Stroke incidence and mortality trends in Hong Kong: implications for public health education efforts and health resource utilisation

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KEY MESSAGES

1. There has been a decline in age-standardised stroke incidence and case fatality between 1999 and 2007, the latter being less steep.
2. Health promotion efforts, improvement in socio-economic circumstances and hospital treatment may be contributing factors.
3. Although the incidence of stroke has declined, the continually ageing population, the static incidence of recurrent stroke, and the decline in case fatality will result in an increase in the absolute number of people with stroke, particularly among the elderly. Hence, declining incidence may not necessarily translate into a reduced demand for rehabilitation and long-term care services.
4. The higher incidence of stroke in men than women suggests that there is room for improvement in primary prevention in men.

Hong Kong Med J 2014;20(Suppl 3):S24-9
HHSRF project number: 06070451

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Introduction

Cerebrovascular disease is the second commonest cause of death and disease burden (measured as disability-adjusted life years) for persons aged 60+ years worldwide.[1] In Hong Kong, it is one of the three commonest causes of hospital admissions accounting for the largest number of hospital bed days, and is the commonest condition warranting long-term residential care. All these give rise to a considerable disease and disability burden.[2]

A review of stroke incidence and mortality trends with respect to age and gender may reflect the outcome of public health risk reduction initiatives: whether changes in incidence and mortality result in compression of morbidity or an increase in disease and disability burden, and whether the disease occurs in successively older age groups, particularly in older women. These data provide information for predicting health and social care resource required for cerebrovascular disease in future years.

Methods

This study was conducted from December 2008 to November 2009. The database of the Clinical Management System of all hospitals of the Hospital Authority was used. The ICD code 430-8 covering all strokes (ischaemic or haemorrhagic) was used. If the date of admission was within 30 days from last discharge, it was counted as one episode. Admissions after 30 days were considered a new episode. To distinguish a new stroke from recurrent or old stroke, the first year in which the diagnosis was made was considered as new (first episode) stroke. The same patient (number) admitted with a diagnostic coding of ICD 430-7 (new stroke) in subsequent years were classified as recurrent strokes, whereas those with ICD 438 (late effect of cerebrovascular disease) were classified as old strokes.

The total number of new and recurrent stroke patients occurring each year from 1999 to 2007 and their linkage to death certificates until 31 May 2008 were recorded. Age-specific stroke incidences were calculated for the age-groups of 35-44, 45-54, 55-64, 65-74, 75-84, and ≥85 years using the gender and age-specific stroke cases as the numerators and age-specific population sizes from the Hong Kong Census and Statistics Department as the denominators. This was done for the overall population and separately by gender and calendar year.

The death of stroke patients was ascertained by matching the hospitalisation records and the death records of patients (including deaths outside hospitals) using the unique Hong Kong identity card number. Dates of death were used to code the 30-day, 60-day, and 365-day case fatality. The 30-day (90-day/365-day) case fatality was the proportion of stroke patients who died within 30 days (90 days/365 days) after onset of symptoms from the first admission date of the episode. For 365-day case fatality, data was truncated on 1 June 2007 because there was censored information, as the cohort was

followed up until 31 May 2008.

Age-standardised rates were also calculated by gender and calendar year to facilitate comparisons controlling for age. We used the direct method with the mid-2006 Hong Kong population to standardise trends in incidences, whereas the total number of episodes (all new and recurrent strokes) from 1999 to 2007 was used to standardise trends in case fatality.

Poisson and negative binomial regression models were used to estimate relative risks (RR), 95% confidence intervals (CI) and P values for comparisons between genders and calendar year (grouped as 1999-2001, 2002-2004, and 2005-2007) while controlling for age. Evidence for heterogeneity of the effect of age-groups and years for different genders was determined by including their pair-wise product terms (ie gender x age and gender x year) in addition to the individual variables in a Poisson regression model. We also used negative binomial regression (a generalisation of Poisson regression) if there was evidence of over dispersion of data (variance of outcome greater than the mean). A significance level of 0.05 was used.

Results

Trends of stroke incidence

Between 1999 and 2007, 166 355 stoke episodes (118 414 new, 33 736 recurrent, and 14 205 old) were identified among patients aged ≥35 years.

