



Public Health  
England

Protecting and improving the nation's health

# **Briefing document: First incidence of stroke**

## **Estimates for England 2007 to 2016**

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# Contents

Contents	3
Background	4
Main findings	5
Estimated incidence of stroke in England in 2016	5
Trends in incidence of stroke in England between 2007 and 2016	5
Incidence of stroke in England by gender, 2016	6
Changes in characteristics of stroke patients between 2007 and 2016	7
Incidence of stroke in England by age, 2016	8
Ethnicity and differences in stroke incidence, 2016	9
Incidence of stroke in England by deprivation, 2016	9

# Background

Stroke is the third most common cause of premature death<sup>1</sup> and a leading cause of disability in the UK<sup>2</sup>. In England, there are around 30,000<sup>3</sup> stroke related deaths each year and more than a quarter of patients leaving hospital experience moderate to severe disability following a stroke<sup>4</sup>.

Most published estimates of stroke incidence in England are out of date, only capture certain types of stroke, include recurrent strokes, or focus on small populations. There are currently no national data on the incidence of first stroke in England. Therefore there is a need to update current knowledge of stroke incidence in England.

Using a general practice database (The Health Improvement Network), the incidence of first ever stroke in England during 2016 has been estimated. This paper reports the estimated total number of first strokes in England in 2016, trends in incidence and differences in stroke incidence by age, gender, ethnicity and deprivation.

Full details of the method used in calculating the estimates are available to download at: <https://www.gov.uk/government/publications/first-stroke-estimates-in-england-2007-to-2016>

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<sup>1</sup> ONS (2016) Registered deaths by age, sex, selected underlying causes of death and the leading causes of death for both males and females. Office for National Statistics

<sup>2</sup> Newton, J, Briggs, A, Murray, C. *et al.* 2015, 'Changes in health in England, with analysis by English regions and areas of deprivation, 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013', *The Lancet*. vol. 386, no. 10010, p2257-2274.

<sup>3</sup> Office for National Statistics (ONS) Annual mortality statistics. 2017 Available from <[www.ons.gov.uk](http://www.ons.gov.uk)>.

<sup>4</sup> Royal College of Physicians Sentinel Stroke National Audit Programme (SSNAP). 'Is stroke care improving?' Second SSNAP Annual Report prepared on behalf of the Intercollegiate Stroke Working Party, November 2015.

# Main findings

These are:

- approximately 57,000 people in England experienced a stroke for the first time in 2016
- stroke is more common in males than females; 29,000 occurred in males compared to 28,000 in females in 2016
- stroke incidence increases with age; 3% of the total estimated stroke incidence occurred in people aged under 40, 38% in people aged 40 to 69 and 59% in people aged over 70
- strokes are occurring at an earlier age; age at onset fell from 70.5 to 68.2 in males and 74.5 to 73.0 in females between 2007 and 2016
- crude incidence rates of stroke are highest in the White ethnic group (excluding unknown ethnicity), reflecting the age structure of this group
- adjusting for the age structure of the population results in increases in incidence rates in the Black African and Caribbean ethnic groups, although they are not significantly different to the White group
- incidence of stroke appears to be highest in the most deprived population, although the difference between the most and least deprived is not significant

