolation that uses piecewise third-order polynomials, ensuring alignment at their joints. It serves as an alternative to fitting a single function over the entire data range. In our study, we applied natural cubic spline graduation using the least-squares method on crude rates, q_x^c, to derive the graduated rate q_x. This is the same graduation method used in the HKA18 report.

The natural cubic spline graduation specifies that the second derivatives at each end are zero.

$$q(x) = \begin{cases} q_0(x) = a_0x^3 + b_0x^2 + c_0x + d_0, & x_0 \le x \le x_1, \\ q_1(x) = a_1x^3 + b_1x^2 + c_1x + d_1, & x_1 \le x \le x_2, \\ \vdots & \vdots \\ q_{k-1}(x) = a_{k-1}x^3 + b_{k-1}x^2 + c_{k-1}x + d_{k-1}, & x_{k-1} \le x \le x_k, \end{cases}$$

where $x \in q_x^c$, and satisfies

$$\left.\begin{array}{l} q_{i-1}(x) = q_i(x) \\ q'_{i-1}(x) = q'_i(x) \\ q''_{i-1}(x) = q''_i(x) \end{array}\right\} \forall\, i = 1,2,\dots,k-1,$$

where k is the number of knots - using more knots increases the model's fitness but reduces its smoothness.

Let the weight be $w_x = \frac{n_x}{q_x*(1-q_x)}$ where n_x is the exposure at age x.

And then the goal is to minimize:

$$SS = \sum_{x=1}^{n} \mathrm{w_x}(\mathrm{q_x^c} - \mathrm{q_x})^2$$

The natural cubic spline graduation has the following advantages:

- Easy to calculate with fewer parameters.
- Fits data better with multiple splines while maintaining higher smoothness.
- Less tendency to oscillate between data points.
- Interpolation error can be small even when using low-degree polynomials.
- Provides a simpler function compared to a single adjustment over the entire data set.

By using natural cubic spline graduation, the graduated rates show similar goodness-of-fit and smoothness levels across different numbers of knots. Additionally, their fitness level increases as the number of knots increases, which aligns with the model design. Therefore, we referenced the testing method suggested by McCutcheon (the same method adopted in the HKA18 report) to determine the number of knots for our final selection. We also considered the percentage of graduated rates that fall within their input rates' confidence interval under different k-knots. Balancing fit and smoothness, we chose 12 knots for males and 7 knots for females.

For graduated rates above age 85, we used the Gompertz model as per the HKA18 report. We also considered other models, such as the Makeham model used in the HKA01 study, but it did not produce a materially different set of graduated rates. Consequently, we decided on the Gompertz model for its consistency with HKA18.

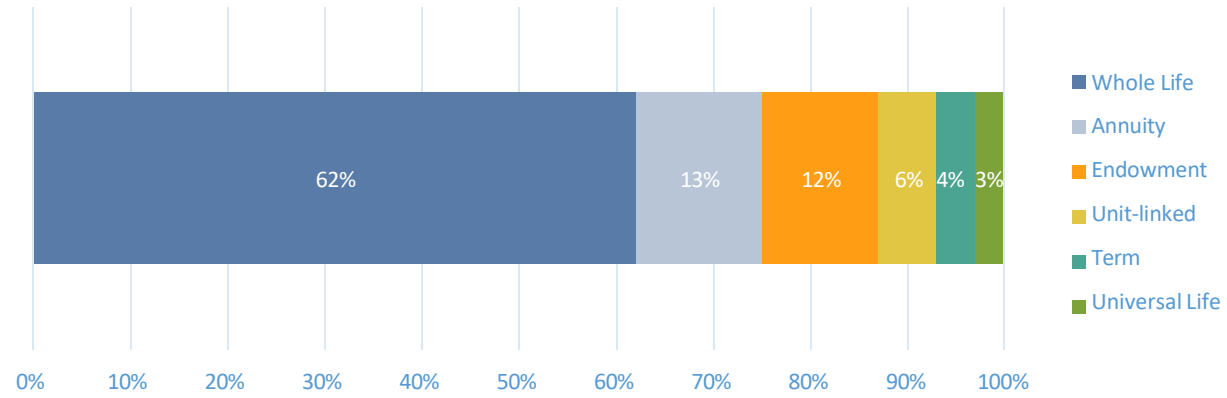
4 New Business Analysis

In this section, we look at new business acquired by the industry during this study period. Analysis is by number of policies.

4.1 New Business by Product Type

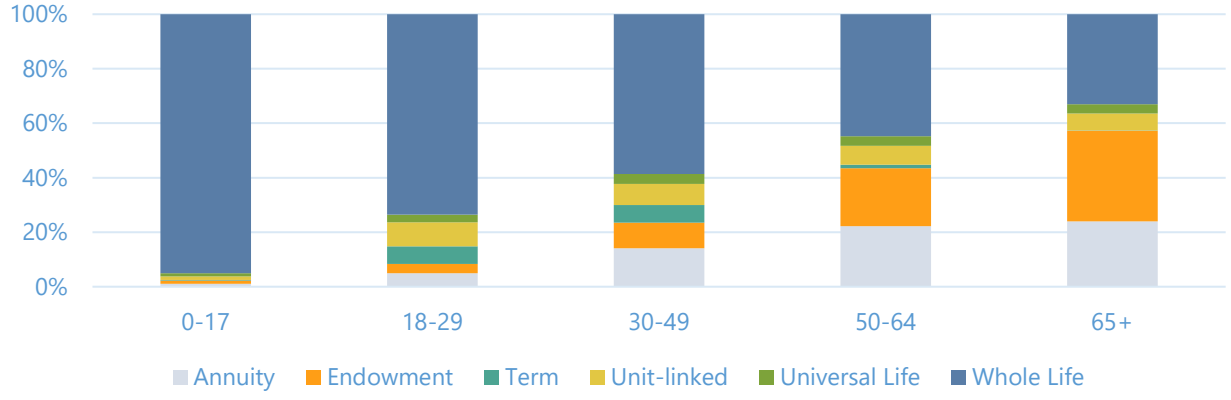
The chart below shows the new business mix by product type during the study period. Whole life products have a dominant share of new business in the Hong Kong market, at 62%. The second and third popular product types are annuity (mostly deferred annuity products including Qualifying Deferred Annuity Policy (QDAP), a retirement planning tool with tax deduction arrangement launched in April 2019) and endowment products at 13% and 12% of new business respectively.

Figure 4.1.1 - New Business Mix - By Product Type

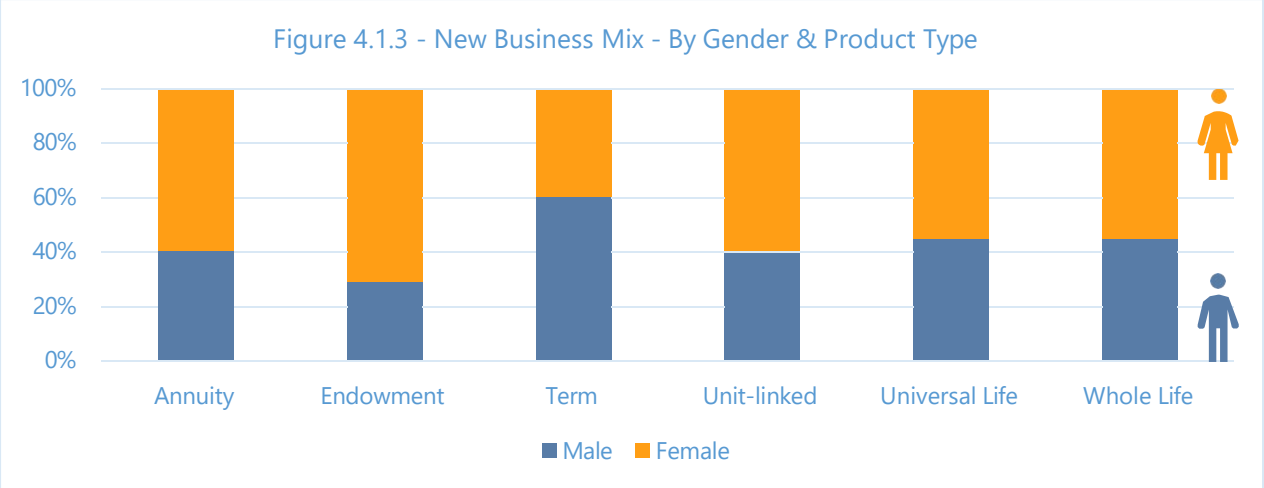


The product mix within the insurance industry illustrates a clear segmentation based on age demographics. Whole life insurance policies are prevalent among those in the 0-17 age group, reflecting a focus on long-term security cum savings from an early age. Annuities rise in prominence as individuals transition from young adulthood into retirement, highlighting a shift towards income stability in later life. Endowment policies are favored by a more mature audience as a means of saving, while term life insurance is particularly popular with adults aged 18-49, likely due to its affordability and the financial protection it offers during their prime working years.

Figure 4.1.2 - New Business Mix - By Age Group & Product Type

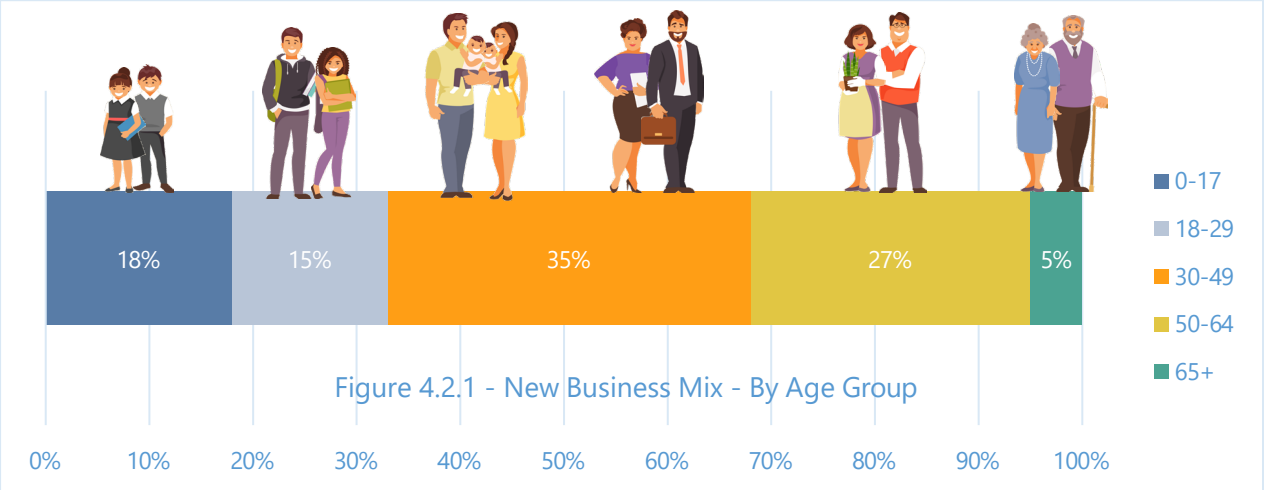


The insurance industry's trend of attracting more female customers aligns with the broader demographic balance, reflecting the male to female ratio of the general population. However, term products remain more popular with male customers, suggesting that different products may appeal to different genders based on their specific financial goals and risk preferences.