The age- and sex-specific crude incidences and age-standardised incidences of strokes (new, recurrent, and old) are shown in Table 1. The incidences for both males and females rose sharply with each decade of age. Age-specific rates in males were higher than those in females, except for males aged ≥85 years in 2002, 2003, and 2005 having new strokes, and males aged 35-44 years in 1999 and 2002, aged 75-84 years in 1999 and 2000, and aged ≥85 in 1999 and 2005 having old strokes. The age-standardised incidences were also generally higher in men than women, and the incidences of new stroke steadily decreased from 1999 to 2007 in both genders with an exception in 2004 for men. The rate ranged from 526.4 per 100 000 persons amongst men in 1999 to 353.5 in 2007 and from 440.1 per 100 000 persons amongst women in 1999 to 279.4 in 2007. However, such a downward trend was not apparent for recurrent and old stroke incidences.

Trends in the 30-day, 90-day and 365-day case fatality of stroke patients

Crude and standardised case fatality within 30, 90, and 365 days are summarised in Table 2. The rates were larger among the patients aged ≥75 years in both sexes. Age-standardised case fatality of strokes in females were slightly higher than those in males. From 1999 to 2007, within a month of hospital admission, the age-standardised case fatality were ~11% in men and ~13% in women; at 90 days they were ~14% in men and ~16% in women; at 365 days they were ~21% in men and ~23% in women. A decline of case fatality for stroke was noted only from 1999 to 2001 but not thereafter.

Regression models of incidence and case fatality for stroke patients

The RRs of stroke incidences by time period and comparison between women and men after adjusting for age are summarised in Table 3. During the study period, the RRs decreased significantly by 21% for new strokes, whereas for recurrent strokes, the RRs increased by 34%. This contradiction might be due to misclassification of recurrent strokes as new strokes (particularly in 1999-2001). When new and recurrent strokes were combined, the incidences decreased significantly over the years but the size of the effect was diminished to 13%. The adjusted RRs for the incidence for women versus men were dependent on age-group (test for interaction, P<0.0001). Although women had a lower incidence than men, the female-to-male RR gradually increased with age (for new and recurrent strokes combined, in those aged 55-64 years, RR=0.57, 95% CI=0.53-0.62; for those aged ≥85 years, RR=0.93, 95% CI=0.86-1.01). Similar results were also obtained for new and recurrent strokes.

With respect to case fatality, using the time period 1999-2001 as reference, the adjusted RRs of the two consecutive time periods of 30-, 90-, and 365-day case fatalities were also reduced by 5% (data not shown). Similar to the findings for incidence, the sex effect depended on age-group. Women aged 35-44 years had significantly lower case fatality than men (RR=0.78, 95% CI=0.64-0.96). For those aged 45-74 years, there was no significant difference between the genders. For those aged ≥75 years, women had a 7% to 16% higher 30-day case fatality than men. There was no significant interaction between sex and year in terms of age-adjusted incidence and case fatality.

Discussion

The declining incidence of new stroke over the 9-year period is compatible with observations among Caucasian populations in the UK[3] and Europeans in New Zealand.[4] The declining trend may be due to the success of primary prevention achieving reduction in cardiovascular risk factors.

The incidence of recurrent stroke did not follow the pattern for new stroke. Instead, there was a slight increasing trend, suggesting that either there was room for improvement in secondary prevention (use of warfarin and antiplatelet drugs,

TABLE 1. Crude and age-standardised rates (based on the mid-2006 Hong Kong population) of new, recurrent, and old strokes in Hong Kong, 1999-2007 (rate per 100 000)