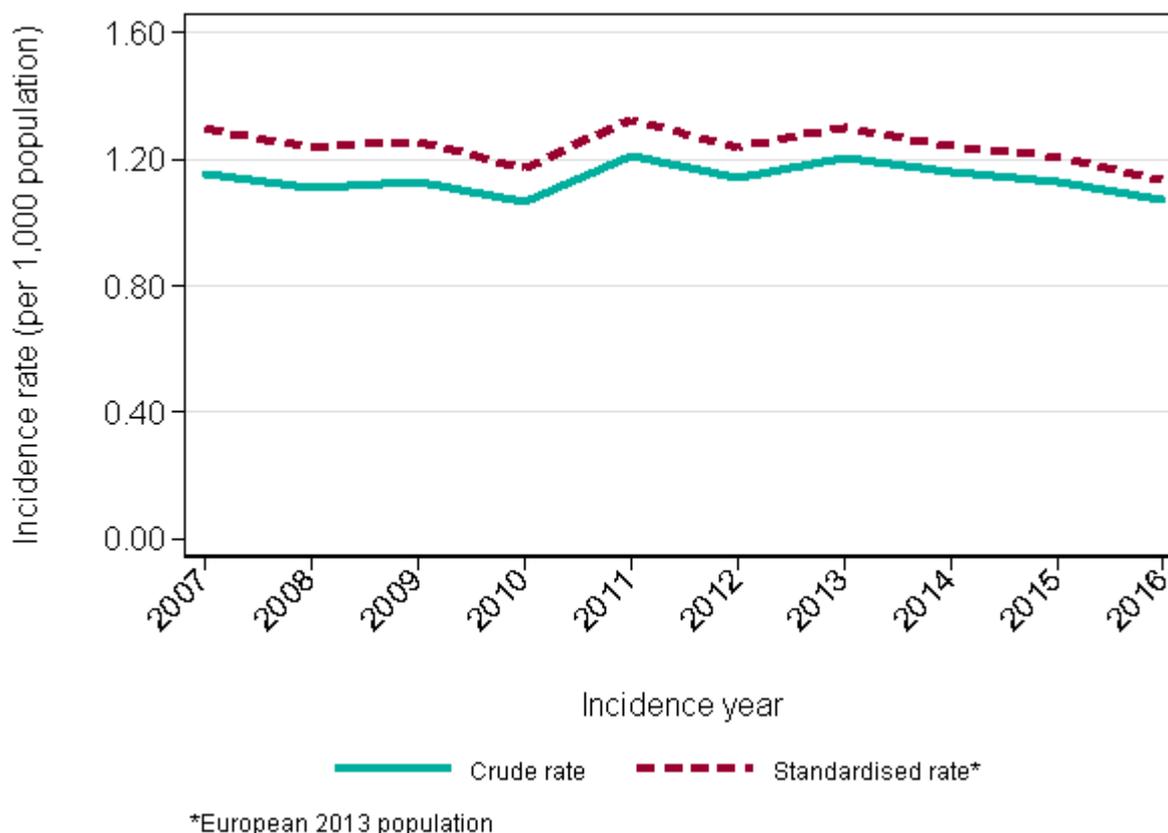
## Estimated incidence of stroke in England in 2016

It is estimated that approximately 57,000 people experienced a stroke for the first time in 2016. Adjusting to the 2013 European standard population to account for differing age structures resulted in the incidence rate increasing slightly from 1.03 strokes per 1,000 population to 1.13 strokes per 1,000 population.

## Trends in incidence of stroke in England between 2007 and 2016

Figure 1 shows that crude incidence of stroke has fallen by 8% since 2007 from 1.16 strokes per 1,000 population to 1.07 strokes per 1,000 population in 2016. A similar pattern is observed in both males and females where crude incidence rates have fallen by 7% and 8% in males and females respectively (not shown in figure1). Age standardised rates follow a similar pattern over the same time period.

**Figure 1: Trends in first incidence of stroke per 1,000 population, 2007 to 2016**



Adjusting to the 2013 European standard population results in an increase in the incidence of stroke compared to the crude incidence.

### Incidence of stroke in England by gender, 2016

Around 51% (n=29,000) of first strokes occurred in males and 49% (n=28,000) in females in 2016. This is similar to 2007, where the total number of first strokes was also approximately 57,000. The population in England has increased from 51.4 million in 2007 to 54.8 million – an increase of 6.2%. The increase in population accounts for the decrease in incidence rates, despite the total number of strokes remaining similar.

Table 2 shows crude incidence rates of first stroke in 2016 was slightly higher in the male population (1.11 strokes per 1,000 males) compared to the female population in 2016 (1.03 strokes per 1,000 females). Table 2 shows the effect of standardising rates to the 2013 European standard population. This results in a larger increase in the male incidence rate of stroke (1.28 strokes per 1,000 males), compared to females (1.00 strokes per 1,000 females).

