

Scottish Stroke Statistics

Year ending 31 March 2022

A National Statistics release for Scotland

Publication date: 24 January 2023





Translations



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Introduction

Cerebrovascular disease (CVD) is a condition that develops as a result of problems with the blood vessels supplying the brain. Despite a substantial decrease in rates of death over the last decade, there were 3,836 deaths in Scotland in 2021 where CVD was the underlying cause.

One of the common types of CVD is stroke. A stroke occurs when the blood supply to part of the brain is interrupted and brain cells are starved of oxygen. This usually occurs because a blood vessel becomes blocked by fatty deposits or a blood clot. Stroke is more common in older people.

Scotland has a high prevalence of the risk factors associated with CVD such as smoking, high blood pressure, poor diet, lack of exercise and alcohol consumption above [recommended limits](#). Treating and preventing stroke continues to be a national clinical priority for Scotland [Stroke Improvement Plan](#).

In the [Scottish Health Survey 2021](#), 3% of men and 2% of women reported that they had experienced a stroke.

The Scottish Stroke Statistics publication is produced annually to provide information on a range of cerebrovascular diseases in Scotland including:

- All CVD;
- Stroke;
- Transient ischaemic attack (TIA): a temporary form of stroke, sometimes referred to as a 'mini-stroke';
- Subarachnoid haemorrhage: a leak of blood caused by the rupture of a blood vessel beneath the membrane covering the brain;

and one of the main procedures used to treat CVD and stroke:

- Carotid endarterectomy: a procedure which removes blockage in the artery in the neck to improve blood flow to the brain

This update contains information on hospital activity, incidence, operations, 30 day survival following first emergency admission, GP prescribing and ambulance service activity up to the period 1 April 2021 - 31 March 2022, and mortality up to the period 1st January - 31st December 2021.

Information is presented at NHS Board level with some tables (activity and mortality) also available at Local Council Area level.

Main Points

- The incidence rate for cerebrovascular disease decreased over the last decade by 8%. Incidence rates were consistently 24% higher in males than females.
- There were 3,836 deaths in Scotland in 2021 where cerebrovascular disease, including stroke, was the underlying cause. In the last decade, the death rate for cerebrovascular disease decreased by 26%.
- The death rate for cerebrovascular disease in the most deprived areas was 43% higher than in the least deprived areas in 2021.
- The percentage of people surviving 30 days or more following their first emergency admission to hospital with a stroke has been consistently between 84% to 86% over the past ten years.
- Over the past ten years, there was an increase in the adjusted discharge rate for stroke in all deprivation quintiles. The rate in the most deprived quintile increased by 39% compared to 21% in the least deprived quintile.

Results and Commentary

Cerebrovascular Disease (CVD)

CVD Summary

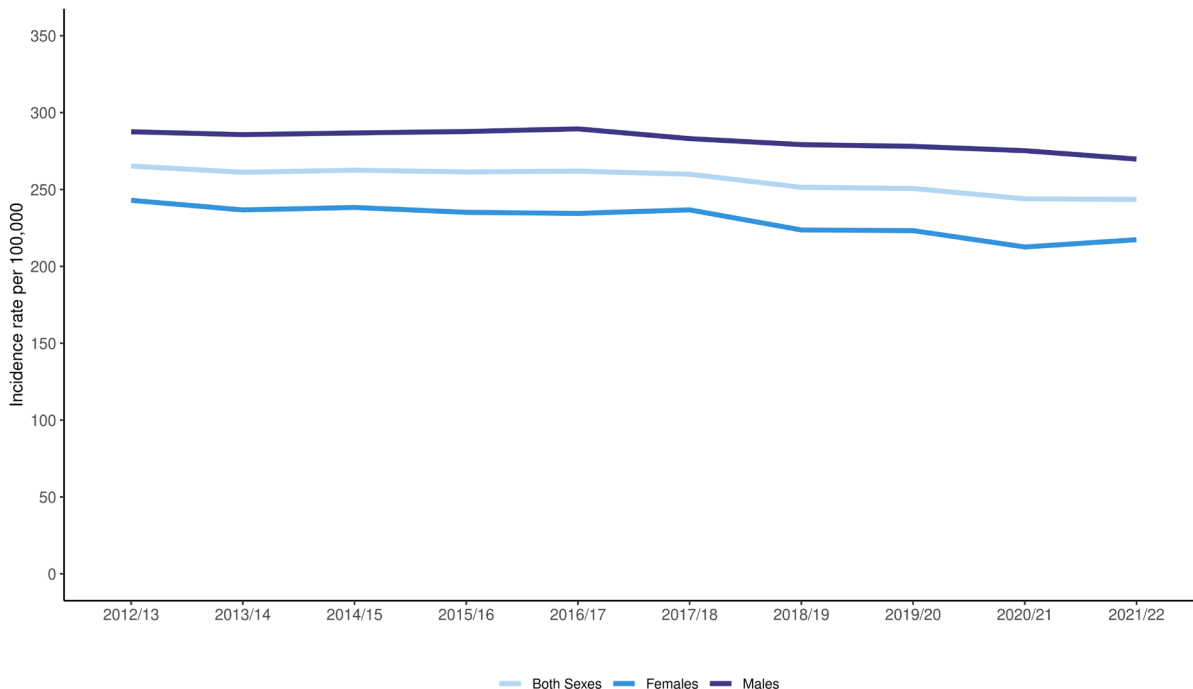
Cerebrovascular disease develops as a result of problems with blood vessels supplying the brain. This can cause a stroke, a transient ischaemic attack (TIA) or a subarachnoid haemorrhage.

Incidence

Incidence is the number of new cases of a specific condition in a population during a defined time period. It is presented here as the number of people with a first hospital admission for CVD (or death from CVD without a prior admission to hospital). Further information is available in the glossary.

The age and sex adjusted incidence rate for CVD decreased by 8% from 265 cases per 100,000 population in 2012/13 to 244 per 100,000 in 2021/22 (Figure 1).

Figure 1: Cerebrovascular Disease¹; Age and sex adjusted incidence rates per 100,000 population²



Notes:

- 1. Analysis includes ICD-10 codes I60-I69 and G45.
 - 2. Rates are directly standardised to the 2013 European standard population.
 - P. Data for 2021/22 are provisional and subject to change in future analyses
- Data Source: PHS SMR01 - discharges; National Records Scotland – Population

Incidence is strongly related to age. The age and sex adjusted rate for the under 75s in 2021/22 was 128 per 100,000 population but for the over 75 age group, it was 1,415 per 100,000 population. However, the rate has fallen more steeply in the over 75 age group (down 15.3% in the last 10 years) than in the under 75s which increased (1.2% in the same period).

Comparing mainland NHS boards, in 2021/22 the adjusted incidence rate was lowest in NHS Grampian (201 per 100,000 population) and highest in NHS Ayrshire and Arran (317 per 100,000 population).

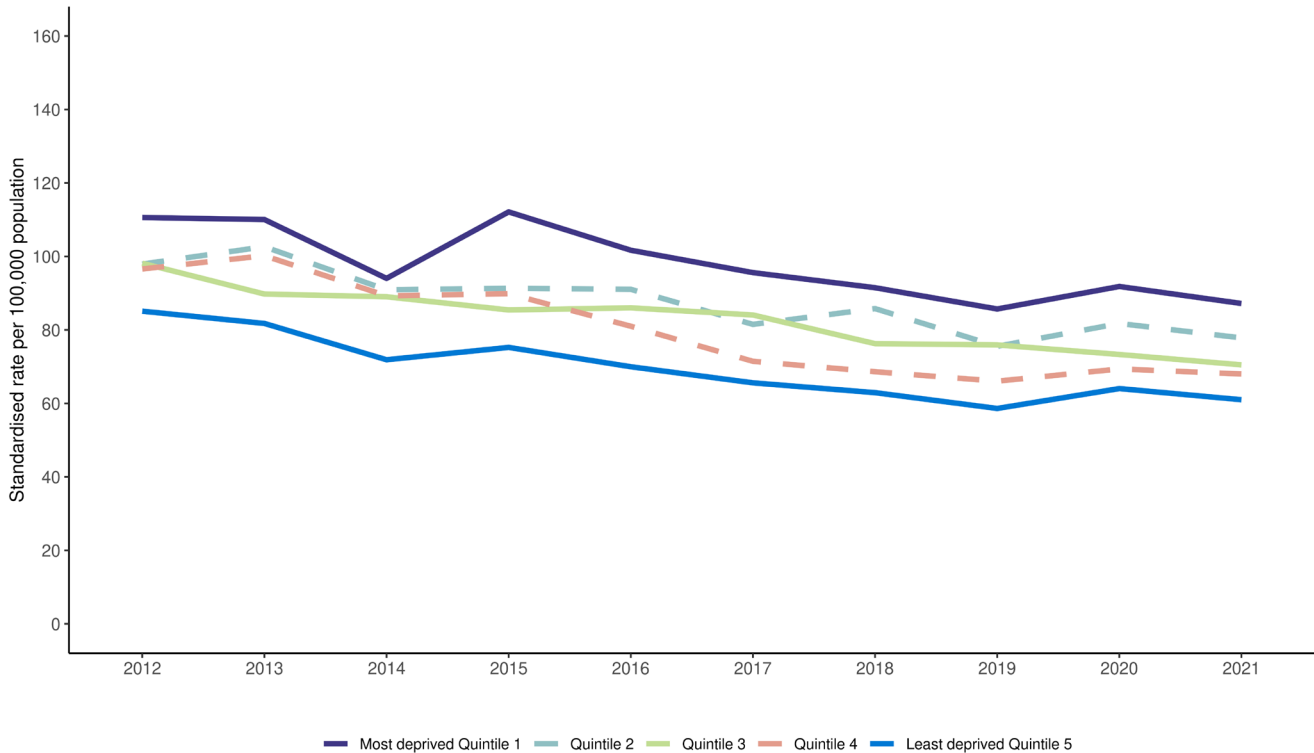
Mortality

Rates of CVD mortality vary between areas of greater or less material deprivation. In Scotland, the Scottish Index of Multiple Deprivation (SIMD) is used to measure area deprivation. It is a measurement of multiple deprivation which combines information on income, employment, education, housing, health, crime and geographical access. More information is provided in the glossary and on the Scottish Government [website](#). For this publication, areas in Scotland were divided into five equal groups (quintiles) with decreasing levels of deprivation.

Age and sex adjusted mortality rates for CVD are presented here, along with adjusted discharge rates for carotid endarterectomy and strokes.

There was a reduction in mortality in all deprivation quintiles over the decade 2012-2021. The reduction in the age and sex adjusted mortality rate in the most deprived quintile (quintile 1) was 21.2% compared with 28.3% in the least deprived quintile (quintile 5) – see [Table 2](#) and figure 2.

Figure 2: Cerebrovascular Disease¹ Deaths by Deprivation (SIMD) Quintile²: Age and sex adjusted mortality rates per 100,000 population³



Notes:

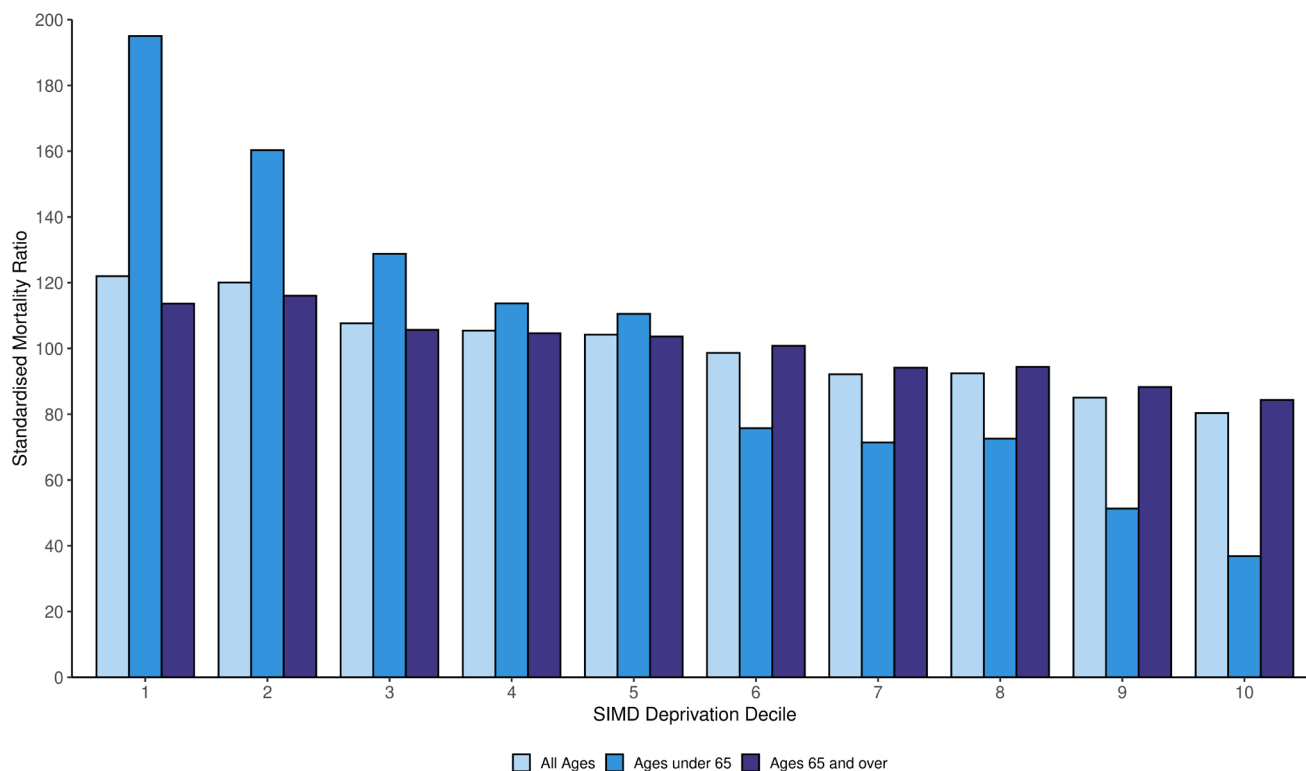
1. Analysis includes ICD-10 codes G45, I60-I69
2. Uses 2012, 2016 and 2020 version of SIMD, dependent on the year.
3. Rates are directly standardised to the 2013 European standard population.