Age group (years)	No. of strokes in female/male/both			
	1999	2000	2001	2002
New stroke				
35-44	21.3/40.6/30.7	22.6/38.8/30.4	19.3/36.0/27.2	20.1/41.0/29.9
45-54	104.0/146.3/125.9	96.7/130.5/114.1	88.6/123.9/106.6	86.3/133.7/110.2
55-64	337.5/548.0/450.9	310.0/511.9/418.5	301.2/457.9/385.2	266.5/462.3/370.4
65-74	937.3/1260.0/1097.9	842.4/1130.5/986.3	786.8/1054.2/920.7	738.2/1042.4/890.6
75-84	1949.6/2318.0/2104.2	1707.0/2020.4/1839.7	1539.2/1977.5/1725.3	1484.9/1817.7/1626.9
85+	3083.6/3411.0/3178.2	2661.5/2950.9/2747.3	2402.3/2449.0/2416.9	2217.2/2136.8/2192.0
Total (crude)	408.2/459.7/433.8	363.2/415.3/388.9	335.6/393.0/363.7	319.7/391.7/354.6
Total (age-adjusted)	440.1/526.4/481.5	391.9/470.7/429.8	359.9/437.8/397.2	338.8/426.0/380.6
Recurrent stroke				
35-44	1.6/4.2/2.9	3.9/7.2/5.5	4.5/6.3/5.4	4.9/5.2/5.0
45-54	5.3/11.7/8.6	16.9/20.0/18.5	17.1/20.3/18.7	14.5/20.3/17.4
55-64	30.8/50.1/41.2	51.9/106.6/81.3	57.3/111.5/86.4	50.4/117.9/86.3
65-74	99.2/159.0/128.9	196.3/268.5/232.4	208.4/295.4/252.0	202.9/313.2/258.2
75-84	243.9/285.4/261.3	410.7/530.6/461.4	452.5/615.5/521.7	469.2/641.3/542.6
85+	314.8/369.9/330.7	596.9/674.8/620.0	641.9/821.4/698.1	714.0/783.0/735.6
Total (crude)	43.4/51.9/47.6	80.4/95.0/87.6	87.5/107.0/97.1	89.2/113.3/100.9
Total (age-adjusted)	46.6/59.1/52.5	86.4/108.1/96.7	93.5/120.2/106.2	94.6/124.4/108.8
Old stroke				
35-44	1.2/0.6/0.9	0.7/1.1/0.9	1.0/2.3/1.6	2.5/2.4/2.4
45-54	4.8/6.1/5.5	2.9/6.6/4.8	4.2/9.5/6.9	9.8/12.9/11.4
55-64	16.5/31.9/24.8	14.3/31.3/23.4	24.0/38.2/31.6	35.8/69.4/53.6
65-74	77.0/102.8/89.8	62.9/83.3/73.1	80.1/123.2/101.7	132.8/189.6/161.3
75-84	239.8/216.9/230.2	205.4/200.9/203.5	258.7/308.8/279.9	357.2/460.9/401.5
85+	507.0/369.9/467.3	356.6/472.4/390.9	465.1/505.1/477.6	509.7/684.0/564.3
Total (crude)	42.0/35.1/38.6	33.6/33.3/33.4	44.2/48.2/46.2	63.3/74.9/68.9
Total (age-adjusted)	47.0/41.2/44.4	37.2/39.4/38.3	48.5/54.8/51.5	67.5/83.1/74.8

control of hypertension and diabetes), or that secondary prevention is less effective than primary prevention. A history of stroke is a strong risk factor for subsequent stroke.

There was a small decrease in case fatality over this period, which was less steep than that in incidence. It has been documented that acute stroke units reduce mortality and also subsequent dependency.[5] At the beginning of the study period, stroke units had just been set up in hospitals, and all patients would undergo computed tomography of the brain within a very short period, followed by drug or surgical consultation where appropriate. This development may have contributed to the decline in case fatality.

In terms of the trend of disease burden, the steeper decline in incidence than case fatality suggests that disease burden may follow a decreasing trend. However, this is counteracted by a slight increase in recurrent stroke, so that there is unlikely to be any marked change in the total disease burden from stroke.

Theoretically, although decline in incidence contributes to reducing the number of new strokes, the ageing population, the static incidence of recurrent strokes, and the decline in case fatality can result in an increase in the absolute number of people with stroke, particularly among the elderly. The higher incidence and lower case fatality in men than women suggests that the absolute number of older men with stroke may increase, which has implications for long-term care, in that male gender is one of the independent risk factors for opting for long-term care in an institution. Although the demand for

