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Trends in Stroke in Singapore 2008 – 2012



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Introduction

Stroke is a significant cause of death and disability in Singapore. In 2011, stroke was the 4th highest cause of death, accounting for 9.0% of total deaths in Singapore¹. This report highlights the trends in stroke incidence, mortality and morbidity for the period 2007 to 2011, as well as the risk factors for stroke.

Definition of Stroke

Stroke is caused by the interruption of blood supply to the brain, which cuts off the supply of oxygen and nutrients, causing damage to the brain tissue². This happens when either a blood vessel to the brain has been blocked by a clot (an *ischaemic stroke*), or has ruptured (a *haemorrhagic stroke*). Of these two subtypes of stroke, ischaemic strokes are more common in Singapore, accounting for about 80% of all strokes locally. Haemorrhagic strokes result in more deaths than ischaemic strokes.

Symptoms of Stroke

The symptoms of stroke depend on which part of the brain has been injured. The most common symptoms are sudden weakness or numbness of the face, arm or leg, most often on one side of the body. Other symptoms include sudden change in speech, difficulty speaking or understanding speech, difficulty seeing with one or both eyes, difficulty swallowing, difficulty walking, and loss of balance or coordination.

Stroke Incidence: 2008-2012

The *incidence rate*, or number of new cases of a disease that occur during a specified time period in a population at risk, is a measure of the *risk* of developing the disease. During the period 2008 to 2012, the crude incidence rate (CIR) of stroke has been increasing, while the age-standardised incidence rate (ASIR- see Glossary) has been decreasing consistently and was 6.5% lower in 2012 compared to 2008 (Figure 1). Age standardisation removes the effect of ageing population on crude rates and results in decreasing age standardised rates.

Overall, stroke was more common among males than females. The CIR among males has been increasing while the one among females has been stable, but the ASIR has declined consistently among females from 2008 to 2012 (Figure 1).

The crude incidence rate of stroke increases with age (Figure 2).

¹ Taken from Singapore Health Facts 2011, Principal Causes of Death.

http://www.moh.gov.sg/content/moh_web/home/statistics/Health_Facts_Singapore/Principal_Causes_of_Death.html

² Definition of stroke adapted from the World Health Organization definition of Stroke

http://www.who.int/topics/cerebrovascular_accident/en/

Key Messages:

- The age-standardised stroke incidence is declining overall, and is more obvious among females.
- The risk of stroke increases with age.
- Stroke is more common in males than females.

Comparing the two stroke subtypes, the ASIR of ischaemic stroke has been declining from 2008 to 2012, while the ASIR of haemorrhagic stroke has remained stable (Figure 3).

Stroke Mortality: 2008-2012

Mortality refers to death from a disease which is an important measure of the burden of a disease on a population.

Figure 4 shows the overall crude mortality rates (CMR) and age-standardised mortality rates (ASMR) from 2008 to 2012. The mortality rates of stroke have been stable with small variation. Over the period, the ASMR for males was consistently higher than females.

The mortality rate of stroke increases with age (Figure 5).

In Figure 6, the 30-day case fatality rate for haemorrhagic stroke was much higher than that for ischaemic stroke and the rates for both types were stable during the period.

Stroke is a very significant cause of disease burden in Singapore. The Singapore Burden of Disease Study 2007 found that stroke was the second highest cause of premature mortality and the eighth highest cause of disability burden in Singapore³. It is the fourth-highest cause of disease burden overall^{4,5}.

Studies have shown that early identification and treatment of stroke within 3 hours of symptom onset can lead to decreased mortality and improved long-term functional outcomes. However, local studies^{6,7}, they have found there were significant delays between the onset of stroke symptoms and presentation of the patients to hospital. The median time from the onset of stroke symptoms to the presentation of patients to the

³ Stroke accounted for 9.1% of Years of Life Lost (YLL) and 3.5% of Years of Life lived with Disability (YLD). (See Glossary for Definitions).

