MINISTRY OF HEALTH
SINGAPORE

SINGAPORE STROKE REGISTRY REPORT NO. 4

TRENDS IN STROKE IN SINGAPORE 2005 - 2013

NATIONAL REGISTRY OF DISEASES OFFICE

SINGAPORE STROKE REGISTRY REPORT NO. 4

TRENDS IN STROKE IN SINGAPORE 2005 - 2013

Application for written permission should be addressed to :

Deputy Director
National Registry of Diseases Office
Health Promotion Board
Level 5, 3 Second Hospital Avenue
Singapore 168937

Fax : (65) 6536-5307
Email : hpb_servicenrdo@hpb.gov.sg

Citation to source is appreciated for content used from this publication.

Suggested Source Citation

Singapore Stroke Registry
National Registry of Diseases Office
Ministry of Health, Singapore

FOREWORD

Since its set-up in 2001, the National Stroke Registry has worked hard to collect data on stroke in Singapore. The information collected includes data on age, gender, ethnicity, stroke risk factors, stroke subtype, performance of investigations, administered treatments, provision of care, complications, and outcome at time of hospital discharge.

This report would not have been possible without the whole-hearted support of many people and organisations, who made data available, collected data, analysed data, prepared reports, and provided guidance. I am particularly grateful to the registry coordinators who have worked tirelessly and spared no effort to carefully extract valuable data, and statisticians who have painstakingly analysed the data.

I am sure the information in this report will be helpful to anyone interested in and caring for patients with stroke.

Dr N V Ramani
Chairman
Singapore Stroke Registry Advisory Committee

SINGAPORE STROKE REGISTRY ADVISORY COMMITTEE

Chairman	Dr NV Ramani Consultant, Raffles Hospital
Members	Dr Aftab Ahmad Associate Consultant, Jurong General Hospital (Alexandra Hospital)
	Dr Ang Yan Hoon Senior Consultant, Khoo Teck Puat Hospital
	Dr Bernard Chan Senior Consultant, National University Hospital
	Dr Chang Hui Meng Senior Consultant, National Neuroscience Institute
	Dr Chow Khuan Yew Deputy Director (NRDO), Research and Strategic Planning Division, HPB
	Assoc Prof Kong Keng He Senior Consultant, Tan Tock Seng Hospital
	Dr Sherry Young Senior Consultant, Changi General Hospital
	Dr Tang Kok Foo Consultant Neurologist, Mount Elizabeth Hospital

NATIONAL REGISTRY OF DISEASES OFFICE

Registry Coordinators	Ms Koh Geok Yan
	Ms Yeo Nguang Luang
	Ms Teo Wan Cheng
	Ms Lim Mui Yang
	Ms Lucille Hoi
Epidemiologist	Dr Jin Aizhen
Data Management	Mr William Ho

Contents

1. GLOSSARY

AAPC	Average Annual Percent Change
ASIR	Age-Standardised Incidence Rate
ASMR	Age-Standardised Mortality Rate
ASR	Age-Standardised Rate
CFR	Case Fatality Rate
CIR	Crude Incidence Rate
CMR	Crude Mortality Rate
CR	Crude Rate
95%CI	95% Confidence Interval

2. INTRODUCTION

The primary aim of the National Registry of Diseases Office (NRDO) is to collect and analyse data to support the national disease management plans, policy formulation and programme planning.

The Singapore Stroke Registry was set up in 2002 to obtain epidemiological and clinical data on stroke cases diagnosed in Singapore from all public hospitals.

Stroke is a significant cause of death and disability in Singapore. In 2013, stroke was the 4th highest cause of death, accounting for 8.9% of total deaths in Singapore[1]. In 2004, stroke was the second highest cause of premature mortality and the sixth highest cause of disability burden[2]. It was also the third highest cause of the overall burden of disease burden in Singapore.

1 .https://www.moh.gov.sg/content/moh_web/home/statistics/Health_Facts_Singapore/Principal_Causes_of_Death.html
2.https://www.moh.gov.sg/content/dam/moh_web/Publications/Reports/2014/Singapore%20Burden%20of%20Disease%20Study%202010%20Report_v2.pdf

DATA SOURCES AND COLLECTION

This report is based on the data collected for the year 2005– 2013 for all residents (Singapore Citizens & Permanent Residents) aged 15 years and above, as at 29th July 2014. The data used was mainly from Mediclaims listing. Case finding was supplemented by Hospital In-patient Discharge Summary (HIDS) review and death registry from the Ministry of Home Affairs (MHA). Name lists from Mediclaims, HIDS and MHA were merged using the NRIC number to obtain the master patient list. The patient lists for the respective hospitals were generated from the master list. Case notes were then traced from the medical record offices at the respective hospitals and the cases were verified by the registry coordinators. We have also included, from year 2011 onwards for the first time, cases that were diagnosed and also those that died, at emergency departments of the various hospitals.

Cases extracted from Mediclaims, HIDS and MHA were coded based on the International Classification of Diseases 9th Revision (ICD-9 Clinical Modification). It covered ICD–9 codes: 430, 431, 432, 433, 434, 436 and 437 while excluding 432.1 (Subdural haemorrhage), 435 (Transient cerebral ischaemia) and 438 (Late effects of cerebrovascular disease) during 2005-2011, while including ICD-10 Australian Modification (ICD-10-AM) codes I60-I68 and excluding I62.0, I62.1 for year 2012 and 2013.

The MONICA (Monitoring Trends and Determinants in Cardiovascular Disease, World Health Organization) criteria were used for episode management. Recurrence of stroke after 28 days of the preceding recorded stroke episode was counted as another episode. Stroke episodes that occurred within the year 2005 to 2013 were recorded. Once the cases were verified, data was captured electronically into registry forms which were later uploaded and transferred into the database in the National Registry of Diseases System.

There are two types of stroke: ischaemic and haemorrhagic stroke. Ischaemic stroke is more common (about 80% of all strokes in Singapore) and occurs when a blood vessel becomes blocked, usually by a blood clot. Haemorrhagic stroke occurs when a blood vessel in the brain bursts or breaks, causing bleeding in or around the brain.

The analysis covers public hospitals in Singapore namely Alexandra Hospital, Changi General Hospital, Kandang Kerbau Women's & Children's Hospital, Khoo Teck Puat Hospital, National University Hospital, Singapore General Hospital, and Tan Tock Seng Hospital. Data from private hospitals (about 6% of all stroke episodes) are not included in the analysis.

This report can be downloaded at National Registry of Diseases Office website: www.nrdo.gov.sg.

DATA CLEANING AND ANALYSIS

The data management team checks the data for obvious errors and inconsistencies. These data items were then extracted and passed to the stroke registry coordinators for verification and data cleaning.

Population denominators were using Department of Statistics mid-year population estimates. Crude rates were computed using these denominators. In relation to standard population, Segi World Population was used for direct standardisation to calculate age-standardised rates for stroke incidence and mortality while all stroke cases in the registry was used for direct standardisation to calculate the age-standardised rate for 30-day case fatality rate. The 95% confidence intervals were calculated in accordance to the methods used by the International Agency for Research on Cancer[3].

To align with the reporting of incidence, we excluded Subdural haemorrhage, Transient cerebral ischaemia and Late effects of cerebrovascular disease from the mortality statistics in this report. Another improvement is the linkage of stroke deaths with unknown etiology to the Singapore Stroke Registry to determine the etiology of stroke deaths; this has reduced the percentage of stroke deaths with unknown etiology.

When computing the percentages of patients on medications, only ischaemic stroke patients were included. Patients with contraindications to taking the medications were excluded in the analysis for all dose types. Patients may be contraindicated to a particular type of medication within the same broad category of the medications hence physicians can switch to its alternative. Patients who were transferred to another hospital for management upon discharge or who died, were also excluded in the analysis for medication on discharge. Information on medications on arrival and upon discharge was collected by the stroke registry from 2009 onwards.

Below are the definitions for the calculation of rates.

Crude rate: Crude incidence or mortality rate is the number of first and recurrent stroke cases or deaths divided by the mid-year population respectively.

Age-standardised incidence rate: The age-standardized incidence rate is a weighted average of the age-specific incidence rates per 100,000 persons, where the weights are the proportions of persons in the corresponding age groups of the external standard population. Age standardisation facilitates the comparison of rates across time, and also across countries.

3 Cancer Registration: Principles and Methods. IARC Scientific Publication No. 95 http://www.iarc.fr/en/publications/pdfs-online/epi/sp95/sp95-chap11.pdf

Age-standardised mortality rate: The age-standardized mortality rate is a weighted average of the

age-specific mortality rates per 100,000 persons, where the weights are the proportions of persons in the corresponding age groups of the external standard population.

30-day Case Fatality Rate: This refers to the proportion of stroke events that died due to stroke only within 30 days of onset, regardless if the death occurred within or outside the hospital.

3. EXECUTIVE SUMMARY

Overall, the crude incidence rates have remained stable while the age-standardised incidence rates (ASIR) decreased then stabilised. But the age-specific rates among males in age group 40-44 and 45-49 increased from 2005 to 2013. The age-standardised mortality rate (ASMR) has declined from 2005 to 2013 with small variations in between.

The ratio of stroke episodes among men as compared to women was approximately 1.36:1 from 2005 to 2013. The ASMR was higher among males than females and has declined significantly from 2005 to 2013 in both genders.

Malays had the highest ASIR for stroke from 2005 onwards, followed by Indians and Chinese, whose rates were similar. The ASIR for Chinese has fallen significantly over the 9-year period; the ASIR for Indians has also fallen but not significantly, while the ASIR for Malays has been increasing significantly. The crude mortality rates (CMRs) among the various ethnicities have remained stable while there was a decrease in ASMR among the Malays after 2005 and also among Chinese.

The ASIRs of ischaemic stroke have fallen over the 9-year period and those for haemorrhagic stroke have remained stable .

The overall crude 30-day case-fatality rates (CFR) have remained stable, ranging from 8.4% to 10.4% in 2005 - 2013. Similar to CMRs, the CFR for females was greater than that for males.

Hypertension and hyperlipidaemia were the two most common risk factors among the stroke patients. The proportion of first-ever stroke patients with hyperlipidaemia has increased over time while that of other risk factors has remained stable.

The percentage of ischaemic stroke patients –taking anticoagulants upon arrival and upon discharge had increased between 2009 and 2012 while the percentage of ischaemic stroke patients given antiplatelets upon arrival had increased by 12.0%from 2009 to 2012. The percentage of ischaemic stroke patients given antiplatelets during hospitalisation has exceeded 90% since 2009).

The two most common complications seen in stroke cases included urinary tract infections (UTI) and pneumonia. The percentage of stroke patients with no common complications has remained above 80% since 2005.

4. INCIDENCE OF STROKE 2005 – 2013

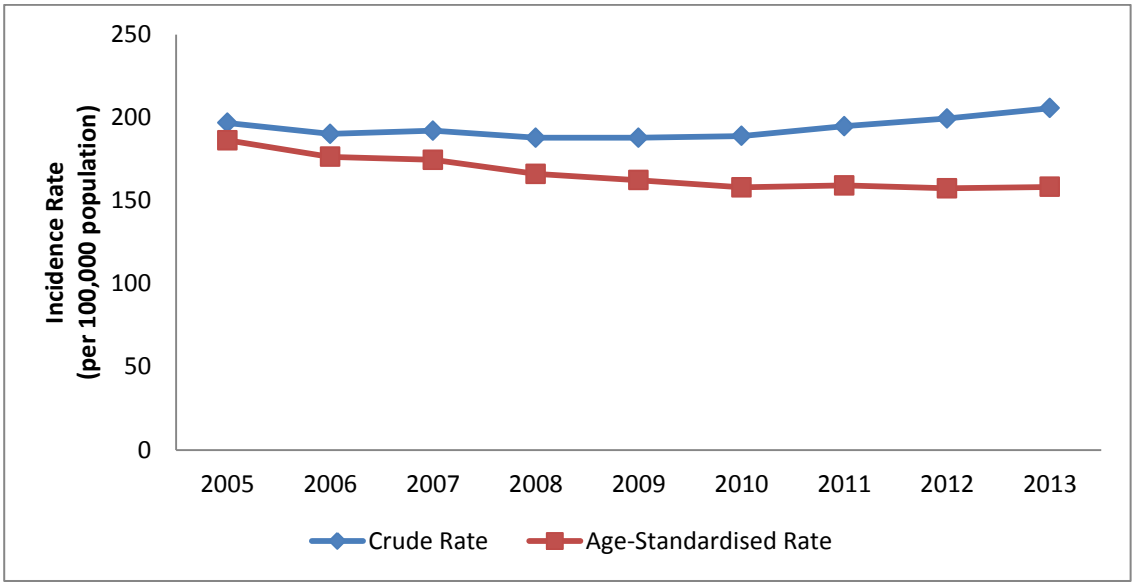
4.1 Incidence of Stroke, Overall, 2005– 2013

The average number of stroke episodes from 2005 to 2013 was approximately 5,868 a year. The number of stroke episodes in 2013 was 6,642. (Table 4.1.1) .The crude incidence rates have remained stable while the age-standardised incidence rates decreased then stabilised, with average annual percentage change (AAPC) -1.98% (95%CI: -2.76 to -1.29) and P <0.0001. This corresponds to the decreasing trends in national prevalence of hypertension (from 27.3% in 1998 to 23.5% in 2010) and hyperlipidaemia (from 25.4% in 1998 to 17.4% in 2010).

Table 4.1.1 Incidence of Stroke Per 100,000 Population (95%CI)

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013
No. of cases	5456	5400	5578	5583	5759	5890	6141	6364	6642
Crude rate	196.8 (191.6-202.0)	190.2 (185.1-195.2)	192.0 (187.0-197.1)	187.9 (183.0-192.8)	187.8 (183.0-192.7)	188.9 (184.1-193.8)	194.8 (189.9-199.7)	199.4 (194.5-204.3)	205.7 (200.7-210.6)
Age-standardised rate	186.3 (181.3-191.4)	176.4 (171.6-181.2)	174.5 (169.9-179.2)	166.1 (161.6-170.5)	162.3 (158.0-166.6)	158.0 (153.9-162.1)	159.1 (155.1-163.2)	157.4 (153.5-161.4)	158.3 (154.4-162.2)

Figure 4.1.1 Crude and Age-Standardised Incidence Rate of Stroke Per 100,000 Population



The number and crude incidence rate (CIR) of stroke increased with age. (Tables 4.1.2, 4.1.3). Generally the incidence rates for those aged 60 years and above have declined since 2007 but with small variation in between. While the age-specific rates among age group 40-44 and 45-49 started to increase in recent years. For age group 40-44, AAPC was 4.81% (95%CI: 3.05 to 6.61) and P <0.0001. The median age of incident stroke has remained at 68 years over the past 5 years but decreased to 67 years in 2012 and 2013 (Table 4.1.4).

Table 4.1.2 Incidence of Stroke by Age Group, 2005 - 2013

Age Group	2005	2006	2007	2008	2009	2010	2011	2012	2013
15 - 19	6	4	6	9	9	2	7	7	7
20 - 24	7	10	5	8	8	9	12	10	9
25 - 29	14	12	15	14	14	19	15	7	12
30 - 34	29	30	30	32	30	43	40	31	46
35 - 39	58	47	60	59	76	86	69	92	69
40 - 44	129	124	150	138	153	143	154	175	179
45 - 49	294	286	309	256	322	312	309	343	331
50 - 54	426	421	469	478	505	536	601	534	545
55 - 59	596	607	583	629	645	672	673	737	769
60 - 64	586	542	631	649	721	712	788	882	869
65 - 69	691	692	785	708	683	650	656	684	828
70 - 74	762	823	743	735	701	720	840	841	871
75 - 79	735	729	722	748	725	737	749	719	739
80 - 84	532	541	537	541	584	687	615	651	626
85+	591	532	533	579	583	562	613	651	742

Table 4.1.3 Age-Specific Incidence Rate of Stroke Per 100,000 Population

Age Group	2005	2006	2007	2008	2009	2010	2011	2012	2013
15 - 19	2.6	1.6	2.3	3.4	3.4	0.8	2.7	2.7	2.7
20 - 24	3.2	4.6	2.3	3.5	3.3	3.6	4.7	3.8	3.4
25 - 29	5.6	4.8	5.9	5.3	5.1	7.0	5.7	2.7	4.7
30 - 34	9.9	10.2	10.2	11.0	10.1	14.4	13.4	10.5	15.5
35 - 39	19.4	15.8	19.9	19.2	24.0	26.9	21.8	29.3	22.6
40 - 44	40.1	38.4	46.7	43.5	48.9	46.2	50.2	56.7	57.3
45 - 49	95.6	91.4	97.9	80.5	99.8	96.5	95.4	106.9	104.6
50 - 54	167.6	157.7	168.0	165.3	169.8	176.9	195.1	172.0	174.1
55 - 59	301.3	282.9	263.9	274.2	268.9	270.2	258.2	271.2	273.6
60 - 64	498.3	458.2	465.7	423.6	424.9	370.8	378.5	412.1	391.3
65 - 69	683.5	636.0	689.8	614.6	587.3	582.9	583.6	530.6	567.9
70 - 74	996.1	1051.1	945.3	904.1	801.1	777.4	840.0	805.6	823.3
75 - 79	1424.4	1340.1	1271.1	1267.8	1180.8	1130.7	1119.6	1062.0	1045.3
80 - 84	1913.7	1840.1	1704.8	1595.9	1574.1	1724.4	1457.3	1476.2	1355.0
85+	2626.7	2244.7	2132.0	2193.2	2097.1	1922.0	1971.1	1937.5	2061.1

Table 4.1.4 Median and Mean Age at Admission

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013
Median Age (Years)	69.0	69.0	68.0	68.0	68.0	68.0	68.0	67.0	67.0
Mean Age (Years)	67.7	67.7	67.2	67.5	67.0	67.1	67.0	67.0	67.2

4.2 Incidence of Stroke by Gender, 2005 - 2013

The ratio of stroke episodes among men as compared to women was increased from 1.17 in 2005 to 1.36 in 2013 (Table 4.2.1). The national health survey 2010 reported higher prevalences of risk factors for stroke among males than females, such as diabetes, hypertension and hyperlipidaemia and especially for smoking. The CIRs have been observed to be stable (Figure 4.2.2) while the ASIRs have declined over the 9-year period in both genders (Figure 4.2.3). AAPC for males was -1.49%, 95%CI (-2.37 to -0.60) and P=0.005. AAPC for females was -2.86%, 95%CI (-3.54 to -2.27) and P<0.0001.