**Table 1: Number of cases, crude and standardised incidence rates, 2016**

<b>Group</b>	<b>Cases</b>	<b>Person-years</b>	<b>Crude rate (per 1,000)</b>	<b>Standardised rate (per 1,000)#</b>
All stroke patients	1,328	1,241,977	1.07	1.13
<b>Gender</b>				
Males	683	613,415	1.11	1.28
Females	645	628,562	1.03	1.00
<b>Age group</b>				
< 40 y	41	590,556	0.07	
40 - 49 y	90	180,214	0.50	
50 - 59 y	175	179,636	0.97	
60 - 69 y	242	135,910	1.78	
70 - 79 y	349	95,768	3.64	
80 - 89 y	312	48,988	6.37	
90 y +	119	10,905	10.91	
<b>Incidence year</b>				
2007	1,264	1,092,531	1.16	1.30
2016	1,328	1,241,977	1.07	1.13
<b>Ethnicity</b>				
Asian	28	46,333	0.6	1.18
Black	17	30,737	0.55	1.06
Mixed	6	11,029	0.54	0.87
Other	4	7,769	0.51	1.30
White	636	583,059	1.09	1.07
Unknown	637	563,050	1.13	1.20
<b>Deprivation<sup>^</sup></b>				
Least Deprived	331	307,274	1.08	1.02
Less Deprived	244	227,300	1.07	1.02
Average Deprivation	243	231,216	1.05	1.12
More Deprived	204	186,865	1.09	1.34
Most Deprived	153	132,184	1.16	1.53
Unknown	153	157,137	0.97	1.13

#2013 European standard population, <sup>^</sup>Townsend deprivation index

## Changes in characteristics of stroke patients between 2007 and 2016

First time strokes are occurring at an earlier age overall: the mean age at onset of has fallen from 72.4 to 70.6. Males experienced a first stroke at an earlier age than females: 68.2 compared to 73.0 in 2016.

Strokes were more common in the 40 to 69 age group in 2016 (38.2% of all strokes) compared to 2007 (33.7% of all strokes).

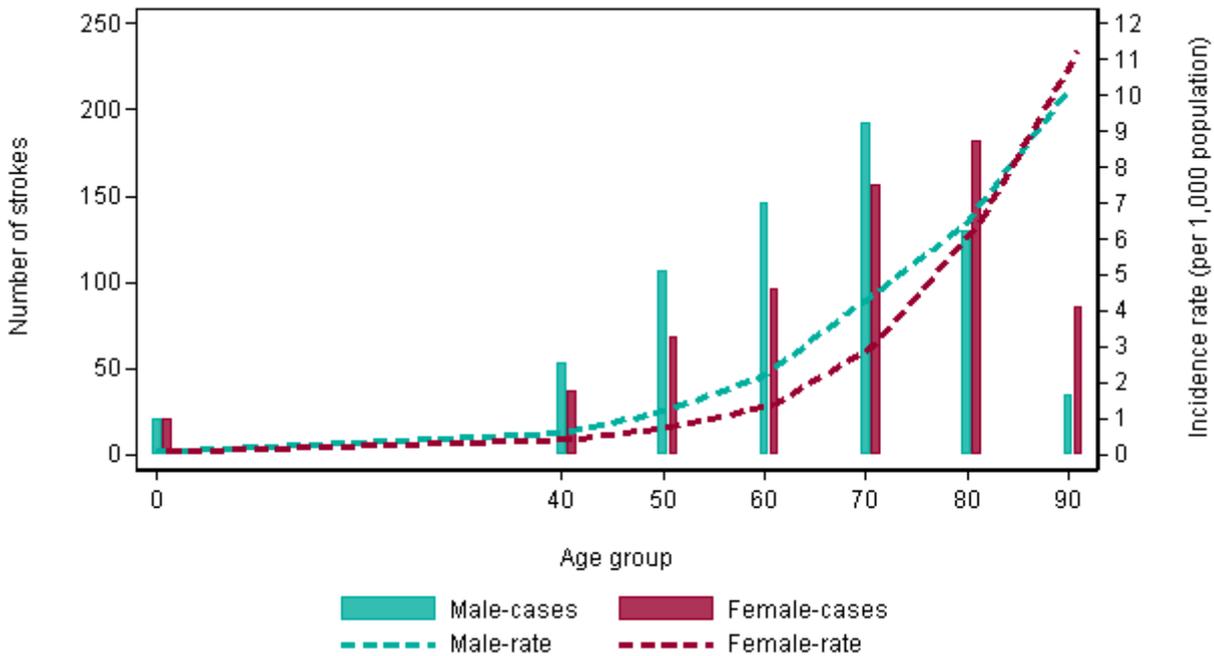
## Incidence of stroke in England by age, 2016

The median age of stroke in males is 70 compared to 76 in females. The largest number of strokes in males occurs in the 70 to 79 age group; for females, the peak in numbers occurs in the 80 to 89 age group. With the exception of the 80 to 89 and 90+ age group, absolute numbers of strokes are greater in males in all age groups compared to females.