⁴ Stroke accounted for 6.1% of Disability-Adjusted Life Years (DALYs- the sum of YLL and YLD- see Glossary for definitions)

⁵ Personal communication, Epidemiology & Disease Control Division, Ministry of Health, Singapore.

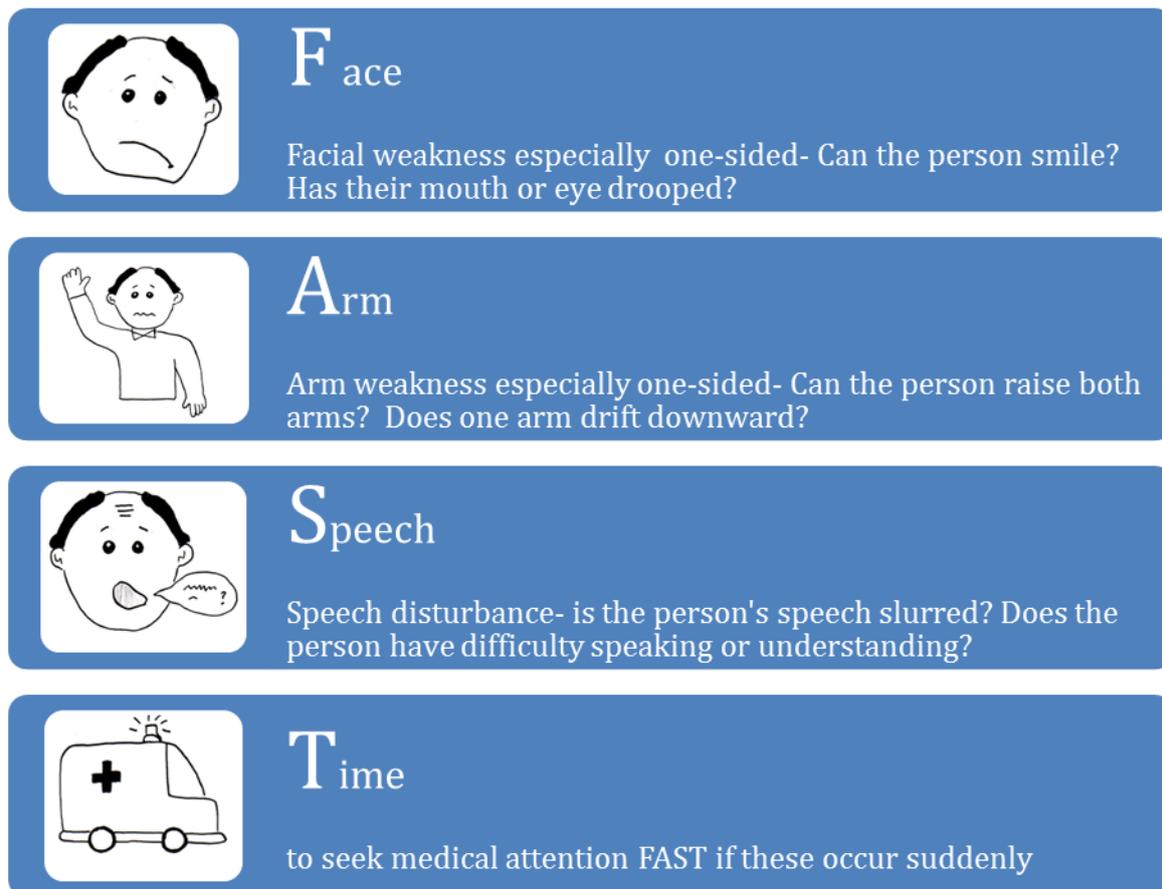
⁶ De Silva et al, *Timing of Hospital Presentation After Acute Cerebral Infarction and Patients' Acceptance of Intravenous Thrombolysis*, Ann Acad Med Singapore 2007;36:244-6

⁷ De Silva et al, *Timing of Arrival to a Tertiary Hospital after Acute Ischaemic Stroke – A Follow-up Survey 5 Years Later*, Ann Acad Med Singapore 2010;39:513-17

hospitals ranged from 16-20 hours. The commonest reasons for the delay were failure to recognise the severity of symptoms and inability to seek medical attention unaided.