4.2 New Business by Age Band

Young families continue to be an important segment to the industry, with 35% of new business coming from the 30-49 age group and 18% from the 0-17 age group.



4.3 New Business by Residency

The business landscape has indeed experienced significant fluctuations during this study period. The overall proportion of business from Mainland Chinese Visitors (MCV) stood at 18%. While there was a notable growth to over 20% in years 2016 to 2018, it plummeted to nearly zero during the COVID-19 pandemic. Interestingly, nearly half of the new business from young children originated from the MCV segment, highlighting a unique market trend within the Hong Kong industry.

Figure 4.3.1 - New Business Mix - By Residency & Calendar Year

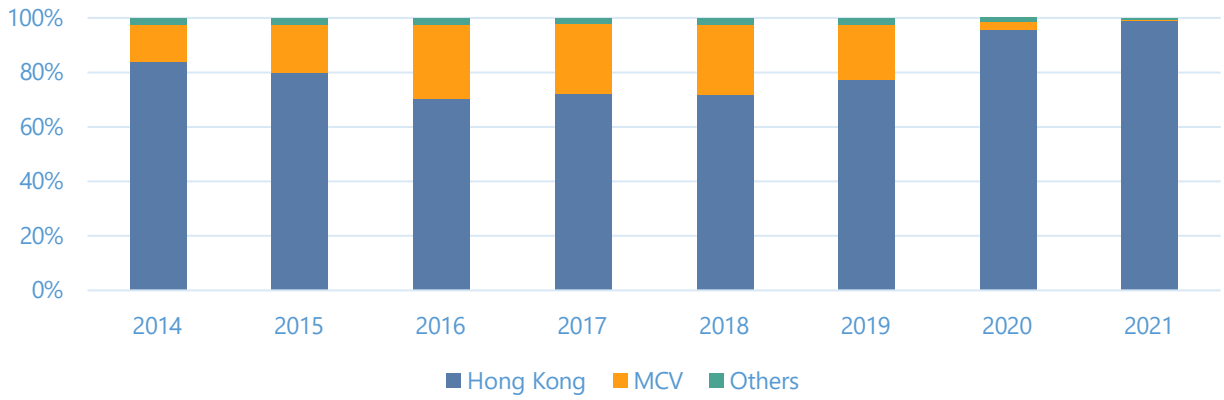
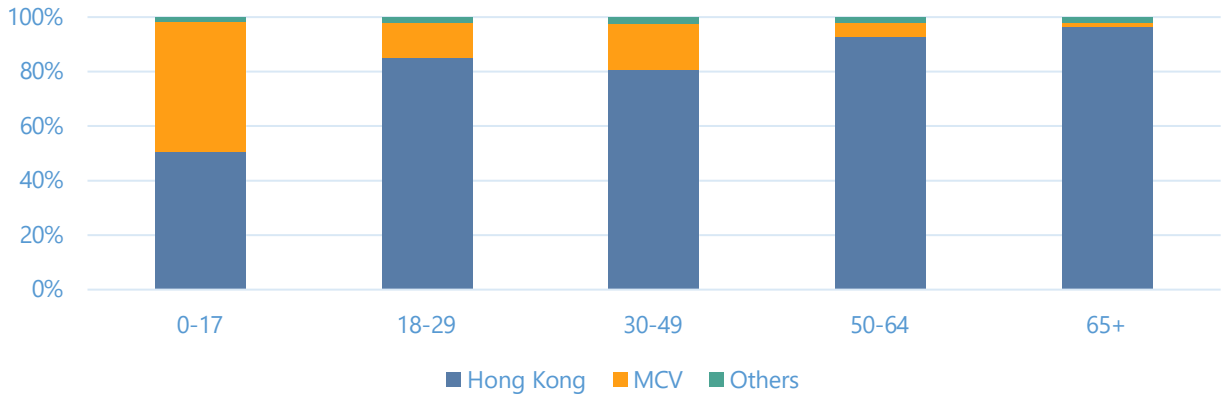


Figure 4.3.2 - New Business Mix - By Residency & Age Group



4.4 New Business by Sum Assured Bands

It is observed that a significant portion of new businesses tend to have a sum assured of HKD 1 million or below. This trend suggests that there is a strong market for policies with lower coverage amounts, catering to a wider range of customers seeking financial protection. Conversely, the MCV segment often opts for higher coverage levels, indicating a different risk profile and financial needs among this group.

Figure 4.4.1 - New Business Mix - By Sum Assured Bands

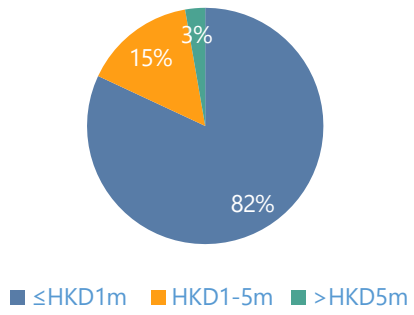
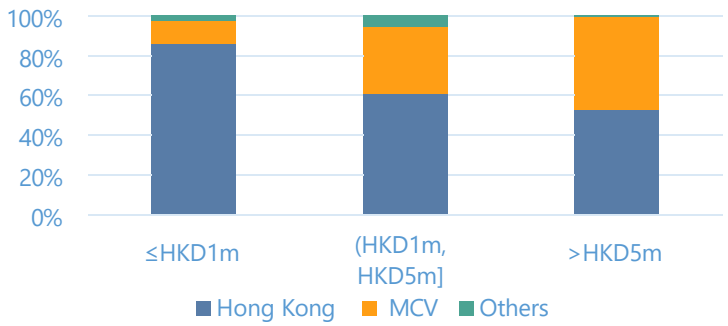


Figure 4.4.2 - New Business Mix - By Sum Assured Bands & Residency



4.5 New Business by Underwriting Type

The industry has seen a significant shift in recent years, with guaranteed issue policies becoming more prevalent.

Figure 4.5.1 - New Business Mix - By Underwriting Type

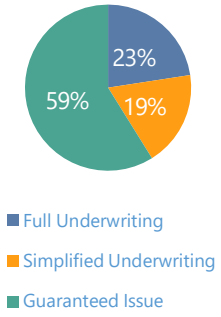
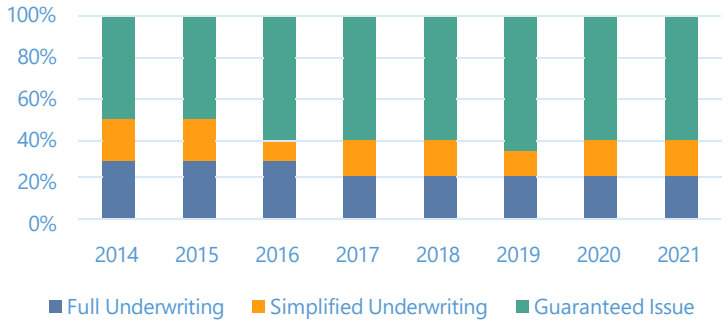
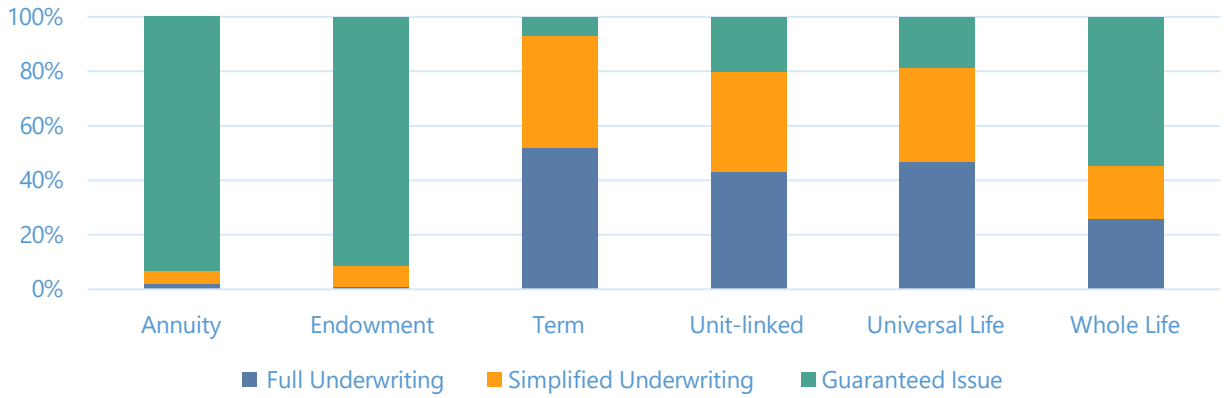


Figure 4.5.2 - New Business Mix - By Underwriting Type & Calendar Year



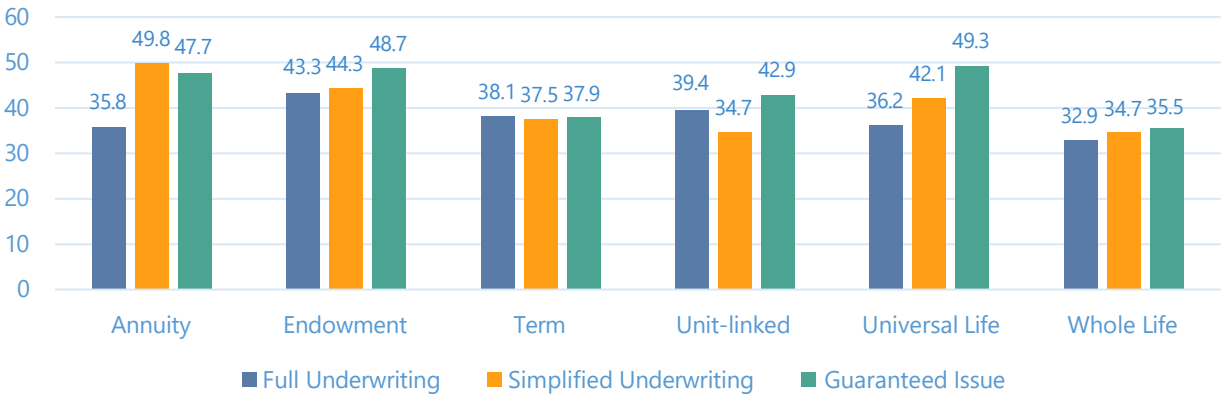
The variation in underwriting status across different product types is indicative of the industry's adaptation to diverse risk profiles, aiming to balance accessibility with financial sustainability.