No. of strokes in female/male/both				
2003	**2004**	**2005**	**2006**	**2007**
22.6/39.8/30.5	21.8/38.4/29.4	24.0/39.0/30.7	22.1/40.6/30.3	23.9/43.4/32.4
78.6/130.7/104.7	89.7/146.4/117.9	81.6/131.8/106.5	83.5/129.8/106.4	84.5/136.4/110.0
236.6/405.6/325.7	240.7/429.6/339.5	223.3/386.4/307.9	213.2/376.0/296.8	200.2/363.3/283.2
646.1/911.8/779.7	641.3/994.6/819.2	625.9/887.9/757.9	584.1/869.1/728.1	582.6/827.7/706.6
1325.5/1597.8/1442.2	1354.6/1686.2/1496.8	1318.7/1560.0/1423.1	1259.4/1514.6/1370.8	1210.4/1405.2/1296.5
2317.3/2108.6/2253.1	2134.0/2285.7/2181.0	2126.3/2089.5/2114.9	1828.0/2014.0/1886.4	1852.7/2078.2/1923.4
298.3/358.0/327.1	302.4/392.1/345.4	298.0/364.2/329.5	283.8/364.6/322.1	283.7/360.9/320.1
313.0/382.5/346.3	312.8/410.6/359.3	303.7/373.3/336.7	283.8/364.6/322.1	279.4/353.5/314.4
2.7/6.5/4.4	5.2/8.7/6.8	5.1/7.0/5.9	5.0/7.8/6.2	3.6/8.9/5.9
15.1/19.9/17.5	18.3/29.0/23.6	16.1/26.2/21.1	17.4/27.2/22.3	15.0/24.1/19.5
50.9/108.9/81.5	50.9/103.4/78.4	53.0/108.3/81.7	48.8/102.2/76.2	57.0/102.5/80.2
189.4/309.9/249.9	203.0/360.5/282.3	192.4/337.7/265.5	205.2/341.8/274.2	214.3/333.6/274.7
490.7/640.0/554.7	552.0/723.9/625.7	510.5/770.0/622.7	484.2/640.4/552.4	508.5/667.7/578.9
636.5/773.8/678.7	769.8/949.6/825.5	764.9/809.3/778.7	741.2/859.6/778.4	753.0/928.3/808.0
87.9/113.9/100.5	100.7/133.1/116.2	97.2/133.5/114.5	97.5/129.2/112.5	102.6/133.6/117.2
92.0/122.4/106.4	104.1/139.7/120.9	99.2/137.3/117.2	97.5/129.2/112.5	100.9/130.5/115.0
1.4/3.9/2.6	2.0/3.8/2.8	1.4/3.1/2.2	1.7/3.8/2.6	3.3/3.5/3.4
6.5/14.7/10.6	5.9/9.9/7.9	7.9/11.5/9.7	6.3/9.4/7.8	7.4/12.2/9.8
25.6/50.4/38.7	21.5/35.1/28.6	13.7/33.1/23.7	17.0/34.8/26.1	17.7/28.9/23.4
73.7/150.1/112.1	65.1/111.4/88.4	49.3/76.6/63.0	58.5/101.9/80.4	64.7/99.8/82.5
222.3/327.8/267.5	165.8/212.1/185.6	134.0/158.3/144.5	148.6/187.3/165.5	144.4/195.5/167.0
481.9/574.7/510.4	305.7/424.4/342.4	278.9/260.7/273.3	249.2/315.8/270.1	260.4/358.3/291.1
43.7/60.1/51.6	33.8/43.3/38.4	28.6/34.0/31.2	30.7/40.8/35.5	32.9/42.5/37.4
46.5/64.9/55.2	35.2/45.6/40.1	29.3/35.0/32.0	30.7/40.8/35.5	32.4/41.5/36.7

services can be projected approximately based on an estimate of the absolute numbers of people with stroke, collection of more primary data regarding stroke outcome in various age-groups is needed to provide more accurate estimates. Efforts in primary prevention appear effective; strategies could be devised specifically for men, whereas the effectiveness of secondary prevention efforts could be reviewed.

One of the limitations of this study was that the category 'old stroke' may have been underestimated, as it might not be the primary diagnosis for admission, and therefore omitted, particularly when there were multiple morbidities. For example it is difficult to explain the apparent sharp peak in incidence of old stroke in 2002. In addition, owing to the definition of recurrent stroke used for the extraction of data, some recurrent strokes may have been misclassified as new strokes if the strokes occurred before 1 January 1999, and thus the reported incidence for recurrent stroke in the first few years of the dataset was artificially low, whereas the reported incidence of new strokes in the first few years was artificially high. Misclassification of new and recurrent strokes may partly explain the decreasing trend in new strokes and the increasing trend in recurrent strokes. These were inherent limitations affecting the analyses of secondary datasets.