It is important for the public to be able to recognise possible symptoms of stroke and seek medical attention immediately. An easy way to remember the commonest symptoms of stroke is the mnemonic FAST- Face, Arm, Speech, Time (Figure 7). If any of the symptoms are present, seek medical attention FAST.

Figure 7: The FAST mnemonic for common symptoms of stroke



The diagram illustrates the FAST mnemonic for stroke symptoms, presented in four blue rounded rectangular boxes. Each box contains an icon, a large letter, and a description of the symptom.

- F**ace: An icon of a person's face with a drooping mouth and one eye. Text: Facial weakness especially one-sided- Can the person smile? Has their mouth or eye drooped?
- A**rm: An icon of a person raising one arm. Text: Arm weakness especially one-sided- Can the person raise both arms? Does one arm drift downward?
- S**peech: An icon of a person's face with a speech bubble containing a question mark. Text: Speech disturbance- is the person's speech slurred? Does the person have difficulty speaking or understanding?
- T**ime: An icon of an ambulance. Text: to seek medical attention FAST if these occur suddenly

Risk Factors for Stroke

The risk factors for stroke can be divided into those that are non-modifiable, for example age, gender and family history, and those that are modifiable, including lifestyle risk factors and medical conditions.

Lifestyle Risk Factors

Lifestyle risk factors for stroke include smoking, being overweight or obese, having an unhealthy diet with excessive salt and high in saturated fat, physical inactivity, excessive alcohol consumption, and stress. Modification of these lifestyle risk factors can significantly reduce the risk of stroke.

Medical Conditions

Some medical conditions, if poorly controlled, can increase the risk of stroke. These include:

- high blood pressure (Hypertension)
- diabetes mellitus
- high low density lipoprotein (LDL)-cholesterol (Hyperlipidemia)
- atrial fibrillation (a heart rhythm disorder where the heart beats irregularly)

Good control of these medical conditions is important to prevent stroke. This requires compliance with regular visits to the doctor, taking all prescribed medications, and compliance with lifestyle modifications like regular exercise and a healthy diet.

Risk Factor Profile of Stroke in Singapore

High blood pressure and high cholesterol were the most common risk factors for men and women who had stroke locally. Smoking was another common risk factor in males- there were greater than 6 times more smokers among male stroke patients compared to females. Figure 8 shows the risk factor profile among patients aged 15 years and above who had stroke for the first time in 2012.

Key Messages:

- Mortality rates and case fatality rates of stroke have remained stable.
- The mortality rate is higher among males than females, and increases with age.
- Stroke is a significant cause of premature death and disability in Singapore
- Early recognition of stroke and seeking medical attention are crucial, and the FAST mnemonic can be used to remember the common symptoms of stroke.

Conclusion

Stroke is a significant cause of death and disability in Singapore. The overall incidence rates of stroke have been declining during the period 2008 to 2012. The overall mortality rates have remained stable.

To reduce the risk of stroke, lifestyle risk factors like smoking, obesity, unhealthy diet, and sedentary lifestyle should be avoided or modified.. In addition, medical conditions that increase risk of stroke- high blood pressure, high cholesterol, diabetes and atrial fibrillation- should be well controlled.

Key Messages:

- To prevent stroke, there are lifestyle risk factors like smoking, obesity, unhealthy diet and physical inactivity that can be reduced
- To prevent stroke, medical conditions like high blood pressure, high cholesterol and diabetes must be well controlled

Remember the mnemonic FAST and seek treatment early, especially within 3 hours of symptom onset, to minimise damage to brain tissue and improve the outcome.