Figure 4.5.3 - New Business Mix - By Underwriting Type & Product Type



As can be seen from the chart below, the average issue age is often older for guaranteed issue policies, reflecting a move towards more inclusive insurance practices, allowing individuals who may not qualify for traditional underwriting to obtain coverage.

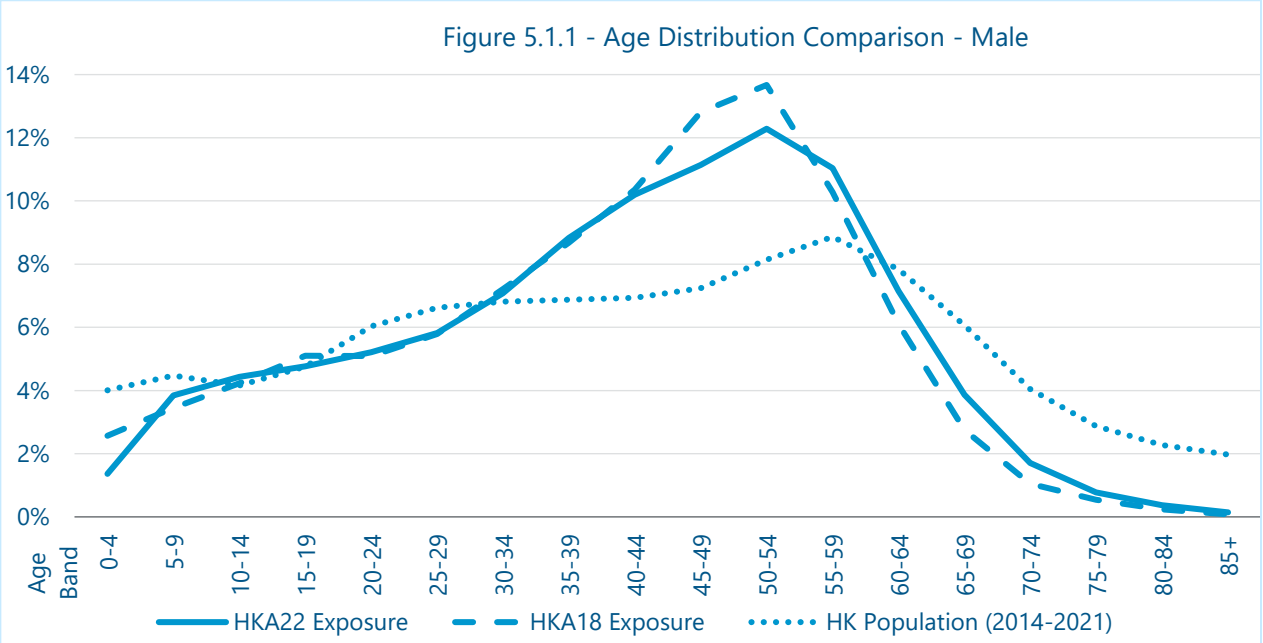
Figure 4.5.4 - Average Issue Age by Product Group & Underwriting Type

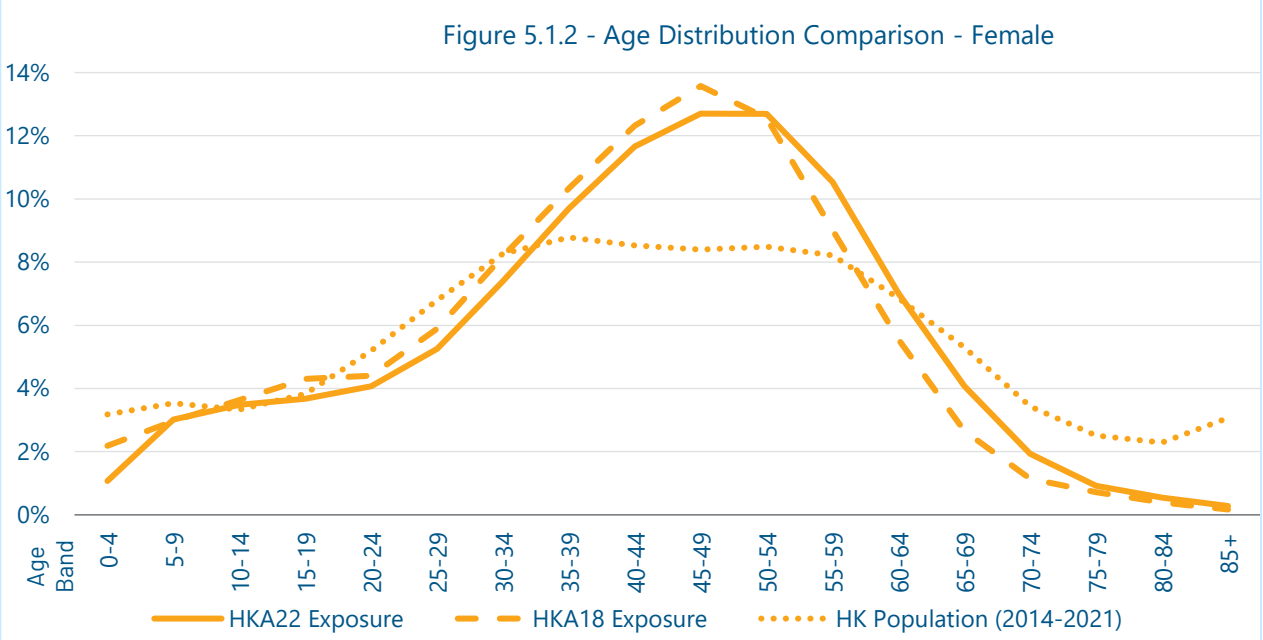


5 Exposure Analysis

5.1 Age Mix of Exposure Data

Age 40 to 59 represent the most significant quinquennial age groups, with each comprising over 10% of our data for both genders. This pattern is similar to HKA18, although HKA22 shows a slightly higher proportion of older ages, indicating the maturity of our portfolio. This age distribution is quite different from the general population[4] (here we use the average of 2014-2021, the same period as HKA22), which is more evenly distributed compared with the insured population.



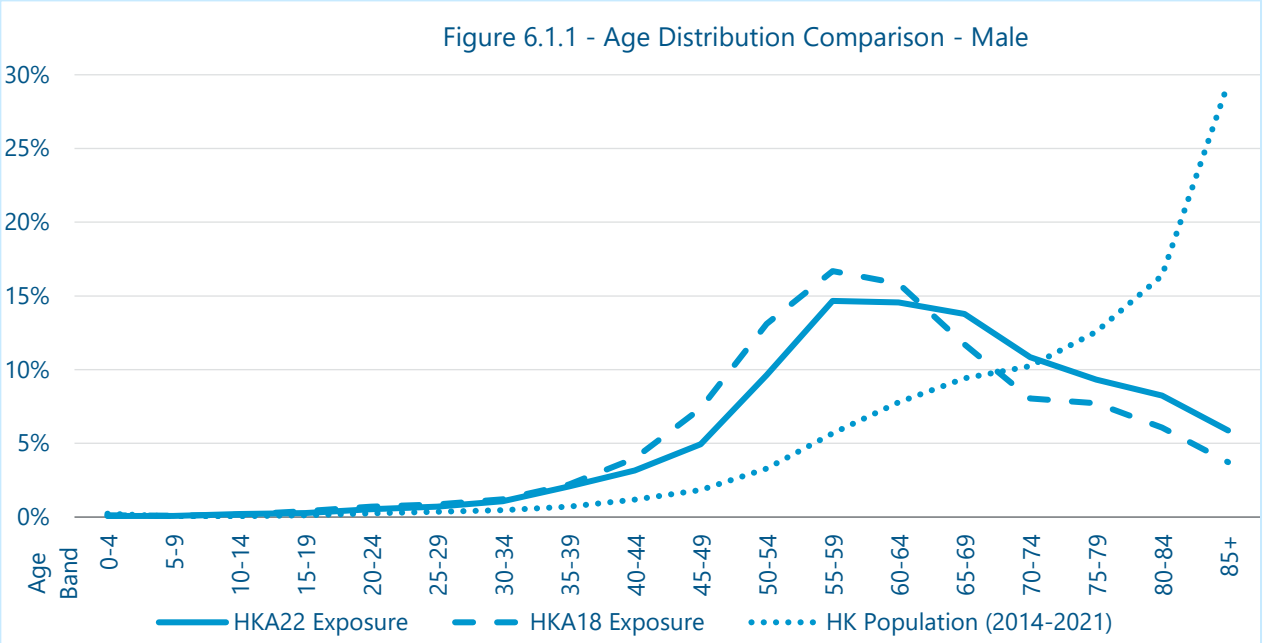


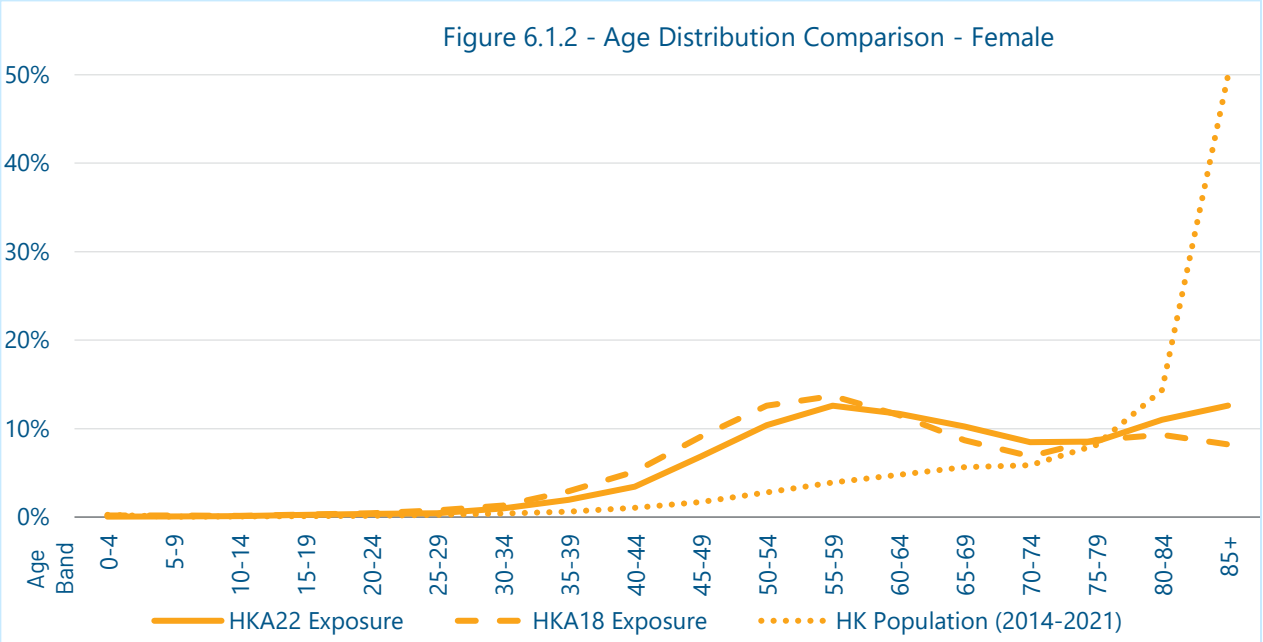
[4] Census and Statistics Department, The Government of the Hong Kong SAR - Population by Sex and Age Group