Table 4.2.1 Incidence of Stroke by Gender

Gender	2005	2006	2007	2008	2009	2010	2011	2012	2013
Male	2946	2994	3073	3073	3217	3296	3509	3617	3825
Female	2510	2406	2505	2510	2542	2594	2632	2747	2817
Ratio (M vs F)	1.17	1.24	1.23	1.22	1.27	1.27	1.33	1.32	1.36

Figure 4.2.2 Crude Incidence Rate of Stroke Per 100,000 Population by Gender

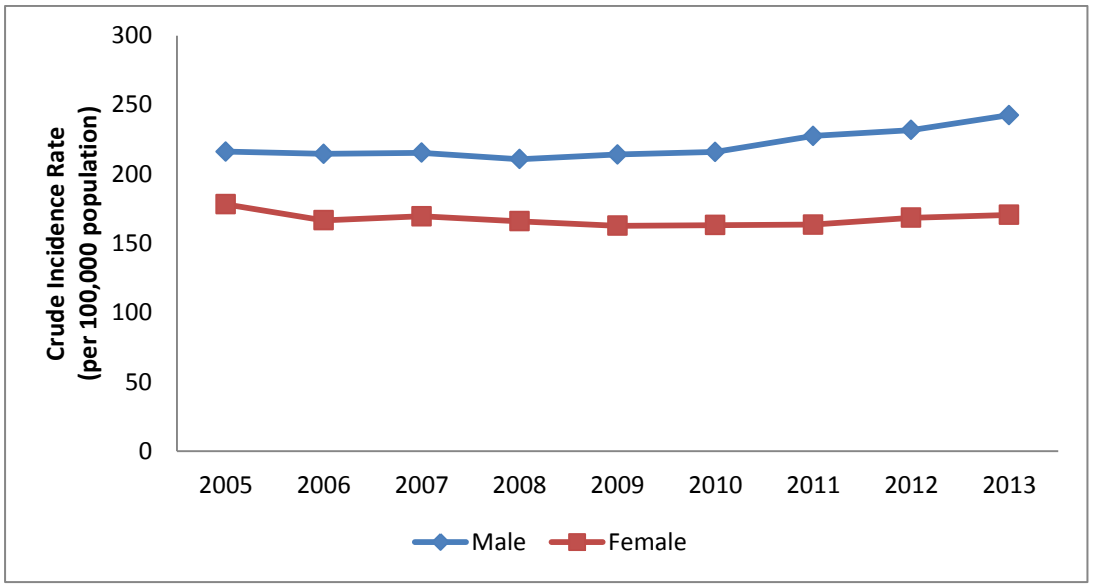


Table 4.2.2 Crude Incidence Rate of Stroke Per 100,000 Population (95%CI) by Gender

Gender	2005	2006	2007	2008	2009	2010	2011	2012	2013
Male	216.1 (208.3-223.9)	214.6 (206.9-222.3)	215.4 (207.8-223.0)	210.7 (203.2-218.1)	214.1 (206.7-221.5)	215.9 (208.5-223.3)	227.5 (219.9-235.0)	231.8 (224.2-239.3)	242.5 (234.8-250.2)
Female	178.1 (171.1-185.1)	166.6 (159.9-173.2)	169.5 (162.8-176.1)	165.9 (159.4-172.4)	162.6 (156.3-168.9)	163.1 (156.8-169.4)	163.5 (157.3-169.8)	168.4 (162.1-174.7)	170.5 (164.2-176.8)

Table 4.2.3 Age-Standardised Incidence Rate of Stroke Per 100,000 Population (95%CI) by Gender

Gender	2005	2006	2007	2008	2009	2010	2011	2012	2013
Male	222.1 (214.0-230.3)	215.3 (207.4-223.2)	210.8 (203.2-218.4)	200.0 (192.9-207.2)	197.0 (190.1-203.9)	192.6 (185.9-199.3)	198.0 (191.4-204.7)	194.9 (188.4-201.3)	198.7 (192.3-205.0)
Female	152.1 (146.0-158.2)	140.9 (135.0-146.7)	140.3 (134.7-146.0)	133.9 (128.5-139.3)	128.7 (123.5-133.8)	124.0 (119.0-128.9)	121.9 (117.1-126.8)	121.7 (116.9-126.4)	119.5 (114.9-124.0)

Figure 4.2.3 Age-Standardised Incidence Rate of Stroke Per 100,000 Population by Gender

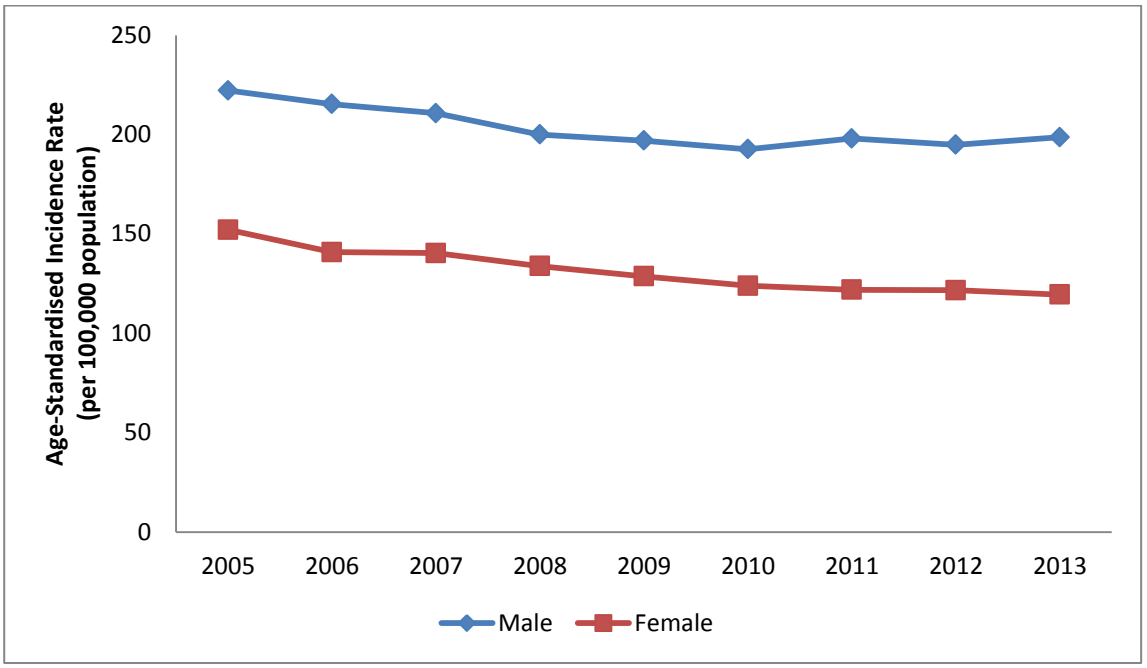


Table 4.2.4 Median and Mean Age of Incidence of Stroke by Gender

Gender	Age	2005	2006	2007	2008	2009	2010	2011	2012	2013
Male	Median Age (Years)	65.0	66.0	65.0	65.0	64.0	63.0	64.0	64.0	64.0
	Mean Age (Years)	65.0	65.4	64.7	65.0	64.2	64.1	64.2	64.4	64.5
Female	Median Age (Years)	73.0	72.0	72.0	72.0	72.0	73.0	73.0	72.0	73.0
	Mean Age (Years)	70.8	70.5	70.2	70.5	70.4	70.9	70.8	70.5	70.9

The age-specific rates among females and males were decreasing above the 60-years age group but not in 2013 for certain groups (Table 4.2.5). But the age-specific rates among males in age group 40-44 and 45-49 increased from 2005 to 2013. AAPC for age group 40-44 was 8.22%, 95%CI (5.34 to 11.1) and P<0.0001. AAPC for age group 45-49 was 2.02%, 95%CI (0.10 to 3.87) and P=0.043. No discernible trend was observed among females in these two age groups.

Table 4.2.5A Age-Specific Incidence Rate of Stroke Per 100,000 Population for Males

Age Group	2005	2006	2007	2008	2009	2010	2011	2012	2013
15 - 19	5.0	1.6	3.0	3.0	3.7	0.0	2.3	3.8	3.1
20 - 24	4.5	4.5	3.6	3.5	4.1	5.6	7.0	3.8	3.7
25 - 29	5.1	6.7	9.0	6.3	5.3	6.1	6.3	3.2	4.0
30 - 34	12.0	13.5	12.7	13.7	12.6	16.1	20.4	12.1	17.0
35 - 39	27.9	21.9	27.1	24.0	29.7	35.8	29.9	41.4	31.2
40 - 44	43.8	45.5	58.3	49.1	64.8	69.3	67.7	82.0	77.9
45 - 49	118.5	122.6	125.9	108.8	124.6	128.6	122.1	136.6	142.8
50 - 54	232.4	205.9	220.2	221.7	238.0	247.5	283.8	230.5	240.2
55 - 59	403.7	385.0	346.3	372.5	385.4	380.5	373.4	376.1	407.7
60 - 64	659.7	603.4	613.2	541.8	560.3	489.5	505.8	562.4	514.5
65 - 69	834.4	798.8	845.7	763.7	698.6	740.8	744.9	644.2	740.4
70 - 74	1186.2	1214.5	1138.1	1090.7	965.3	895.4	982.6	966.6	1034.9
75 - 79	1454.1	1504.3	1401.6	1418.0	1363.3	1276.0	1213.1	1276.1	1153.8
80 - 84	2090.9	1965.5	1821.1	1689.4	1572.4	1770.5	1536.1	1474.3	1381.7
85+	2405.4	2468.4	2012.0	2046.0	1891.3	1610.9	1960.8	1873.9	1958.0

Table 4.2.5B Age-Specific Incidence Rate of Stroke Per 100,000 Population for Females

Age Group	2005	2006	2007	2008	2009	2010	2011	2012	2013
15 - 19	0.0	1.7	1.6	3.9	3.1	1.5	3.1	1.6	2.4
20 - 24	1.8	4.6	0.9	3.6	2.5	1.6	2.4	3.8	3.0
25 - 29	6.2	3.0	3.0	4.4	4.9	7.8	5.2	2.3	5.3
30 - 34	7.9	7.2	7.8	8.6	7.8	12.9	7.1	9.0	14.1
35 - 39	11.2	9.8	12.9	14.6	18.5	18.3	14.2	17.9	14.5
40 - 44	36.4	31.2	35.0	37.9	33.1	23.7	33.4	32.4	37.5
45 - 49	72.3	59.5	69.2	51.5	74.6	63.7	68.3	77.0	66.5
50 - 54	101.6	108.7	114.9	108.0	100.8	105.1	104.8	112.5	107.0
55 - 59	199.6	181.2	181.7	175.5	151.5	159.0	142.3	165.4	139.0
60 - 64	344.9	318.4	322.7	309.4	293.0	255.1	254.3	265.2	269.9
65 - 69	545.5	488.6	550.0	480.2	486.0	438.2	434.0	424.1	406.4
70 - 74	836.5	912.7	780.7	744.3	660.3	675.6	718.0	669.0	642.7
75 - 79	1402.7	1217.9	1172.8	1152.7	1040.3	1019.9	1047.6	894.7	959.5
80 - 84	1797.6	1758.4	1630.2	1536.2	1575.2	1695.0	1406.3	1477.4	1337.0
85+	2735.1	2132.9	2191.6	2265.5	2198.9	2074.5	1976.1	1968.9	2112.0

4.3 Incidence of Stroke by Ethnic Group, 2005-2013

Malays had the highest CIR for stroke from year 2007, followed by Chinese and Indians (Figure 4.3.2).

Table 4.3.1 Incidence of Stroke by Ethnic Group

Ethnic Group	2005	2006	2007	2008	2009	2010	2011	2012	2013
Chinese	4305	4250	4286	4293	4472	4499	4662	4849	5007
Malay	663	678	787	805	825	923	976	1059	1047
Indian	357	345	390	375	386	379	403	355	471
Others	131	127	115	110	76	89	100	101	117

Figure 4.3.2 Crude Incidence Rate of Stroke Per 100,000 Population by Ethnic Group

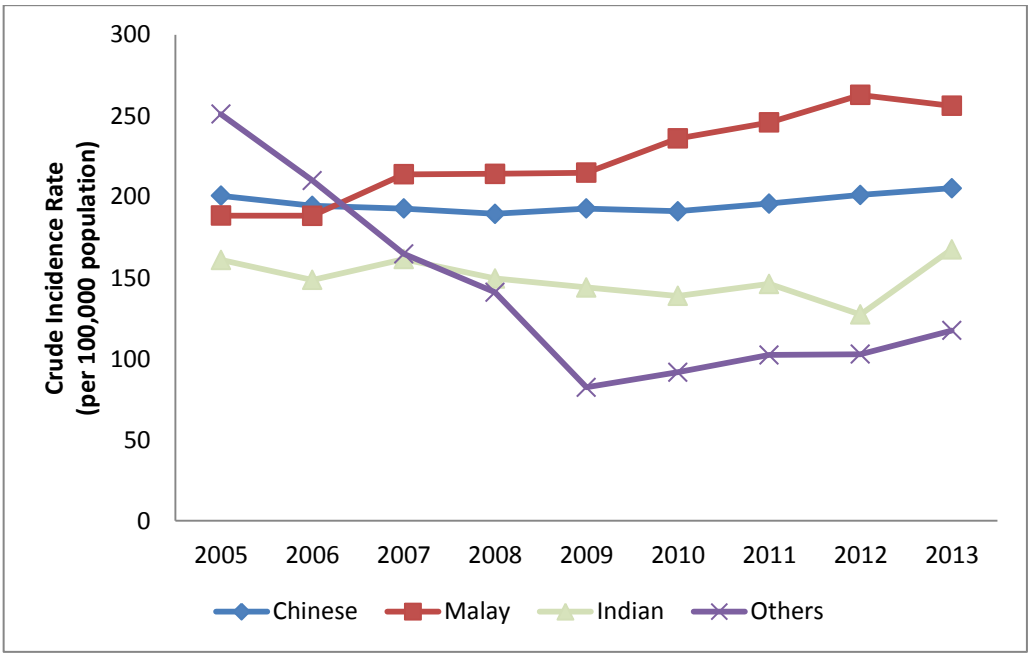


Table 4.3.2 Crude Incidence Rate of Stroke Per 100,000 Population (95%CI) by Ethnic Group

Ethnic Group	2005	2006	2007	2008	2009	2010	2011	2012	2013
Chinese	200.6 (194.6-206.6)	194.4 (188.5-200.2)	192.7 (186.9-198.4)	189.4 (183.8-195.1)	192.6 (187.0-198.3)	191.0 (185.4-196.6)	195.8 (190.1-201.4)	201.1 (195.4-206.8)	205.3 (199.6-210.9)
Malay	188.4 (174.0-202.7)	188.2 (174.1-202.4)	213.9 (198.9-228.8)	214.1 (199.3-228.9)	214.8 (200.1-229.4)	235.9 (220.7-251.2)	245.8 (230.4-261.2)	262.8 (247.0-278.6)	256.1 (240.6-271.6)
Indian	161.0 (144.3-177.7)	148.6 (132.9-164.3)	161.4 (145.4-177.4)	149.5 (134.3-164.6)	144.0 (129.6-158.3)	138.7 (124.8-152.7)	146.1 (131.9-160.4)	127.3 (114.0-140.5)	167.5 (152.4-182.6)
Others	251.0 (208.0-293.9)	209.9 (173.4-246.4)	164.8 (134.6-194.9)	141.0 (114.7-167.4)	82.3 (63.8-100.9)	91.6 (72.6-110.7)	102.2 (82.2-122.3)	102.7 (82.7-122.8)	117.4 (96.1-138.6)

Table 4.3.3 Age-Standardised Incidence Rate of Stroke Per 100,000 Population (95%CI) by Ethnic Group

Ethnic Group	2005	2006	2007	2008	2009	2010	2011	2012	2013
Chinese	179.0 (173.6-184.5)	169.5 (164.3-174.7)	163.5 (158.5-168.4)	156.0 (151.2-160.7)	154.1 (149.5-158.7)	147.5 (143.1-151.9)	147.2 (142.9-151.5)	146.5 (142.3-150.7)	145.6 (141.5-149.7)
Malay	222.1 (204.4-239.8)	214.8 (197.8-231.7)	243.4 (225.7-261.0)	238.9 (221.9-255.9)	232.3 (215.9-248.8)	244.6 (228.2-261.1)	255.4 (238.7-272.2)	263.0 (246.7-279.4)	250.5 (235.0-266.1)
Indian	183.3 (163.5-203.1)	168.9 (150.2-187.6)	183.3 (164.4-202.2)	162.9 (145.8-180.0)	161.8 (145.0-178.6)	156.6 (140.2-172.9)	158.7 (142.6-174.8)	133.1 (118.8-147.4)	170.3 (154.5-186.1)
Others	316.2 (259.5-372.9)	301.9 (246.5-357.3)	242.5 (195.5-289.6)	210.7 (169.2-252.3)	132.9 (100.7-165.2)	129.5 (100.4-158.6)	152.5 (119.5-185.4)	143.3 (113.0-173.5)	159.2 (128.3-190.0)

Malays had the highest ASIR during the period, followed by Indians and Chinese, whose rates were similar (Figure 4.3.3). But for year 2012, Chinese ranked the 2nd following Malays. Singapore national health survey showed that Malays had higher prevalence of risk factors of stroke, such as hypertension and hyperlipidaemia.

The ASIR for Chinese and Indians has fallen over the 9-year period, while the ASIR for Malays has increased. AAPC for Chinese was -2.57% with 95%CI (-3.25 to -1.78) and P<0.0001. AAPC for Malays was 2.02% with 95%CI (0.90 to 3.25) and P=0.004.