The incidence of stroke is largely driven by age: in the under 40 age group, the incidence rate was 0.1 strokes per 1,000 population, rising steadily before peaking in the 90+ age group with an incidence rate of 11 strokes per 1,000 population in 2016. Total number of cases peak in the 70 to 79 age group.

Age specific incidence rates in both males and females are similar in the under 40 age group. Incidence rates between males and females diverge substantially between 40 and 80 with higher rates in males, although rates are higher in females in the 90+ age group compared to males. In males, peak incidence is reached in the 70 to 79 age group compared to the 80 to 89 age group in the female population.

**Figure 2: Number of strokes and age-specific rates per 1,000 population, by gender, 2016**

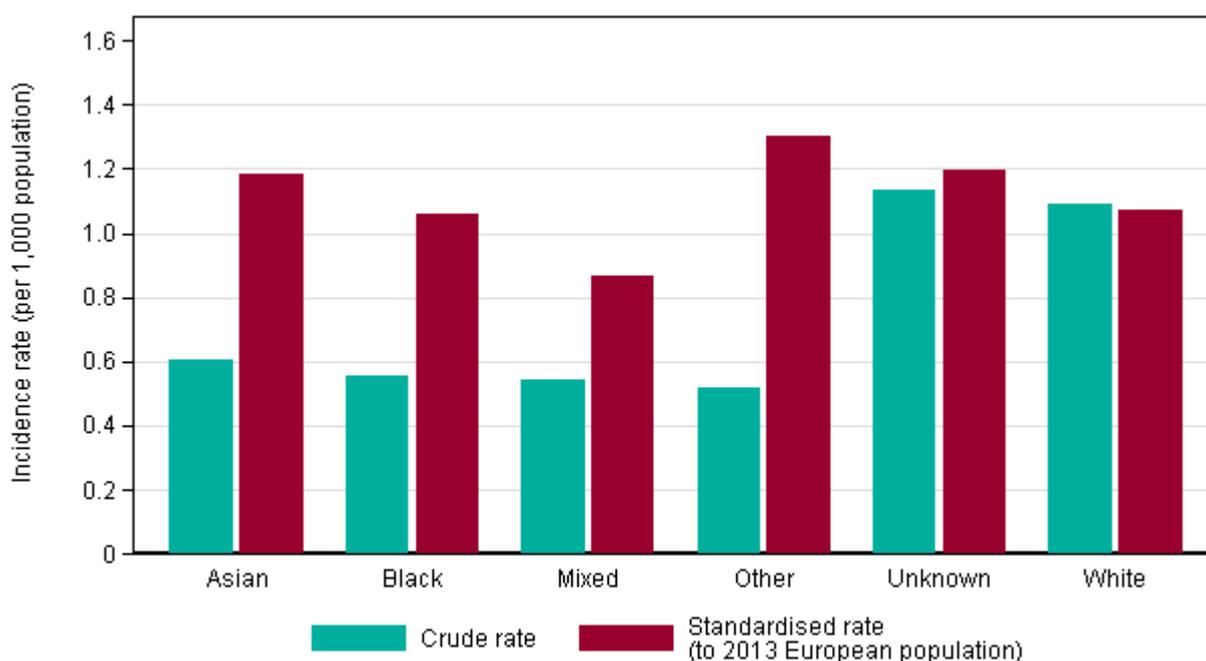


## Ethnicity and differences in stroke incidence, 2016

The crude incidence of stroke is highest in the 'White' ethnic group, excluding the unknown ethnic population group (1.09 strokes per 1,000 population) and lowest in the 'Other' and 'Mixed' ethnic groups (0.51 and 0.54 strokes per 1,000 population respectively). Age standardised incidence of stroke is highest in the ethnic group identified as 'Other' and lowest in the 'Mixed' ethnic group.

Age at onset is earlier in the 'Asian' group compared to the 'White' ethnic group (median age 66.5 years compared to 72 years).

**Figure 3: Crude and standardised incidence rates of stroke per 1,000 population, by ethnic group, 2016**



## Incidence of stroke in England by deprivation, 2016

Incidence rates of first stroke are lowest in the least deprived quintile. Increasing deprivation is associated with increasing incidence rates. When accounting for differing age structures, the standardised rates show an increase in the gap between least and most deprived; rates in the most deprived increase while rates in the least deprived decrease.