6 Claim Analysis

6.1 Age Distribution of Death Claims

In this study, the majority of death claims are from males aged 50-80 and females 50-90. Compared with the previous study, HKA18, we observe a higher proportion of deaths at more advanced ages. This contrasts with the general population[5], where most deaths occur at age 80 and above.





[5] Census and Statistics Department, The Government of the Hong Kong SAR - Deaths by Sex and Age Group

6.2 Cause of Death

Cancer remained the top cause of death in this study, at 44.8%, followed by respiratory diseases and cardiovascular diseases, at 16.1% and 12.8% respectively. Despite the global attention on COVID-19, its contribution to mortality in the context of this study was minimal.

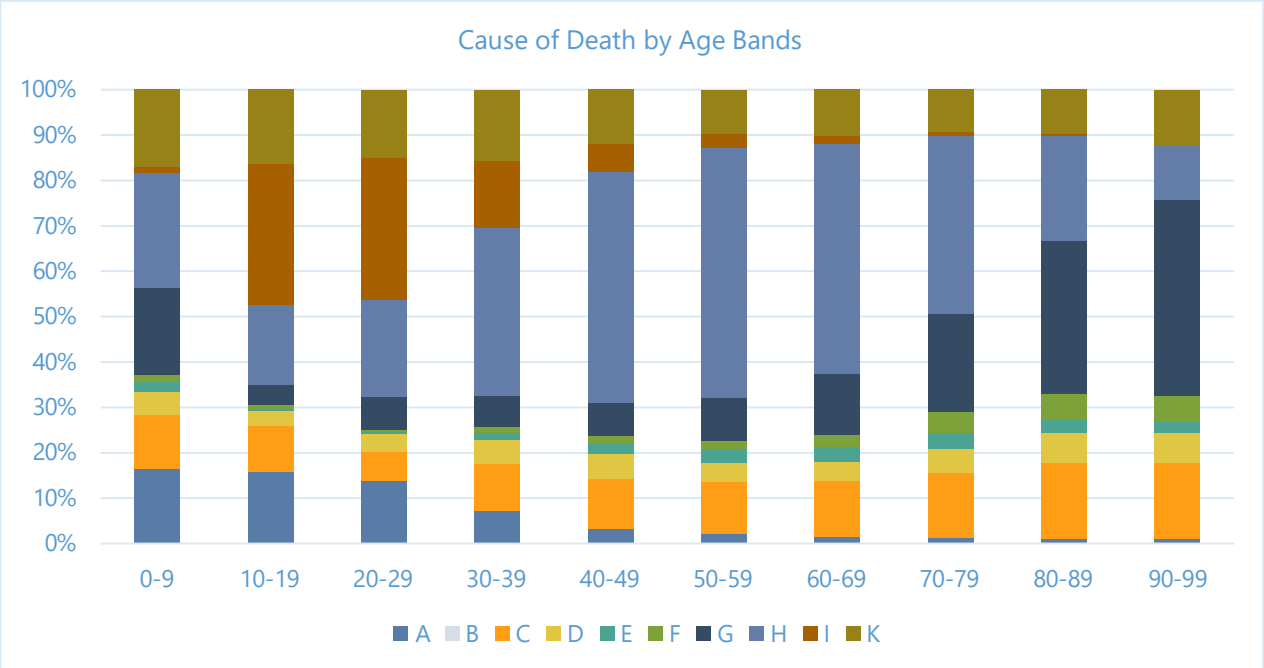
Table 6.2.1 - Cause of Death - By Proportion of Claims

Group	Cause of Death	Proportion of Claims
A	Accidents, Poisonings and Violence	2.1%
B	AIDS and Related Symptoms	0.0%
C	Diseases of the Circulatory System - Cardiovascular	12.8%
D	Diseases of the Circulatory System - Cerebrovascular	4.9%
E	Diseases of the Digestive System	3.1%
F	Diseases of the Genito-Urinary System	3.0%
G	Diseases of the Respiratory System	16.1%
H	Neoplasms (Malignancies) and Cancer Related Diseases	44.8%
I	Suicide	3.0%
K	Others	10.3%

6.3 Cause of Death by Age Bands

The progression of causes of death across different age groups reflects a complex interplay of biological, environmental, and societal factors. Accidents tend to affect younger individuals more. Suicide, tragically, has a higher incidence in teenagers and young adults, often linked to mental health issues and stressors unique to this life stage. As age increases, the prevalence of chronic conditions such as cancer and respiratory diseases (towards more advanced ages) become more pronounced.

Figure 6.3.1 - Cause of Death - By Age Band



6.4 Comparison with Previous Studies

The tables below show proportion of the cause of death by age group as compared with previous studies. The observation of suicide rates being higher in the under 25 age group as compared to previous studies is a concerning trend. It highlights the need for targeted mental health support and interventions for younger populations.

Age Group under 25 years old:

Figure 6.4.1 - Cause of Death - Age Group <25 years old

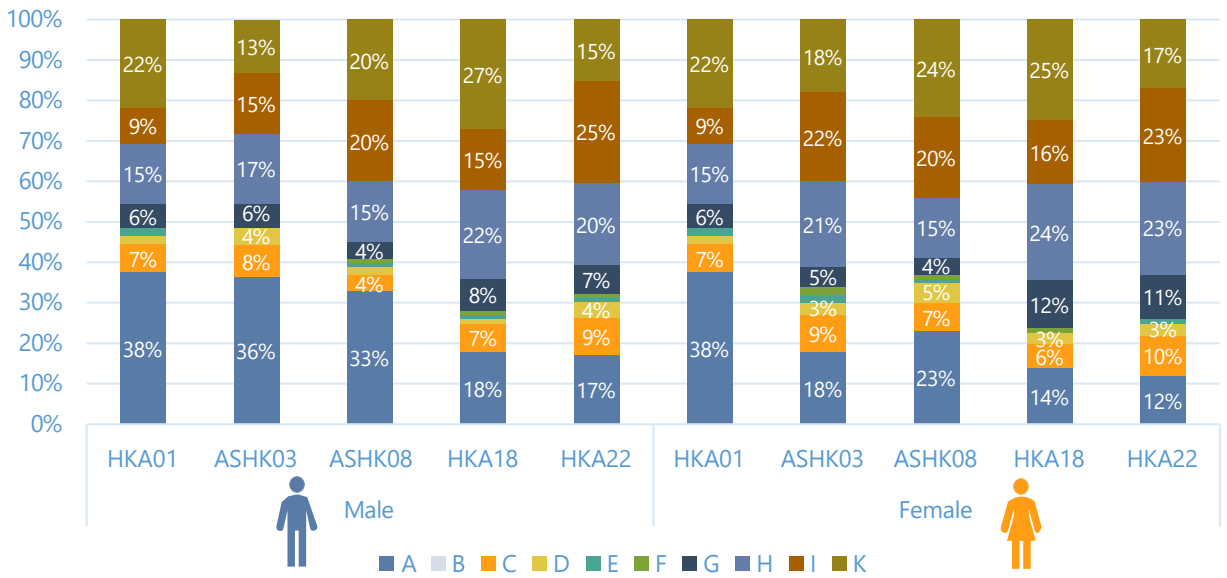


Table 6.4.2 Cause of Death - Age Group <25 years old

Group	Cause of Death	Male under 25 years old					Female under 25 years old				
		HKA 01	ASHK 03	ASHK 08	HKA 18	**HKA 22**	HKA 01	ASHK 03	ASHK 08	HKA 18	**HKA 22**
A	Accidents, Poisonings and Violence	38%	36%	33%	18%	**17%**	38%	18%	23%	14%	**12%**
B	AIDS and Related Symptom	0%	0%	0%	0%	**0%**	0%	0%	0%	0%	**0%**
C	Diseases of the Circulatory System - Cardiovascular	7%	8%	4%	7%	**9%**	7%	9%	7%	6%	**10%**
D	Diseases of the Circulatory System - Cerebrovascular	2%	4%	2%	1%	**4%**	2%	3%	5%	3%	**3%**
E	Diseases of the Digestive System	2%	0%	1%	1%	**1%**	2%	2%	1%	0%	**1%**
F	Diseases of the Genito-Urinary System	0%	0%	1%	1%	**1%**	0%	2%	1%	1%	**0%**
G	Diseases of the Respiratory System	6%	6%	4%	8%	**7%**	6%	5%	4%	12%	**11%**
H	Neoplasms (Malignancies) and Cancer Related Diseases	15%	17%	15%	22%	**20%**	15%	21%	15%	24%	**23%**
I	Suicide	9%	15%	20%	15%	**25%**	9%	22%	20%	16%	**23%**
K	Others	22%	13%	20%	27%	**15%**	22%	18%	24%	25%	**17%**

Age Group 25 to 45 years old:

Figure 6.4.3 - Cause of Death - Age Group 25 to 45 years old

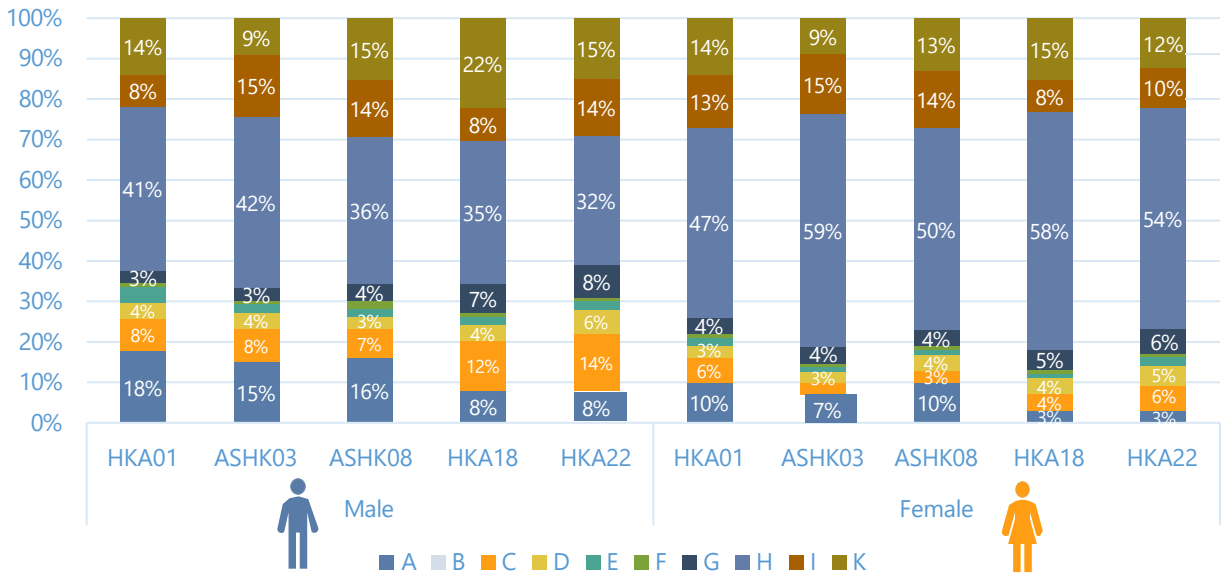


Table 6.4.4 Cause of Death - Age Group 25 to 45 years old

Group	Cause of Death	Male between 25 and 45 years old					Female between 25 and 45 years old				
		HKA 01	ASHK 03	ASHK 08	HKA 18	**HKA 22**	HKA 01	ASHK 03	ASHK 08	HKA 18	**HKA 22**
A	Accidents, Poisonings and Violence	18%	15%	16%	8%	**8%**	10%	7%	10%	3%	**3%**
B	AIDS and Related Symptom	0%	0%	0%	0%	**0%**	0%	0%	0%	0%	**0%**
C	Diseases of the Circulatory System - Cardiovascular	8%	8%	7%	12%	**14%**	6%	3%	3%	4%	**6%**
D	Diseases of the Circulatory System - Cerebrovascular	4%	4%	3%	4%	**6%**	3%	3%	4%	4%	**5%**
E	Diseases of the Digestive System	4%	2%	2%	2%	**2%**	2%	1%	1%	1%	**2%**
F	Diseases of the Genito-Urinary System	1%	1%	2%	1%	**1%**	1%	1%	1%	1%	**1%**
G	Diseases of the Respiratory System	3%	3%	4%	7%	**8%**	4%	4%	4%	5%	**6%**
H	Neoplasms (Malignancies) and Cancer Related Diseases	41%	42%	36%	35%	**32%**	47%	59%	50%	58%	**54%**
I	Suicide	8%	15%	14%	8%	**14%**	13%	15%	14%	8%	**10%**
K	Others	14%	9%	15%	22%	**15%**	14%	9%	13%	15%	**12%**

Age Group over 45 years old:

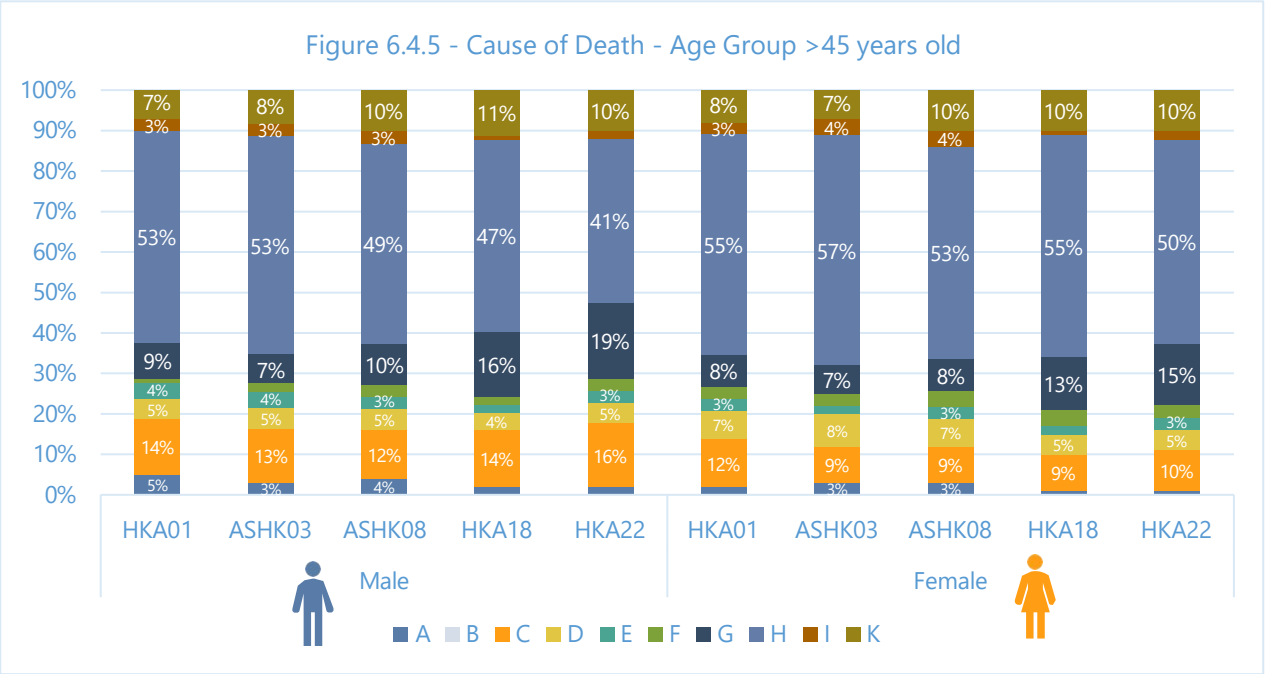


Table 6.4.6 Cause of Death - Age Group >45 years old

Group	Cause of Death	Male over 45 years old					Female over 45 years old				
		HKA 01	ASHK 03	ASHK 08	HKA 18	**HKA 22**	HKA 01	ASHK 03	ASHK 08	HKA 18	**HKA 22**
A	Accidents, Poisonings and Violence	5%	3%	4%	2%	**2%**	2%	3%	3%	1%	**1%**
B	AIDS and Related Symptom	0%	0%	0%	0%	**0%**	0%	0%	0%	0%	**0%**
C	Diseases of the Circulatory System - Cardiovascular	14%	13%	12%	14%	**16%**	12%	9%	9%	9%	**10%**
D	Diseases of the Circulatory System - Cerebrovascular	5%	5%	5%	4%	**5%**	7%	8%	7%	5%	**5%**
E	Diseases of the Digestive System	4%	4%	3%	2%	**3%**	3%	2%	3%	2%	**3%**
F	Diseases of the Genito-Urinary System	1%	2%	3%	2%	**3%**	3%	3%	4%	4%	**3%**
G	Diseases of the Respiratory System	9%	7%	10%	16%	**19%**	8%	7%	8%	13%	**15%**
H	Neoplasms (Malignancies) and Cancer Related Diseases	53%	53%	49%	47%	**41%**	55%	57%	53%	55%	**50%**
I	Suicide	3%	3%	3%	1%	**2%**	3%	4%	4%	1%	**2%**
K	Others	7%	8%	10%	11%	**10%**	8%	7%	10%	10%	**10%**

7 Highlights of Mortality Results

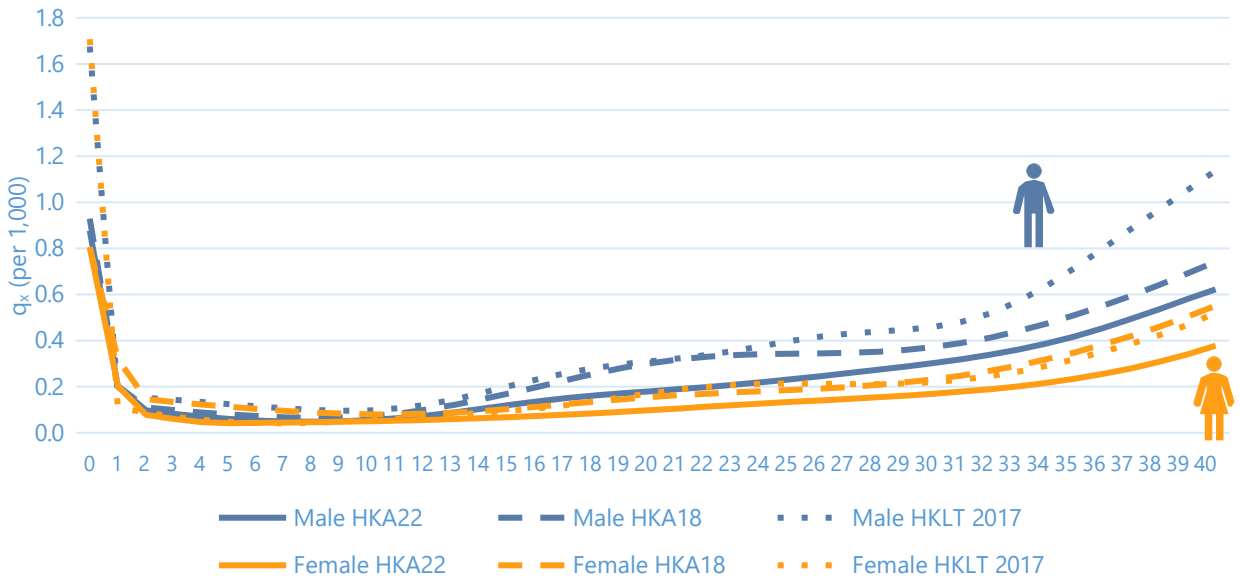
7.1 Life Tables Comparison

Mortality rates are a crucial indicator of public health and demographic trends. In this section, HKA22 mortality rates are compared with HKA18 as well as with the general population data from Hong Kong Life Tables in 2017 (HKLT2017) (the mid-point of HKA22).