Conclusions

There was a decline in both age-standardised stroke incidence (new and recurrent combined) and case fatality between 1999 and 2007, the latter decline being less steep. This may be due to health promotion efforts and improvement in socio-

TABLE 2. Crude and age-standardised fatality for stroke within 30, 90, and 365 days of onset in Hong Kong during 1999-2007 (rate per 100)

Age group (years)	No. of stroke fatalities in female/male/both								
	1999	2000	2001	2002	2003	2004	2005	2006	2007
30-day fatality									
35-44	11.0/11.7/11.5	6.5/11.4/9.5	5.9/10.9/9.0	7.8/9.9/9.1	11.6/11.9/11.8	5.7/8.2/7.2	9.8/10.2/10.0	7.9/10.1/9.2	8.9/11.4/10.4
45-54	8.4/9.5/9.1	7.7/9.4/8.7	6.5/8.8/7.8	9.3/8.5/8.8	9.0/9.4/9.2	8.1/8.9/8.6	7.7/6.7/7.1	7.7/8.1/8.0	6.5/8.4/7.7
55-64	10.7/8.7/9.4	6.6/8.7/8.0	8.2/6.9/7.4	5.8/7.9/7.2	7.0/9.3/8.5	7.1/6.9/7.0	7.1/7.8/7.5	6.5/6.7/6.6	6.1/7.5/7.0
65-74	10.2/10.3/10.2	10.2/10.2/10.2	10.8/9.6/10.1	10.5/8.5/9.3	9.8/9.2/9.4	8.8/8.6/8.7	9.8/10.1/9.9	9.8/9.6/9.7	8.3/9.8/9.2
75-84	14.9/14.2/14.5	13.7/13.7/13.7	13.9/11.1/12.5	13.3/12.3/12.8	14.4/12.9/13.7	12.8/12.6/12.7	14.5/12.6/13.5	13.9/13.5/13.7	13.3/13.2/13.2
85+	22.7/19.4/21.7	23.6/19.1/22.1	17.6/16.4/17.2	19.1/17.8/18.7	24.4/20.3/23.1	19.4/17.0/18.6	20.5/16.6/19.3	19.6/18.2/19.2	21.0/18.1/20.0
Total (crude)	13.8/11.6/12.6	12.9/11.4/12.1	12.3/10.0/11.1	12.4/10.2/11.2	14.0/11.2/12.5	12.0/10.2/11.0	13.2/10.6/11.8	12.7/10.9/11.7	12.4/11.1/11.7
Total (age-adjusted)	14.1/11.8/12.9	13.3/11.6/12.4	12.5/10.1/11.2	12.4/10.3/11.3	13.8/11.2/12.5	11.9/10.1/10.9	13.0/10.6/11.7	12.6/10.8/11.6	12.1/10.9/11.5
90-day fatality									
35-44	11.0/12.8/12.1	8.1/12.0/10.5	5.9/12.4/9.9	7.8/11.6/10.1	12.7/12.6/12.7	6.7/8.2/7.6	10.7/10.2/10.4	7.9/10.1/9.2	10.5/12.5/11.7
45-54	9.9/11.1/10.6	8.7/10.2/9.6	7.5/9.5/8.7	9.9/10.0/10.0	10.2/10.5/10.4	9.1/10.1/9.7	8.6/7.4/7.9	8.4/8.8/8.6	7.5/9.2/8.5
55-64	12.0/10.4/11.0	8.1/10.1/9.5	9.1/8.1/8.5	7.3/9.0/8.4	8.4/10.5/9.8	8.5/8.7/8.6	8.0/9.0/8.6	7.8/8.5/8.2	7.2/8.8/8.2
65-74	12.6/12.9/12.8	12.5/12.7/12.6	13.2/12.0/12.5	12.9/11.0/11.8	11.6/11.6/11.6	10.8/11.4/11.2	12.0/12.6/12.3	11.3/11.7/11.6	10.8/12.1/11.6
75-84	19.5/18.6/19.1	17.8/17.7/17.8	17.9/15.1/16.5	17.2/16.9/17.1	19.1/17.5/18.3	16.5/16.9/16.7	18.1/16.9/17.5	17.2/17.3/17.2	16.8/17.6/17.2
85+	30.1/28.8/29.7	31.3/25.7/29.5	24.4/25.3/24.7	26.7/25.5/26.3	31.6/27.9/30.5	26.3/24.2/25.6	28.8/25.5/27.7	26.3/24.9/25.9	28.7/28.4/28.6
Total (crude)	17.5/14.9/16.1	16.5/14.2/15.3	15.7/13.0/14.3	16.0/13.3/14.5	17.8/14.3/15.9	15.4/13.3/14.3	16.9/13.7/15.2	15.8/13.6/14.6	16.1/14.4/15.2
Total (age-adjusted)	18.0/15.2/16.5	17.0/14.4/15.7	16.0/13.0/14.4	16.1/13.4/14.7	17.6/14.3/15.8	15.2/13.3/14.2	16.6/13.6/15.0	15.5/13.5/14.4	15.6/14.1/14.8
365-day fatality*									
35-44	12.3/15.9/14.6	10.3/14.0/12.6	7.6/14.6/11.9	10.0/12.6/11.6	14.9/13.0/13.7	6.7/8.5/7.8	12.2/12.1/12.2	9.5/12.0/11.0	10.7/13.6/12.4
45-54	11.9/13.7/13.0	10.9/12.3/11.7	8.7/11.4/10.3	11.5/11.8/11.7	11.8/12.5/12.2	10.9/11.6/11.3	10.0/9.8/9.9	9.5/11.2/10.5	9.6/12.1/11.1
55-64	14.7/13.8/14.1	11.2/13.4/12.7	12.1/11.8/11.9	8.9/13.0/11.7	11.4/13.7/12.9	10.3/11.8/11.3	10.9/12.1/11.7	10.5/12.0/11.5	11.3/12.8/12.3
65-74	17.5/18.9/18.3	17.8/18.9/18.4	17.4/17.8/17.6	17.8/17.3/17.5	16.1/17.8/17.1	14.7/17.2/16.3	16.0/17.9/17.1	15.4/17.7/16.8	15.5/17.5/16.7
75-84	27.5/30.9/29.1	25.9/28.3/27.0	25.9/24.2/25.1	25.4/26.9/26.1	26.7/27.6/27.1	23.9/26.8/25.3	25.8/26.1/26.0	24.5/26.3/25.4	25.6/28.5/27.0
85+	46.1/47.1/46.4	44.9/40.8/43.6	37.5/37.8/37.6	41.2/41.7/41.3	43.6/44.4/43.8	40.9/40.5/40.8	42.4/40.8/41.9	40.3/39.4/40.0	39.5/48.1/42.4
Total (crude)	24.8/22.4/23.5	23.6/21.2/22.3	22.3/19.4/20.8	23.1/20.3/21.6	24.5/21.2/22.7	22.2/20.1/21.0	23.9/20.3/21.9	22.6/20.4/21.4	23.5/22.4/22.9
Total (age-adjusted)	25.5/23.0/24.1	24.3/21.5/22.8	22.7/19.4/21.0	23.2/20.5/21.8	24.1/21.2/22.6	21.9/20.0/20.9	23.3/20.0/21.6	22.1/20.0/21.0	22.5/21.5/22.0