Figure 4.3.3 Age-Standardised Incidence Rate of Stroke Per 100,000 Population by Ethnic Group

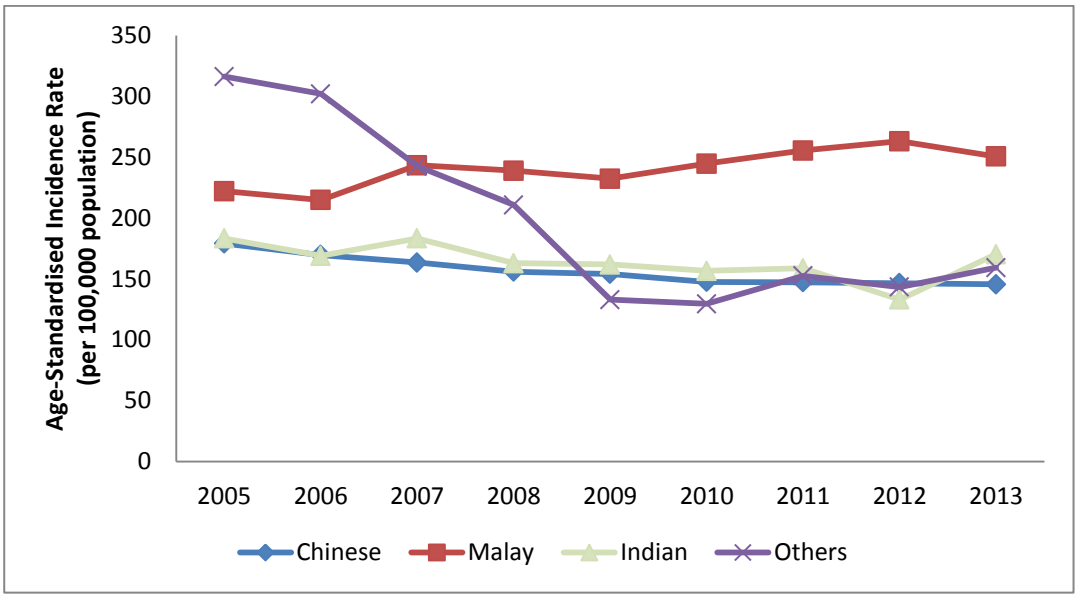


Table 4.3.4 Incidence of Stroke by Gender and Ethnic Group

Gender	Ethnic Group	2005	2006	2007	2008	2009	2010	2011	2012	2013
Male	Chinese	2280	2311	2349	2380	2505	2502	2642	2772	2874
	Malay	364	370	409	409	440	507	569	562	596
	Indian	224	232	239	230	230	233	246	220	289
	Others	78	81	76	54	42	54	52	63	66
Female	Chinese	2025	1939	1937	1913	1967	1997	2020	2077	2133
	Malay	299	308	378	396	385	416	407	497	451
	Indian	133	113	151	145	156	146	157	135	182
	Others	53	46	39	56	34	35	48	38	51

Table 4.3.5A Crude Incidence Rate of Stroke Per 100,000 Population (95%CI) by Ethnic Group for Males

Ethnic Group	2005	2006	2007	2008	2009	2010	2011	2012	2013
Chinese	217.1 (208.2-226.0)	216.2 (207.4-225.1)	216.2 (207.5-224.9)	215.3 (206.7-224.0)	221.8 (213.1-230.4)	218.5 (210.0-227.1)	228.4 (219.7-237.2)	237.0 (228.2-245.8)	243.1 (234.2-252.0)
Malay	209.3 (187.8-230.8)	208.1 (186.9-229.3)	225.2 (203.4-247.0)	220.5 (199.1-241.9)	232.6 (210.8-254.3)	263.0 (240.1-285.8)	290.8 (266.9-314.6)	282.8 (259.5-306.2)	295.8 (272.0-319.5)
Indian	196.0 (170.3-221.6)	193.7 (168.7-218.6)	190.7 (166.6-214.9)	176.2 (153.5-199.0)	164.2 (143.0-185.4)	163.1 (142.1-184.0)	170.8 (149.5-192.2)	151.6 (131.6-171.7)	198.1 (175.2-220.9)
Others	315.8 (245.7-385.9)	280.3 (219.2-341.3)	227.5 (176.4-278.7)	145.2 (106.4-183.9)	95.9 (66.9-124.9)	117.2 (85.9-148.5)	111.8 (81.4-142.2)	134.3 (101.2-167.5)	138.7 (105.2-172.1)

Table 4.3.5B Crude Incidence Rate of Stroke Per 100,000 Population (95%CI) by Ethnic Group for Females

Ethnic Group	2005	2006	2007	2008	2009	2010	2011	2012	2013
Chinese	184.7 (176.7-192.8)	173.5 (165.8-181.2)	170.2 (162.6-177.8)	164.8 (157.4-172.1)	165.0 (157.7-172.3)	164.9 (157.7-172.2)	164.9 (157.7-172.1)	167.3 (160.1-174.5)	169.6 (162.4-176.8)
Malay	167.9 (148.9-186.9)	168.9 (150.0-187.7)	202.8 (182.3-223.2)	207.9 (187.4-228.3)	197.5 (177.8-217.3)	209.7 (189.5-229.8)	202.1 (182.5-221.7)	243.3 (221.9-264.7)	217.6 (197.5-237.6)
Indian	123.7 (102.7-144.7)	100.5 (82.0-119.1)	129.8 (109.1-150.5)	120.4 (100.8-140.0)	121.9 (102.7-141.0)	112.0 (93.9-130.2)	119.1 (100.5-137.8)	100.9 (83.9-117.9)	134.5 (115.0-154.1)
Others	192.7 (140.8-244.6)	145.6 (103.5-187.6)	107.1 (73.5-140.8)	137.3 (101.3-173.2)	70.1 (46.5-93.7)	68.5 (45.8-91.2)	93.6 (67.1-120.0)	73.9 (50.4-97.4)	97.9 (71.0-124.8)

Malays had higher ASIR compared to Indians and Chinese among males and females. Except for Malay males and Malay females, the gender specific ASIRs for the other ethnic groups have been decreasing (Table 4.3.6)

Table 4.3.6A Age-Standardised Incidence Rate of Stroke Per 100,000 Population (95%CI) by Ethnic Group for Males

Ethnic Group	2005	2006	2007	2008	2009	2010	2011	2012	2013
Chinese	216.0 (207.0-225.0)	208.8 (200.2-217.5)	201.6 (193.3-209.8)	193.8 (185.9-201.7)	192.3 (184.7-199.9)	182.9 (175.6-190.1)	185.7 (178.5-192.9)	186.1 (179.1-193.1)	186.6 (179.7-193.5)
Malay	253.7 (226.2-281.2)	251.1 (224.1-278.0)	269.0 (241.8-296.1)	256.3 (230.5-282.0)	255.7 (230.8-280.6)	280.3 (254.7-306.0)	315.6 (288.2-342.9)	296.9 (271.6-322.3)	302.1 (277.1-327.1)
Indian	216.0 (186.2-245.8)	211.1 (182.3-239.9)	212.1 (183.7-240.4)	191.8 (165.6-218.0)	189.7 (163.8-215.6)	184.5 (159.6-209.4)	190.7 (165.4-215.9)	161.2 (139.0-183.4)	203.4 (179.1-227.7)
Others	389.4 (299.8-479.0)	371.4 (286.4-456.3)	303.8 (230.3-377.3)	211.6 (150.8-272.3)	134.2 (89.1-179.4)	154.6 (109.8-199.3)	143.4 (100.7-186.2)	161.1 (118.0-204.3)	176.2 (130.3-222.2)

Table 4.3.6B Age-Standardised Incidence Rate of Stroke Per 100,000 Population (95%CI) by Ethnic Group for Females

Ethnic Group	2005	2006	2007	2008	2009	2010	2011	2012	2013
Chinese	144.3 (137.7-150.8)	134.7 (128.4-140.9)	128.1 (122.2-134.1)	120.7 (115.1-126.3)	117.9 (112.5-123.3)	112.9 (107.7-118.1)	111.2 (106.1-116.3)	109.0 (104.1-113.9)	107.2 (102.5-112.0)
Malay	194.1 (171.2-217.0)	183.7 (162.3-205.1)	220.9 (197.8-244.1)	223.4 (200.8-246.0)	210.4 (188.6-232.1)	211.6 (190.5-232.8)	200.4 (180.2-220.7)	232.5 (211.5-253.5)	203.4 (184.2-222.6)
Indian	149.8 (123.2-176.4)	122.0 (98.6-145.4)	160.8 (134.1-187.5)	132.8 (110.6-154.9)	136.6 (114.5-158.7)	128.9 (107.3-150.5)	127.1 (106.6-147.5)	105.9 (87.6-124.3)	136.5 (116.3-156.8)
Others	240.6 (171.4-309.8)	232.2 (160.0-304.5)	178.7 (119.2-238.3)	215.1 (154.5-275.7)	129.1 (81.1-177.1)	107.1 (68.2-146.1)	156.3 (105.6-207.0)	113.3 (73.8-152.8)	130.1 (91.8-168.5)

4.4 Incidence of Stroke by Subtype, 2005-2013

Table 4.4.1 Incidence of Stroke by Subtype

Subtype	2005	2006	2007	2008	2009	2010	2011	2012	2013
Ischaemic	4458	4373	4545	4455	4639	4749	4899	5137	5339
Haemorrhagic	951	994	1009	1097	1091	1125	1212	1202	1284
Unknown	47	33	24	31	29	16	30	25	19

The ASIR of ischaemic stroke has significantly fallen over the 9-year period with AAPC -2.27% (95%CI: -3.15 to -1.39) and P<0.0001, while incidence rates of haemorrhagic stroke have remained constant (Figure 4.4.2, 4.4.3).

Figure 4.4.2 Crude Incidence Rate of Stroke Per 100,000 Population by Subtype

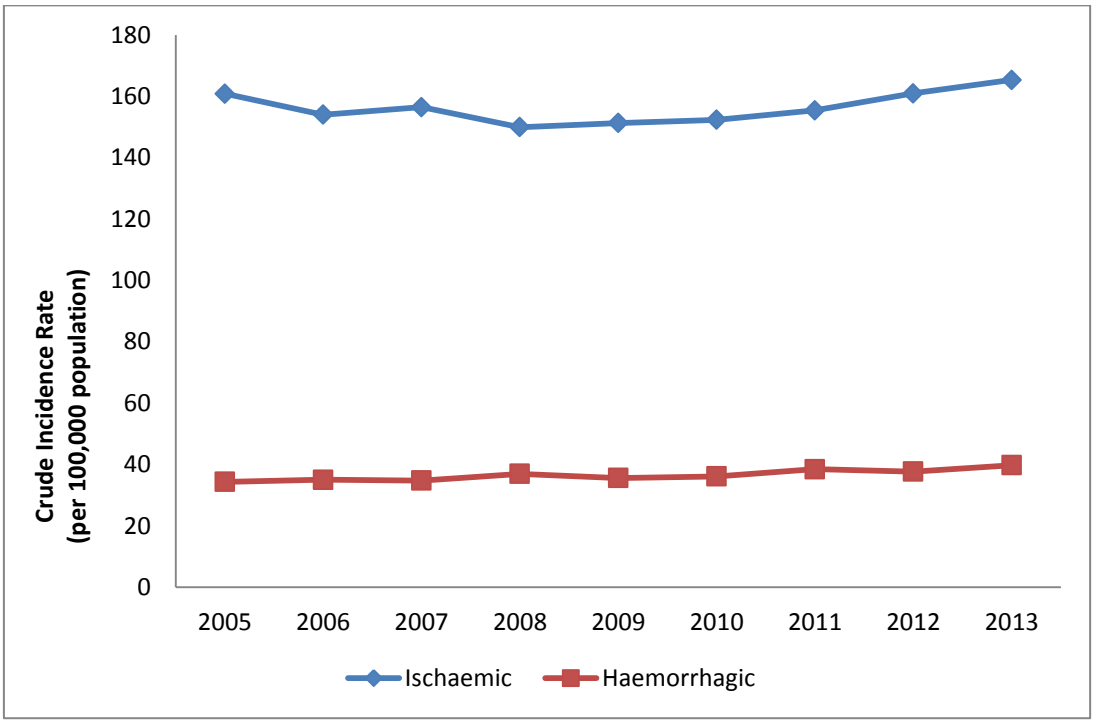


Table 4.4.2 Crude Incidence Rate of Stroke Per 100,000 Population (95%CI) by Subtype

Subtype	2005	2006	2007	2008	2009	2010	2011	2012	2013
Ischaemic	160.8 (156.1-165.5)	154.0 (149.4-158.6)	156.5 (151.9-161.0)	149.9 (145.5-154.3)	151.3 (147.0-155.7)	152.3 (148.0-156.7)	155.4 (151.1-159.8)	160.9 (156.5-165.3)	165.3 (160.9-169.7)
Haemorrhagic	34.3 (32.1-36.5)	35.0 (32.8-37.2)	34.7 (32.6-36.9)	36.9 (34.7-39.1)	35.6 (33.5-37.7)	36.1 (34.0-38.2)	38.4 (36.3-40.6)	37.7 (35.5-39.8)	39.8 (37.6-41.9)

Table 4.4.3 Age-Standardised Incidence Rate of Stroke Per 100,000 Population (95%CI) by Subtype

Subtype	2005	2006	2007	2008	2009	2010	2011	2012	2013
Ischaemic	152.7 (148.2-157.3)	143.2 (138.8-147.5)	142.4 (138.1-146.6)	132.6 (128.7-136.6)	130.5 (126.7-134.3)	127.2 (123.5-130.9)	126.4 (122.8-130.0)	126.7 (123.2-130.2)	126.6 (123.2-130.1)
Haemorrhagic	32.1 (30.0-34.2)	32.2 (30.1-34.2)	31.4 (29.5-33.4)	32.5 (30.6-34.5)	31.0 (29.1-32.9)	30.4 (28.6-32.2)	32.0 (30.2-33.9)	30.2 (28.4-31.9)	31.2 (29.5-33.0)

Figure 4.4.3 Age-Standardised Incidence Rate of Stroke Per 100,000 Population by Subtype

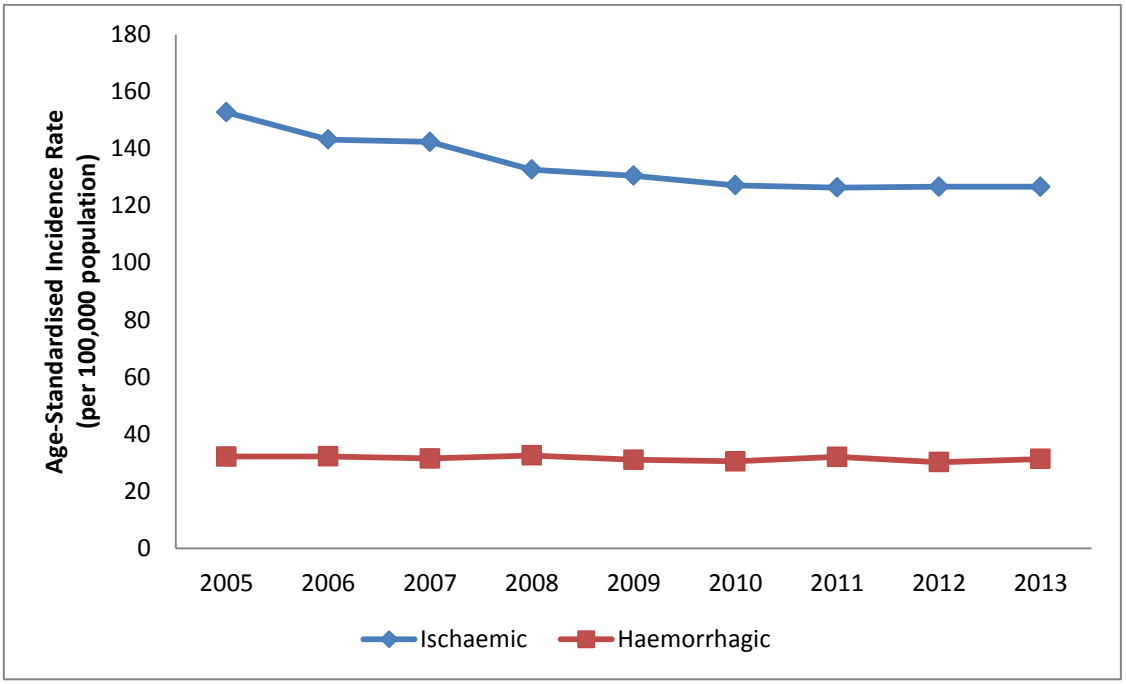


Table 4.4.4 Incidence of Stroke by Gender and Subtype

Gender	Subtype	2005	2006	2007	2008	2009	2010	2011	2012	2013
Male	Ischaemic	2419	2442	2527	2451	2592	2672	2820	2944	3110
	Haemorrhagic	503	534	535	609	613	621	678	662	708
	Unknown	24	18	11	13	12	3	11	11	7
Female	Ischaemic	2039	1931	2018	2004	2047	2077	2079	2193	2229
	Haemorrhagic	448	460	474	488	478	504	534	540	576
	Unknown	23	15	13	18	17	13	19	14	12

Table 4.4.5A Crude Incidence Rate of Stroke Per 100,000 Population (95%CI) by Subtype for Males

Subtype	2005	2006	2007	2008	2009	2010	2011	2012	2013
Ischaemic	177.5 (170.4-184.5)	175.0 (168.1-182.0)	177.1 (170.2-184.0)	168.0 (161.4-174.7)	172.5 (165.8-179.1)	175.0 (168.4-181.6)	182.8 (176.1-189.6)	188.6 (181.8-195.5)	197.2 (190.2-204.1)
Haemorrhagic	36.9 (33.7-40.1)	38.3 (35.0-41.5)	37.5 (34.3-40.7)	41.8 (38.4-45.1)	40.8 (37.6-44.0)	40.7 (37.5-43.9)	44.0 (40.6-47.3)	42.4 (39.2-45.7)	44.9 (41.6-48.2)
Unknown	1.8 (1.1-2.5)	1.3 (0.7-1.9)	0.8 (0.3-1.2)	0.9 (0.4-1.4)	0.8 (0.3-1.3)	0.2 (-0.0-0.4)	0.7 (0.3-1.1)	0.7 (0.3-1.1)	0.4 (0.1-0.8)

Table 4.4.5B Crude Incidence Rate of Stroke Per 100,000 Population (95%CI) by Subtype for Females

Subtype	2005	2006	2007	2008	2009	2010	2011	2012	2013
Ischaemic	144.7 (138.4-151.0)	133.7 (127.7-139.7)	136.5 (130.6-142.5)	132.5 (126.7-138.3)	130.9 (125.3-136.6)	130.6 (125.0-136.2)	129.2 (123.6-134.7)	134.4 (128.8-140.1)	134.9 (129.3-140.5)
Haemorrhagic	31.8 (28.8-34.7)	31.8 (28.9-34.8)	32.1 (29.2-35.0)	32.3 (29.4-35.1)	30.6 (27.8-33.3)	31.7 (28.9-34.5)	33.2 (30.4-36.0)	33.1 (30.3-35.9)	34.9 (32.0-37.7)
Unknown	1.6 (1.0-2.3)	1.0 (0.5-1.6)	0.9 (0.4-1.4)	1.2 (0.6-1.7)	1.1 (0.6-1.6)	0.8 (0.4-1.3)	1.2 (0.6-1.7)	0.9 (0.4-1.3)	0.7 (0.3-1.1)

For ischaemic strokes, the ASIR among males was higher than females, while the gender difference was small for haemorrhagic stroke. A downward trend was observed among both males and females for ischaemic stroke, but not for haemorrhagic stroke (Table 4.4.6).