Data Source: National Records Scotland - Deaths and Population

For this section, areas in Scotland were divided into 10 equal groups (deciles) where decile 1 is most deprived and decile 10 is least deprived. The information is presented using age standardised mortality ratios (SMRs). SMRs are the ratio of actual deaths to expected deaths (calculated using the average Scottish mortality rate). It adjusts for the age and sex of the population being examined. If the actual mortality rate was the same as the expected mortality rate, the SMR would have a value of 100.

Figure 3 shows that the association between mortality and deprivation was stronger in the under 65 age category than in the over 65 category. In the under-65s, there is a clear pattern between SMR and deprivation decile. The SMR in the under-65 age category was 95% above the Scottish average in the most deprived 10% of the population, whereas the SMR in the under-65 age category in the least deprived 10% of the population was 63% below the Scottish average (see [Table 2](#) and Figure 3).

Figure 3: Cerebrovascular Disease Standardised Mortality Ratios¹ by broad age grouping and SIMD decile; 2017-2021



Notes:

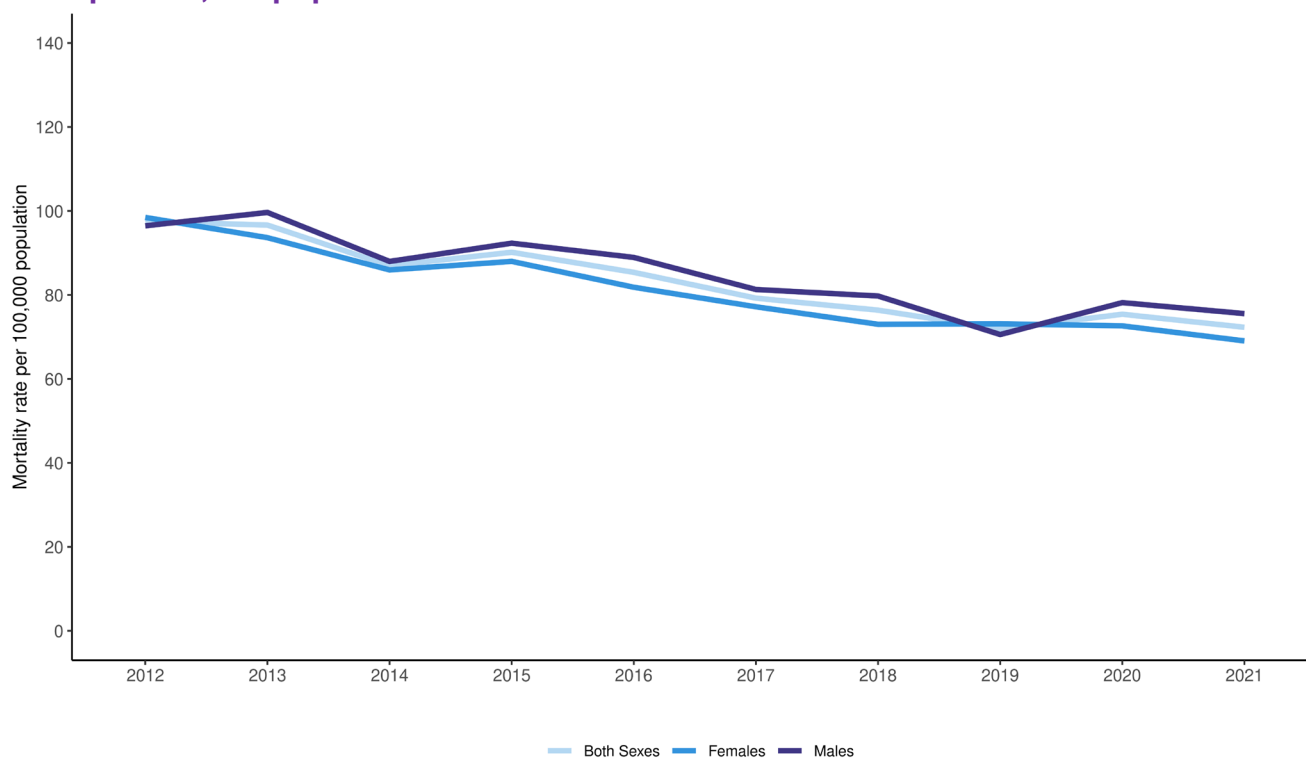
1. Scotland is used as the 'standard population'.

Data Source: National Records Scotland (NRS) deaths data 2017-2021

This section provides information on the number of deaths from CVD, as well as the common types of CVD, i.e. stroke, TIA and subarachnoid haemorrhage separately.

In Scotland, the age and sex adjusted mortality rate for CVD decreased by 25.8% in the last ten years from 97 per 100,000 population in 2012 to 72 per 100,000 population in 2021 ([Table 2](#) and [Figure 4](#)).

Figure 4: Cerebrovascular disease¹: all ages by sex; age and sex adjusted mortality rates per 100,000 population²



Notes:

1. Analysis includes ICD-10 codes I60-I69 and G45.
2. Rates are directly standardised to the 2013 European standard population.

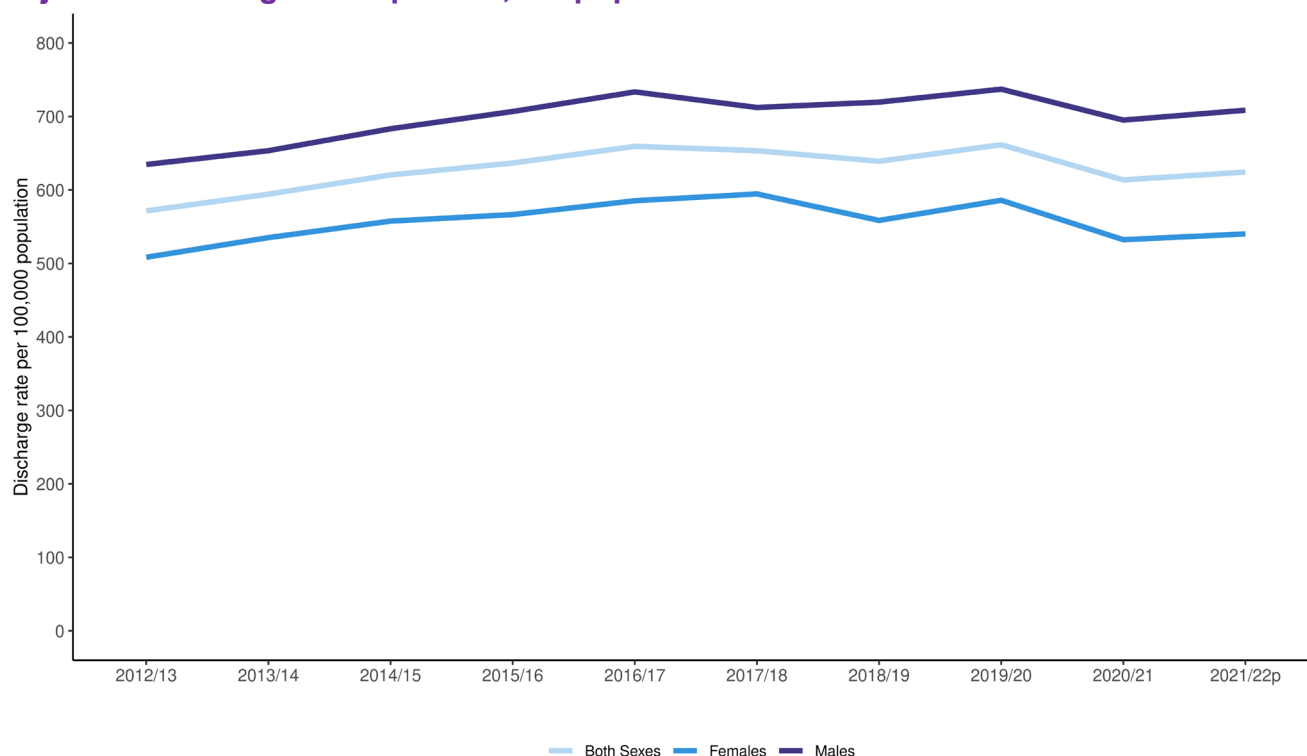
Data Source: National Records Scotland - Deaths and Population

Discharges

This section of the report examines the number of discharges from hospital with a specific cerebrovascular disease. Please note that one patient can have more than one discharge from hospital within a given time period.

Figures on discharges provide an indication of hospital usage for the diagnosis and treatment of cerebrovascular disease in either an inpatient or day case setting but exclude activity relating to outpatients. Age and sex adjusted rates are presented here. Further information is available in Appendix A1.

Figure 5: Discharges from hospital with cerebrovascular disease¹; age and sex adjusted discharge rates per 100,000 population²



Notes:

- 1. Analysis includes ICD-10 codes I60-I69, G45
 - 2. Rates are directly standardised to the 2013 European standard population.
 - P. Data for 2021/22 are provisional and subject to change in future analyses
- Data Source: PHS SMR01 - discharges; National Records Scotland – Population See Appendix A1 for details of completeness of hospital activity figures derived from SMR01 records.

There were historically more CVD hospital discharges for women than men (although in the last four years the reverse is true) but the age and sex adjusted rates were higher for men. This is because CVD is more common in older people and men have a higher risk of stroke. A larger proportion of the older male population have an admission due to CVD compared to women as there are more women in the older population than men. Men therefore have a higher adjusted discharge rate than women. This is true for all age groups included in this report (figure 5).

The age and sex adjusted discharge rate has increased gradually over the last ten years, with a slight decrease in 2018/19 and a substantial decrease in 2020/21 due to the COVID-19 Pandemic. The rate has increased by 9.2% from 572 per 100,000 population in 2012/13 to 624 in 2021/22. There is a slightly smaller increase in the rate for women over the last 10 years (6.3%) than for men (11.6%).

Stroke

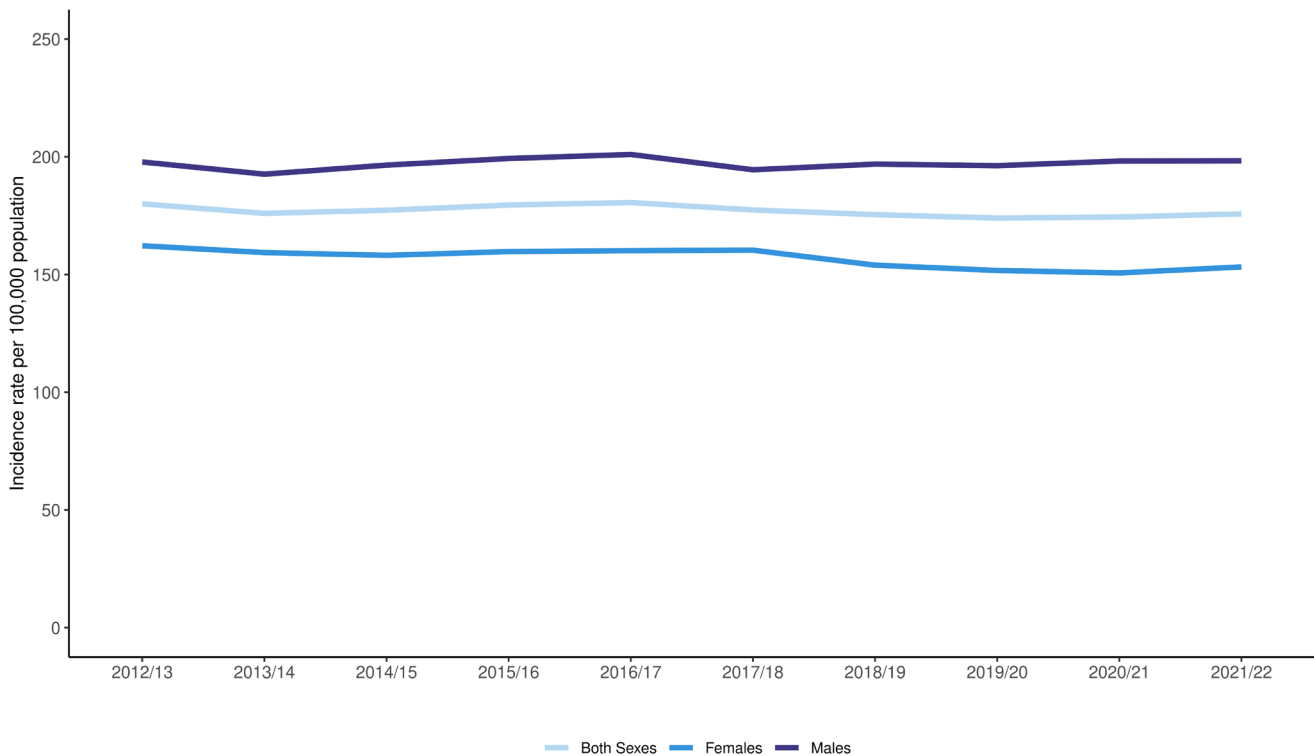
Stroke Summary

A stroke occurs when an area of the brain is deprived of its blood supply because of a blockage of a blood vessel supplying the brain.