* Stroke episodes were up to 31 May 2007

TABLE 3. Adjusted period effects and sex effects for various age-groups on stroke incidence in Hong Kong (1999-2007) estimated by relative risk (RR)

Parameter	New stroke (negative binomial regression)		Recurrent stroke (Poisson regression)		Both (negative binomial regression)	
	RR (95% CI)	P value	RR (95% CI)	P value	RR (95% CI)	P value
Period						
1999-2001	1.00		1.00		1.00	
2002-2004	0.86 (0.81-0.90)	<0.001	1.30 (1.27-1.34)	<0.001	0.92 (0.89-0.96)	<0.001
2005-2007	0.79 (0.75-0.83)	<0.001	1.34 (1.30-1.37)	<0.001	0.87 (0.84-0.91)	<0.001
Age-group (years)	Women vs men		Women vs men		Women vs men	
35-44	0.55 (0.49-0.62)		0.59 (0.51-0.70)		0.56 (0.51-0.62)	
45-54	0.65 (0.59-0.72)		0.68 (0.62-0.75)		0.66 (0.61-0.71)	
55-64	0.59 (0.53-0.65)		0.50 (0.46-0.53)		0.57 (0.53-0.62)	
65-74	0.71 (0.64-0.78)		0.63 (0.60-0.65)		0.69 (0.64-0.74)	
75-84	0.83 (0.75-0.91)		0.75 (0.72-0.77)		0.81 (0.75-0.87)	
85+	0.96 (0.87-1.06)		0.85 (0.80-0.90)		0.93 (0.86-1.01)	

economic circumstances and hospital treatment. This may not necessarily translate into a reduction in demand for rehabilitation and long-term care services, because of population ageing. The higher incidence in men than women shows that there is room for improvement in primary prevention in men. Efforts in primary prevention appear effective; strategies could be devised specifically for men, whereas the effectiveness of secondary prevention efforts could be reviewed.

Acknowledgement

This study was supported by the Health and Health Services Research Fund, Food and Health Bureau, Hong Kong SAR Government (#06070451).

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