Generally, females exhibit lower mortality rates than males, which is reflected in various actuarial studies and life expectancy statistics. The HKA22 mortality study has shown improvements in mortality experience over time for both genders. The assured lives mortality rates also compare favorably to that of the general population.

These studies are essential for actuaries and insurers to assess risk and develop life insurance products. The comparison between different versions of these studies, like HKA22, HKA18, and HKLT2017, provides insights into the trends and factors influencing mortality rates, such as advancements in healthcare, changes in lifestyle, and environmental factors. Such data is invaluable for policy development, financial planning, and ensuring the sustainability of insurance systems in the face of demographic changes.

Figure 7.1.1 - Life Tables Comparison of q_x (Age 0-40)



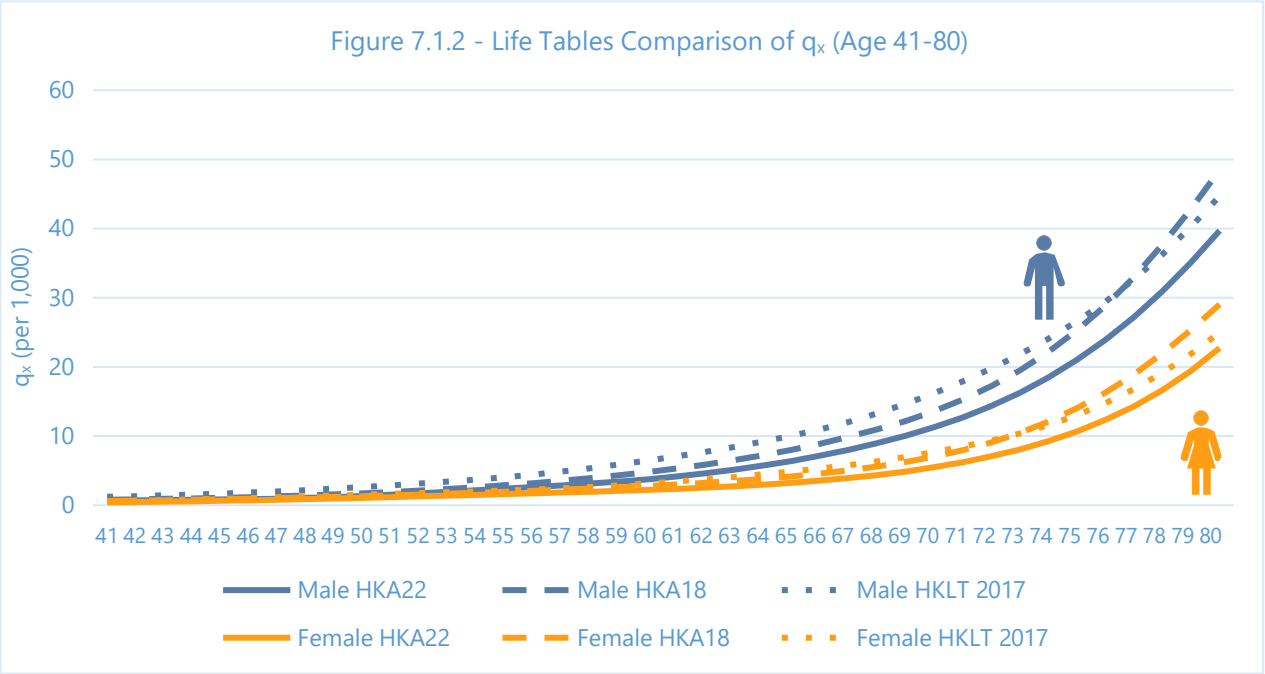


Figure 7.1.2 - Life Tables Comparison of q_x (Age 41-80)
60
50
40
30
20
10
0
q_x (per 1,000)
41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80
Male HKA22
Male HKA18
Male HKLT 2017
Female HKA22
Female HKA18
Female HKLT 2017

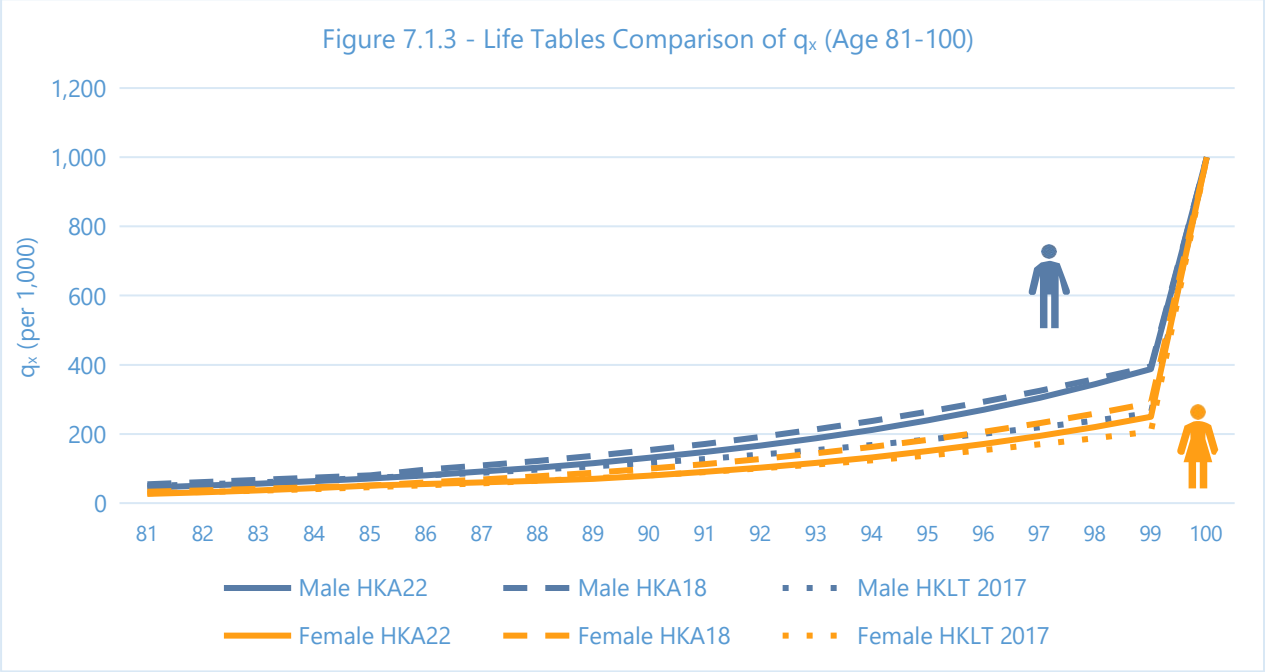


Figure 7.1.3 - Life Tables Comparison of q_x (Age 81-100)
1,200
1,000
800
600
400
200
0
q_x (per 1,000)
81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100
Male HKA22
Male HKA18
Male HKLT 2017
Female HKA22
Female HKA18
Female HKLT 2017

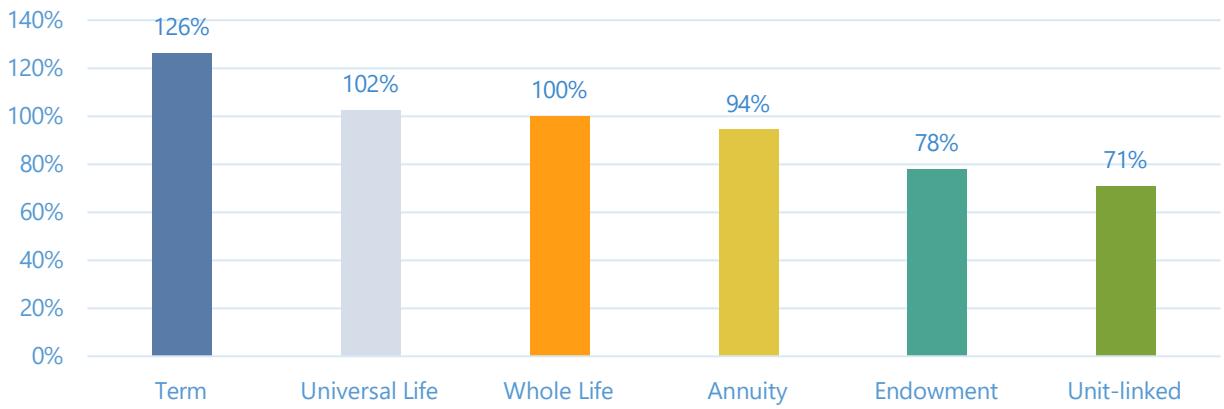
7.2 Mortality Experience by Various Factors

While the results may not be credible, it is fascinating to observe the variations in mortality experiences when segmented by different factors. Please note 100% is used for the most significant group as a comparison base in this section to highlight the differences in experience with other groups. These are not actual over expected ratios.

7.2.1 Product Type

The experience by product type is shaped by the product's nature, whether it focuses on protection or savings, along with other elements such as the rigor of underwriting. Please note that other than whole life products, exposure data of other product types are relatively small, less than 20% in total.

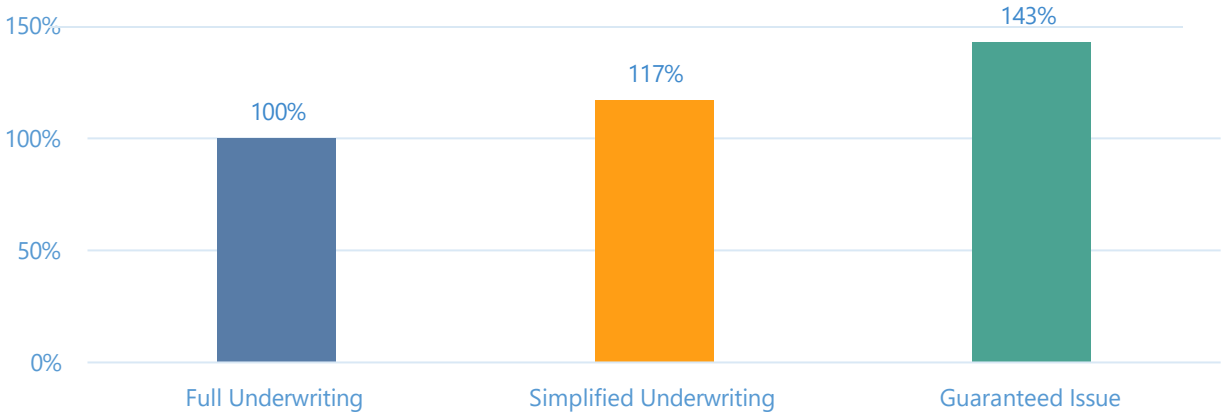
Figure 7.2.1.1 - Mortality Experience Comparison - By Product Type



7.2.2 Underwriting Type

As shown in the previous section, simplified underwriting and guaranteed issue policies are becoming more popular. The results depicted below are only an early indication as we gradually increase exposure. Other factors have influenced these results, including the mix of products within each underwriting category, the methods of policy acquisition, and the specific details of each underwriting category, which can vary from one product to another and from one company to another.