Incidence

The age and sex adjusted incidence rate for stroke decreased by 2.4% from 180 cases per 100,000 population in 2012/13 to 176 per 100,000 in 2021/22 (Figure 6).

Figure 6: Stroke¹; Age and sex adjusted incidence rates per 100,000 population²



Notes:

- 1. Analysis includes ICD-10 codes I61-I64.
 - 2. Rates are directly standardised to the 2013 European standard population.
 - P. Data for 2021/22 are provisional and subject to change in future analyses
- Data Source: PHS SMR01 - discharges; National Records Scotland – Population

As with CVD, stroke incidence is strongly related to age. The age and sex adjusted rate for the under 75s in 2021/22 was 89 per 100,000 population and for those aged 75 and over for the same period it was 1,054 per 100,000 population. However, the rate has fallen in the over 75 age group (down 10.6% in the last 10 years) whereas the under 75s has increased (up 9.4% in the same period).

Comparing mainland NHS boards, in 2021/22 the adjusted incidence rate was lowest in NHS Dumfries and Galloway (137 per 100,000 population) and highest in NHS Ayrshire and Arran (220 per 100,000 population).

Further details on incidence for CVD and stroke, TIA are given in [Table 3](#).

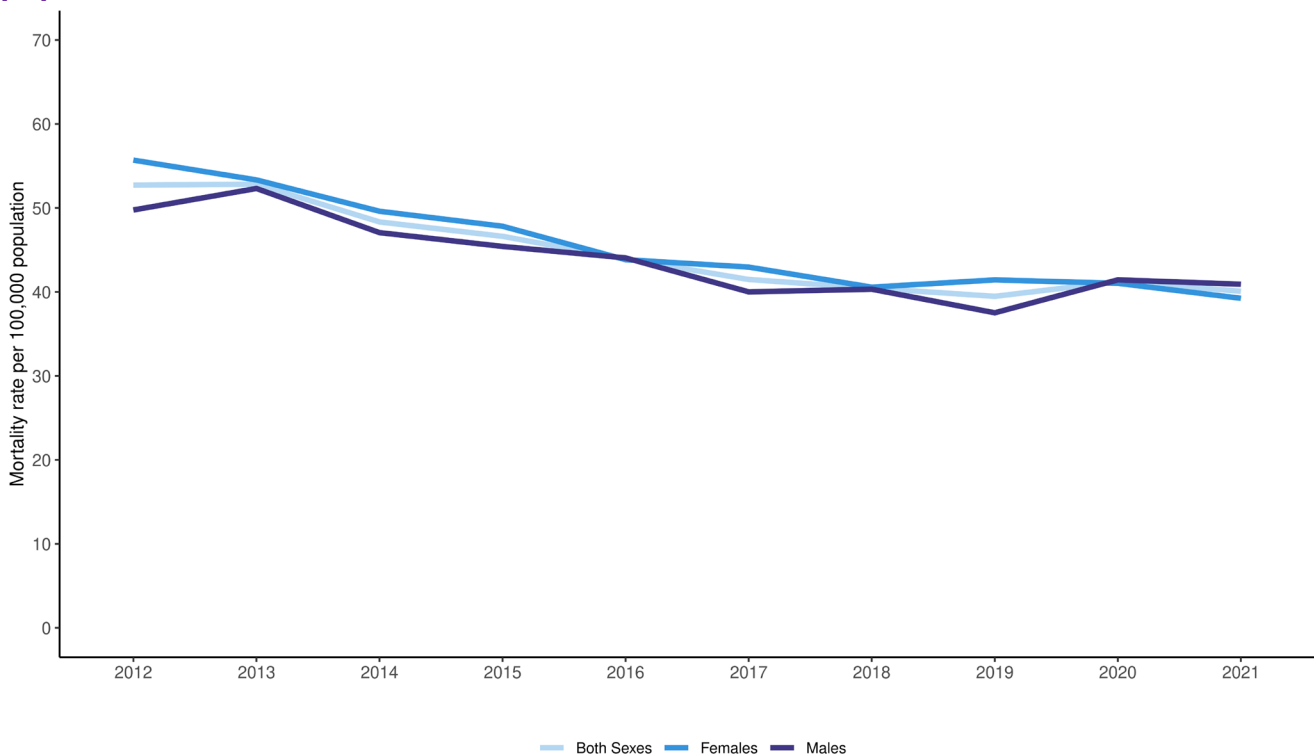
Mortality

The age and sex adjusted mortality rate for stroke decreased by 24% over the last ten years, from 53 per 100,000 population in 2012 to 40 per 100,000 population in 2021.

Between 2012 and 2021, the fall in age and sex adjusted mortality rates for stroke was higher for females (29.5%) than males (17.8%). However, in seven out of the ten years, the adjusted mortality rate was slightly higher for females (Figure 8).

Of the mainland NHS Boards, NHS Ayrshire and Arran had the highest age adjusted mortality rate in 2021 (44.3 per 100,000 population). NHS Dumfries and Galloway had the lowest age adjusted mortality rate (27.9 per 100,000 population) among the mainland Boards in 2021. The mortality rate decreased in the majority of the mainland boards between 2012 and 2021 - NHS Dumfries and Galloway had the highest percentage decrease (51.6%) and NHS Borders had the lowest decrease (5.3%).

Figure 8: Stroke¹: all ages by sex; age and sex adjusted mortality rates per 100,000 population²



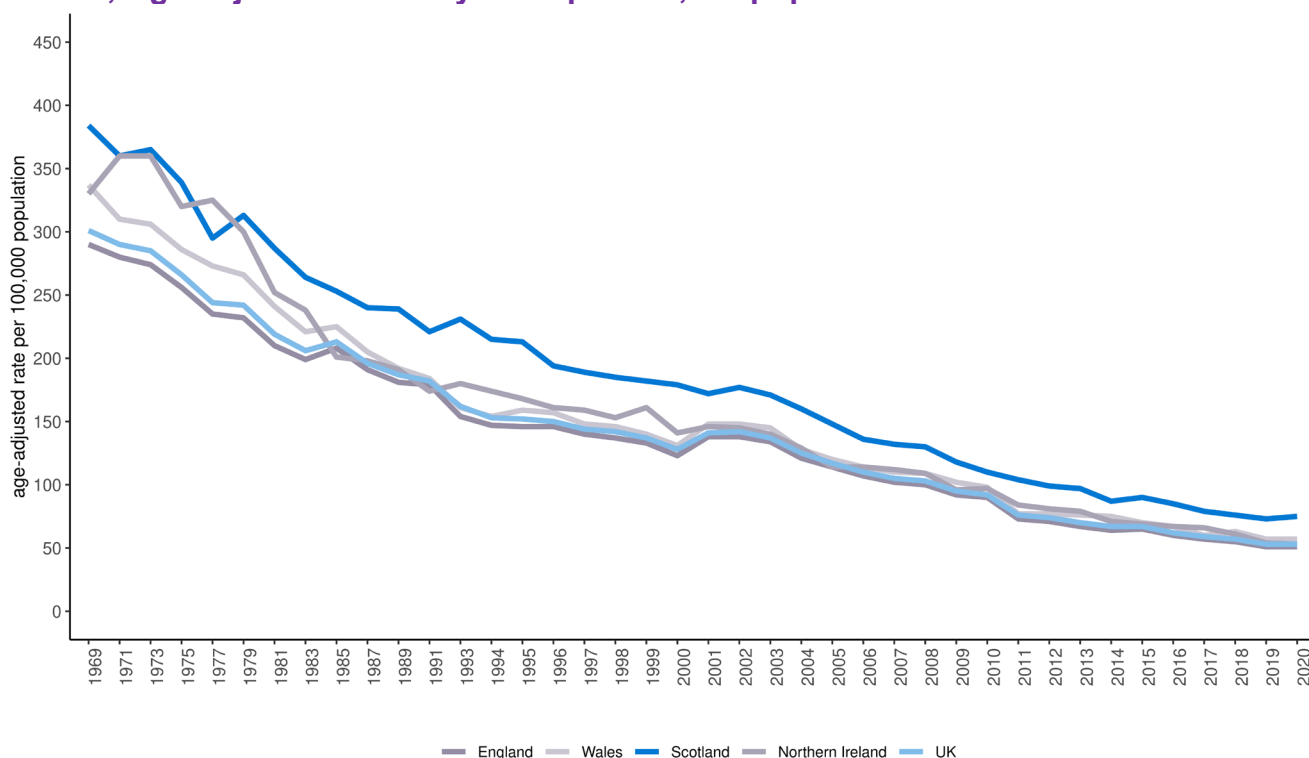
Notes:

1. Analysis includes ICD-10 codes I61, I63 and I64.
2. Rates are directly standardised to the 2013 European standard population.

Data Source: National Records Scotland - Deaths and Population

The British Heart Foundation also publish comparisons of stroke mortality rates within the UK (figure 9). The mortality rates in Scotland were higher than England, Wales and Northern Ireland for most of the last 50+ years. However, the absolute gap in mortality rates narrowed over this time.

Figure 9: Stroke mortality in United Kingdom, England, Wales, Scotland and Northern Ireland; Age-adjusted mortality rates per 100,000 population¹



Notes:

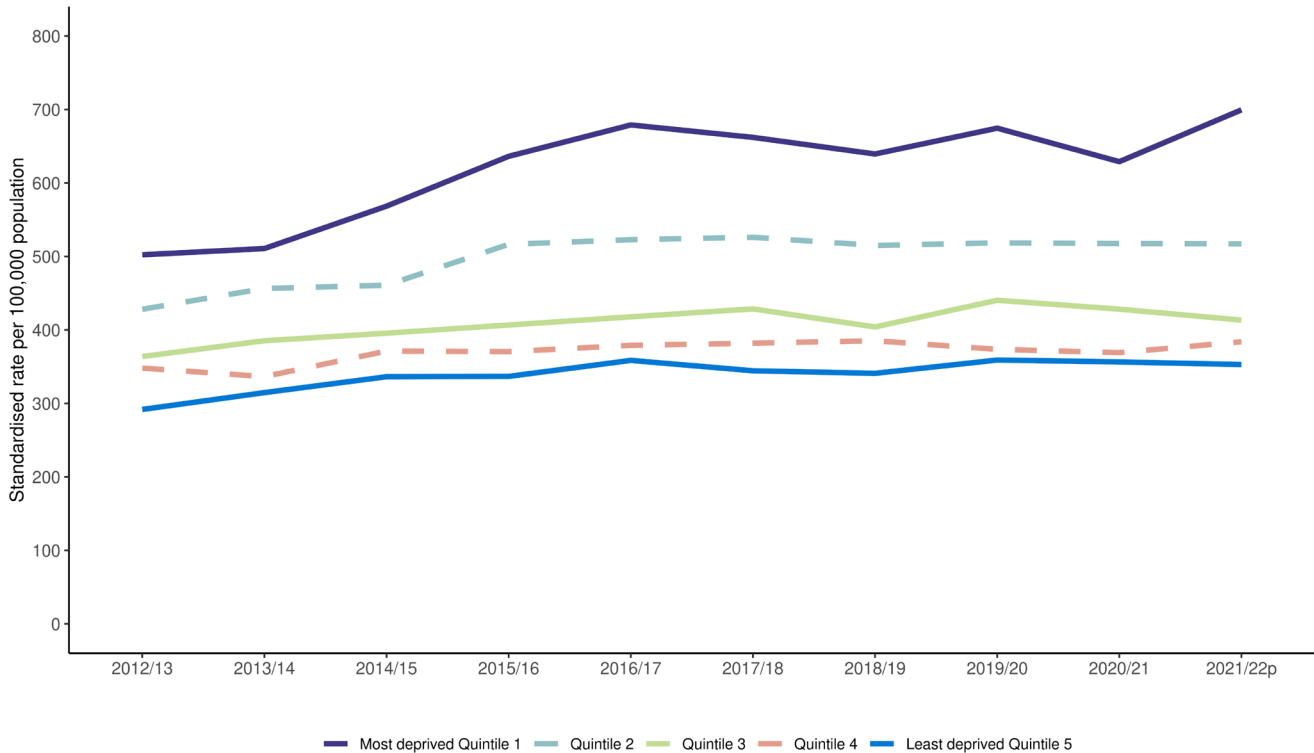
1. Rates are directly standardised to the 2013 European standard population

Data Source: British Heart Foundation Cardiovascular Disease Statistics, (available from <https://www.bhf.org.uk/what-we-do/our-research/heart-statistics/heart-statistics-publications>)

Discharges

Over the last ten years, there was an increase in the adjusted discharge rate for stroke in all deprivation quintiles. The rate in the most deprived quintile increased by 39.3% compared to 20.9% in the least deprived quintile (Table 1 and figure 7).