Glossary

Crude Incidence Rate (CIR)- The number of new and recurrent stroke cases over a specified period of time (one year in this report), divided by the mid-year general population size. This is a measure of the *risk* of stroke in the general population.

Age-Standardised Incidence Rate (ASIR)- This is the incidence rate that would be observed if the general population had the age structure of an external world standard population. As the crude incidence rate is affected by changes in the population age structure from year to year, it is not reliable in comparing incidence rates over time, and the ASIR is used instead to *compare incidence rates over time, and between different populations*.

Crude Mortality Rate (CMR)- The number of deaths due to stroke over a specified period of time (one year in this report), divided by the mid-year general population size. This is a measure of the *risk of dying* from stroke in the general population.

Age-Standardised Mortality Rate (ASMR)- This is the mortality rate that would be observed if the general population had the age structure of an external world standard population. ASMR facilitates the *comparison of mortality rates over time and between different populations*.

*The CIR, ASIR, CMR and ASMR figures in this report are stated as per 100,000 population.

**Mortality rates in this report are overall rates, including deaths both in- and out-of-hospital.

30-day Case Fatality Rate- The percentage of stroke patients who died within 30 days. This can be affected by a few factors- the severity of stroke cases, timing of presentation and treatment given.

Years of Life Lost (YLL)- A measure of the time lost due to premature mortality in a given population, due to a certain disease

Years of Life Lost due to disability (YLD)- A measure of the time spent in ill-health or disability in a given population, arising from a certain disease.

Disability-Adjusted Life Years (DALYs)- A summary measure of disease burden on a population that is the sum of YLLs and YLDs. It measures the burden of disease on a population in terms of premature mortality and time spent in ill-health or disability.

Appendix

Figure 1: Crude and age-standardised incidence rates of stroke for overall, male and female population, 2008-2012