Table 4.4.6A Age-Standardised Incidence Rate of Stroke Per 100,000 Population (95%CI) by Subtype for Males

Subtype	2005	2006	2007	2008	2009	2010	2011	2012	2013
Ischaemic	183.6 (176.1-191.0)	176.3 (169.2-183.5)	174.3 (167.3-181.2)	160.0 (153.6-166.5)	159.4 (153.1-165.6)	156.4 (150.3-162.4)	159.3 (153.3-165.3)	158.8 (153.0-164.6)	161.3 (155.6-167.0)
Haemorrhagic	36.6 (33.3-39.9)	37.6 (34.3-40.9)	35.7 (32.6-38.8)	39.1 (36.0-42.3)	36.9 (33.9-39.8)	36.1 (33.2-39.0)	38.1 (35.2-41.0)	35.4 (32.7-38.1)	37.0 (34.3-39.8)
Unknown	2.0 (1.2-2.7)	1.4 (0.7-2.0)	0.8 (0.3-1.3)	0.9 (0.4-1.4)	0.8 (0.3-1.2)	0.1 (-0.0-0.3)	0.7 (0.3-1.1)	0.6 (0.3-1.0)	0.3 (0.1-0.6)

Table 4.4.6B Age-Standardised Incidence Rate of Stroke Per 100,000 Population (95%CI) by Subtype for Females

Subtype	2005	2006	2007	2008	2009	2010	2011	2012	2013
Ischaemic	123.2 (117.7-128.8)	112.6 (107.4-117.9)	112.3 (107.3-117.4)	106.6 (101.8-111.4)	102.7 (98.1-107.2)	98.3 (93.9-102.7)	94.9 (90.7-99.1)	95.9 (91.8-100.1)	93.1 (89.1-97.1)
Haemorrhagic	27.7 (25.0-30.3)	27.5 (24.9-30.1)	27.3 (24.8-29.8)	26.4 (24.0-28.8)	25.3 (22.9-27.6)	25.0 (22.8-27.3)	26.3 (24.0-28.6)	25.2 (23.0-27.4)	25.8 (23.7-28.0)
Unknown	1.2 (0.7-1.7)	0.7 (0.3-1.1)	0.7 (0.3-1.1)	0.9 (0.5-1.4)	0.8 (0.4-1.1)	0.6 (0.3-0.9)	0.7 (0.4-1.1)	0.6 (0.3-0.9)	0.5 (0.2-0.8)

5. MORTALITY OF STOKE, 2005-2013

5.1 Mortality of Stroke, Overall, 2005 - 2013

The age-standardised mortality rate (ASMR) of stroke has declined from 2005 to 2013 (Figure 5.1.1), with AAPC -3.92% (95%CI: -5.16 to -2.66) and P<0.0001. The decrease could be due to the better treatment of the stroke and also partly due to the decreasing trend of the stroke incidence.

Table 5.1.1 Mortality of Stroke Per 100,000 Population (95%CI)

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013
No. of deaths	1059	1043	1096	1078	997	1087	1179	1141	1108
Crude rate	38.2 (35.9-40.5)	36.7 (34.5-39.0)	37.7 (35.5-40.0)	36.3 (34.1-38.4)	32.5 (30.5-34.5)	34.9 (32.8-36.9)	37.4 (35.3-39.5)	35.7 (33.7-37.8)	34.3 (32.3-36.3)
Age-standardised rate	34.8 (32.7-36.9)	32.7 (30.7-34.8)	32.8 (30.8-34.8)	30.8 (28.9-32.7)	26.9 (25.2-28.6)	27.6 (25.9-29.2)	28.6 (26.9-30.2)	26.4 (24.9-28.0)	24.5 (23.1-26.0)

Figure 5.1.1 Crude and Age-Standardised Mortality Rates of Stoke Per 100, 000 Population

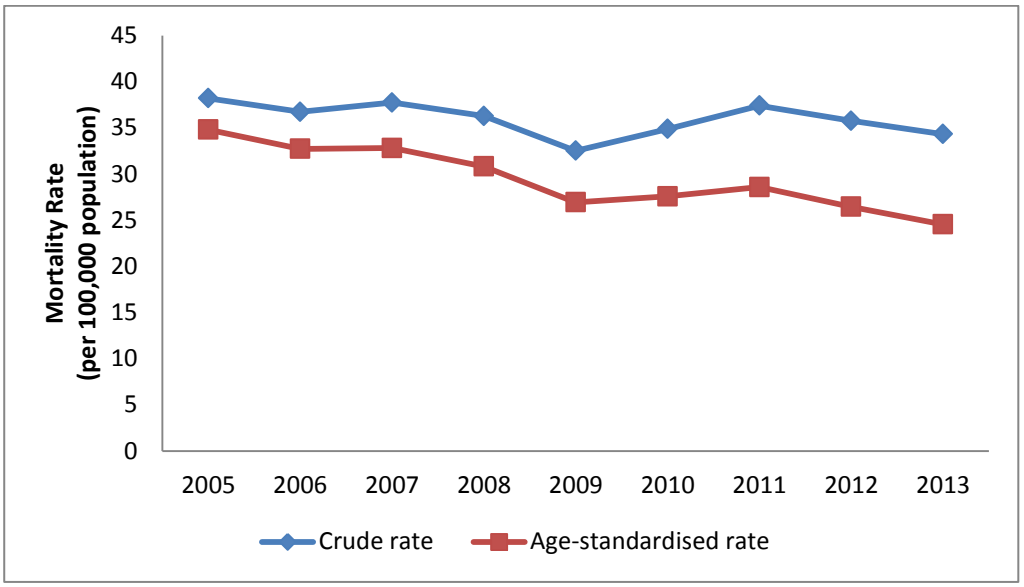


Table 5.1.2 Mortality of Stoke by Age Group

Age Group	2005	2006	2007	2008	2009	2010	2011	2012	2013
15 - 19	1	0	1	2	4	1	1	0	1
20 - 24	0	1	0	1	1	2	1	0	2
25 - 29	2	3	3	3	2	0	2	1	3
30 - 34	2	7	5	5	7	6	4	5	3
35 - 39	5	2	1	7	6	10	10	14	8
40 - 44	24	20	22	20	14	20	22	10	11
45 - 49	28	32	29	26	23	34	20	29	23
50 - 54	43	45	54	42	52	47	52	46	51
55 - 59	63	74	55	76	57	72	74	62	58
60 - 64	65	66	74	69	55	75	76	86	74
65 - 69	97	98	98	100	88	71	81	88	93
70 - 74	151	121	125	123	107	120	129	142	125
75 - 79	165	145	182	158	135	143	169	130	154
80 - 84	178	167	154	155	144	198	199	196	169
85+	235	262	293	291	302	288	339	332	333

There was a decline in age-specific mortality rates for those aged 60 years and above (Table 5.1.3).

Table 5.1.3 Age-Specific Mortality Rate of Stroke Per 100,000 Population

Age Group	2005	2006	2007	2008	2009	2010	2011	2012	2013
15 - 19	0.4	0.0	0.4	0.8	1.5	0.4	0.4	0.0	0.4
20 - 24	0.0	0.5	0.0	0.4	0.4	0.8	0.4	0.0	0.7
25 - 29	0.8	1.2	1.2	1.1	0.7	0.0	0.8	0.4	1.2
30 - 34	0.7	2.4	1.7	1.7	2.4	2.0	1.3	1.7	1.0
35 - 39	1.7	0.7	0.3	2.3	1.9	3.1	3.2	4.5	2.6
40 - 44	7.5	6.2	6.9	6.3	4.5	6.5	7.2	3.2	3.5
45 - 49	9.1	10.2	9.2	8.2	7.1	10.5	6.2	9.0	7.3
50 - 54	16.9	16.9	19.3	14.5	17.5	15.5	16.9	14.8	16.3
55 - 59	31.9	34.5	24.9	33.1	23.8	29.0	28.4	22.8	20.6
60 - 64	55.3	55.8	54.6	45.0	32.4	39.1	36.5	40.2	33.3
65 - 69	95.9	90.1	86.1	86.8	75.7	63.7	72.1	68.3	63.8
70 - 74	197.4	154.5	159.0	151.3	122.3	129.6	129.0	136.0	118.1
75 - 79	319.8	266.5	320.4	267.8	219.9	219.4	252.6	192.0	217.8
80 - 84	640.3	568.0	488.9	457.2	388.1	497.0	471.6	444.4	365.8
85+	1044.4	1105.5	1172.0	1102.3	1086.3	984.9	1090.0	988.1	925.0

The median age of stroke mortality increased from 76 in 2005 to 78 in 2013 (Table 5.1.4).

Table 5.1.4 Median and Mean Age at Death

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Median Age (Years)	76.0	76.0	77.0	77.0	77.0	77.0	78.0	78.0	78.0
Mean Age (Years)	73.9	74.0	74.5	74.3	75.0	74.5	75.5	75.4	75.5

5.2 Mortality of Stroke by Gender, 2005-2013

Table 5.2.1 Mortality of Stroke by Gender

Gender	2005	2006	2007	2008	2009	2010	2011	2012	2013
Male	451	457	511	506	462	517	530	537	512
Female	608	586	585	572	535	570	649	604	596

The CMR for females was higher than that for males and has remained more or less stable over the years (Figure 5.2.2).

Figure 5.2.2 Crude Mortality Rate of Stroke Per 100,000 Population by Gender

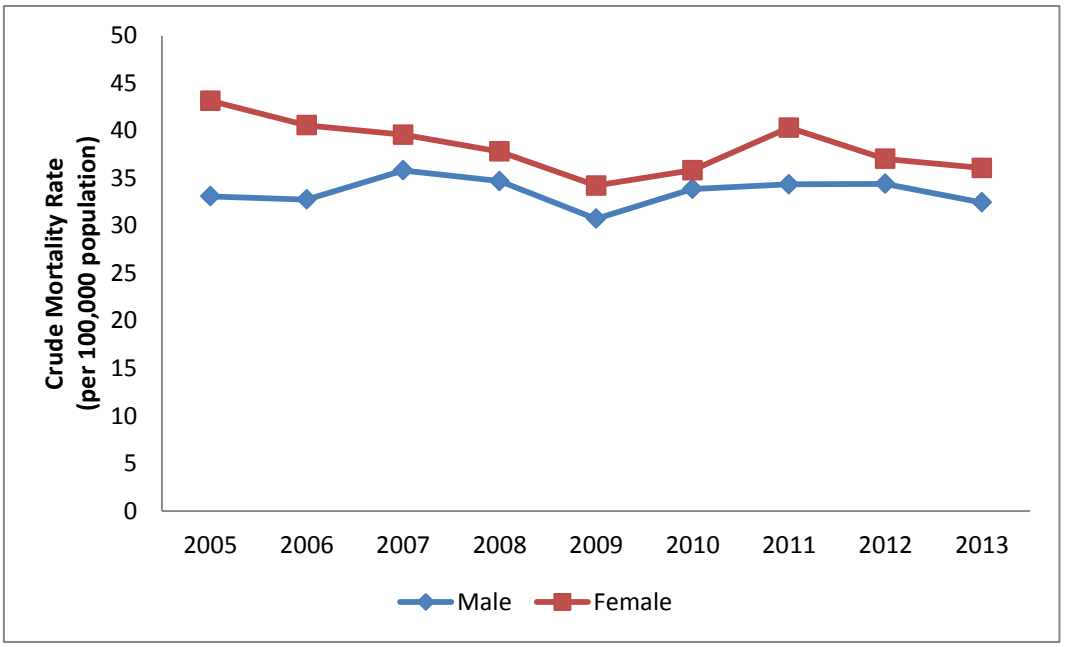


Table 5.2.2 Crude Mortality Rate of Stoke Per 100,000 Population (95%CI) by Gender

Gender	2005	2006	2007	2008	2009	2010	2011	2012	2013
Male	33.1 (30.0-36.1)	32.8 (29.7-35.8)	35.8 (32.7-38.9)	34.7 (31.7-37.7)	30.7 (27.9-33.5)	33.9 (30.9-36.8)	34.4 (31.4-37.3)	34.4 (31.5-37.3)	32.5 (29.6-35.3)
Female	43.1 (39.7-46.6)	40.6 (37.3-43.9)	39.6 (36.4-42.8)	37.8 (34.7-40.9)	34.2 (31.3-37.1)	35.8 (32.9-38.8)	40.3 (37.2-43.4)	37.0 (34.1-40.0)	36.1 (33.2-39.0)

Table 5.2.3 Age-Standardised Mortality Rate of Stroke Per 100,000 Population (95%CI) by Gender

Gender	2005	2006	2007	2008	2009	2010	2011	2012	2013
Male	34.5 (31.3-37.8)	33.8 (30.6-36.9)	36.3 (33.1-39.5)	33.9 (30.9-36.9)	29.5 (26.7-32.2)	31.1 (28.4-33.9)	30.5 (27.9-33.2)	29.7 (27.1-32.2)	26.9 (24.5-29.3)
Female	34.3 (31.5-37.1)	31.4 (28.7-34.0)	29.6 (27.1-32.1)	27.9 (25.6-30.3)	24.2 (22.1-26.3)	24.0 (22.0-26.1)	26.4 (24.3-28.6)	23.2 (21.3-25.2)	22.0 (20.2-23.9)

The ASMR was higher among males than females and has declined significantly from 2005 to 2013 in both genders (Figure 5.2.3).). A higher proportion of haemorrhagic stroke and higher stroke incidence in males led to higher ASMR, compared to females. AAPC for males was -2.96%, with 95%CI (-4.50 to -1.49) and P=0.002. AAPC for females was -4.97%, with 95%CI (-6.57 to -3.25) and P<0.0001.

Figure 5.2.3 Age-Standardised Mortality Rate of Stroke Per 100,000 Population by Gender

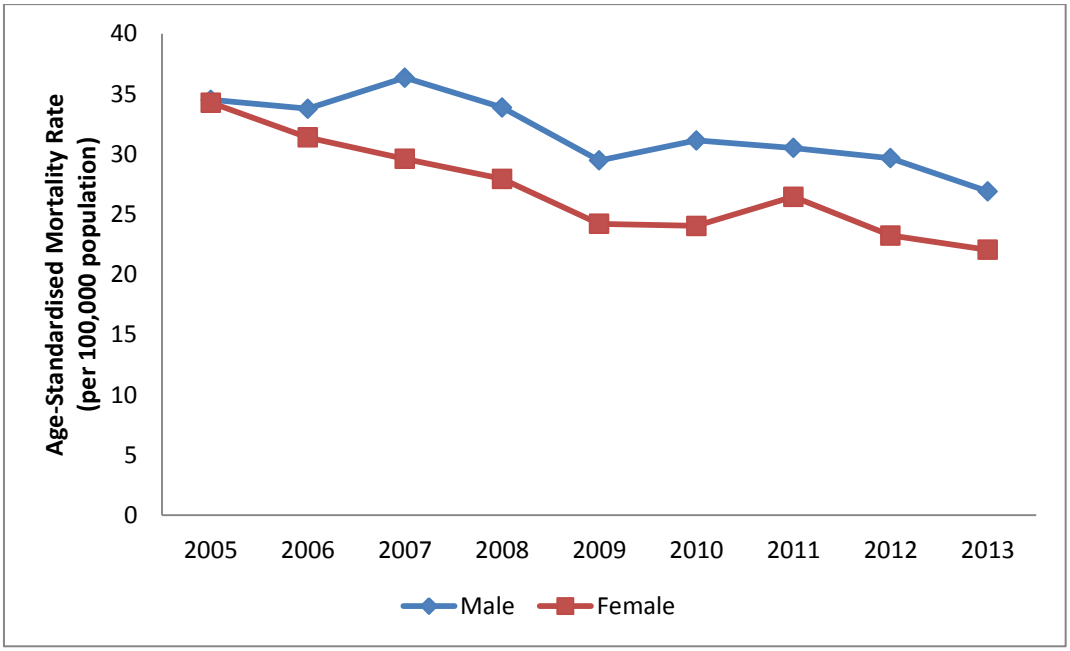


Table 5.2.4 Median and Mean Age at Death of Stroke by Gender

Gender	Age	2005	2006	2007	2008	2009	2010	2011	2012	2013
Male	Median Age (Years)	73.0	72.0	73.0	73.0	73.0	72.0	74.0	73.0	73.0
	Mean Age (Years)	70.4	70.6	71.7	71.0	70.8	70.4	71.8	71.7	71.9
Female	Median Age (Years)	78.0	79.0	79.0	79.0	81.0	81.0	81.0	81.0	82.0
	Mean Age (Years)	76.6	76.7	76.9	77.2	78.6	78.2	78.5	78.6	78.6

Table 5.2.5A Age-Specific Mortality Rate of Stroke Per 100,000 Population for Males

Age Group	2005	2006	2007	2008	2009	2010	2011	2012	2013
15 - 19	0.8	0.0	0.0	0.7	2.2	0.7	0.0	0.0	0.8
20 - 24	0.0	0.0	0.0	0.0	0.0	1.6	0.8	0.0	0.7
25 - 29	1.7	2.5	1.6	1.6	1.5	0.0	0.8	0.8	0.0
30 - 34	1.4	2.8	1.4	2.2	2.8	2.1	2.1	1.4	1.4
35 - 39	2.7	0.7	0.0	4.0	1.9	4.5	5.2	4.6	3.4
40 - 44	6.8	7.4	9.3	8.2	5.8	8.5	6.0	4.6	3.9
45 - 49	10.3	10.7	9.4	11.2	7.4	14.1	4.9	9.9	8.2
50 - 54	24.2	19.3	22.7	16.5	24.1	20.3	21.9	18.5	21.5
55 - 59	35.5	44.9	31.7	46.1	39.0	38.5	40.6	31.5	27.7
60 - 64	62.8	63.8	66.0	55.8	46.6	52.7	43.8	54.8	42.6
65 - 69	103.5	110.3	115.2	91.6	79.4	82.5	85.0	84.9	79.4
70 - 74	180.5	144.8	171.3	168.0	141.1	144.6	141.0	171.2	139.6
75 - 79	302.8	219.8	352.5	257.8	213.5	237.5	264.6	198.7	237.2
80 - 84	663.6	577.6	463.4	553.0	393.1	489.3	469.9	445.7	354.8
85+	824.3	1038.0	1192.8	1057.5	1000.0	935.4	1000.0	918.9	840.3