Figure 7: Stroke Hospital Activity by Deprivation (SIMD) Quintile²: age and sex standardised discharge rates per 100,000 population



Notes:

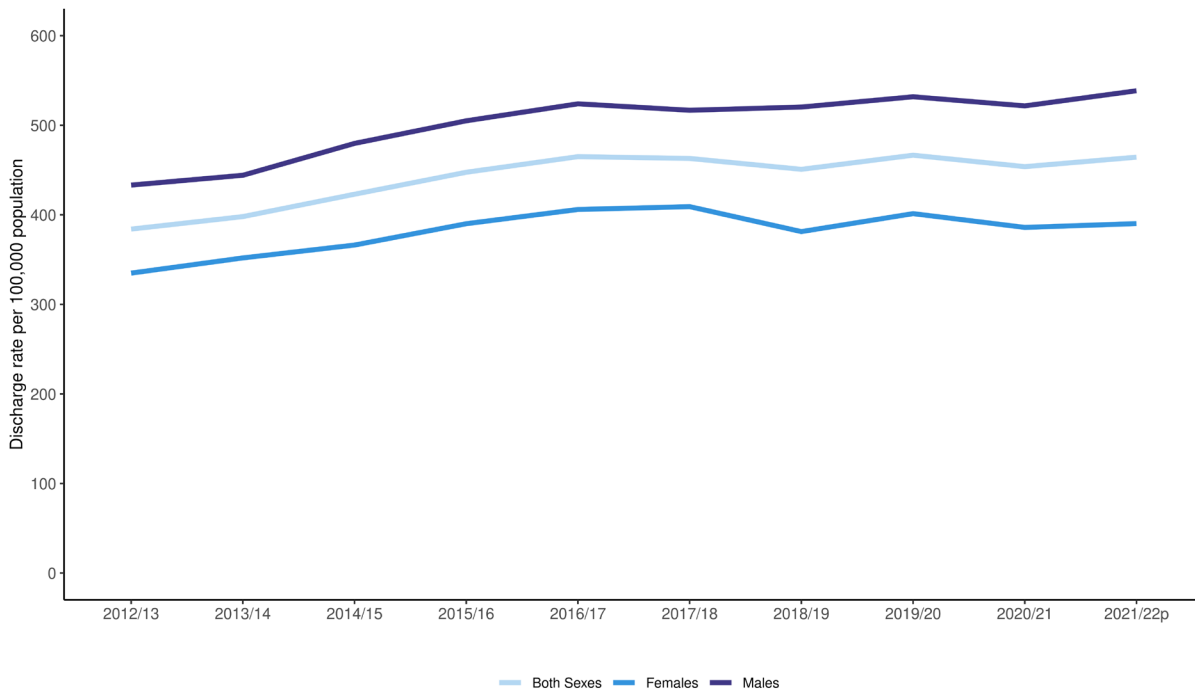
1. Analysis includes ICD-10 codes I61, I63 and I64.
2. Uses 2012, 2016 and 2020 version of SIMD, dependent on the year.
3. Rates are directly standardised to the 2013 European standard population.
P data are provisional for 2021/22 and are subject to change in future analyses.

Data Source: PHS SMR01 - discharges; National Records Scotland – Population

The number of hospital discharges for stroke for men and women in 2021/22 decreased compared to the previous year. The gap in age and sex adjusted discharge rate between men and women (539 per 100,000 population for men compared to 390 per 100,000 population for women in 2021/22), however, has been gradually widening over the past ten years.

In the last decade, the pattern for the age and sex adjusted discharge rate for stroke was similar to that for CVD. The rate increased by 20.9% from 384 per 100,000 population in 2012/13 to 464 in 2021/22 (Figure 10). The trend was similar in both men and women.

Figure 10: Discharges from hospital with stroke¹; age and sex adjusted discharge rates per 100,000 population²



Notes:

- 1. Analysis includes ICD-10 codes I61, I63 and I64
 - 2. Rates are directly standardised to the 2013 European standard population.
 - P. Data for 2021/22 are provisional and subject to change in future analyses
- Data Source: PHS SMR01 - discharges; National Records Scotland – Population

The increase in the adjusted rates for stroke over the last decade was smaller in the over-75 age group (12.5%) compared with the under-75 group (32%).

Comparing mainland NHS Boards, in 2021/22 the adjusted discharge rate was lowest in NHS Grampian (251 per 100,000 population) and highest in NHS Greater Glasgow and Clyde (688 per 100,000 population).

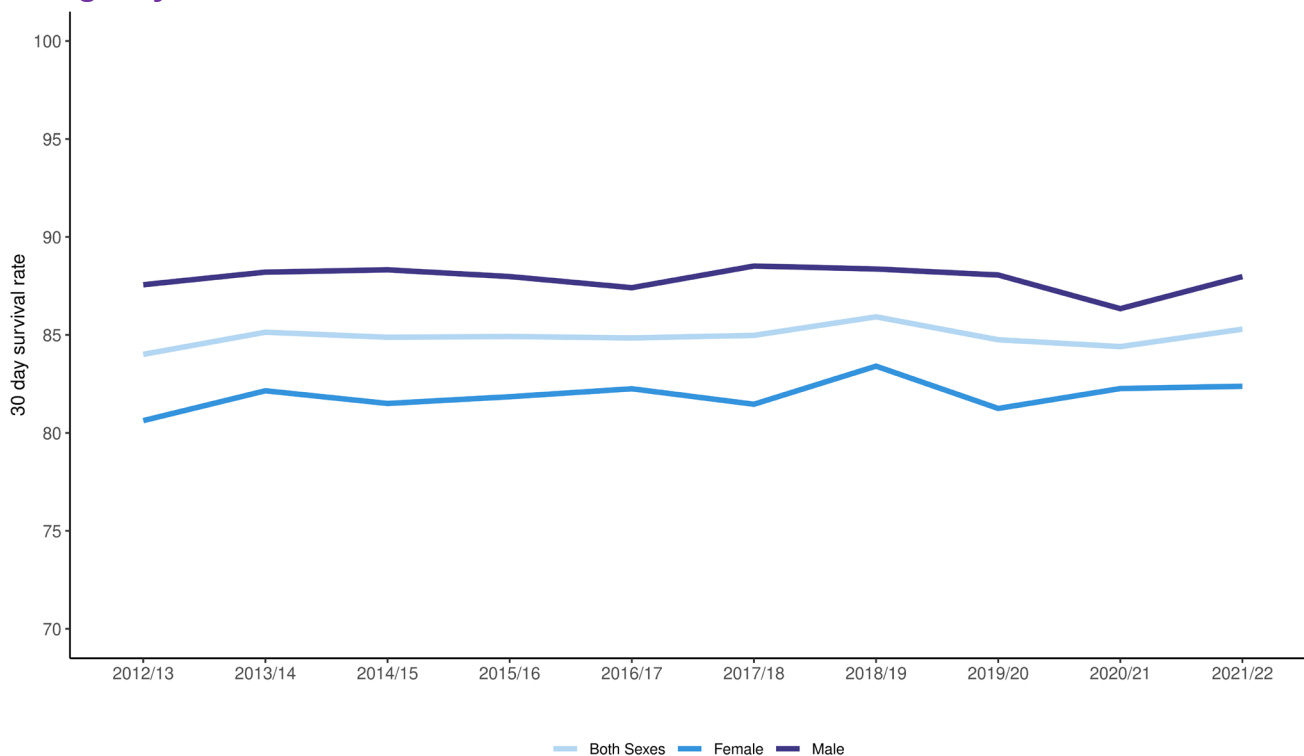
Survival

Thirty day survival is widely used as a measure of the outcome of hospital admission and reflects the severity of disease as well as the quality of care.

The percentage of people surviving 30 days or more following their first emergency admission to hospital with a stroke has been consistently between 84% to 86% over the past ten years. (Table 4 and Figure 11).

For those aged 75 and over, 30 day survival was 77.9% in 2012/13, rising to 79.2% in 2021/22.

Figure 11: Stroke¹; Percentage of patients surviving 30 days or more after first emergency admission



Notes:

- 1. Analysis includes ICD-10 codes I61, I63 and I64
 - 2. y-axis (percentage surviving 30 days) starts at 70% to enable clear comparison between sexes.
 - P. Data for 2021/22 are provisional and subject to change in future analyses
- Data Source: PHS SMR01 - discharges; National Records Scotland – Population

Transient Ischaemic Attack (TIA)

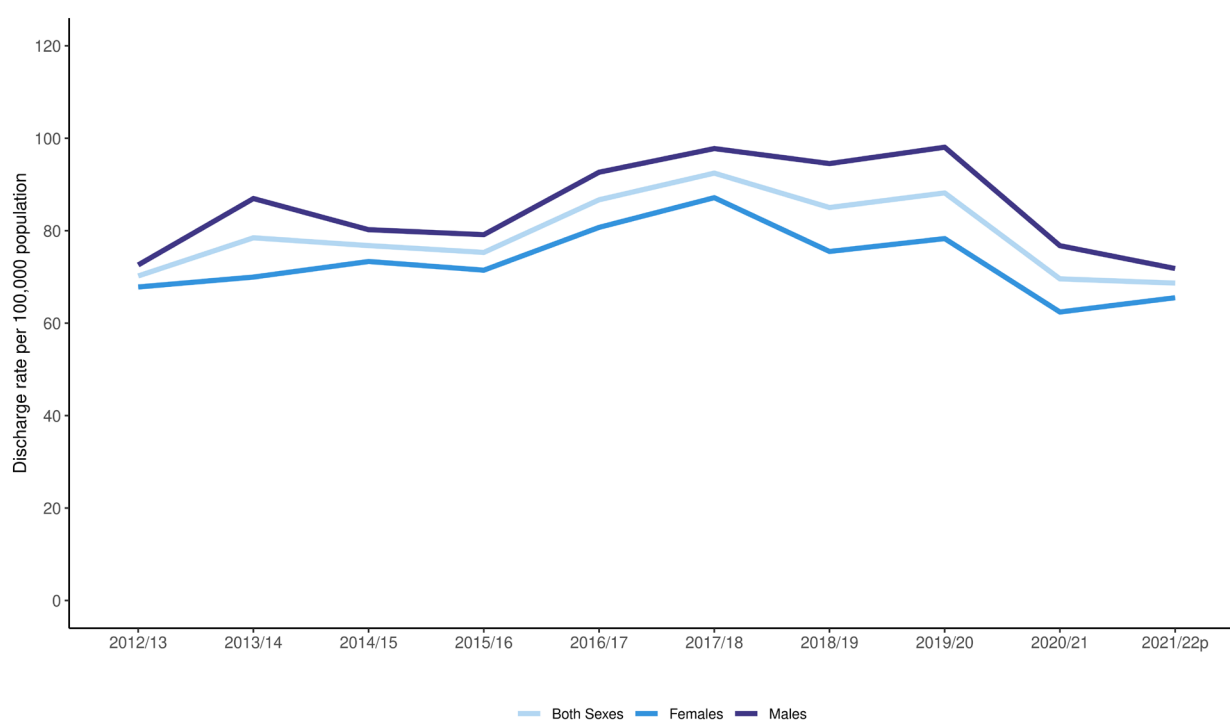
Transient Ischaemic Attack (TIA) Summary

A TIA is similar to a stroke but the interruption of the blood supply to the brain is temporary, and the symptoms last less than 24 hours. However having a TIA is a risk factor for having a later stroke.

Discharges

There was an decrease of 2.2% in the age and sex adjusted rate for a diagnosis of TIA in the last decade, from 70 per 100,000 population in 2012/13 to 69 per 100,000 population in 2021/22 (Figure 12).

Figure 12: Discharges from hospital with transient ischaemic attack¹; age and sex adjusted discharge rates per 100,000 population²



Notes:

1. Analysis includes ICD-10 code G45
 2. Rates are directly standardised to the 2013 European standard population.
- P. Data for 2021/22 are provisional and subject to change in future analyses
 Data Source: PHS SMR01 - discharges; National Records Scotland – Population

Subarachnoid Haemorrhage

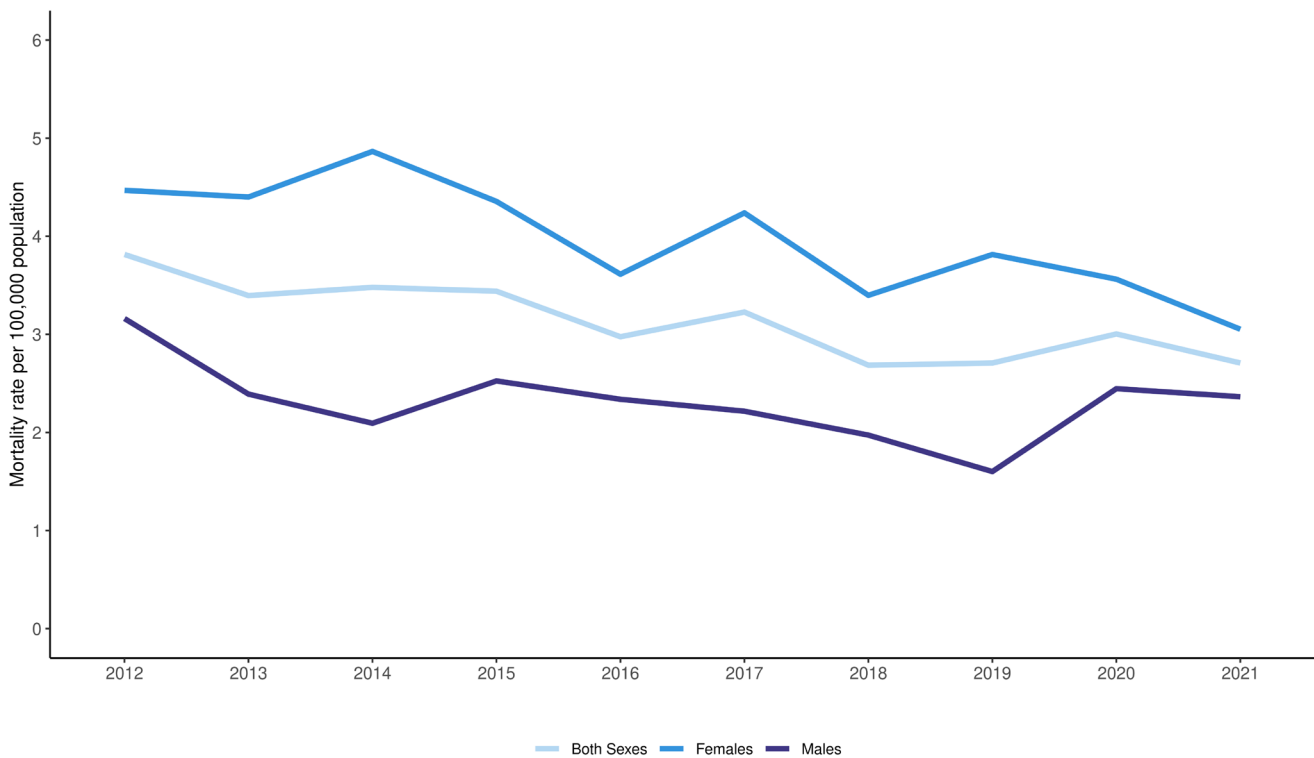
Subarachnoid Haemorrhage Summary

A subarachnoid haemorrhage is a leak of blood caused by the rupture of one of the blood vessels beneath one of the layers of membrane covering the brain.