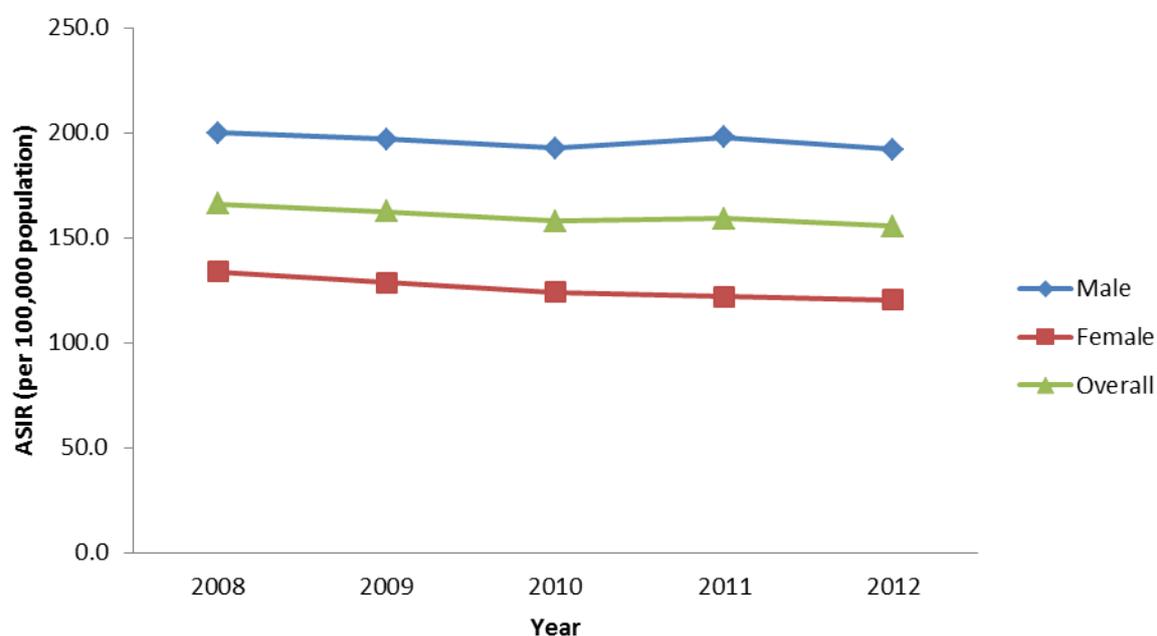
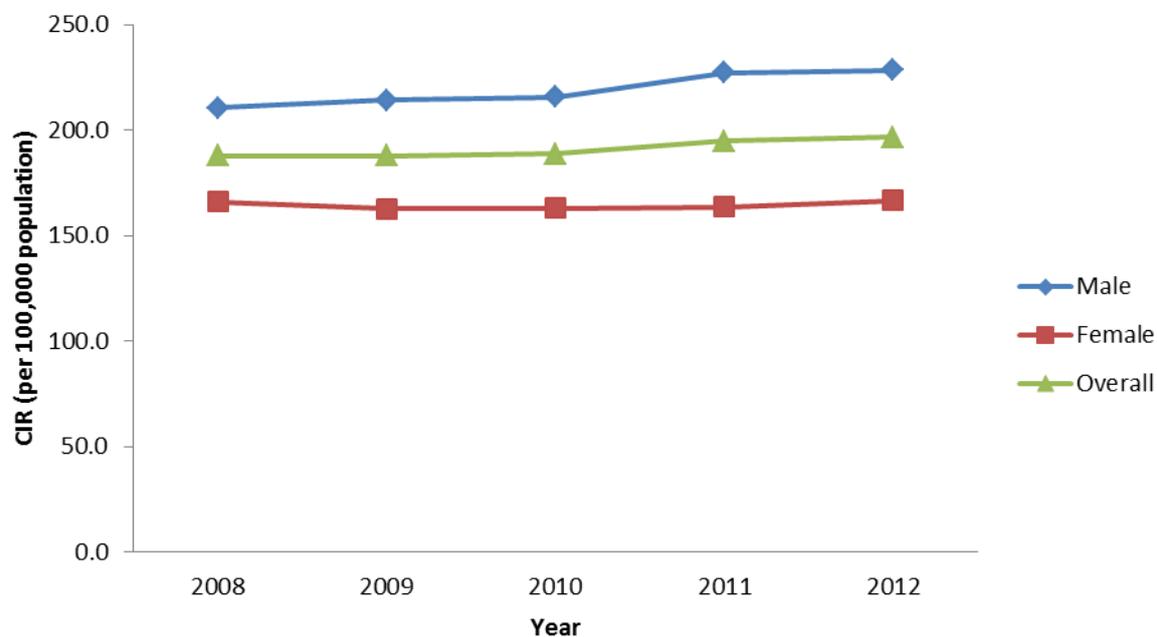