Table 5.2.5B Age-Specific Mortality Rate of Stroke Per 100,000 Population for Females

Age Group	2005	2006	2007	2008	2009	2010	2011	2012	2013
15 - 19	0.0	0.0	0.8	0.8	0.8	0.0	0.8	0.0	0.0
20 - 24	0.0	0.9	0.0	0.9	0.8	0.0	0.0	0.0	0.8
25 - 29	0.0	0.0	0.8	0.7	0.0	0.0	0.7	0.0	2.3
30 - 34	0.0	2.0	2.0	1.3	1.9	1.9	0.6	1.9	0.6
35 - 39	0.7	0.7	0.6	0.6	1.8	1.8	1.2	4.3	1.9
40 - 44	8.2	5.0	4.4	4.4	3.2	4.5	8.3	1.9	3.1
45 - 49	7.9	9.7	9.0	5.1	6.9	6.9	7.5	8.1	6.3
50 - 54	9.5	14.3	15.9	12.5	10.8	10.6	11.8	11.1	11.0
55 - 59	28.2	24.2	18.1	20.1	8.4	19.4	16.2	14.0	13.5
60 - 64	48.1	48.1	43.6	34.7	18.6	25.7	29.4	25.9	24.1
65 - 69	89.0	71.8	60.0	82.5	72.2	46.4	60.0	52.6	49.1
70 - 74	211.5	162.7	148.6	137.0	106.2	116.6	118.7	106.2	99.8
75 - 79	332.2	301.3	296.3	275.4	224.8	205.6	243.4	186.8	202.5
80 - 84	625.0	561.8	505.2	396.1	385.0	501.9	472.7	443.6	373.2
85+	1152.3	1139.2	1161.7	1124.3	1129.0	1009.2	1134.0	1022.2	966.8

5.3 Mortality of Stroke by Ethnic Group, 2005-2013

Table 5.3.1 Mortality of Stroke by Ethnic Group

Ethnic Group	2005	2006	2007	2008	2009	2010	2011	2012	2013
Chinese	820	773	827	813	726	807	909	859	810
Malay	178	189	214	198	194	205	197	220	202
Indian	54	64	48	60	64	65	54	55	76
Others	7	17	7	7	13	10	19	7	20

The CMRs among the various ethnicities have remained stable (Figure 5.3.1) while there was a decrease in ASMR among the Malays between 2007 and 2011, which was followed by an upturn in 2012 (Figure 5.3.2). Similarly, the higher proportion of medical histories (risk factors of death) and more incidences among Malays led to higher ASMR, compared to the other two major ethnic groups (Table 7.3.1) . There were significant decreases in ASMR among Chinese (Figure 5.3.2). AAPC for Malays was -2.76%, with 95%CI (-4.59 to -0.90) and P=0.009. AAPC for Chinese was -4.21%, with 95%CI (-5.82 to -2.47) and P=0.001.

Figure 5.3.2 Crude Mortality Rate of Stroke Per 100,000 Population by Ethnic Group

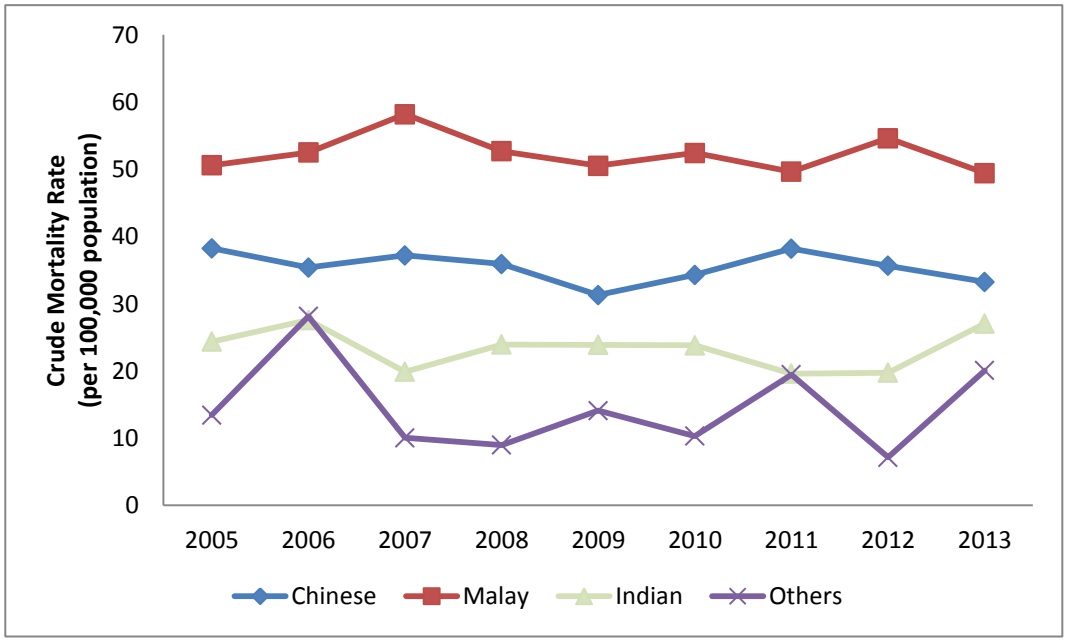


Table 5.3.2 Crude Mortality Rate of Stroke Per 100,000 Population (95%CI) by Ethnic Group

Ethnic Group	2005	2006	2007	2008	2009	2010	2011	2012	2013
Chinese	38.2 (35.6-40.8)	35.4 (32.9-37.8)	37.2 (34.6-39.7)	35.9 (33.4-38.3)	31.3 (29.0-33.5)	34.3 (31.9-36.6)	38.2 (35.7-40.6)	35.6 (33.2-38.0)	33.2 (30.9-35.5)
Malay	50.6 (43.1-58.0)	52.5 (45.0-60.0)	58.2 (50.4-65.9)	52.7 (45.3-60.0)	50.5 (43.4-57.6)	52.4 (45.2-59.6)	49.6 (42.7-56.5)	54.6 (47.4-61.8)	49.4 (42.6-56.2)
Indian	24.3 (17.9-30.8)	27.6 (20.8-34.3)	19.9 (14.2-25.5)	23.9 (17.9-30.0)	23.9 (18.0-29.7)	23.8 (18.0-29.6)	19.6 (14.4-24.8)	19.7 (14.5-24.9)	27.0 (21.0-33.1)
Others	13.4 (3.5-23.3)	28.1 (14.7-41.5)	10.0 (2.6-17.5)	9.0 (2.3-15.6)	14.1 (6.4-21.7)	10.3 (3.9-16.7)	19.4 (10.7-28.2)	7.1 (1.8-12.4)	20.1 (11.3-28.9)

Table 5.3.3 Age-Standardised Mortality Rate of Stroke Per 100,000 Population (95%CI) by Ethnic Group

Ethnic Group	2005	2006	2007	2008	2009	2010	2011	2012	2013
Chinese	32.3 (30.0-34.5)	29.3 (27.2-31.4)	29.8 (27.8-31.9)	28.0 (26.0-29.9)	23.7 (21.9-25.4)	24.8 (23.1-26.6)	26.2 (24.5-28.0)	23.9 (22.2-25.5)	21.8 (20.2-23.3)
Malay	59.6 (50.5-68.7)	62.4 (53.0-71.7)	66.6 (57.4-75.9)	61.8 (53.0-70.7)	58.4 (49.9-66.8)	55.0 (47.2-62.8)	52.3 (44.7-59.9)	56.9 (49.2-64.6)	48.4 (41.6-55.2)
Indian	29.0 (21.0-37.0)	33.7 (25.1-42.4)	24.4 (17.3-31.5)	25.2 (18.6-31.9)	27.3 (20.4-34.3)	26.4 (19.8-33.1)	23.0 (16.6-29.5)	20.5 (14.9-26.2)	26.8 (20.6-32.9)
Others	14.1 (3.5-24.6)	38.6 (19.5-57.7)	12.1 (2.8-21.4)	11.4 (2.2-20.6)	25.3 (10.9-39.6)	19.9 (7.1-32.7)	27.5 (13.9-41.1)	9.2 (1.9-16.4)	26.3 (14.5-38.1)

Figure 5.3.3 Age-Standardised Mortality Rate of Stroke Per 100,000 Population by Ethnic Group

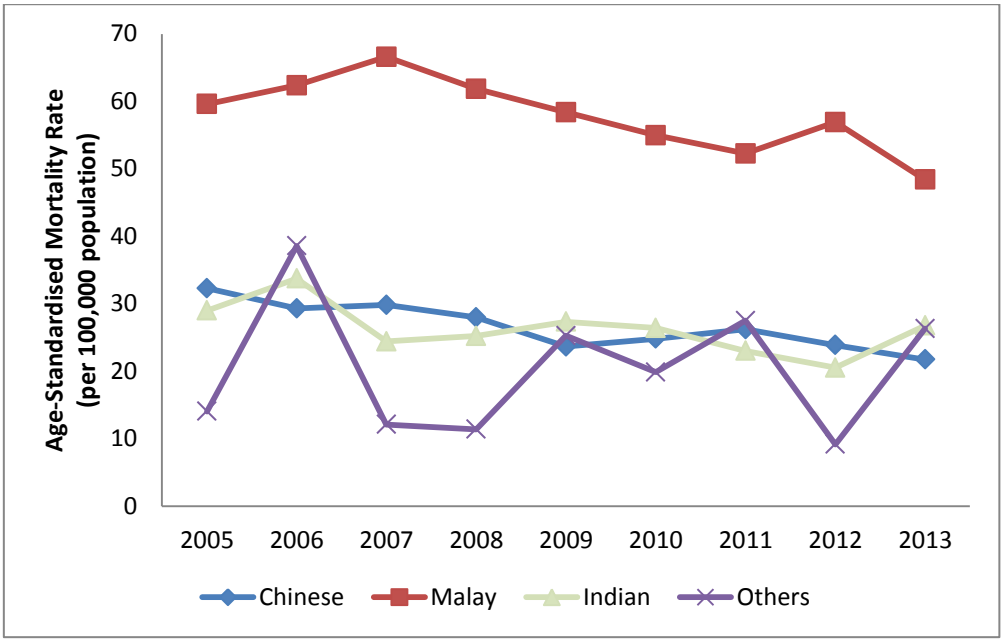


Table 5.3.4 Mortality of Stroke by Gender and Ethnic Group

Gender	Ethnic Group	2005	2006	2007	2008	2009	2010	2011	2012	2013
Male	Chinese	334	335	376	377	329	389	405	393	380
	Malay	77	74	100	86	91	87	90	112	93
	Indian	36	38	30	40	37	37	25	28	32
	Others	4	10	5	3	5	4	10	4	7
Female	Chinese	486	438	451	436	397	418	504	466	430
	Malay	101	115	114	112	103	118	107	108	109
	Indian	18	26	18	20	27	28	29	27	44
	Others	3	7	2	4	8	6	9	3	13

Table 5.3.5A Crude Mortality Rate of Stroke Per 100,000 Population (95%CI) by Ethnic Group for Males

Ethnic Group	2005	2006	2007	2008	2009	2010	2011	2012	2013
Chinese	31.8 (28.4-35.2)	31.3 (28.0-34.7)	34.6 (31.1-38.1)	34.1 (30.7-37.6)	29.1 (26.0-32.3)	34.0 (30.6-37.3)	35.0 (31.6-38.4)	33.6 (30.3-36.9)	32.1 (28.9-35.4)
Malay	44.3 (34.4-54.2)	41.6 (32.1-51.1)	55.1 (44.3-65.9)	46.4 (36.6-56.2)	48.1 (38.2-58.0)	45.1 (35.6-54.6)	46.0 (36.5-55.5)	56.4 (45.9-66.8)	46.2 (36.8-55.5)
Indian	31.5 (21.2-41.8)	31.7 (21.6-41.8)	23.9 (15.4-32.5)	30.7 (21.2-40.2)	26.4 (17.9-34.9)	25.9 (17.6-34.2)	17.4 (10.6-24.2)	19.3 (12.1-26.4)	21.9 (14.3-29.5)
Others	16.2 (0.3-32.1)	34.6 (13.2-56.0)	15.0 (1.8-28.1)	8.1 (-1.1-17.2)	11.4 (1.4-21.4)	8.7 (0.2-17.2)	21.5 (8.2-34.8)	8.5 (0.2-16.9)	14.7 (3.8-25.6)

Table 5.3.5B Crude Mortality Rate of Stroke Per 100,000 Population (95%CI) by Ethnic Group for Females

Ethnic Group	2005	2006	2007	2008	2009	2010	2011	2012	2013
Chinese	44.3 (40.4-48.3)	39.2 (35.5-42.9)	39.6 (36.0-43.3)	37.6 (34.0-41.1)	33.3 (30.0-36.6)	34.5 (31.2-37.8)	41.1 (37.5-44.7)	37.5 (34.1-40.9)	34.2 (31.0-37.4)
Malay	56.7 (45.6-67.8)	63.0 (51.5-74.6)	61.2 (49.9-72.4)	58.8 (47.9-69.7)	52.8 (42.6-63.1)	59.5 (48.7-70.2)	53.1 (43.1-63.2)	52.9 (42.9-62.8)	52.6 (42.7-62.5)
Indian	16.7 (9.0-24.5)	23.1 (14.2-32.0)	15.5 (8.3-22.6)	16.6 (9.3-23.9)	21.1 (13.1-29.1)	21.5 (13.5-29.4)	22.0 (14.0-30.0)	20.2 (12.6-27.8)	32.5 (22.9-42.1)
Others	10.9 (-1.4-23.3)	22.2 (5.7-38.6)	5.5 (-2.1-13.1)	9.8 (0.2-19.4)	16.5 (5.1-27.9)	11.7 (2.3-21.1)	17.5 (6.1-29.0)	5.8 (-0.8-12.4)	25.0 (11.4-38.5)

Table 5.3.6A Age-Standardised Mortality Rate of Stroke Per 100,000 Population (95%CI) by Ethnic Group for Males

Ethnic Group	2005	2006	2007	2008	2009	2010	2011	2012	2013
Chinese	32.5 (29.0-36.1)	31.2 (27.8-34.6)	33.9 (30.4-37.4)	31.9 (28.6-35.1)	26.2 (23.4-29.1)	29.4 (26.4-32.3)	29.0 (26.1-31.9)	27.0 (24.3-29.8)	24.9 (22.3-27.4)
Malay	53.2 (40.8-65.7)	52.3 (39.8-64.9)	66.3 (52.8-79.7)	57.1 (44.7-69.5)	59.5 (46.9-72.0)	51.8 (40.5-63.0)	50.4 (39.5-61.2)	63.6 (51.5-75.7)	49.3 (39.1-59.6)
Indian	32.3 (21.3-43.3)	35.2 (23.2-47.1)	28.2 (17.7-38.7)	30.4 (20.4-40.3)	29.6 (19.4-39.8)	29.0 (19.1-38.8)	22.1 (12.8-31.4)	21.9 (13.3-30.4)	21.1 (13.5-28.7)
Others	16.4 (0.1-32.7)	48.3 (16.9-79.6)	14.5 (1.5-27.6)	6.9 (-2.1-15.9)	21.3 (0.8-41.8)	13.9 (-0.5-28.3)	33.3 (11.6-55.1)	9.9 (-0.2-20.0)	21.1 (4.9-37.2)

Table 5.3.6B Age-Standardised Mortality Rate of Stroke Per 100,000 Population (95%CI) by Ethnic Group for Females

Ethnic Group	2005	2006	2007	2008	2009	2010	2011	2012	2013
Chinese	31.3 (28.4-34.1)	27.4 (24.7-30.1)	26.4 (23.9-29.0)	24.6 (22.2-27.0)	20.8 (18.6-22.9)	20.6 (18.5-22.6)	23.5 (21.3-25.6)	20.7 (18.7-22.6)	18.5 (16.7-20.4)
Malay	65.1 (51.8-78.3)	72.1 (58.3-86.0)	67.1 (54.3-80.0)	65.8 (53.4-78.3)	57.5 (46.0-69.0)	57.7 (46.9-68.5)	53.4 (42.9-64.0)	51.1 (41.2-61.0)	47.3 (38.2-56.4)
Indian	25.4 (13.0-37.7)	33.7 (20.3-47.1)	22.7 (11.8-33.7)	20.6 (11.2-30.0)	27.8 (17.0-38.7)	23.7 (14.6-32.7)	26.4 (16.4-36.4)	19.7 (12.0-27.4)	32.9 (23.0-42.9)
Others	13.0 (-2.1-28.2)	28.4 (7.0-49.7)	8.5 (-3.4-20.3)	13.7 (-1.3-28.7)	24.6 (5.5-43.8)	25.4 (3.7-47.2)	18.1 (5.5-30.7)	9.1 (-2.1-20.2)	30.5 (13.5-47.4)

5.4 Mortality of Stroke by Subtype, 2005-2013

Table 5.4.1 Mortality of Stroke by Subtype

Subtype	2005	2006	2007	2008	2009	2010	2011	2012	2013
Ischaemic	378	367	398	393	350	373	460	417	406
Haemorrhagic	339	344	341	366	333	404	389	374	375
Unknown	342	332	357	319	314	310	330	350	327