Mortality

The age and sex adjusted mortality rate for subarachnoid haemorrhage decreased from 3.8 per 100,000 population in 2012 to 2.7 per 100,000 population in 2021, a fall of 29% over ten years (Figure 13).

Figure 13: Subarachnoid haemorrhage¹: all ages by sex; age and sex adjusted mortality rates per 100,000 population²



Notes:

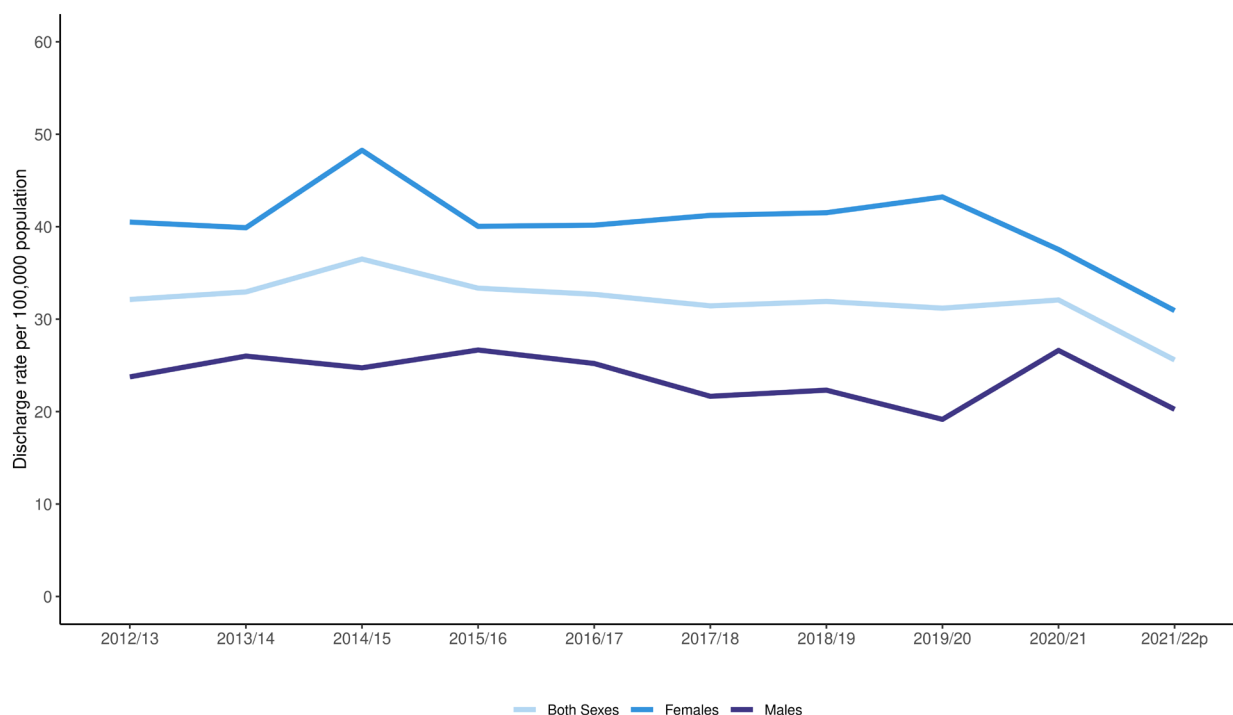
- 1. Analysis includes ICD-10 codes I60.
 - 2. Rates are directly standardised to the 2013 European standard population.
- Data Source: National Records Scotland - Deaths and Population

Further details of mortality from CVD, stroke and subarachnoid haemorrhage by age, gender, NHS board and local authority area are given in [Table 2](#).

Discharges

The age and sex adjusted rate for a diagnosis of subarachnoid haemorrhage decreased by - 20.4% from 32 per 100,000 population in 2012/13 to 26 per 100,000 population in 2021/22 (figure 14). The rate for females was higher than that for males (30.9 and 20.2 per 100,000 population respectively).

Figure 14: Discharges from hospital with subarachnoid haemorrhage¹; age and sex adjusted discharge rates per 100,000 population²



Notes:

- 1. Analysis includes ICD-10 code I60
 - 2. Rates are directly standardised to the 2013 European standard population.
 - P. Data for 2021/22 are provisional and subject to change in future analyses
- Data Source: PHS SMR01 - discharges; National Records Scotland – Population

Further details of hospital activity for CVD, stroke, TIA and subarachnoid haemorrhage by age, gender, type of admission, NHS board and local authority area are given in [Table 1](#).

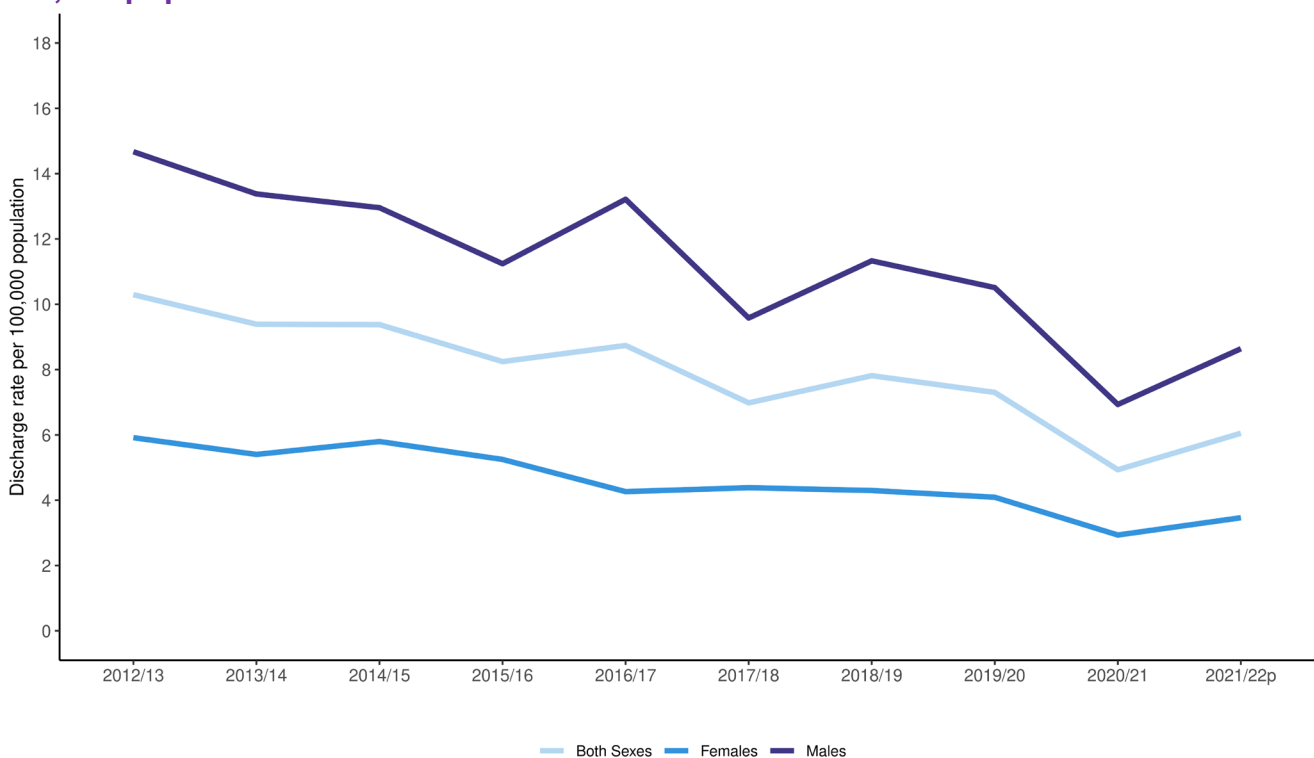
Operations

Carotid Endarterectomy

Carotid endarterectomy is a common operation used to deal with a blocked artery in the neck that may lead to a stroke. It involves clearing the blocked artery to improve the flow of blood through the artery to the brain.

The age and sex adjusted hospital discharge rate showed an overall downward trend over the last 10 years. The fall seems to be particularly sharp in 2020/21, this is likely to be the effect of the COVID-19 pandemic (see [Table 5](#) and Figure 15). The rate decreased by 41.2%, from 10.3 per 100,000 in 2012/13 to 6.1 in 2021/22. There was a substantial decrease in elective procedures in 2020/21 due to the COVID-19 Pandemic.

Figure 15: Carotid Endarterectomies¹: Age and sex adjusted discharge rates per 100,000 population²



Notes:

1. Analysis includes OPCS4 codes L294 or L295 (in any position).
2. Rates are directly standardised to the 2013 European standard population.
- P. Data for 2021/22 are provisional and subject to change in future analyses

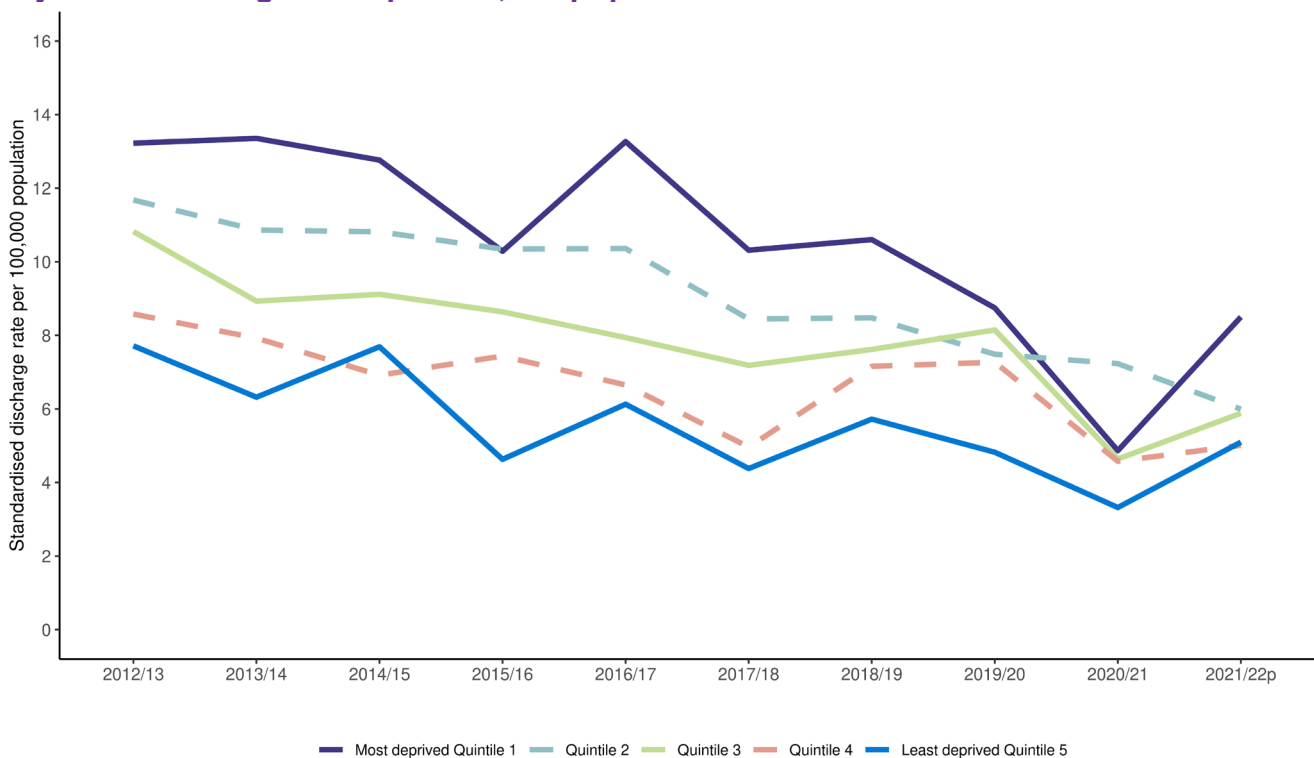
Data Source: PHS SMR01 - discharges; National Records Scotland – Population

The rate for males was more than twice the rate for females in each of the last 10 years (8.6 per 100,000 population for males compared to 3.5 per 100,000 population for females in 2021/22).

Carotid Endarterectomy by Deprivation Quintiles

Over the last ten years, there was a decrease in the adjusted discharge rate for carotid endarterectomy in all deprivation quintiles, again particularly sharp in the 2020/21 as likely impacted by COVID-19 pandemic. The rate in the least deprived quintile decreased by 35.7%, from 2012/13 to 2021/22. Similarly, the rate in the most deprived quintile decreased by 33.9% (Table 5 and Figure 16). There was a substantial decrease in elective procedures in 2020/21 due to the COVID-19 Pandemic.

Figure 16: Carotid Endarterectomy by Deprivation (SIMD) Quintile²: age and sex adjusted discharge rates per 100,000 population³



Notes:

1. Analysis includes OPCS4 codes L294 or L295 (in any position).
2. Uses 2012, 2016 and 2020 version of SIMD, dependent on the year.
3. Rates are directly standardised to the 2013 European standard population. P data are provisional for 2021/22 and are subject to change in future analyses.