Figure 2: Crude incidence rates of stroke among different age groups, 2012

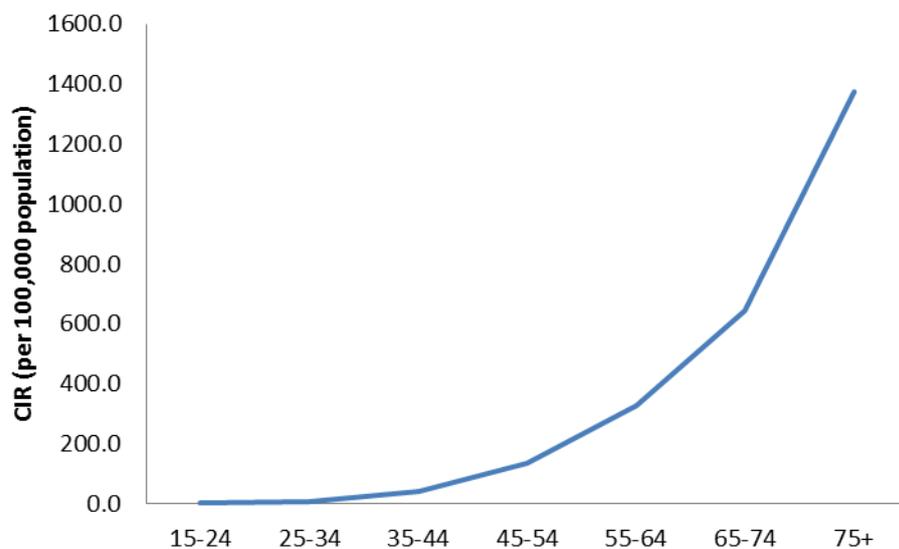


Figure 3: Age-standardised incidence rates of ischaemic and haemorrhagic stroke, 2008-2012

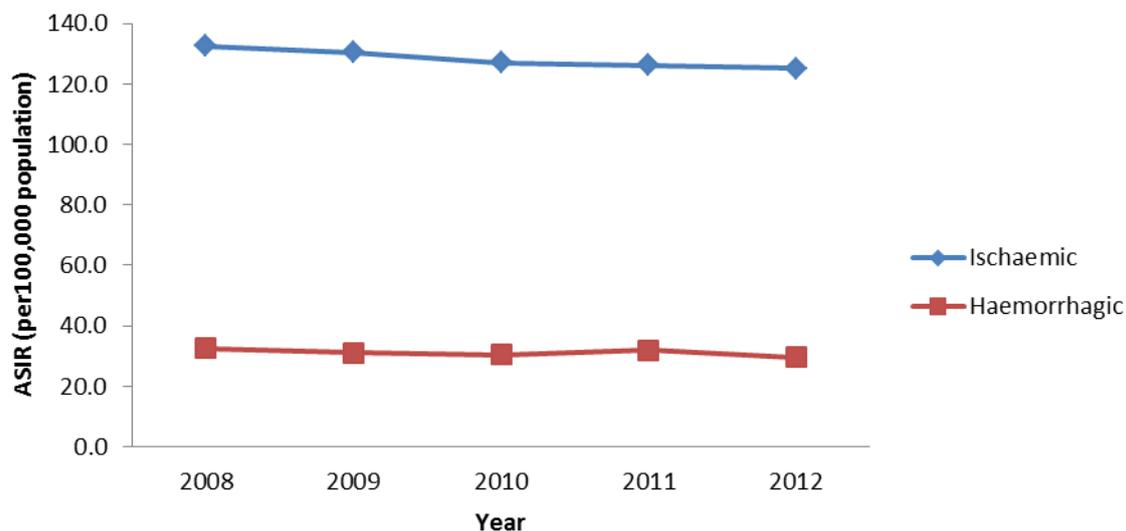


Figure 4: Crude and age-standardised mortality rates of stroke for overall, male and female population, 2008-2012