Figure 5.4.2 Crude Mortality Rate of Stroke Per 100,000 Population by Subtype

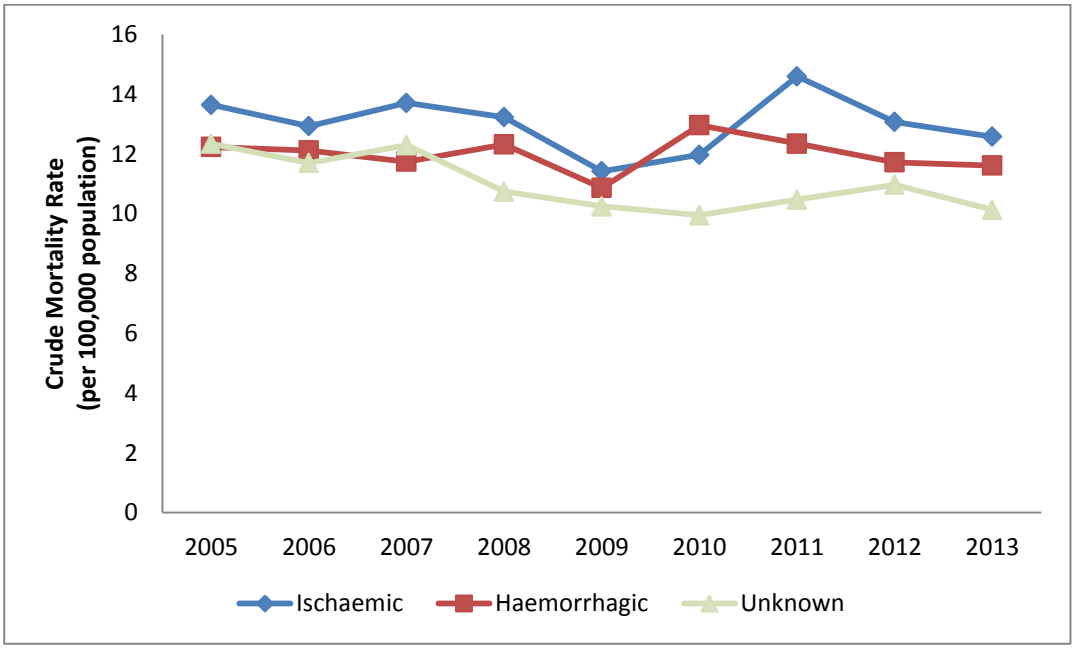


Table 5.4.2 Crude Mortality Rate of Stroke Per 100,000 Population (95%CI) by Subtype

Subtype	2005	2006	2007	2008	2009	2010	2011	2012	2013
Ischaemic	13.6 (12.3-15.0)	12.9 (11.6-14.2)	13.7 (12.4-15.0)	13.2 (11.9-14.5)	11.4 (10.2-12.6)	12.0 (10.8-13.2)	14.6 (13.3-15.9)	13.1 (11.8-14.3)	12.6 (11.3-13.8)
Haemorrhagic	12.2 (10.9-13.5)	12.1 (10.8-13.4)	11.7 (10.5-13.0)	12.3 (11.1-13.6)	10.9 (9.7-12.0)	13.0 (11.7-14.2)	12.3 (11.1-13.6)	11.7 (10.5-12.9)	11.6 (10.4-12.8)
Unknown	12.3 (11.0-13.6)	11.7 (10.4-12.9)	12.3 (11.0-13.6)	10.7 (9.6-11.9)	10.2 (9.1-11.4)	9.9 (8.8-11.1)	10.5 (9.3-11.6)	11.0 (9.8-12.1)	10.1 (9.0-11.2)

Table 5.4.3 Age-Standardised Mortality Rate of Stroke Per 100,000 Population (95%CI) by Subtype

Subtype	2005	2006	2007	2008	2009	2010	2011	2012	2013
Ischaemic	12.5 (11.2-13.8)	11.6 (10.4-12.8)	11.8 (10.6-13.0)	11.3 (10.1-12.4)	9.5 (8.5-10.5)	9.5 (8.5-10.5)	10.9 (9.9-11.9)	9.6 (8.7-10.6)	8.9 (8.0-9.8)
Haemorrhagic	11.3 (10.1-12.5)	11.0 (9.8-12.2)	10.6 (9.4-11.7)	10.8 (9.6-11.9)	9.2 (8.2-10.2)	10.6 (9.5-11.7)	9.9 (8.9-11.0)	9.1 (8.1-10.0)	8.8 (7.9-9.7)
Unknown	11.0 (9.8-12.2)	10.1 (9.0-11.2)	10.4 (9.3-11.5)	8.8 (7.8-9.8)	8.3 (7.3-9.2)	7.5 (6.6-8.3)	7.7 (6.9-8.6)	7.7 (6.9-8.6)	6.8 (6.1-7.6)

The age-standardised mortality rate for Ischaemic Stroke has been declining significantly during the period, with AAPC -3.63% (95%CI: -5.64 to -1.69) and P=0.004, while Haemorrhagic Stroke with AAPC -2.86% (95%CI: -4.30 to -1.29) and P=0.003, and for Unknown stoke with AAPC -5.64% (95%CI: -7.13 to -4.11) and P<0.0001.

Figure 5.4.3 Age-Standardised Mortality Rate of Stroke Per 100,000 Population by Subtype

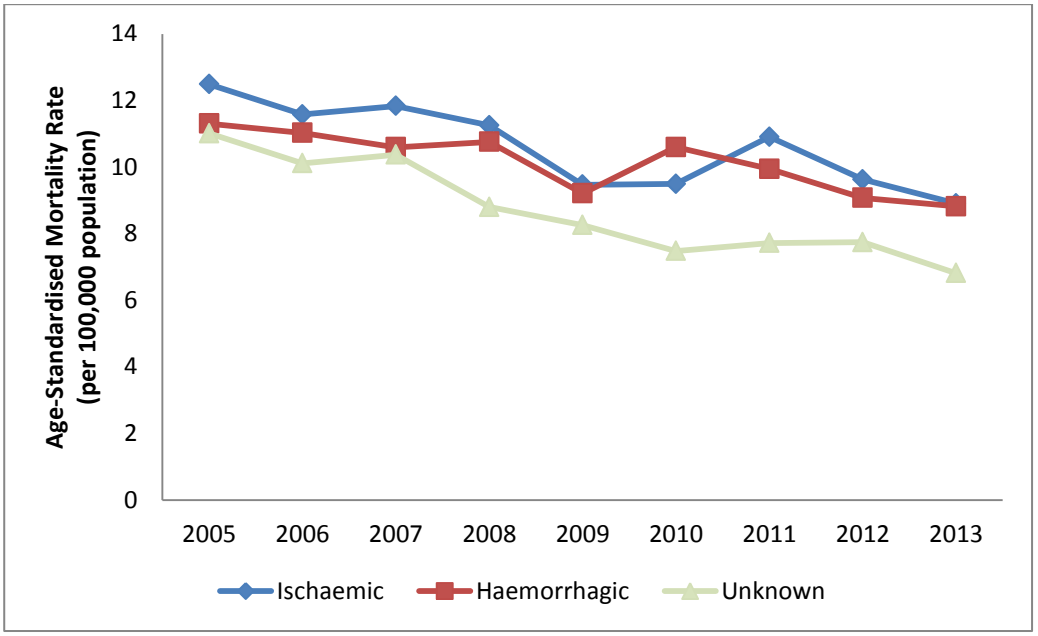


Table 5.4.4 Mortality of Stroke by Gender and Subtype

Gender	Subtype	2005	2006	2007	2008	2009	2010	2011	2012	2013
Male	Ischaemic	163	151	180	177	154	156	192	178	170
	Haemorrhagic	154	179	183	191	183	234	197	205	195
	Unknown	134	127	148	138	125	127	141	154	147
Female	Ischaemic	215	216	218	216	196	217	268	239	236
	Haemorrhagic	185	165	158	175	150	170	192	169	180
	Unknown	208	205	209	181	189	183	189	196	180

Table 5.4.5A Crude Mortality Rate of Stroke Per 100,000 Population (95%CI) by Subtype for Males

Subtype	2005	2006	2007	2008	2009	2010	2011	2012	2013
Ischaemic	12.0 (10.1-13.8)	10.8 (9.1-12.5)	12.6 (10.8-14.5)	12.1 (10.3-13.9)	10.2 (8.6-11.9)	10.2 (8.6-11.8)	12.4 (10.7-14.2)	11.4 (9.7-13.1)	10.8 (9.2-12.4)
Haemorrhagic	11.3 (9.5-13.1)	12.8 (10.9-14.7)	12.8 (11.0-14.7)	13.1 (11.2-15.0)	12.2 (10.4-13.9)	15.3 (13.4-17.3)	12.8 (11.0-14.6)	13.1 (11.3-14.9)	12.4 (10.6-14.1)
Unknown	9.8 (8.2-11.5)	9.1 (7.5-10.7)	10.4 (8.7-12.0)	9.5 (7.9-11.0)	8.3 (6.9-9.8)	8.3 (6.9-9.8)	9.1 (7.6-10.6)	9.9 (8.3-11.4)	9.3 (7.8-10.8)

Table 5.4.5B Crude Mortality Rate of Stroke Per 100,000 Population (95%CI) by Subtype for Females

Subtype	2005	2006	2007	2008	2009	2010	2011	2012	2013
Ischaemic	15.3 (13.2-17.3)	15.0 (13.0-16.9)	14.7 (12.8-16.7)	14.3 (12.4-16.2)	12.5 (10.8-14.3)	13.6 (11.8-15.5)	16.6 (14.7-18.6)	14.6 (12.8-16.5)	14.3 (12.5-16.1)
Haemorrhagic	13.1 (11.2-15.0)	11.4 (9.7-13.2)	10.7 (9.0-12.4)	11.6 (9.9-13.3)	9.6 (8.1-11.1)	10.7 (9.1-12.3)	11.9 (10.2-13.6)	10.4 (8.8-11.9)	10.9 (9.3-12.5)
Unknown	14.8 (12.8-16.8)	14.2 (12.3-16.1)	14.1 (12.2-16.1)	12.0 (10.2-13.7)	12.1 (10.4-13.8)	11.5 (9.8-13.2)	11.7 (10.1-13.4)	12.0 (10.3-13.7)	10.9 (9.3-12.5)

Table 5.4.6A Age-Standardised Mortality Rate of Stroke Per 100,000 Population (95%CI) by Subtype for Males

Subtype	2005	2006	2007	2008	2009	2010	2011	2012	2013
Ischaemic	12.6 (10.6-14.6)	11.0 (9.2-12.9)	12.8 (10.9-14.7)	11.9 (10.1-13.7)	9.7 (8.1-11.2)	9.4 (7.9-10.9)	10.7 (9.1-12.2)	9.9 (8.4-11.4)	8.9 (7.6-10.3)
Haemorrhagic	11.3 (9.5-13.1)	12.8 (10.9-14.7)	12.6 (10.7-14.4)	12.2 (10.5-14.0)	11.2 (9.6-12.9)	13.8 (12.0-15.6)	11.2 (9.6-12.8)	11.2 (9.6-12.8)	10.3 (8.9-11.8)
Unknown	10.6 (8.8-12.4)	9.9 (8.2-11.7)	11.0 (9.2-12.8)	9.7 (8.0-11.3)	8.6 (7.0-10.1)	7.9 (6.5-9.3)	8.6 (7.2-10.1)	8.6 (7.2-10.0)	7.6 (6.4-8.9)

Table 5.4.6B Age-Standardised Mortality Rate of Stroke Per 100,000 Population (95%CI) by Subtype for Females

Subtype	2005	2006	2007	2008	2009	2010	2011	2012	2013
Ischaemic	12.0 (10.3-13.6)	11.5 (9.9-13.1)	11.0 (9.5-12.5)	10.2 (8.8-11.7)	8.9 (7.6-10.2)	9.2 (7.9-10.4)	10.8 (9.4-12.1)	9.1 (7.9-10.3)	8.5 (7.3-9.6)
Haemorrhagic	11.2 (9.5-12.8)	9.6 (8.1-11.1)	8.9 (7.5-10.3)	9.4 (7.9-10.8)	7.3 (6.1-8.6)	7.7 (6.5-9.0)	8.7 (7.4-9.9)	7.2 (6.0-8.3)	7.4 (6.3-8.6)
Unknown	11.1 (9.6-12.7)	10.3 (8.9-11.8)	9.7 (8.4-11.1)	8.3 (7.1-9.6)	8.0 (6.8-9.1)	7.1 (6.1-8.2)	7.0 (6.0-8.1)	7.0 (6.0-8.0)	6.2 (5.2-7.1)

6. 30-DAY CASE-FATALITY OF STROKE, 2005-2013

6.1 30-Day Case-Fatality of Stroke, Overall, 2005-2013

The 30-day case fatality refers to the percentage of stroke patients who died of stroke only within 30 days of stroke onset, regardless if the death occurred within or outside the hospital. This can be affected by several factors such as case severity, timing of presentation and treatment administered.

The number of stroke patients who died of stroke only within 30 days had increased from 503 in 2005 to 577 in 2013. (Table 6.1.1) The crude case-fatality rates (CFR) have remained stable, ranging from 8.4% to 10.4% in 2005 - 2013. The age-standardised rates have also remained stable, ranging from 8.3% to 10.4% in 2005 - 2013.

Table 6.1.1 30-Day Case-Fatality of Stroke (%)

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013
No.	503	525	550	573	481	566	638	572	577
CR	9.2 (8.4-10.0)	9.7 (8.9-10.6)	9.9 (9.0-10.7)	10.3 (9.4-11.1)	8.4 (7.6-9.1)	9.6 (8.8-10.4)	10.4 (9.6-11.2)	9.0 (8.3-9.7)	8.7 (8.0-9.4)
ASR	9.1 (8.4-9.9)	9.7 (8.9-10.5)	9.9 (9.1-10.6)	10.2 (9.4-10.9)	8.3 (7.6-9.0)	9.5 (8.8-10.3)	10.4 (9.6-11.1)	8.9 (8.2-9.6)	8.7 (8.0-9.3)

6.2 30-Day Case-Fatality of Stroke by gender, 2005-2013

Table 6.2.1 30-Day Case-Fatality of Stroke by Gender

Gender	2005	2006	2007	2008	2009	2010	2011	2012	2013
Male	233	234	272	276	232	288	314	284	269
Female	270	291	278	297	249	278	324	288	308

Table 6.2.2 30-Day Case-Fatality Rate of Stroke (%) by Gender

Gender	2005	2006	2007	2008	2009	2010	2011	2012	2013
Male	7.9 (6.9-8.9)	7.8 (6.8-8.8)	8.9 (7.8-9.9)	9.0 (7.9-10.0)	7.2 (6.3-8.1)	8.7 (7.7-9.7)	8.9 (8.0-9.9)	7.9 (6.9-8.8)	7.0 (6.2-7.9)
Female	10.8 (9.5-12.0)	12.1 (10.7-13.5)	11.1 (9.8-12.4)	11.8 (10.5-13.2)	9.8 (8.6-11.0)	10.7 (9.5-12.0)	12.3 (11.0-13.7)	10.5 (9.3-11.7)	10.9 (9.7-12.2)

Similar to crude mortality rates, the CFR for females was greater than that for males (Table 6.2.2).

Table 6.2.3 Age-Standardised 30-Day Case-Fatality Rate of Stroke (%) by Gender

Gender	2005	2006	2007	2008	2009	2010	2011	2012	2013
Male	8.2 (7.2-9.2)	8.0 (7.0-9.0)	9.5 (8.4-10.6)	9.5 (8.4-10.6)	7.6 (6.6-8.6)	9.4 (8.3-10.5)	9.7 (8.7-10.8)	8.5 (7.5-9.4)	7.6 (6.7-8.5)
Female	10.1 (8.9-11.3)	11.5 (10.2-12.9)	10.5 (9.3-11.7)	10.8 (9.6-12.0)	8.8 (7.7-9.8)	9.6 (8.5-10.8)	11.1 (9.9-12.3)	9.5 (8.4-10.6)	9.6 (8.5-10.7)

Also, the age-standardised case fatality rate was greater for females than males (Table 6.2.3). The higher case fatality rate among females was due to higher number of older patients and higher number of patients having risk factor such as hypertension and hyperlipidemia which correlated to other factors.

6.3 30-Day Case-Fatality of Stroke by Ethnic Group, 2005-2013

Chinese and Malays had similar case fatality rate, which were generally higher than Indians except for year 2013.

Table 6.3.1 30-Day Case-Fatality of Stroke by Ethnic Group

Ethnic Group	2005	2006	2007	2008	2009	2010	2011	2012	2013
Chinese	399	405	420	450	368	437	499	462	461
Malay	74	74	99	80	75	89	100	81	66
Indian	20	31	24	27	32	30	25	21	32
Others	10	15	7	16	6	10	14	8	18

Table 6.3.2 30-Day Case-Fatality Rate of Stroke (%) by Ethnic Group

Ethnic Group	2005	2006	2007	2008	2009	2010	2011	2012	2013
Chinese	9.3 (8.4-10.2)	9.5 (8.6-10.5)	9.8 (8.9-10.7)	10.5 (9.5-11.5)	8.2 (7.4-9.1)	9.7 (8.8-10.6)	10.7 (9.8-11.6)	9.5 (8.7-10.4)	9.2 (8.4-10.0)
Malay	11.2 (8.6-13.7)	10.9 (8.4-13.4)	12.6 (10.1-15.1)	9.9 (7.8-12.1)	9.1 (7.0-11.1)	9.6 (7.6-11.6)	10.2 (8.2-12.3)	7.6 (6.0-9.3)	6.3 (4.8-7.8)
Indian	5.6 (3.1-8.1)	9.0 (5.8-12.1)	6.2 (3.7-8.6)	7.2 (4.5-9.9)	8.3 (5.4-11.2)	7.9 (5.1-10.7)	6.2 (3.8-8.6)	5.9 (3.4-8.4)	6.8 (4.4-9.1)
Others	7.6 (2.9-12.4)	11.8 (5.8-17.8)	6.1 (1.6-10.6)	14.5 (7.4-21.7)	7.9 (1.6-14.2)	11.2 (4.3-18.2)	14.0 (6.7-21.3)	7.9 (2.4-13.4)	15.4 (8.3-22.5)

Table 6.3.3 30-Day Case-Fatality of Stroke by Gender and Ethnic Group

Gender	Ethnic Group	2005	2006	2007	2008	2009	2010	2011	2012	2013
Male	Chinese	179	174	204	216	173	224	241	227	218
	Malay	36	33	46	36	34	40	53	41	33
	Indian	16	18	17	19	23	20	13	11	12
	Others	2	9	5	5	2	4	7	5	6
Female	Chinese	220	231	216	234	195	213	258	235	243
	Malay	38	41	53	44	41	49	47	40	33
	Indian	4	13	7	8	9	10	12	10	20
	Others	8	6	2	11	4	6	7	3	12

Table 6.3.4A 30-Day Case-Fatality Rate of Stroke (%) by Ethnic Group for Males

Ethnic Group	2005	2006	2007	2008	2009	2010	2011	2012	2013
Chinese	7.9 (6.7-9.0)	7.5 (6.4-8.6)	8.7 (7.5-9.9)	9.1 (7.9-10.3)	6.9 (5.9-7.9)	9.0 (7.8-10.1)	9.1 (8.0-10.3)	8.2 (7.1-9.3)	7.6 (6.6-8.6)
Malay	9.9 (6.7-13.1)	8.9 (5.9-12.0)	11.2 (8.0-14.5)	8.8 (5.9-11.7)	7.7 (5.1-10.3)	7.9 (5.4-10.3)	9.3 (6.8-11.8)	7.3 (5.1-9.5)	5.5 (3.6-7.4)
Indian	7.1 (3.6-10.6)	7.8 (4.2-11.3)	7.1 (3.7-10.5)	8.3 (4.5-12.0)	10.0 (5.9-14.1)	8.6 (4.8-12.3)	5.3 (2.4-8.2)	5.0 (2.0-8.0)	4.2 (1.8-6.5)
Others	2.6 (-1.0-6.1)	11.1 (3.9-18.4)	6.6 (0.8-12.3)	9.3 (1.1-17.4)	4.8 (-1.8-11.4)	7.4 (0.1-14.7)	13.5 (3.5-23.4)	7.9 (1.0-14.9)	9.1 (1.8-16.4)

Table 6.3.4B 30-Day Case-Fatality Rate of Stroke (%) by Ethnic Group for Females

Ethnic Group	2005	2006	2007	2008	2009	2010	2011	2012	2013
Chinese	10.9 (9.4-12.3)	11.9 (10.4-13.4)	11.2 (9.7-12.6)	12.2 (10.7-13.8)	9.9 (8.5-11.3)	10.7 (9.2-12.1)	12.8 (11.2-14.3)	11.3 (9.9-12.8)	11.4 (10.0-12.8)
Malay	12.7 (8.7-16.7)	13.3 (9.2-17.4)	14.0 (10.2-17.8)	11.1 (7.8-14.4)	10.6 (7.4-13.9)	11.8 (8.5-15.1)	11.5 (8.2-14.8)	8.0 (5.6-10.5)	7.3 (4.8-9.8)
Indian	3.0 (0.1-6.0)	11.5 (5.3-17.8)	4.6 (1.2-8.1)	5.5 (1.7-9.3)	5.8 (2.0-9.5)	6.8 (2.6-11.1)	7.6 (3.3-12.0)	7.4 (2.8-12.0)	11.0 (6.2-15.8)
Others	15.1 (4.6-25.6)	13.0 (2.6-23.5)	5.1 (-2.0-12.2)	19.6 (8.0-31.3)	11.8 (0.2-23.3)	17.1 (3.4-30.9)	14.6 (3.8-25.4)	7.9 (-1.0-16.8)	23.5 (10.2-36.8)

The 30-day CFR of haemorrhagic stroke was 4 – 5 times that of ischaemic stroke (Table 6.4.1, 6.4.2). However, unlike the mortality rate which had a large proportion of unknown subtypes (Table 5.4.1), less than 2% of the in-hospital deaths were of unknown subtype (Table 6.4.1).