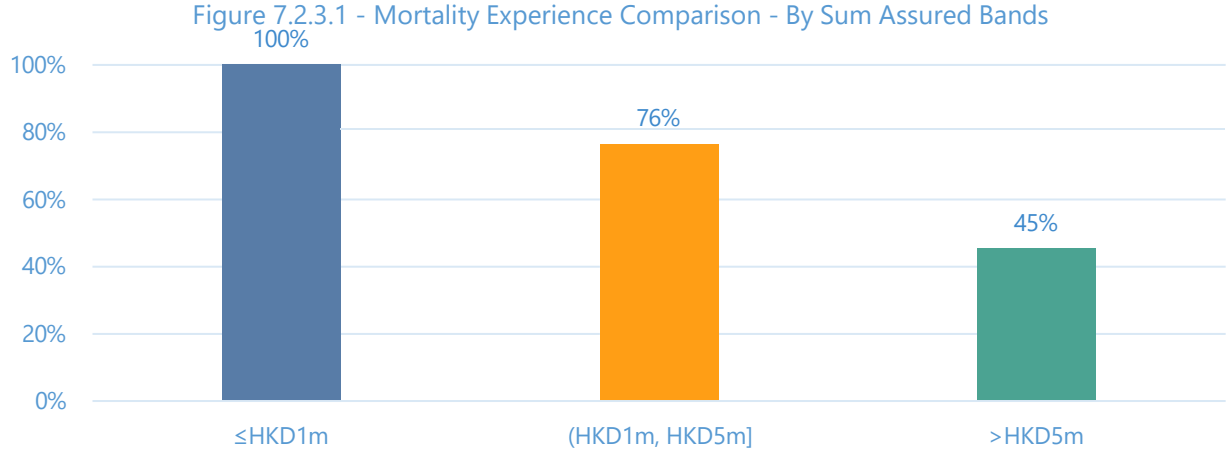
Figure 7.2.2.1 - Mortality Experience Comparison - By Underwriting Type



7.2.3 Sum Assured Band

The higher the sum assured, the more rigorous the underwriting requirements become. Therefore, it is not surprising that the mortality experience improves as the sum assured increases. However, it should be noted that most policies (representing 95% of the exposure data) had a sum assured at or below HKD 1 million.

Figure 7.2.3.1 - Mortality Experience Comparison - By Sum Assured Bands



8 Use of This Report

8.1 Use of HKA22

The following points should be noted when applying this mortality rate table for pricing, valuation, or any other purposes. Appropriate adjustments are required according to different purposes:

- The data is based predominantly on permanent assurance experience.
- The data excludes the first two years of policy duration.
- Despite the increase in overall exposure and claims compared to HKA18, the tables are based on a relatively small amount of data, especially for very young and old ages.
- The tables shall be applied to individual basic life products only.
- The data excludes policies issued by simplified underwriting or guaranteed issue.
- The tables pool data across eight calendar years from 2014 to 2021. Since the mid-point of this mortality study is the end of 2017, appropriate adjustments are required when this mortality study is used for different time periods.
- As this study covers data up to 2021, which has little impact from COVID-19, the effects of the pandemic are only partially captured. Additionally, this study does not attempt to quantify the magnitude of mortality improvement for future years. Therefore, the improvement in mortality experience from HKA18 to HKA22 should not be used as a basis for future mortality improvement.
- The tables pool data across all participating companies, and considerable variations in experience between companies and non-participants should be considered.

8.2 Disclaimer

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9 Reference List

1. McCutcheon, J. J. (1985). Experiments in Graduating the Data for the English Life Tables (No. 14). Transactions of the Faculty of Actuaries, 40, 135-147

2. Society of Actuaries (2018). Table Development.

3. Kirkwood T. B. (2015). Deciphering Death: A Commentary on Gompertz (1825) 'On the nature of the function expressive of the law of human mortality, and on a new mode of determining the value of life contingencies'. Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences, 370(1666), 20140379.

4. Census and Statistics Department. The Government of the Hong Kong Special Administrative Region

    - Hong Kong Life Tables
    - Hong Kong Annual Digest of Statistics, 2023 Edition
    - Population by Sex and Age Group
    - Deaths by Sex and Age group

5. Actuarial Society of Hong Kong (2020). Report on Hong Kong Assured Lives Mortality 2018

6. Report on China Assured Lives Mortality Investigation (2010-2013)

All links in references and footnotes last accessed February 2025.

10 Appendix

10.1 HKA22 Mortality Table

Hong Kong Assured Lives Mortality Table 2022 (Male) - HKA22(M)

Age *x*	Probability of dying between exact age *x* and age *x*+1 *q(x)*	Number of survivors at exact age *x* *l(x)*	Number of deaths between exact age *x* and age *x*+1 *d(x)*	Number of person-years lived between exact age *x* and age *x*+1 *L(x)*	Total person-years lived after exact age *x* *T(x)*	Expectation of life at exact age *x* *e(x)*
0	0.00088	1,000,000	877	999,255	84,171,601	84.17
1	0.00020	999,123	200	999,023	83,172,347	83.25
2	0.00010	998,923	98	998,875	82,173,323	82.26
3	0.00008	998,826	82	998,785	81,174,449	81.27
4	0.00007	998,744	69	998,710	80,175,664	80.28
5	0.00006	998,675	60	998,645	79,176,954	79.28
6	0.00005	998,616	53	998,589	78,178,309	78.29
7	0.00005	998,563	49	998,538	77,179,720	77.29
8	0.00005	998,513	48	998,489	76,181,182	76.29
9	0.00005	998,465	50	998,440	75,182,693	75.30
10	0.00006	998,415	55	998,387	74,184,253	74.30
11	0.00006	998,360	63	998,328	73,185,866	73.31
12	0.00007	998,296	75	998,259	72,187,538	72.31
13	0.00009	998,221	89	998,177	71,189,279	71.32
14	0.00011	998,133	105	998,080	70,191,102	70.32
15	0.00012	998,027	122	997,966	69,193,022	69.33
16	0.00014	997,905	138	997,836	68,195,056	68.34
17	0.00015	997,768	151	997,692	67,197,220	67.35
18	0.00016	997,617	162	997,535	66,199,528	66.36
19	0.00017	997,454	172	997,368	65,201,992	65.37
20	0.00018	997,282	181	997,192	64,204,624	64.38
21	0.00019	997,101	189	997,007	63,207,432	63.39
22	0.00020	996,912	199	996,813	62,210,426	62.40
23	0.00021	996,713	209	996,609	61,213,613	61.42
24	0.00022	996,505	220	996,395	60,217,004	60.43
25	0.00023	996,285	232	996,168	59,220,609	59.44
26	0.00025	996,052	245	995,930	58,224,441	58.46
27	0.00026	995,808	258	995,678	57,228,511	57.47
28	0.00027	995,549	272	995,413	56,232,832	56.48
29	0.00029	995,277	286	995,134	55,237,419	55.50
30	0.00030	994,991	301	994,840	54,242,285	54.52
31	0.00032	994,690	318	994,531	53,247,444	53.53
32	0.00034	994,371	337	994,203	52,252,914	52.55
33	0.00036	994,034	359	993,855	51,258,711	51.57
34	0.00039	993,675	385	993,483	50,264,856	50.58
35	0.00042	993,291	415	993,083	49,271,373	49.60
36	0.00045	992,875	451	992,650	48,278,290	48.62
37	0.00049	992,424	490	992,179	47,285,640	47.65
38	0.00054	991,934	532	991,668	46,293,461	46.67
39	0.00058	991,402	575	991,115	45,301,793	45.69
40	0.00062	990,827	617	990,519	44,310,678	44.72
41	0.00066	990,211	655	989,883	43,320,159	43.75
42	0.00070	989,555	690	989,210	42,330,276	42.78
43	0.00073	988,865	725	988,503	41,341,066	41.81
44	0.00077	988,140	763	987,759	40,352,563	40.84
45	0.00082	987,377	807	986,974	39,364,804	39.87
46	0.00088	986,570	864	986,138	38,377,830	38.90
47	0.00095	985,706	940	985,236	37,391,692	37.93
48	0.00106	984,766	1,041	984,245	36,406,457	36.97
49	0.00119	983,725	1,167	983,141	35,422,211	36.01
50	0.00134	982,558	1,319	981,899	34,439,070	35.05

Hong Kong Assured Lives Mortality Table 2022 (Male) - HKA22(M) - (cont.)