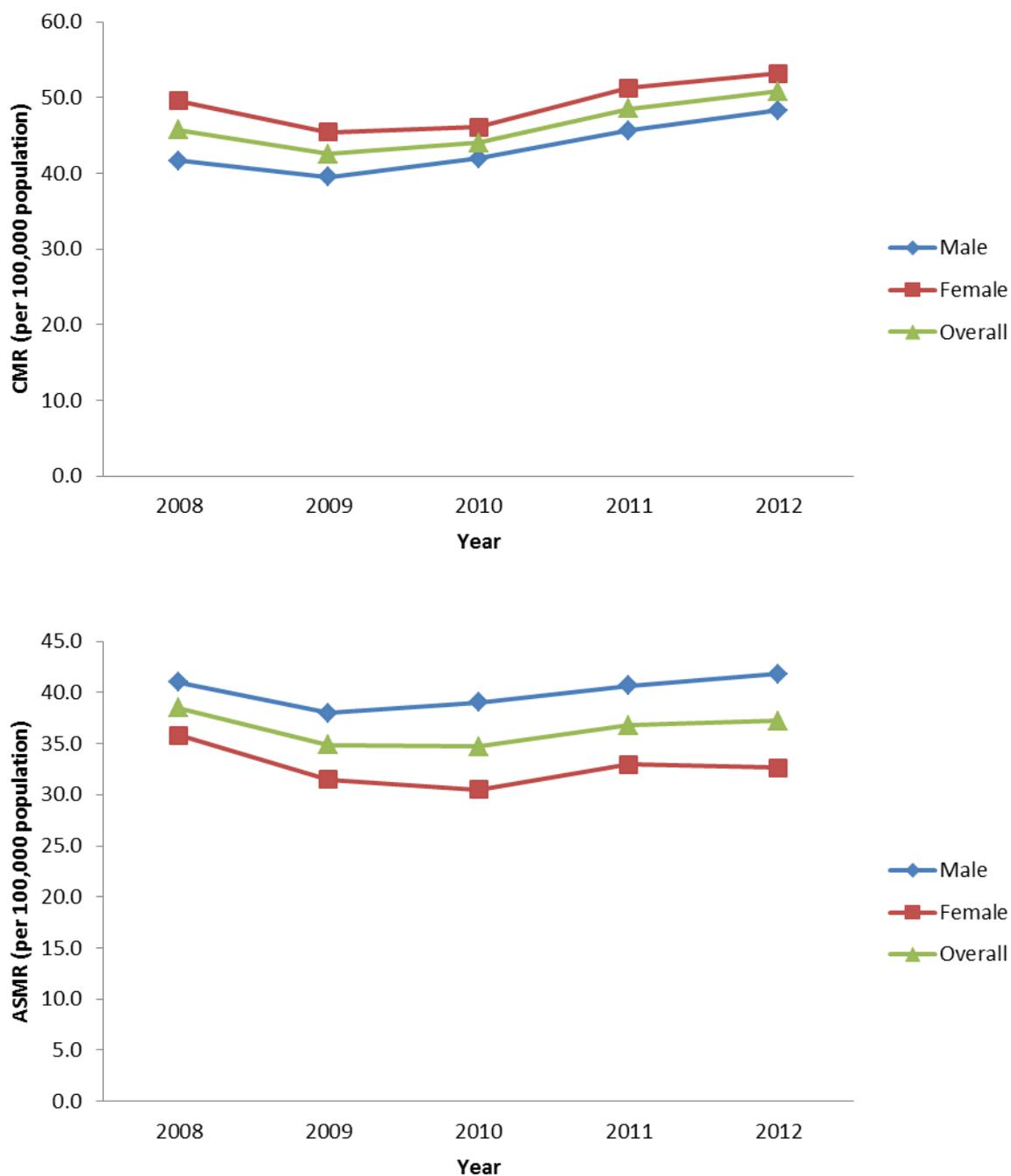


Figure 5: Crude mortality rates of stroke among different age groups, 2012

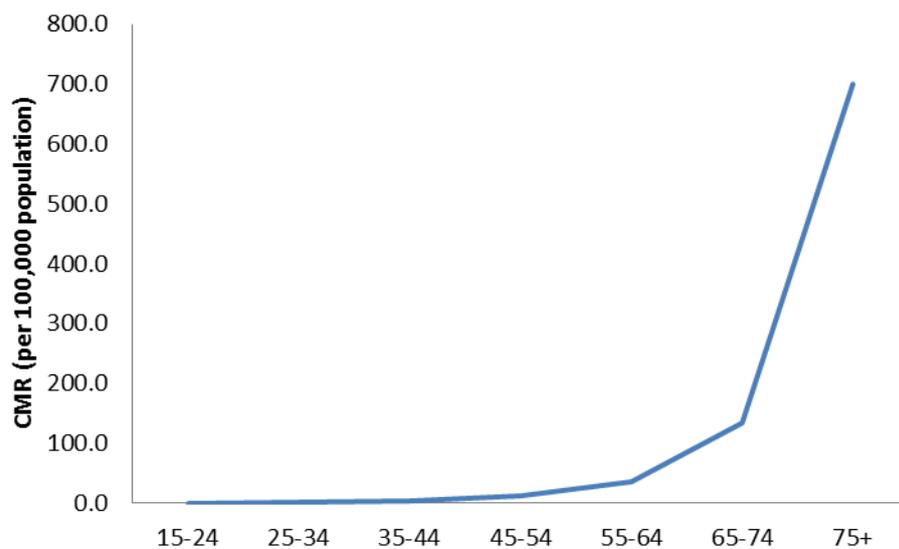


Figure 6: 30-day case fatality rates