Data Source: PHS SMR01 - discharges; National Records Scotland – Population

Cardiovascular Prescribing

Cardiovascular disease covers a range of conditions including heart disease, strokes and diseases of the arteries and veins. This section describes statistics on drugs prescribed for the treatment of cardiovascular disease.

Of the prescriptions dispensed in the community, GPs write the vast majority. The remainder are written by nurses, dentists or are written in hospital to be dispensed in the community. Information on those NHS prescriptions is compiled by ISD's Prescribing Team from data provided by Practitioner Services Division (PSD) of NHS National Services Scotland. PSD is responsible for the processing and pricing of all prescriptions dispensed in the community in Scotland. Note that these data exclude drugs dispensed within hospitals.

The overall cost of cardiovascular drugs reduced over the last ten years, whilst the number of prescriptions gradually increased up to 2009/10 before levelling off. The changing price of statin drugs (used to prevent heart disease) partly explains this. Simvastatin, pravastatin and atorvastatin, three of the most widely used drugs, have come out of patent during this time, allowing equivalent lower cost non-branded (generic) drugs to be made available. Since then, the prices of these drugs have continued to decline, resulting in reduced overall costs, despite growth in the total volume prescribed. The increase in cost from 2014/15 is mainly due to the increased use of direct oral anti-coagulant drugs (DOACs).

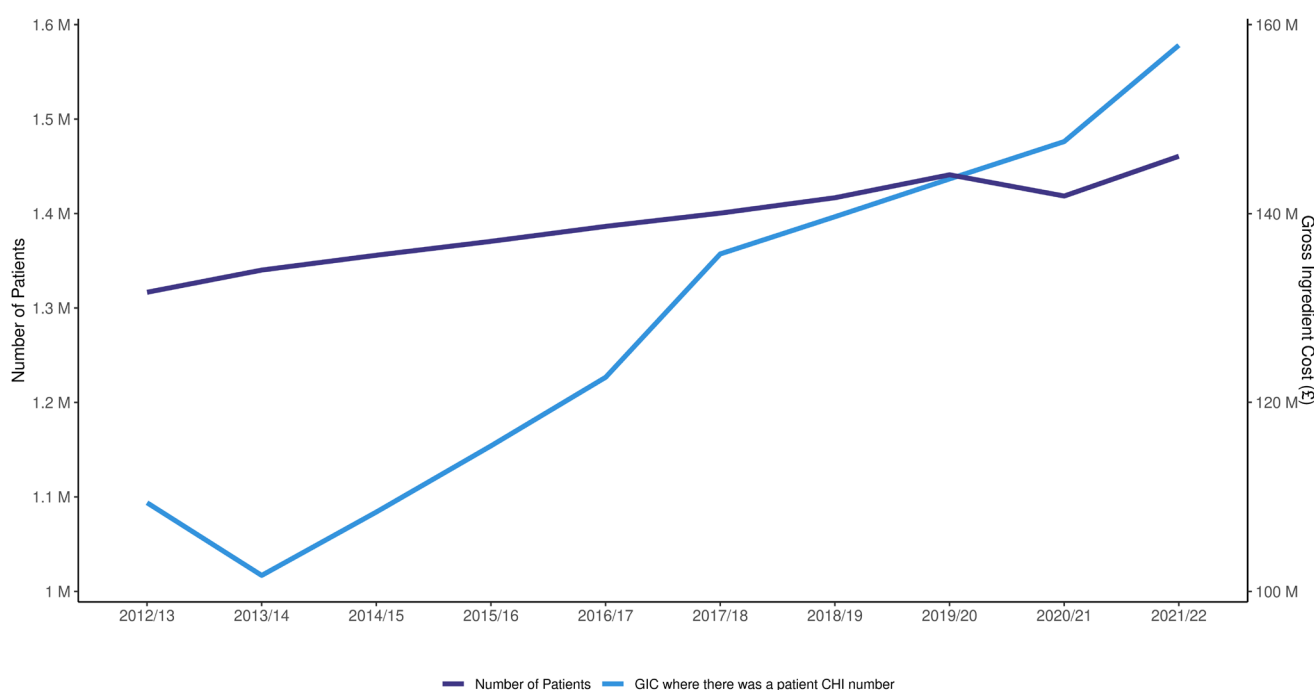
In addition, lower prices have now been set for the non-branded drugs, resulting in further reduction in costs. The introduction of targets for quality improvement in General Practice, as part of the Quality and Outcomes Framework (QOF), is likely to have added to the growth in prescribing volume of statins by providing incentives to identify and treat those at high risk of cardiovascular disease.

The data presented here are identical to those in the prescribing section of the [Heart Disease Statistics](#) publication. This is because many drugs can be used for the treatment of both stroke and heart disease and it is not possible from available data to distinguish whether a drug was used to treat stroke or heart disease.

Number of patients

From 2012/13 - 2021/22, the number of patients have risen from 1.32 million to 1.46 million, an increase of 10.9% (see [Table 6](#) and figure 17). From 2012 to 2021, the Scottish population increased by 3.4% in this time, and the overall population demographic is ageing, which will drive the increase in addition to the points above.

Figure 17 – Volume and cost of cardiovascular prescribing, financial years ending 31 March 2012-2021



Data Source: Prescribing Information System

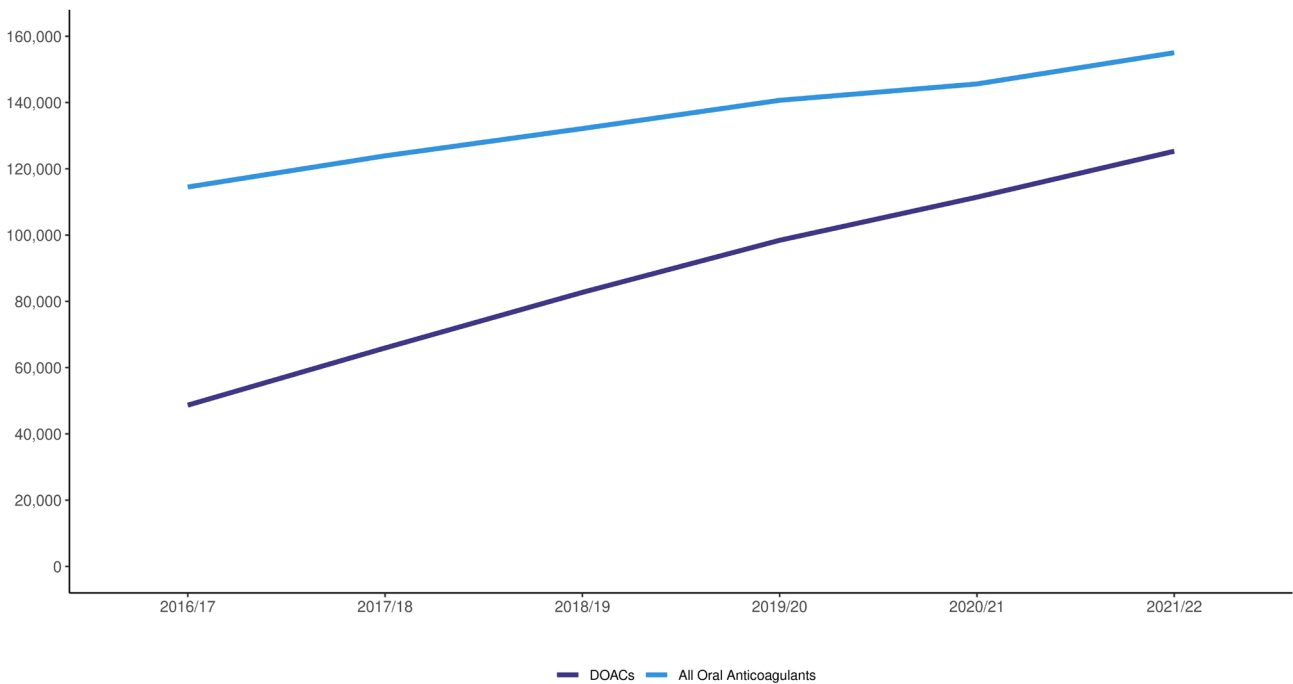
Gross Ingredient Costs

Gross ingredient cost indicates the total cost of a prescription drug. The overall cost of prescriptions dispensed for cardiovascular-related drugs have increased each year from 2014/15, after falling for each year prior to this from 2009/10 – 2013/14. As mentioned before, this increase in cost is mainly due to the increased use of direct oral anti-coagulant drugs (DOACs). Over the last ten years, the gross ingredient cost has risen by 44.3%. Cardiovascular related drugs form approximately 13.6% of the total gross ingredient cost in Scotland (see [Prescription Cost Analysis 2021/22](#)).

DOACs

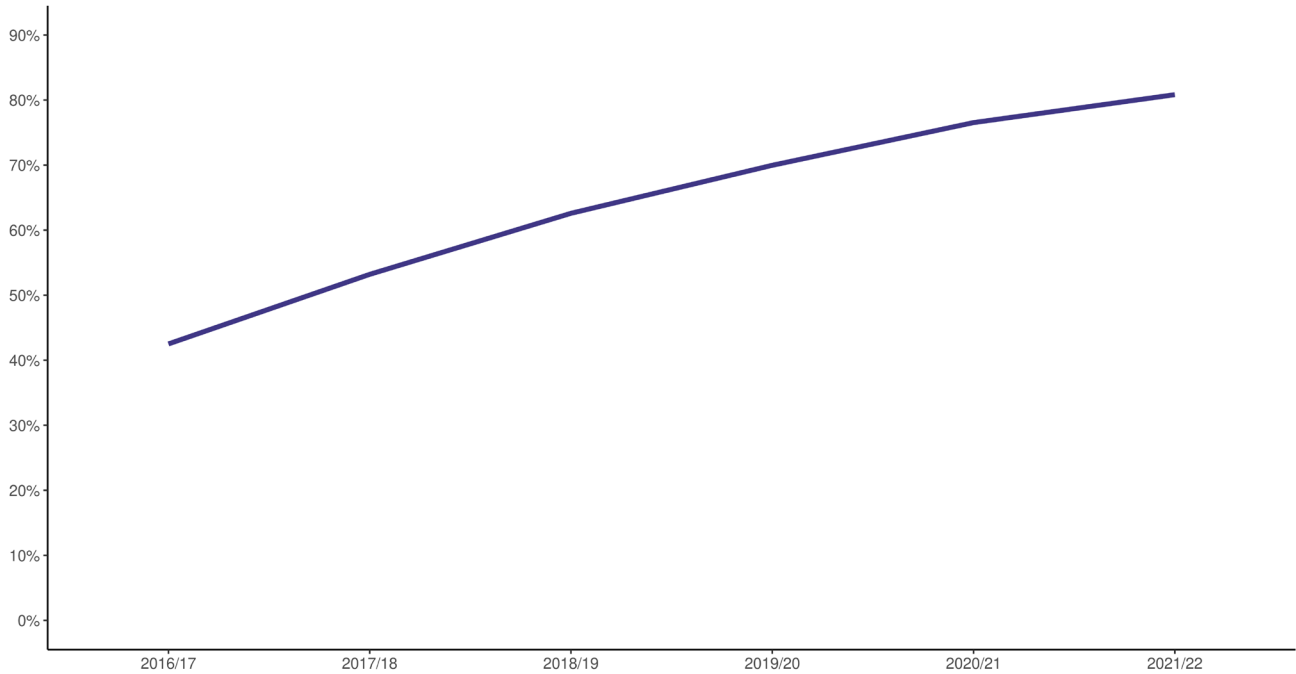
As mentioned previously, there has been an increased use of DOACs over recent years. This can be seen from ([Table 6](#) and figure 18) where the number of patients treated using DOACs has increased from 48,665 to 125,303. The table and figure also shows those treated using All Oral Anticoagulants where the number has increased from 114,496 to 155,031.

Figure 18 – Number of patients treated for DOACs and All Oral Anticoagulants



Taking the number of patients treated using a DOAC against All Oral Anticoagulants shows the increase over time in those treated using DOACs. Figure 19 below shows the proportion of DOAC patients treated against All Oral Anticoagulant patients and it can be seen that in 2016/17 approximately 1 in 40 patients were treated with DOACs compared to a substantial increase each year to over 81% by 2021/22.

Figure 19 – Proportion of number of patients treated for DOACs against All Oral Anticoagulants



Further information relating to cardiovascular prescribing is available in [Table 6](#).

Primary Care Activity – Disease Prevalence

Prevalence data is now available from the Scottish Primary Care Information Resource (SPIRE) for the last three financial years for Stroke and TIA at Scotland level and the figures show a fall for Stroke and TIA prevalence over the three year period.

The Stroke and TIA prevalence fell from 2.25 per 100 people in 2017/18 to 2.21 in 2021/22.

Further information and operational guidance on how to access and then use the SPIRE dashboards can be found on the PHS website:

[General Practice – Disease Prevalence](#)

Ambulance Service Activity

Information on Scottish Ambulance Service (SAS) activity has been collected for (a) incidents where a SAS resource attended and (b) conveyances where a patient was conveyed to hospital. More details are included in the glossary and in the definitions for [Table 7](#). The SAS activity data gives an indication of demand on unscheduled care services (also including NHS24 and A&E) for people with a suspected stroke.

The data presented in [Table 7](#) are for the last ten years and by NHS board of the location of the incident.

In the last ten years, the number of incidents increased from 11,520 to 14,105. The increase in the number of conveyances followed a similar pattern, 11,017 to 13,135. ([Table 7](#) and [Figure 20](#)). This decrease is likely to be attributed, in part, to the change in recording practices described below.