6.4 30-Day Case-Fatality of Stroke by Subtype, 2005-2013

Table 6.4.1 30-Day Case-Fatality of Stroke by Subtype

Subtype	2005	2006	2007	2008	2009	2010	2011	2012	2013
Ischaemic	244	247	280	283	238	254	306	273	260
Haemorrhagic	251	269	258	281	234	307	308	285	301
Unknown	8	9	12	9	9	5	24	14	16

Table 6.4.2 30-Day Case-Fatality Rate of Stroke (%) by Subtype

Subtype	2005	2006	2007	2008	2009	2010	2011	2012	2013
Ischaemic	5.5 (4.8-6.2)	5.6 (4.9-6.4)	6.2 (5.4-6.9)	6.4 (5.6-7.1)	5.1 (4.5-5.8)	5.3 (4.7-6.0)	6.2 (5.5-6.9)	5.3 (4.7-5.9)	4.9 (4.3-5.5)
Haemorrhagic	26.4 (23.1-29.7)	27.1 (23.8-30.3)	25.6 (22.4-28.7)	25.6 (22.6-28.6)	21.4 (18.7-24.2)	27.3 (24.2-30.3)	25.4 (22.6-28.3)	23.7 (21.0-26.5)	23.4 (20.8-26.1)

Table 6.4.3 30-Day Case-Fatality of Stroke by Gender and Subtype

Gender	Subtype	2005	2006	2007	2008	2009	2010	2011	2012	2013
Male	Ischaemic	113	104	131	130	104	112	145	123	106
	Haemorrhagic	116	127	134	143	126	176	160	155	157
	Unknown	4	3	7	3	2	0	9	6	6
Female	Ischaemic	131	143	149	153	134	142	161	150	154
	Haemorrhagic	135	142	124	138	108	131	148	130	144
	Unknown	4	6	5	6	7	5	15	8	10

Table 6.4.4A 30-Day Case-Fatality Rate of Stroke (%) by Subtype for Males

Subtype	2005	2006	2007	2008	2009	2010	2011	2012	2013
Ischaemic	4.7 (3.8-5.5)	4.3 (3.4-5.1)	5.2 (4.3-6.1)	5.3 (4.4-6.2)	4.0 (3.2-4.8)	4.2 (3.4-5.0)	5.1 (4.3-6.0)	4.2 (3.4-4.9)	3.4 (2.8-4.1)
Haemorrhagic	23.1 (18.9-27.3)	23.8 (19.6-27.9)	25.0 (20.8-29.3)	23.5 (19.6-27.3)	20.6 (17.0-24.1)	28.3 (24.2-32.5)	23.6 (19.9-27.3)	23.4 (19.7-27.1)	22.2 (18.7-25.6)

Table 6.4.4B 30-Day Case-Fatality Rate of Stroke (%) by Subtype for Females

Subtype	2005	2006	2007	2008	2009	2010	2011	2012	2013
Ischaemic	6.4 (5.3-7.5)	7.4 (6.2-8.6)	7.4 (6.2-8.6)	7.6 (6.4-8.8)	6.5 (5.4-7.7)	6.8 (5.7-8.0)	7.7 (6.5-8.9)	6.8 (5.7-7.9)	6.9 (5.8-8.0)
Haemorrhagic	30.1 (25.1-35.2)	30.9 (25.8-35.9)	26.2 (21.6-30.8)	28.3 (23.6-33.0)	22.6 (18.3-26.9)	26.0 (21.5-30.4)	27.7 (23.3-32.2)	24.1 (19.9-28.2)	25.0 (20.9-29.1)

7. RISK FACTOR PROFILE OF INCIDENT STROKE (%), 2005 - 2013

7.1 Risk Factor Profile of Incident Stroke (%), Overall, 2005 - 2013

The risk factor profile of first incident stroke was defined as either having a history of or being newly diagnosed with the risk factor. The risk factor of smoker includes both ex and current smoker.

Hypertension and hyperlipidaemia were the two most common risk factors among the stroke patients (Table 7.1.1). The proportion of first-ever stroke patients with hyperlipidaemia has increased over time while that of other risk factors has remained stable.

Table 7.1.1 Risk Factor of Profile of Incident Stroke (%)

Risk Factors (%)	Overall								
	2005	2006	2007	2008	2009	2010	2011	2012	2013
Atrial Fibrillation	11.7	12.3	13.4	15.1	13.7	15.0	16.3	16.6	17.7
Diabetes Mellitus	39.3	38.2	40.1	39.4	38.5	39.0	39.1	38.3	37.6
Hyperlipidaemia	64.5	69.5	75.4	77.9	80.2	80.7	80.0	80.9	81.9
Hypertension	75.5	75.9	78.3	79.2	79.4	78.1	78.7	79.0	78.5
Smoker	33.1	36.3	35.9	35.1	35.0	35.4	37.4	36.5	37.3

There were higher proportions of women with diabetes, hypertension and atrial fibrillation compared to men (Table 7.2.1). Hyperlipidaemia and smoking were more common among men compared to women. The proportion of smokers among male stroke patients were 5 times more compared to female stroke patients.

7.2 Risk Factor Profile of Incident Stroke (%) by Gender, 2005 - 2013

Table 7.2.1 Risk Factor Profile of Incident Stroke (%) by Gender

Risk Factors (%)	Male								
	2005	2006	2007	2008	2009	2010	2011	2012	2013
Atrial Fibrillation	9.7	9.2	11.9	13.3	12.1	11.4	13.8	12.5	14.8
Diabetes Mellitus	35.9	37.8	37.7	38.0	37.0	37.5	37.2	37.2	36.1
Hyperlipidaemia	64.8	71.0	76.9	79.3	81.2	82.1	81.5	81.4	82.4
Hypertension	72.9	73.9	76.9	78.0	76.6	76.3	77.0	77.6	75.9
Smoker	52.4	56.4	57.4	56.2	55.5	55.4	57.4	57.5	58.3

Risk Factors (%)	Female								
	2005	2006	2007	2008	2009	2010	2011	2012	2013
Atrial Fibrillation	14.1	16.1	15.1	17.4	15.7	19.6	19.6	22.0	21.5
Diabetes Mellitus	43.3	38.8	43.0	41.1	40.4	40.9	41.7	39.8	39.7
Hyperlipidaemia	64.2	67.7	73.6	76.3	79.0	78.8	77.8	80.2	81.3
Hypertension	78.6	78.4	80.1	80.8	83.1	80.5	81.0	81.0	82.0
Smoker	10.3	11.9	9.4	9.3	8.7	9.4	9.4	8.7	8.6

Indians had the highest proportion of patients with diabetes and hyperlipidaemia, and the lowest proportion of patients with atrial fibrillation (Table 7.3.1). Hypertension was more common among Malay and Indian patients compared to Chinese patients.

7.3 Risk Factor Profile of Incident Stroke (%) by Ethnic Group, 2005 - 2013

Table 7.3.1 Risk Factor Profile of Incident Stroke (%) by Ethnic Group

Risk Factors (%)	Chinese								
	2005	2006	2007	2008	2009	2010	2011	2012	2013
Atrial Fibrillation	11.9	12.6	14.3	15.9	14.4	15.5	17.3	16.7	18.8
Diabetes Mellitus	36.0	35.5	36.2	36.3	35.2	35.7	35.1	34.5	33.4
Hyperlipidaemia	62.6	67.9	73.5	76.9	79.0	79.8	78.8	79.3	80.6
Hypertension	75.9	75.8	78.4	78.3	78.9	77.9	78.2	78.6	78.3
Smoker	32.5	35.7	35.3	35.4	34.5	34.7	36.3	36.1	35.7

Risk Factors (%)	Malay								
	2005	2006	2007	2008	2009	2010	2011	2012	2013
Atrial Fibrillation	12.1	15.1	12.2	14.0	13.9	14.7	13.4	18.2	16.0
Diabetes Mellitus	49.1	46.5	51.8	46.0	47.1	47.5	49.8	50.0	48.3
Hyperlipidaemia	71.4	76.6	81.2	80.9	83.2	82.7	83.1	85.6	86.1
Hypertension	74.2	78.4	79.2	83.3	82.1	78.5	79.7	83.1	80.8
Smoker	35.6	37.1	35.3	32.5	37.8	37.5	41.4	36.5	43.6

Risk Factors (%)	Indian								
	2005	2006	2007	2008	2009	2010	2011	2012	2013
Atrial Fibrillation	6.0	4.3	5.9	9.7	6.1	9.6	10.2	10.6	9.0
Diabetes Mellitus	54.8	54.7	59.2	60.5	58.1	57.7	59.7	58.3	57.9
Hyperlipidaemia	71.4	73.4	83.7	84.9	87.8	88.8	84.6	89.4	87.4
Hypertension	74.6	75.8	77.5	82.9	78.9	80.0	81.2	75.2	76.1
Smoker	33.5	41.8	42.2	40.7	34.4	36.5	40.6	42.1	39.6

Risk Factors (%)	Others								
	2005	2006	2007	2008	2009	2010	2011	2012	2013
Atrial Fibrillation	16.2	11.1	12.1	12.6	7.8	12.7	18.3	13.9	17.2
Diabetes Mellitus	46.7	35.6	35.2	41.4	35.3	40.5	40.2	36.1	39.8
Hyperlipidaemia	69.5	72.2	74.7	73.6	78.4	73.4	82.9	80.6	78.5
Hypertension	72.4	67.8	73.6	73.6	78.4	74.7	79.3	73.6	74.2
Smoker	37.1	37.8	41.8	26.4	41.2	41.8	35.4	38.9	36.6

Among all the ethnic groups, there were higher percentages of hypertensives, diabetics and patients with atrial fibrillation among females compared to males (Table 7.3.2 & Table 7.3.3). Conversely, there were higher percentages of smokers and patients with hyperlipidaemia among males compared to females.

Table 7.3.2 Risk Factor Profile of Incident Stroke (%) by Ethnic Group for Males

Risk Factors (%)	Chinese Male								
	2005	2006	2007	2008	2009	2010	2011	2012	2013
Atrial Fibrillation	10.0	9.2	12.7	13.5	12.2	11.7	14.6	12.5	15.8
Diabetes Mellitus	32.6	35.1	34.5	35.1	34.2	34.7	33.9	34.0	32.3
Hyperlipidaemia	63.2	70.4	75.4	78.9	80.1	81.3	80.7	80.3	81.1
Hypertension	74.2	74.1	77.5	77.5	75.9	76.6	76.7	77.7	75.9
Smoker	50.6	54.8	55.3	55.0	53.9	53.5	55.1	55.5	55.6

Risk Factors (%)	Malay Male								
	2005	2006	2007	2008	2009	2010	2011	2012	2013
Atrial Fibrillation	9.4	12.8	10.6	14.0	15.0	12.0	12.8	13.9	13.4
Diabetes Mellitus	42.1	46.2	45.8	41.4	42.3	43.9	44.6	44.0	43.7
Hyperlipidaemia	68.7	75.5	81.3	79.8	84.7	83.9	84.3	84.6	85.5
Hypertension	69.4	74.7	74.5	79.5	80.2	74.7	77.2	80.0	75.7
Smoker	60.8	63.7	63.6	61.6	63.0	63.5	65.4	63.6	69.9

Risk Factors (%)	Indian Male								
	2005	2006	2007	2008	2009	2010	2011	2012	2013
Atrial Fibrillation	4.8	3.7	6.3	10.1	6.0	6.3	7.0	8.9	7.8
Diabetes Mellitus	53.8	52.8	55.7	62.9	59.0	56.9	56.7	62.0	57.8
Hyperlipidaemia	71.7	72.7	83.5	84.3	87.3	90.0	85.4	90.5	88.5
Hypertension	68.3	74.5	76.1	83.0	75.9	77.5	79.5	71.5	75.7
Smoker	52.4	62.7	65.9	62.9	57.2	57.5	66.7	65.8	61.0

Risk Factors (%)	Others Male								
	2005	2006	2007	2008	2009	2010	2011	2012	2013
Atrial Fibrillation	14.1	8.5	13.1	13.3	3.2	12.2	16.7	9.8	17.0
Diabetes Mellitus	50.0	33.9	32.8	40.0	32.3	30.6	40.5	36.6	35.8
Hyperlipidaemia	73.4	64.4	75.4	71.1	77.4	75.5	78.6	73.2	81.1
Hypertension	65.6	64.4	73.8	68.9	74.2	71.4	78.6	73.2	77.4
Smoker	59.4	52.5	59.0	44.4	58.1	55.1	50.0	63.4	56.6

Table 7.3.3 Risk Factor Profile of Incident Stroke (%) by Ethnic Group for Females

Risk Factors (%)	Chinese Female								
	2005	2006	2007	2008	2009	2010	2011	2012	2013
Atrial Fibrillation	14.2	16.5	16.2	18.9	17.1	20.3	21.1	22.4	22.9
Diabetes Mellitus	40.0	36.1	38.2	37.9	36.6	37.0	36.7	35.1	34.9
Hyperlipidaemia	61.9	65.0	71.3	74.4	77.7	77.9	76.3	77.9	79.9
Hypertension	77.8	77.8	79.4	79.4	82.7	79.7	80.4	79.8	81.5
Smoker	11.6	13.1	11.2	10.7	9.7	10.5	10.4	9.3	9.1

Risk Factors (%)	Malay Female								
	2005	2006	2007	2008	2009	2010	2011	2012	2013
Atrial Fibrillation	15.5	17.6	14.1	14.0	12.4	18.2	14.5	22.7	19.5
Diabetes Mellitus	57.5	46.9	58.7	50.5	53.1	51.9	57.6	56.4	54.5
Hyperlipidaemia	74.7	78.0	81.2	82.1	81.4	81.2	81.4	86.7	86.9
Hypertension	79.8	82.4	84.8	87.0	84.5	83.1	83.4	86.4	87.8
Smoker	5.6	7.3	2.5	4.3	6.6	5.1	5.2	7.6	7.6

Risk Factors (%)	Indian Female								
	2005	2006	2007	2008	2009	2010	2011	2012	2013
Atrial Fibrillation	7.8	5.3	5.3	9.1	6.2	15.0	14.8	13.5	10.9
Diabetes Mellitus	56.3	57.9	64.6	56.6	56.6	59.0	63.9	52.1	58.0
Hyperlipidaemia	70.9	74.7	84.1	85.9	88.5	87.0	83.6	87.5	85.5
Hypertension	83.5	77.9	79.6	82.8	83.2	84.0	83.6	81.3	76.8
Smoker	6.8	6.3	5.3	5.1	0.9	3.0	4.1	3.1	5.8

Risk Factors (%)	Others Female								
	2005	2006	2007	2008	2009	2010	2011	2012	2013
Atrial Fibrillation	19.5	16.1	10.0	11.9	15.0	13.3	20.0	19.4	17.5
Diabetes Mellitus	41.5	38.7	40.0	42.9	40.0	56.7	40.0	35.5	45.0
Hyperlipidaemia	63.4	87.1	73.3	76.2	80.0	70.0	87.5	90.3	75.0
Hypertension	82.9	74.2	73.3	78.6	85.0	80.0	80.0	74.2	70.0
Smoker	2.4	9.7	6.7	7.1	15.0	20.0	20.0	6.5	10.0

7.4 Risk Factor Profile of Incident Stroke (%) by Subtype, 2005 - 2013

Diabetes and hyperlipidaemia were about twice as common among ischaemic stroke patients than among haemorrhagic stroke patients while atrial fibrillation was more than three times as common in ischaemic stroke patients (Table 7.4.1).