of stroke overall, ischaemic and haemorrhagic, 2008-2012

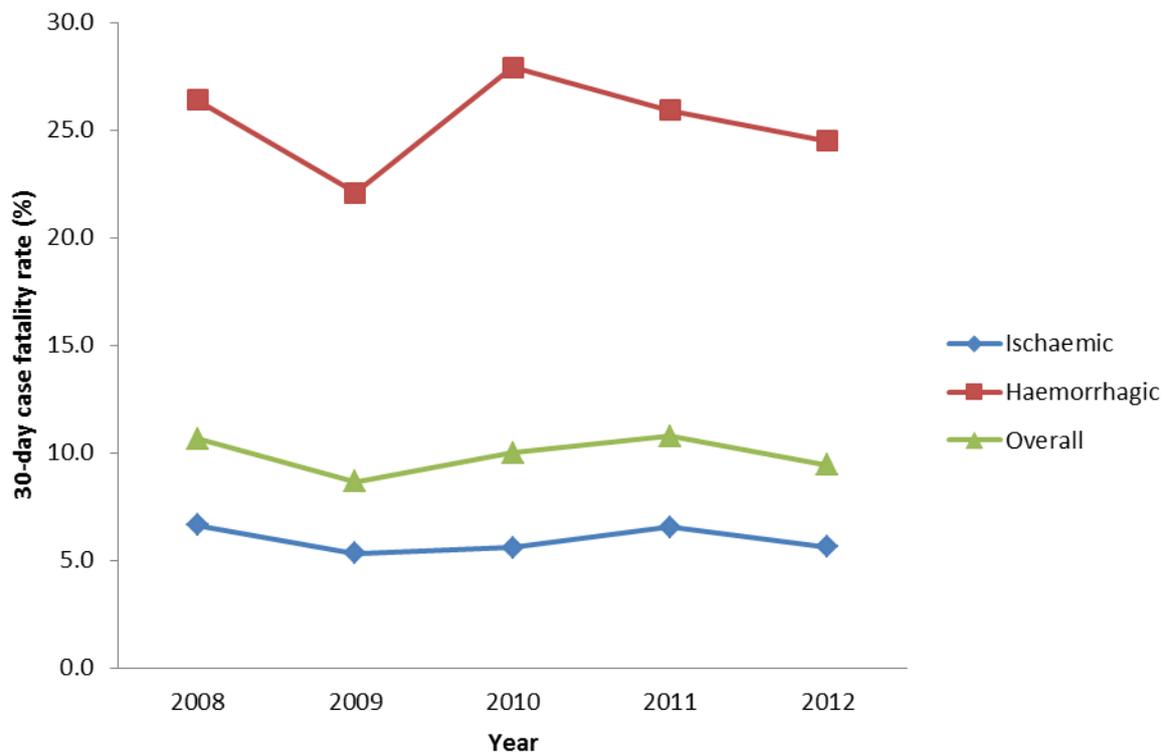


Figure 8: Risk factor profile among First-ever stroke patients aged 15 years and above, 2012