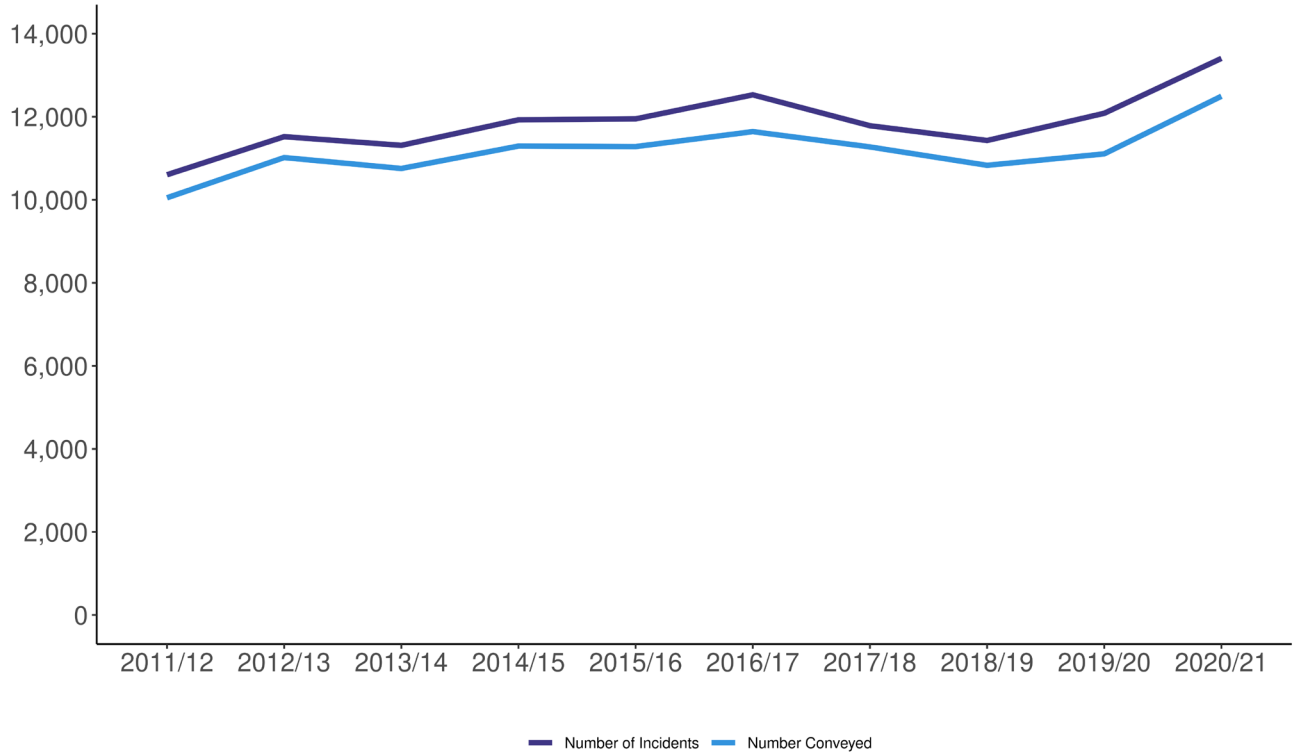
SAS Diagnosis - Stroke

At the end of 2017, a new clinical reporting system was introduced in the SAS organisation. This removed the recording of sub conditions for all diagnoses and introduced additional final conditions that potentially have contributed to changes in recording practices.

It is likely, therefore, that incidents that were previously recorded as 'Stroke' are now being recorded under a different code such as 'Other Presenting Complaint' which was introduced with the new reporting system in 2017.

Note that the final diagnosis codes used here are not compatible with ICD10 diagnosis codes used elsewhere in this publication.

Figure 20: Scottish Ambulance Service Activity: Number of incidents and conveyances with a stroke diagnosis



Data Source: SAS Data Warehouse

Glossary

Acute Hospital	Acute Hospital Care/Activity includes services such as: consultation with specialist clinicians; emergency treatment; routine, complex and life saving surgery; specialist diagnostic procedures; close observation and short-term care of patients. 'Acute' hospital care includes activity occurring in major teaching hospitals, district general hospitals and community hospitals but excludes obstetric, psychiatric and long stay care services.
Carotid Endarterectomy	An operation to remove a blockage in the carotid artery in the neck.
Cardiovascular disease	Includes diseases which affect the heart and the blood vessels, including coronary heart disease, stroke and other cerebrovascular diseases.
Conveyance	A SAS resource has recorded an at hospital time, indicating the patient was conveyed to hospital.
Datazone	A small geographical area with a population between 500-1,000 household residents. They are based on groups of 2001 Census output areas.
Day case	This is when a patient makes a planned attendance to a specialty for clinical care, and requires the use of a bed or trolley in lieu of a bed.
Deciles	Deprivation deciles each contain 10% of the total population in Scotland. Deprivation decile 1 contains the 10% of the population living in the most deprived datazones, while decile 10 contains the 10% of the population living in the least deprived datazones.
Discharge	A discharge marks the end of an episode of care. Discharges include deaths and transfers to other specialties/significant facilities and hospitals as well as routine discharges home.
Emergency	An emergency admission occurs when, for clinical reasons, a patient is admitted at the earliest possible time after seeing a doctor.
ePRF	Electronic patient record form used by ambulance crews to record important patient information, including diagnostic data and treatment provided. This information can be accessed electronically by hospital staff.
European age-standardised rate	The rate that would have been found if the population in Scotland had the same age-composition as the hypothetical standard European population. The 2013 European Standard Population (ESP2013) has been used to calculate EASRs within this publication. The European Standard Population (ESP), which was first used in 1976, was revised in 2013. Reports published before 2015 used ESP1976 to calculate EASRs. Figures using ESP1976 and ESP2013 are not comparable.
Final diagnostic code (SAS)	Diagnosis codes recorded by SAS resource after treating the patient.
Generic drugs	When the patent expires on a branded drug, the manufacturer loses exclusive rights to produce it. Generic drugs are non-branded versions produced by different manufacturers that produce equivalent clinical effects. Normally, the differences in formulation, and the small variation in the amount of drugs absorbed, make no difference clinically. Generic drugs are generally cheaper than their branded equivalents.
Gross Ingredient	Cost of drugs and appliances reimbursed before deduction of any dispenser

Cost (GIC)	discount (note: this definition differs from other parts of the UK).
Incidence	Incidence refers to the number of new cases of a condition in a defined population during a defined period and is typically expressed as the number of new cases per 100,000 population per year (or other suitable units). In this publication, an incident case is defined as the first admission to hospital (or death without a hospital admission). A first admission is defined as an admission where there has been no admission for the same condition in the previous 10 years. For example, a patient might be admitted with CVD in 2004 and again in 2005 for the same diagnosis. For the purpose of counting incidence, only the hospital episode in 2004 would be counted. The 2005 episode would not be counted because the previous episode occurred less than 10 years previously. First hospital admission is a reasonable measure of incidence for CVD since most cases are treated in hospital.
Incident	An incident where a SAS resource attends and record an at scene time.
Inpatient	This is when a patient occupies an available staffed bed in a hospital and either remains overnight whatever the original intention or is expected to remain overnight but is discharged earlier.
Items prescribed	Prescription items are prescribed and dispensed in the community. GPs write the vast majority of these prescriptions, with the remainder written mainly by nurses and dentists. The totals for items prescribed include prescriptions written in hospitals and dispensed in the community, but exclude drugs dispensed within hospitals themselves.
Mainland Health Boards	Health Boards in Scotland excluding the three Island Health Boards (Orkney, Shetland and Western Isles)
Mortality rate	The number of deaths as a rate per 100,000 population per year.
Outpatient	A patient who attends (outpatient attendance) a consultant or other medical clinic or has an arranged meeting with a consultant or a senior member of their team out with a clinic session.
Prevalence rate	The proportion of people with a given condition over a period of time (e.g. a year).
PTI	Practice Team Information (PTI) collects information from a 6% sample of Scottish general practices (60 practices in 2012/13). The population in the sample is a reasonable reflection of the Scottish population with regard to age, gender and deprivation. The information collected is on face-to-face consultations between patients and a GP or practice nurse. 2012/13 was the last year PTI data was collected since it is being superseded by SPIRE (see below).
QOF	The Quality & Outcomes Framework (QOF) represents one of the main sources of potential income for general practices (GP surgeries) across the UK. It is a major part of the new General Medical Services (GMS) contract, introduced on 1st April 2004. Participation by general practices in the QOF is voluntary. For those that do participate, the QOF measures achievement against a range of evidence-based indicators, with points and payments awarded according to the level of achievement.
SAS	The Scottish Ambulance Service.

SIMD	Deprivation for individuals is estimated from aggregate data derived from the census and other routine sources. These are used to estimate the level of material deprivation in small geographical areas. The Scottish Index of Multiple Deprivation (SIMD) has seven domains (income, employment, education, housing, health, crime, and geographical access) at datazone level, which have been combined into an overall index to pick out area concentrations of multiple deprivation. See notes in tables as to which version of SIMD is used.
SMR01	An SMR01 episode is generated when a patient is discharged from hospital but also when a patient is transferred between hospitals, significant facilities, specialties or to the care of a different consultant.
SPIRE	Scottish Primary Care Information Resource (SPIRE) is a national GP information service being developed. It is open to all consenting GP practices in Scotland and will create a potential source of data for analysis.
Standardised Mortality Ratio	The ratio of actual deaths to expected deaths based on indirect standardisation. Expected deaths are the number of deaths that would be expected in each deprivation decile given the age-sex distribution of the underlying populations and the death rates in the reference population (in this case the whole Scottish population).
Stroke	A stroke occurs when an area of the brain is deprived of its blood supply because of a blockage of a blood vessel supplying the brain.
Subarachnoid haemorrhage	A leak of blood as a result of the rupture of one of the blood vessels beneath one of the layers of membrane that covers the brain.
30 day survival	Number of people who survived 30 days following a first emergency admission to hospital for a specific condition.
TIA	Transient ischaemic attack. A transient ischemic attack is a temporary disruption to the blood supply to the brain as a result of a blockage of a blood vessel supplying the brain.

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Further Information

Further Information can be found on the [Public Health Scotland website](#).

For more information on stroke see the [stroke section of our website](#). For information on heart disease, please see the [heart disease](#) pages.

The next release of this publication will be in January 2024.

Rate this publication

If you wish to provide feedback on this publication to help us improve our service, please email phs.hdstroke@phs.scot.

Appendices

Appendix 1 - Background information

Stroke

Cerebrovascular Disease includes cerebrovascular accident (stroke) and transient ischaemic attack (TIA). A stroke or TIA happens when narrowing of the arteries that supply the brain interrupts the blood supply to part of the brain and brain cells are starved of oxygen. Stroke is more common in older people.

Clarification of Terminology

Different terms can be used when talking about cerebrovascular disease conditions and operations and sometimes these are interchangeable. For consistency the following terms are used throughout this report.

Term used in report	Also known as	Description
Stroke	Cerebrovascular accident	A stroke occurs when an area of the brain is deprived of its blood supply because of a blockage of a blood vessel supplying the brain.
Transient ischaemic attack (TIA)	'mini-stroke'	A temporary disruption to the blood supply to the brain as a result of a blockage of a blood vessel supplying the brain.

Standardisation

Apparent differences in disease rates between areas or deprivation groups may be partially or entirely due to the fact that one population is different from the other in age structure. For example, areas with a larger proportion of younger people are unlikely to have as high levels of mortality as areas with larger proportions of older people. Therefore, if we don't adjust for these differences, we may draw the wrong conclusion about the health of an area simply because of the age-structure of the population.

Information in this publication has been 'standardised' using the 2013 European standard population to calculate the European Age Standardised Rates (EASRs). EASRs make allowances for differences in the age and sex structure of the population between areas or time periods and allow fairer comparisons to be made.

Risk factors associated with CVD & stroke

The main preventable risk factors for stroke are smoking, high blood pressure, lack of exercise and a poor diet. Research also indicates a strong relationship between social deprivation and these risk factors. Detailed information on the prevalence of these risk factors is available from the Scottish Health Survey. The results of the Scottish Health survey can be found on the Scottish Government [website](#).

Policy Context

NHSScotland service provision for patients with stroke operates within the framework of the Scottish Government policy. A chronology of policy documents that steer service provision for stroke patients is outlined below.

[Coronary Heart Disease & Stroke Task Force](#) (2001)

[Better health, better care - action plan](#) (2007)

[Better coronary heart disease & stroke care: a consultation document](#) (2008)

[Better heart disease & stroke care action plan](#) (2009)

[Stroke improvement plan](#) (2014)

Data Collection

1. Hospital Activity data

Hospital activity data are collected across NHSScotland and are based on nationally available information routinely drawn from hospital administrative systems across the country. Hospital activity data includes inpatient and day case activity occurring in major teaching hospitals, district general hospitals and community hospitals but excludes obstetric and psychiatric services. This data collection is known as SMR01.

2. Prescribing data

Practitioner Services (PSD), a division of NHS National Services Scotland, processes all NHS prescriptions for payment of pharmacists, dispensing doctors and appliance suppliers. Hospital dispensed prescriptions are NOT included in the figures.

Information on NHS prescriptions dispensed in the community in Scotland is compiled by PHS's Prescribing Team from data provided by Practitioner Services Division (PSD). PSD are responsible for the processing and pricing of all prescriptions dispensed in Scotland.

3. Deaths data

Information on the quality of National Records of Data on Deaths can be found on the [National Records of Scotland website](#).

Data Completeness

The hospital activity figures are sourced from SMR01 records and the levels of completeness of the SMR01 data are deemed to be fit for publication (99% of the expected figure at the time of extraction).