Table 7.4.1 Risk Factor Profile of Incident Stroke (%) by Subtype

Risk Factors (%)	Ischaemic								
	2005	2006	2007	2008	2009	2010	2011	2012	2013
Atrial Fibrillation	12.8	13.8	15.1	17.2	15.6	17.1	19.0	18.9	20.1
Diabetes Mellitus	43.4	42.4	44.1	43.7	42.5	43.0	43.4	42.4	41.2
Hyperlipidaemia	73.1	78.6	84.2	87.8	89.0	88.7	88.9	89.3	89.3
Hypertension	75.6	75.6	77.9	79.1	79.3	78.2	79.6	79.8	78.6
Smoker	35.5	38.7	38.4	38.0	38.1	38.1	40.4	38.7	39.9

Risk Factors (%)	Haemorrhagic								
	2005	2006	2007	2008	2009	2010	2011	2012	2013
Atrial Fibrillation	6.6	6.0	6.0	7.2	5.7	6.0	5.6	6.5	7.6
Diabetes Mellitus	21.7	20.0	23.3	23.0	21.8	22.1	22.1	21.3	23.3
Hyperlipidaemia	28.2	31.1	38.9	40.8	44.2	47.5	45.2	46.1	52.0
Hypertension	75.1	77.9	80.3	80.0	79.4	77.8	75.2	76.3	78.2
Smoker	23.4	25.9	25.8	24.5	22.5	23.9	25.8	27.4	26.8

Table 7.4.2 Risk Factor Profile of Incident Stroke (%) by Subtype for Males

Risk Factors (%)	Ischaemic Male								
	2005	2006	2007	2008	2009	2010	2011	2012	2013
Atrial Fibrillation	10.5	9.9	12.9	15.0	13.4	12.8	15.9	14.2	16.1
Diabetes Mellitus	39.5	41.3	41.0	41.8	40.9	41.8	41.1	40.7	39.0
Hyperlipidaemia	72.9	79.7	85.4	88.7	90.4	89.7	89.8	89.8	89.3
Hypertension	72.2	73.1	75.4	77.0	75.3	75.4	77.1	77.8	75.0
Smoker	56.0	60.0	60.9	60.5	60.6	59.3	61.4	60.5	61.9

Risk Factors (%)	Haemorrhagic Male								
	2005	2006	2007	2008	2009	2010	2011	2012	2013
Atrial Fibrillation	5.9	6.7	7.8	6.6	6.4	5.5	5.5	4.9	9.2
Diabetes Mellitus	20.3	21.3	23.1	23.5	20.6	18.9	21.1	21.8	23.5
Hyperlipidaemia	30.0	33.2	38.8	42.9	43.7	50.1	48.0	45.3	52.5
Hypertension	76.2	78.7	83.7	82.0	81.6	79.8	76.8	76.9	80.0
Smoker	36.9	41.1	42.0	39.1	34.3	38.4	41.3	44.3	42.9

Table 7.4.3 Risk Factor Profile of Incident Stroke (%) by Subtype for Females

Risk Factors (%)	Ischaemic Female								
	2005	2006	2007	2008	2009	2010	2011	2012	2013
Atrial Fibrillation	15.6	18.7	18.0	20.0	18.4	22.8	23.5	25.4	25.7
Diabetes Mellitus	48.1	43.6	48.0	46.2	44.5	44.6	46.6	44.7	44.2
Hyperlipidaemia	73.4	77.2	82.5	86.6	87.3	87.5	87.8	88.7	89.3
Hypertension	79.6	78.8	81.1	81.8	84.6	81.8	83.2	82.4	83.6
Smoker	10.9	12.5	9.9	10.0	9.1	10.3	10.3	9.2	9.0

Risk Factors (%)	Haemorrhagic Female								
	2005	2006	2007	2008	2009	2010	2011	2012	2013
Atrial Fibrillation	7.4	5.3	4.1	7.8	4.9	6.6	5.7	8.4	5.8
Diabetes Mellitus	23.4	18.5	23.5	22.5	23.4	26.1	23.4	20.7	23.0
Hyperlipidaemia	26.0	28.8	38.9	38.4	44.8	44.2	41.6	47.0	51.3
Hypertension	74.0	77.1	76.5	77.5	76.6	75.3	73.2	75.7	76.1
Smoker	7.7	8.5	7.8	7.0	7.6	5.8	5.7	6.5	7.3

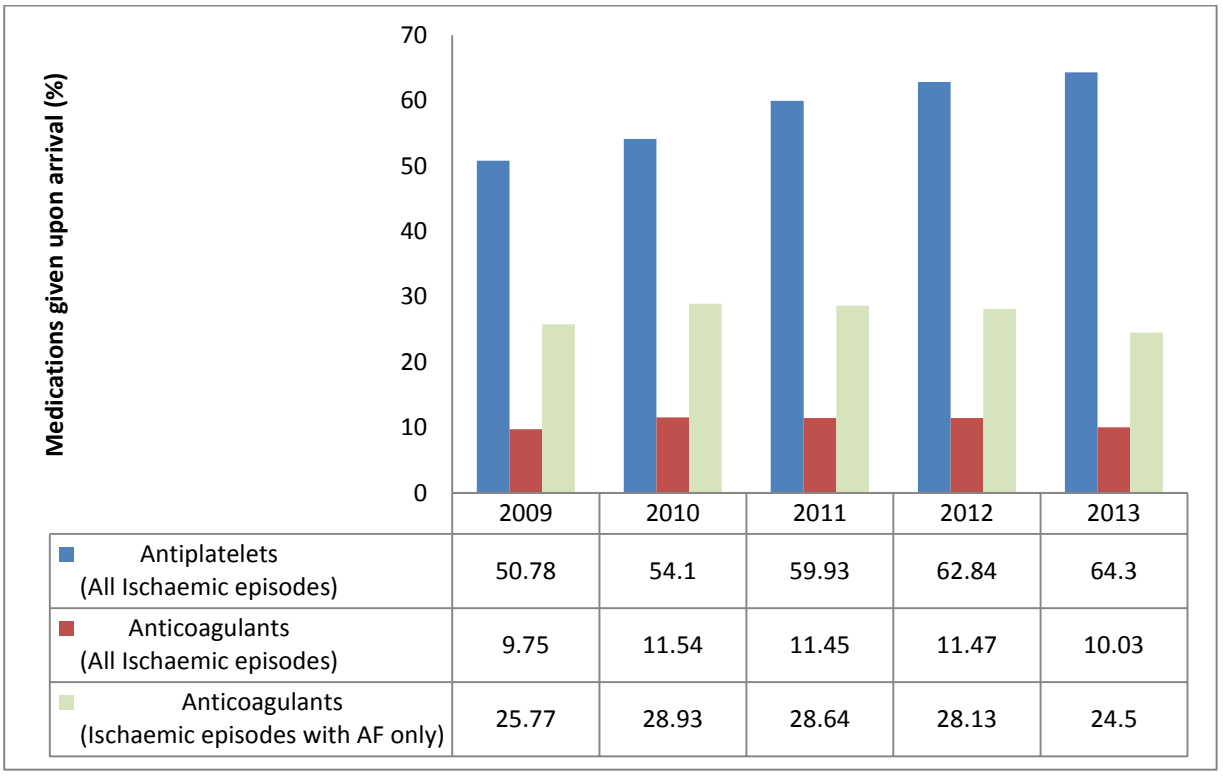
8. MEDICATION FOR ISCHAEMIC STROKE, 2005-2013

8.1 Medication (%), 2005 - 2013

The percentage of patients given anticoagulants upon arrival and upon discharge had increased from 2009 to 2010 (Figure 8.1.1, 8.1.3). The percentage of patients given antiplatelets upon arrival had increased from 2009 to 2013 (Figure 8.1.1). While there was no discernible trend in the medication given to stroke patients during hospitalisation, the percentage of stroke patients given antiplatelets during hospitalisation has exceeded 90% since 2009 (Figure 8.1.2).

Among patients with either newly diagnosed or a history of atrial fibrillation (AF), the percentage of patients given anticoagulants upon arrival and upon discharge both increased from 2009 to 2010 (Figure 8.1.1, 8.1.3).

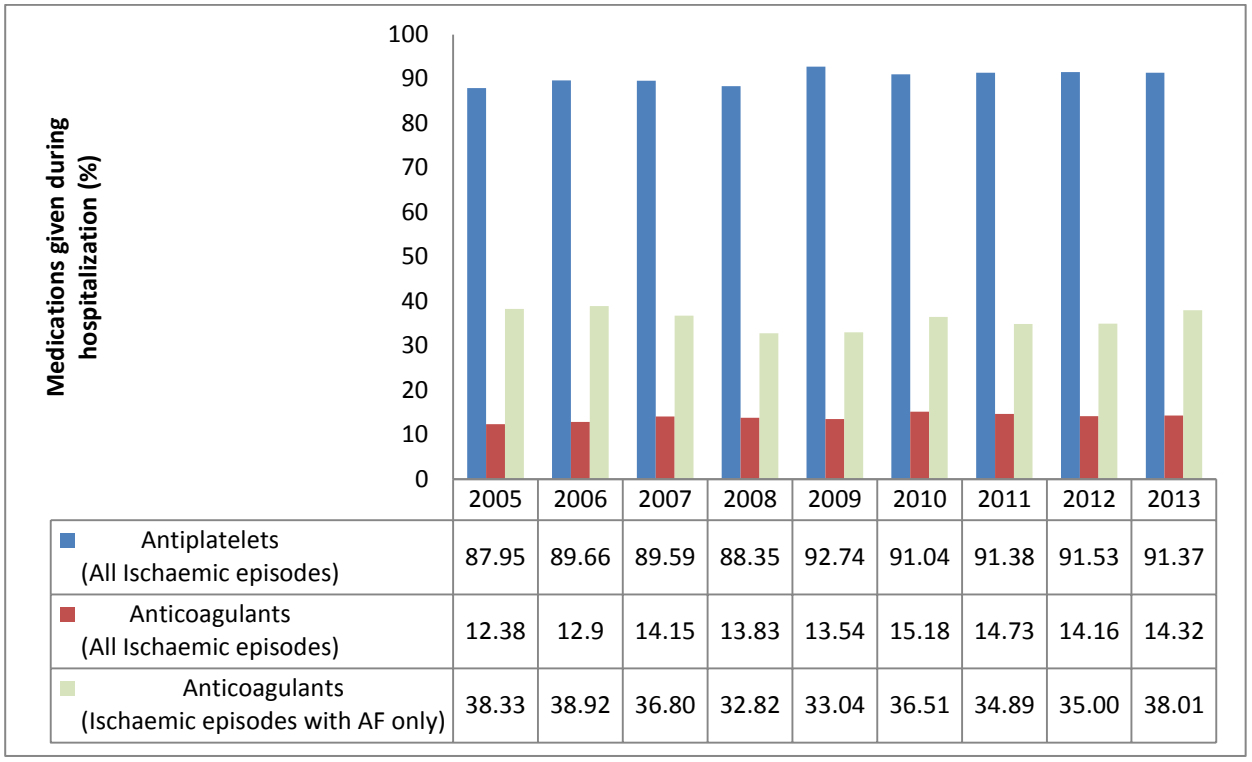
Figure 8.1.1 Medication on Arrival (Stat Doses) (%),2009 - 2013



	2009	2010	2011	2012	2013
Antiplatelets (All Ischaemic episodes)	50.78	54.1	59.93	62.84	64.3
Anticoagulants (All Ischaemic episodes)	9.75	11.54	11.45	11.47	10.03
Anticoagulants (Ischaemic episodes with AF only)	25.77	28.93	28.64	28.13	24.5

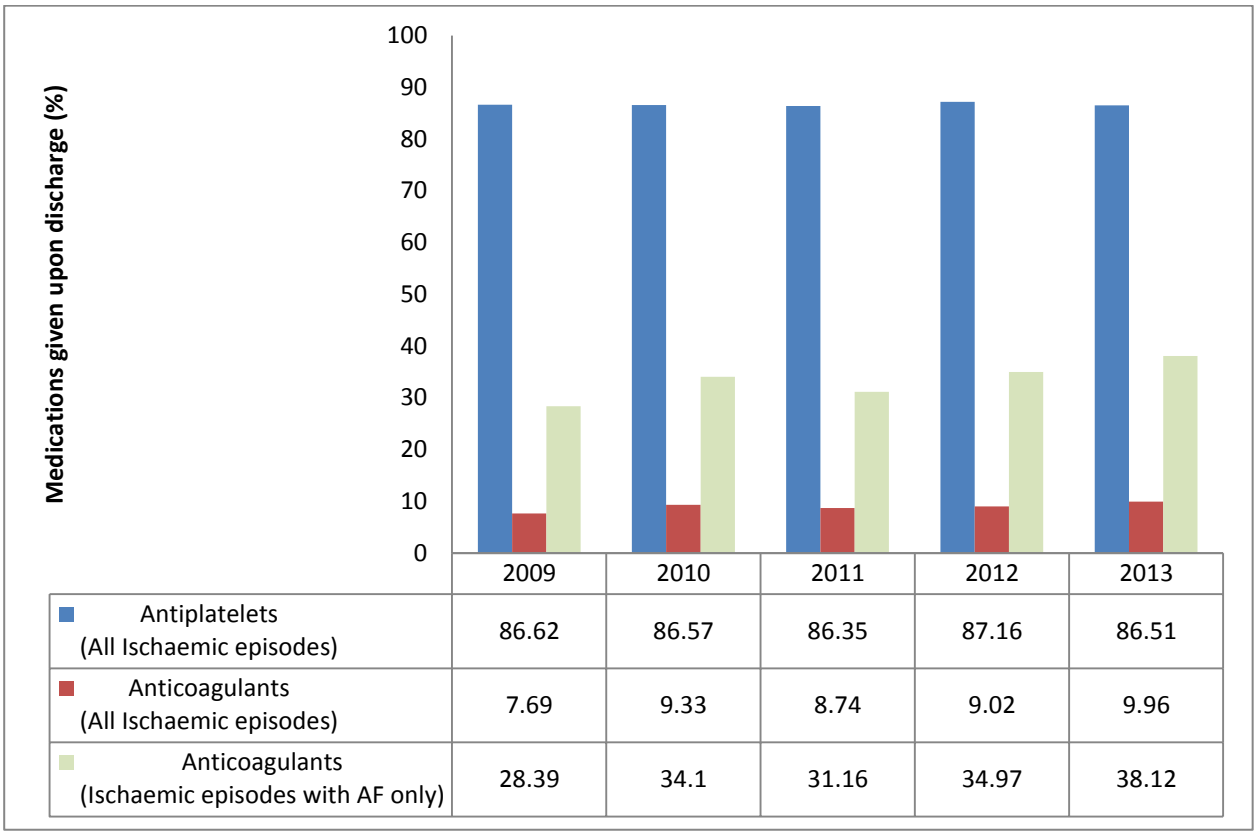
Information about medication on discharge and arrival was collected from 2009 onwards.

Figure 8.1.2 Medication during Hospitalisation (%), , 2005 - 2013



	2005	2006	2007	2008	2009	2010	2011	2012	2013
Antiplatelets (All Ischaemic episodes)	87.95	89.66	89.59	88.35	92.74	91.04	91.38	91.53	91.37
Anticoagulants (All Ischaemic episodes)	12.38	12.9	14.15	13.83	13.54	15.18	14.73	14.16	14.32
Anticoagulants (Ischaemic episodes with AF only)	38.33	38.92	36.80	32.82	33.04	36.51	34.89	35.00	38.01

Figure 8.1.3 Medication upon Discharge (%),2009 - 2013

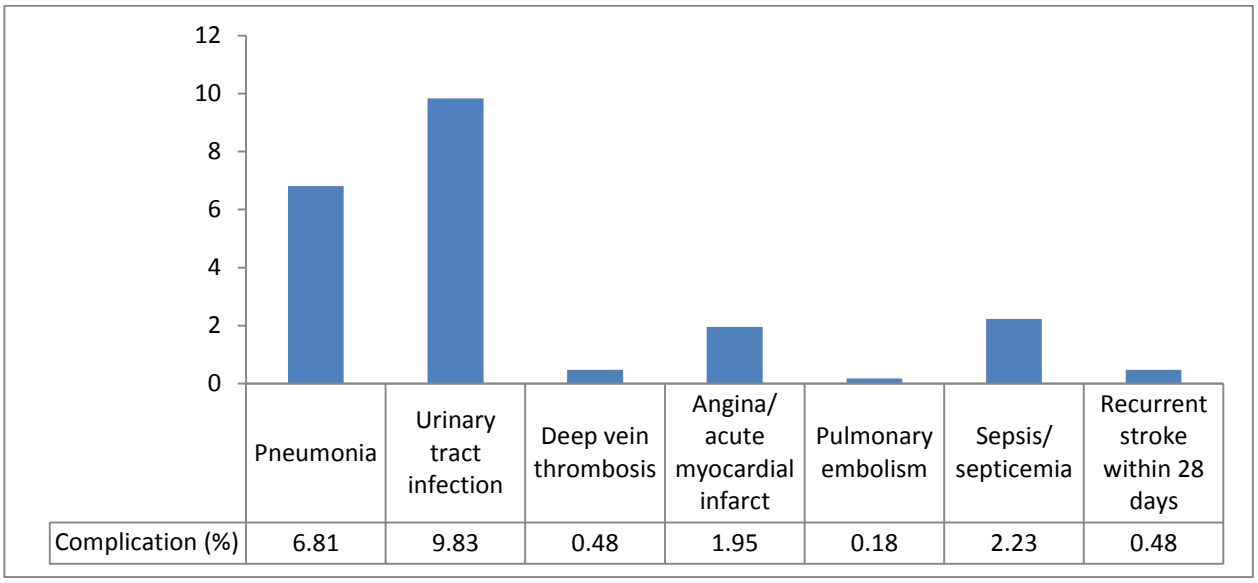


	2009	2010	2011	2012	2013
Antiplatelets (All Ischaemic episodes)	86.62	86.57	86.35	87.16	86.51
Anticoagulants (All Ischaemic episodes)	7.69	9.33	8.74	9.02	9.96
Anticoagulants (Ischaemic episodes with AF only)	28.39	34.1	31.16	34.97	38.12

9. INPATIENT COMPLICATIONS / EVENTS (%), 2005-2013

The two most common complications seen in stroke cases were urinary tract infections (UTI) and pneumonia (Figure 9.1.1). As there were no discernible trends in specific complication rates over the 9-year period, they are not presented here. The percentage of stroke patients without these common complications has remained above 80% since 2005.

Figure 9.1.1 Inpatient Complications / Events (%), 2005 – 2013



	Pneumonia	Urinary tract infection	Deep vein thrombosis	Angina/ acute myocardial infarct	Pulmonary embolism	Sepsis/ septicemia	Recurrent stroke within 28 days
Complication (%)	6.81	9.83	0.48	1.95	0.18	2.23	0.48