Age *x*	Probability of dying between exact age *x* and age *x*+1 *q(x)*	Number of survivors at exact age *x* *l(x)*	Number of deaths between exact age *x* and age *x*+1 *d(x)*	Number of person-years lived between exact age *x* and age *x*+1 *L(x)*	Total person-years lived after exact age *x* *T(x)*	Expectation of life at exact age *x* *e(x)*
51	0.00152	981,239	1,495	980,492	33,457,171	34.10
52	0.00173	979,744	1,692	978,898	32,476,680	33.15
53	0.00195	978,052	1,903	977,100	31,497,782	32.20
54	0.00217	976,149	2,117	975,091	30,520,681	31.27
55	0.00239	974,033	2,332	972,866	29,545,591	30.33
56	0.00263	971,700	2,553	970,423	28,572,724	29.40
57	0.00287	969,147	2,784	967,755	27,602,301	28.48
58	0.00314	966,363	3,031	964,847	26,634,546	27.56
59	0.00343	963,332	3,305	961,679	25,669,698	26.65
60	0.00377	960,026	3,619	958,217	24,708,019	25.74
61	0.00416	956,408	3,981	954,417	23,749,802	24.83
62	0.00462	952,426	4,397	950,228	22,795,385	23.93
63	0.00514	948,029	4,871	945,594	21,845,157	23.04
64	0.00573	943,159	5,406	940,456	20,899,563	22.16
65	0.00640	937,753	6,006	934,750	19,959,108	21.28
66	0.00716	931,747	6,674	928,410	19,024,358	20.42
67	0.00801	925,073	7,411	921,367	18,095,948	19.56
68	0.00897	917,661	8,229	913,547	17,174,581	18.72
69	0.01005	909,432	9,140	904,862	16,261,034	17.88
70	0.01128	900,293	10,159	895,213	15,356,171	17.06
71	0.01270	890,134	11,304	884,482	14,460,958	16.25
72	0.01434	878,830	12,599	872,530	13,576,476	15.45
73	0.01624	866,230	14,068	859,196	12,703,946	14.67
74	0.01845	852,162	15,723	844,301	11,844,750	13.90
75	0.02100	836,440	17,565	827,657	11,000,449	13.15
76	0.02392	818,875	19,586	809,082	10,172,792	12.42
77	0.02723	799,289	21,766	788,406	9,363,710	11.72
78	0.03096	777,523	24,072	765,487	8,575,304	11.03
79	0.03511	753,452	26,452	740,225	7,809,817	10.37
80	0.03970	726,999	28,858	712,570	7,069,591	9.72
81	0.04477	698,141	31,255	682,513	6,357,021	9.11
82	0.05039	666,886	33,604	650,084	5,674,508	8.51
83	0.05663	633,282	35,862	615,351	5,024,424	7.93
84	0.06358	597,420	37,983	578,429	4,409,072	7.38
85	0.07134	559,437	39,912	539,481	3,830,643	6.85
86	0.08064	519,525	41,894	498,578	3,291,162	6.33
87	0.09100	477,631	43,463	455,900	2,792,584	5.85
88	0.10268	434,168	44,582	411,878	2,336,684	5.38
89	0.11587	389,587	45,141	367,016	1,924,806	4.94
90	0.13075	344,445	45,037	321,927	1,557,790	4.52
91	0.14754	299,409	44,176	277,321	1,235,863	4.13
92	0.16649	255,233	42,494	233,986	958,543	3.76
93	0.18787	212,739	39,968	192,754	724,557	3.41
94	0.21200	172,770	36,628	154,456	531,802	3.08
95	0.23923	136,142	32,569	119,858	377,346	2.77
96	0.26995	103,573	27,960	89,593	257,488	2.49
97	0.30462	75,613	23,034	64,096	167,895	2.22
98	0.34375	52,579	18,074	43,542	103,799	1.97
99	0.38789	34,505	13,384	27,813	60,257	1.75
100	1.00000	21,121	21,121	32,443	32,443	1.54

Hong Kong Assured Lives Mortality Table 2022 (Female) - HKA22(F)

Age *x*	Probability of dying between exact age *x* and age *x*+1 *q(x)*	Number of survivors at exact age *x* *l(x)*	Number of deaths between exact age *x* and age *x*+1 *d(x)*	Number of person-years lived between exact age *x* and age *x*+1 *L(x)*	Total person-years lived after exact age *x* *T(x)*	Expectation of life at exact age *x* *e(x)*
0	0.00080	1,000,000	805	999,316	88,575,531	88.58
1	0.00020	999,195	203	999,094	87,576,215	87.65
2	0.00008	998,992	78	998,953	86,577,121	86.66
3	0.00006	998,914	59	998,885	85,578,168	85.67
4	0.00005	998,855	47	998,832	84,579,283	84.68
5	0.00004	998,808	42	998,788	83,580,451	83.68
6	0.00004	998,767	43	998,745	82,581,664	82.68
7	0.00004	998,724	45	998,701	81,582,918	81.69
8	0.00005	998,679	46	998,656	80,584,217	80.69
9	0.00005	998,633	48	998,609	79,585,561	79.69
10	0.00005	998,585	50	998,560	78,586,952	78.70
11	0.00005	998,535	53	998,508	77,588,392	77.70
12	0.00006	998,482	56	998,454	76,589,884	76.71
13	0.00006	998,426	59	998,397	75,591,430	75.71
14	0.00006	998,367	63	998,335	74,593,033	74.72
15	0.00007	998,304	68	998,270	73,594,698	73.72
16	0.00007	998,236	73	998,199	72,596,428	72.72
17	0.00008	998,163	79	998,123	71,598,228	71.73
18	0.00009	998,084	85	998,041	70,600,105	70.74
19	0.00009	997,999	92	997,953	69,602,064	69.74
20	0.00010	997,907	99	997,858	68,604,111	68.75
21	0.00011	997,808	106	997,755	67,606,253	67.75
22	0.00011	997,702	113	997,645	66,608,498	66.76
23	0.00012	997,589	121	997,528	65,610,853	65.77
24	0.00013	997,468	127	997,404	64,613,325	64.78
25	0.00013	997,341	134	997,274	63,615,920	63.79
26	0.00014	997,207	140	997,137	62,618,646	62.79
27	0.00015	997,066	147	996,993	61,621,510	61.80
28	0.00015	996,919	154	996,843	60,624,517	60.81
29	0.00016	996,766	161	996,685	59,627,674	59.82
30	0.00017	996,605	169	996,520	58,630,989	58.83
31	0.00018	996,436	178	996,347	57,634,469	57.84
32	0.00019	996,258	188	996,164	56,638,122	56.85
33	0.00020	996,069	201	995,969	55,641,959	55.86
34	0.00022	995,869	216	995,761	54,645,990	54.87
35	0.00023	995,653	233	995,536	53,650,229	53.88
36	0.00026	995,419	254	995,292	52,654,693	52.90
37	0.00028	995,165	279	995,026	51,659,401	51.91
38	0.00031	994,887	307	994,733	50,664,375	50.92
39	0.00034	994,580	339	994,410	49,669,642	49.94
40	0.00038	994,241	376	994,053	48,675,231	48.96
41	0.00042	993,865	418	993,656	47,681,178	47.98
42	0.00047	993,448	465	993,215	46,687,522	47.00
43	0.00052	992,983	518	992,724	45,694,307	46.02
44	0.00058	992,465	576	992,177	44,701,583	45.04
45	0.00065	991,889	641	991,568	43,709,406	44.07
46	0.00072	991,247	713	990,891	42,717,838	43.10
47	0.00080	990,535	790	990,140	41,726,947	42.13
48	0.00088	989,745	874	989,307	40,736,808	41.16
49	0.00098	988,870	964	988,388	39,747,500	40.19
50	0.00107	987,906	1,060	987,376	38,759,112	39.23

Hong Kong Assured Lives Mortality Table 2022 (Female) - HKA22(F) – (cont.)

Age *x*	Probability of dying between exact age *x* and age *x*+1 *q(x)*	Number of survivors at exact age *x* *l(x)*	Number of deaths between exact age *x* and age *x*+1 *d(x)*	Number of person-years lived between exact age *x* and age *x*+1 *L(x)*	Total person-years lived after exact age *x* *T(x)*	Expectation of life at exact age *x* *e(x)*
50	0.00107	987,906	1,060	987,376	38,759,112	39.23
51	0.00118	986,846	1,161	986,266	37,771,736	38.28
52	0.00128	985,685	1,266	985,052	36,785,470	37.32
53	0.00140	984,419	1,373	983,733	35,800,418	36.37
54	0.00151	983,046	1,482	982,305	34,816,685	35.42
55	0.00162	981,564	1,591	980,768	33,834,380	34.47
56	0.00173	979,973	1,700	979,123	32,853,612	33.53
57	0.00185	978,273	1,811	977,368	31,874,489	32.58
58	0.00197	976,462	1,925	975,500	30,897,121	31.64
59	0.00210	974,537	2,046	973,514	29,921,622	30.70
60	0.00224	972,491	2,175	971,404	28,948,108	29.77
61	0.00239	970,316	2,317	969,158	27,976,704	28.83
62	0.00256	968,000	2,475	966,762	27,007,546	27.90
63	0.00275	965,524	2,656	964,196	26,040,784	26.97
64	0.00298	962,868	2,866	961,435	25,076,588	26.04
65	0.00324	960,003	3,113	958,446	24,115,152	25.12
66	0.00356	956,890	3,405	955,187	23,156,706	24.20
67	0.00393	953,485	3,747	951,611	22,201,519	23.28
68	0.00437	949,738	4,150	947,663	21,249,908	22.37
69	0.00489	945,588	4,621	943,278	20,302,245	21.47
70	0.00550	940,967	5,173	938,381	19,358,967	20.57
71	0.00622	935,794	5,819	932,885	18,420,586	19.68
72	0.00707	929,976	6,573	926,689	17,487,701	18.80
73	0.00807	923,402	7,455	919,675	16,561,012	17.93
74	0.00926	915,947	8,484	911,705	15,641,337	17.08
75	0.01067	907,463	9,684	902,621	14,729,632	16.23
76	0.01234	897,779	11,078	892,240	13,827,011	15.40
77	0.01432	886,701	12,695	880,354	12,934,771	14.59
78	0.01666	874,006	14,562	866,725	12,054,418	13.79
79	0.01944	859,445	16,707	851,091	11,187,692	13.02
80	0.02273	842,737	19,158	833,158	10,336,601	12.27
81	0.02663	823,579	21,936	812,611	9,503,443	11.54
82	0.03125	801,644	25,053	789,117	8,690,832	10.84
83	0.03671	776,590	28,510	762,335	7,901,715	10.17
84	0.04316	748,080	32,285	731,937	7,139,379	9.54
85	0.05075	715,795	36,330	697,630	6,407,442	8.95
86	0.05500	679,465	37,367	660,781	5,709,812	8.40
87	0.05959	642,098	38,263	622,966	5,049,031	7.86
88	0.06457	603,835	38,990	584,340	4,426,064	7.33
89	0.06997	564,845	39,520	545,085	3,841,724	6.80
90	0.07946	525,325	41,744	504,453	3,296,639	6.28
91	0.09025	483,581	43,644	461,759	2,792,186	5.77
92	0.10250	439,937	45,095	417,389	2,330,427	5.30
93	0.11642	394,842	45,967	371,858	1,913,038	4.85
94	0.13222	348,874	46,130	325,810	1,541,179	4.42
95	0.15017	302,745	45,465	280,013	1,215,370	4.01
96	0.17056	257,280	43,882	235,339	935,357	3.64
97	0.19372	213,398	41,339	192,729	700,018	3.28
98	0.22002	172,059	37,856	153,131	507,290	2.95
99	0.24988	134,204	33,535	117,436	354,158	2.64
100	1.00000	100,668	100,668	236,722	236,722	2.35