Information on SMR01 data completeness can be found on the Hospital Records Data Monitoring [SMR Completeness](#) web page, while information on the timeliness of SMR01 data submissions can be found on the [SMR Timeliness](#) web page. Details on completeness can also be found within the excel data files.

Data Quality

The [Data Quality Assurance \(DQA\)](#) team is responsible for evaluating and ensuring SMR datasets are accurate, consistent and comparable across time and between sources.

The DQA team's [previous projects](#) web page contains details of past Data Quality Assurance Assessments, including final reports and findings.

The most recent report published is [Assessment of SMR01 Data 2019-2020](#). This report includes feedback on clinical coding accuracy, sensitivity and completeness within defined groups and includes commonly encountered conditions including Ischaemic Heart Disease, Cerebrovascular Disease and Myocardial Infarction.

An earlier report, "[Towards Better Data from Scottish Hospitals: An Assessment of SMR01 and Associated Data 2004-2006](#)" [1.77Mb], contains sub-sections on specific conditions and interventions, including some related to CHD and stroke.

In hospital discharge data, clinical information for diagnoses and operations/interventions is currently recorded using ICD10 (the International Classification of Diseases 10th Revision maintained by the World Health Organization) and OPCS4 (the Office of Population Censuses & Surveys 4th Revision Classification of Surgical Operations and Procedures maintained by NHS Connecting for Health (CfH)).

Lists of ICD10 codes are available at <http://www.who.int/classifications/icd/en/>. OPCS4 codes are available from <https://digital.nhs.uk/article/290/Terminology-and-Classifications>.

Supporting information from Public Health Scotland

Further information relating to heart disease and stroke is published by ISD Scotland:

1. ScotPHO – the [Health and Well Being Profiles](#) produce charts at NHS Board and Local Authority on premature mortality from CHD and CVD and patients hospitalised with CHD and CVD.
2. The [Hospital Standardised Mortality Ratios](#) updated quarterly produce information on deaths in hospitals participating in the Scottish Patient Safety Programme. Deaths will include those dying from heart disease and stroke.
3. Detailed tables on [number/incidence of hospital episodes by diagnosis](#), including diseases of the circulatory system and [number of procedures in main hospitals](#), including those associated with heart disease and stroke. This is available as part of the Hospital Care topic on the ISD website.
4. The [Scottish Stroke Care Audit](#) reports on stroke services in Scottish hospitals

Independent & voluntary sector

Although there are a number of independent & voluntary sector organisations involved in the provision of information and services to CHD & stroke patients, three of the main ones, with links to NHSScotland, are the Stroke Association, Chest, Heart & Stroke Scotland (CHSS) and British Heart Foundation (BHF). Each organisation is involved in the funding of research and provides extensive information for patients and carers on their respective web sites at <http://www.stroke.org.uk>, <http://www.chss.org.uk> and <http://www.bhf.org.uk/>

Comparisons

1. UK comparisons

Hospital activity data relating to cerebrovascular disease in England, Wales and Northern Ireland are available separately. Please note that these figures are sometimes not directly comparable with published data from Scotland due to differences in recording and definitions. Prior to making comparisons, please check the definitions carefully for each of the sources. In particular, the ICD-10 codes used to define cerebrovascular disease may vary between sources. Scotland includes code G45 (Transient Ischaemic Attack and related syndromes) while other areas may not include this code.

England: [NHS Hospital Episode Statistics \(HES\)](#)

Wales: [Health and care statistics](#)

Northern Ireland: [Hospital Statistics & Research](#)

Mortality from specific causes, including cerebrovascular disease, in England and Wales is available from the [Office for National Statistics](#).

2. International comparisons

The [Scotland and European Health for All](#) database allows users to make comparisons of trends in mortality in Scotland with countries in the rest of Europe. These include standardised death rates and hospital discharges for CVD. European comparisons indicate that while CVD mortality rates have fallen, Scotland still compares unfavourably with most other European countries.

Further Information

Our [Links to other sources](#) section offers a few examples of other information sources.

Appendix 2 - Publication Metadata

Metadata Indicator	Description
Publication title	Scottish Stroke Statistics
Description	Annual update of stroke statistics. Update including hospital activity, incidence, operations, 30 days survival, mortality, deprivation, prescribing, primary care and ambulance service activity
Theme	Health and Social Care
Topic	Conditions and Diseases
Format	Excel workbooks
Data source(s)	Scottish Morbidity Record 01 (SMR01); National Records of Scotland (NRS) Death Registrations and Population Estimates; Prescribing Information System (PIS); Scottish Index of Multiple Deprivation (Scottish Government); SAS Data Warehouse; Quality Outcomes Framework (QOF).
Date that data are acquired	February 2022
Release date	24 January 2023
Frequency	Annual
Timeframe of data and timeliness	10 years annual data up to 2022-03-31(hospital activity, operations, prescribing, incidence, survival), 31-Dec-2022-03-30(mortality). 10 years annual data up to 2022-03-31(ambulance service).
Continuity of data	Mortality data: Reports data since 2007. There was a change to the coding of causes of death by National Records of Scotland between 2010 and 2011. The overall scale of change was small. For full details, please consult the NRS website . Population estimates: Small corrections were made to the 2012-2014 mid-year population estimates by NRS. The errors had no effect on the population for Scotland and a very small effect on health board and council area populations. For full details, please consult the NRS website . Prescribing data: The definition of the main measures such as gross ingredient cost and number of items are unchanged over this period. Types and value of dispensing fees are agreed the Scottish Government and set annually. Details can be found in the [Scottish Drug Tariff] and in Primary Care circulars issued by the Government. Drug products are first licensed as proprietary medicines but generic versions often appear once the original patent expires. This can affect the price and uptake of these drugs. The Scottish Government sets the reimbursement price of generic drug products via the Scottish Drug Tariff which is updated and issued quarterly.
Revisions statement	This publication contains planned revisions. More details below
Revisions relevant to this publication	Historical mortality figures at health board level have been updated. The changes are minor and relate to a small number of death registrations that had not previously been assigned to a health board. Figures at Scotland and council area level are unaffected.
Concepts and	See Glossary and Appendix A1 contained within this report.

definitions	
Relevance and key uses of the statistics	<p>Uses of the data include: To allow NHS Boards and the Scottish Government to compare activity levels nationally; To provide health intelligence and performance information for NHS Boards and the Scottish Government; To provide information to support answers to Parliamentary Questions; To support the information requirements of voluntary sector organisations such as Chest, Heart and Stroke Scotland (CHSS), including research and media activity; To allow members of the public to readily access information on cerebrovascular disease; To respond to information requests for a variety of customers e.g. researchers, charities, public companies, Freedom of Information requests; To assist students and universities conducting studies on topics such as cerebrovascular disease; To assist private companies interested in cerebrovascular disease information in Scotland, such as pharmaceutical companies and consultancy companies.</p>
Accuracy	<p>Mortality: For coding of deaths see the website of the National Records of Scotland. Reported data are compared to previous years' figures and to expected trends. Prescribing: The data is sourced from a payment system and routine monthly checks are carried out by PSD on a random sample of approximately 5% of prescription payments. These check all data captured for payment and the accuracy of the payment calculation and have a target accuracy of 98% which is routinely met. Data that is captured but is not mandatory for payment purposes can be of lower quality; principally this includes the prescriber code which links a prescription back to the individual prescriber e.g. GP and their organisation including NHS Board. Routine monitoring of unallocated prescriptions is carried out and correct codes are applied before publication. This ensures that unallocated prescriptions account for under 2% of all prescriptions. For remaining unallocated prescriptions, the prescribing NHS Board is assumed to be the same as the dispensing NHS Board. Hospital Activity: SMR01 data are subjected to validation on submission. The figures are compared to previous years' figures and to expected trends. The SMR01 data are also assessed for accuracy by PHS's Data Quality Assurance team – see Appendix A1</p>
Completeness	<p>Mortality: Death registrations are deemed to be complete and finalised. Prescribing: The Prescribing Information System holds information on 100% of NHS Scotland prescriptions dispensed within the community and claimed for payment by a pharmacy contractor (i.e. pharmacy, dispensing doctor or appliance supplier). It does not include data on prescriptions dispensed but not claimed (likely to be very small) or prescriptions prescribed but not submitted for dispensing by a patient. Some research has estimated these latter prescriptions to account for around 6% of all prescriptions issued to patients. It is not possible to determine from payment data how much of the medicine dispensed to patients is actually taken in accordance with dosage instructions. Hospital Activity: Levels of SMR01 submission are deemed to be 98% complete compared to expected levels of submission at time of extraction.</p>
Comparability	<p>Prescribing: The main measures of drug ingredient cost and volumes of items dispensed in the community are comparable across the UK countries. However it should be noted that the Gross Ingredient Cost (GIC) within Scotland is equivalent to the Net Ingredient Cost (NIC) in England, i.e. the reimbursement cost of drugs before any pharmacy discounts are applied. Also each country determines its own dispensing fees based on separate contractual arrangements with dispensing contractors in each country. A</p>

	<p>common formulary called the British National Formulary (BNF) is used to classify drugs based on therapeutic use. Hospital activity data relating to cerebrovascular disease in England, Wales and Northern Ireland are available separately. Please note that these figures are sometimes not directly comparable with published data from Scotland due to differences in recording and definitions. Prior to making comparisons, please check the definitions carefully for each of the sources. In particular, the ICD-10 codes used to define cerebrovascular disease may vary between sources. Scotland includes code G45 (Transient Ischaemic Attack and related syndromes) while other areas may not include this code. England: NHS Hospital Episode Statistics (HES) Wales: Health and care statistics Northern Ireland: Hospital Statistics & Research. Mortality: Deaths from specific causes, including cerebrovascular disease, in England and Wales is available from the Office for National Statistics. The ICD-10 codes used to define cerebrovascular disease may vary between sources. Scotland includes code G45 (Transient Ischaemic Attack and related syndromes) while other areas may not include this code.</p>
Accessibility	<p>It is the policy of PHS to make its web sites and products accessible according to published guidelines.</p>
Coherence and clarity	<p>Relevant key statistics are presented on each Topic Area page. Statistics are presented within Excel spreadsheets. Geographical areas and national figures are presented using drop down menus. Further features to aid clarity: 1. Tables use drop down menus to display data by Age Band, Diagnostic and other Groupings. 2. Key data presented graphically. 3. Each Excel workbook contains a notes page.</p>
Value type and unit of measurement	<p>The number of deaths in a given year is based on the date of registration. Rates are expressed as both a crude rate per 100,000 population and directly standardised for age only or both age and sex as detailed on the notes pages of the relevant Excel table. The main units of measure of drug reimbursement costs are Gross Ingredient Cost (GIC) and Net ingredient cost (NIC) quantity. The latter takes account of pharmacy discounts, the rates for which are set by the Scottish Government in the Scottish Drug Tariff. There are a large number of individual dispensing remuneration fees paid to dispensing contractors details of which can be found in the Scottish Drug Tariff. The main measures of drug volume are items (the number of individual drug items on a prescription form), quantity (the total number of tablets, capsules etc), and defined daily doses (DDDs - estimated average daily maintenance doses for a total quantity of prescribed). Hospital activity is based on hospital episodes, which if based on the date of discharge. Rates are expressed as both a crude rate per 100,000 population and directly standardised for age only or both age and sex as detailed on the notes page of the relevant Excel tables.</p>
Disclosure	<p>The PHS protocol on Statistical Disclosure Protocol is followed.</p>
Official Statistics designation	<p>National Statistics</p>
UK Statistics Authority Assessment	<p>April 2013</p>
Last published	<p>25 January 2022</p>
Next published	<p>24 January 2024</p>

Date of first publication	22 February 2011 (in current format)
Help email	phs.hdstroke@phs.scot
Date form completed	5 January 2023

Appendix 3 - Early access details

Pre-Release Access

Under terms of the "Pre-Release Access to Official Statistics (Scotland) Order 2008", PHS is obliged to publish information on those receiving Pre-Release Access ("Pre-Release Access" refers to statistics in their final form prior to publication). The standard maximum Pre-Release Access is five working days. Shown below are details of those receiving standard Pre-Release Access.

Standard Pre-Release Access:

Scottish Government Health Department
NHS Board Chief Executives
NHS Board Communication leads

Early Access for Management Information

NHS Tayside Health Intelligence team.

Appendix 4 - PHS and Official Statistics

About Public Health Scotland (PHS)

PHS is a knowledge-based and intelligence driven organisation with a critical reliance on data and information to enable it to be an independent voice for the public's health, leading collaboratively and effectively across the Scottish public health system, accountable at local and national levels, and providing leadership and focus for achieving better health and wellbeing outcomes for the population. Our statistics comply with the [Code of Practice for Statistics](#) in terms of trustworthiness, high quality and public value. This also means that we keep data secure at all stages, through collection, processing, analysis and output production, and adhere to the ['five safes'](#).

Official Statistics

Public Health Scotland (PHS) is the principal and authoritative source of statistics on health and care services in Scotland. PHS is designated by legislation as a producer of 'Official Statistics'. Our official statistics publications are produced to a high professional standard and comply with the Code of Practice for Official Statistics. The Code of Practice is produced and monitored by the UK Statistics Authority which is independent of Government. Under the Code of Practice, the format, content and timing of statistics publications are the responsibility of professional staff working within PHS. PHS's statistical publications are currently classified as one of the following:

- National Statistics (ie assessed by the UK Statistics Authority as complying with the Code of Practice)
- National Statistics (ie legacy, still to be assessed by the UK Statistics Authority)
- Official Statistics (ie still to be assessed by the UK Statistics Authority)
- other (not Official Statistics)

Further information on PHS's statistics, including compliance with the Code of Practice for Official Statistics, and on the UK Statistics Authority, is available on the [PHS website](#).