

Kent & Medway: Stroke Profile

June 2015

Produced by Kent Public Health Observatory

Zara Cuccu, Public Health Analyst, (zara.cuccu@kent.gov.uk)

Malti Varshney: Public Health Consultant (Malti.Varshney@Kent.gov.uk)

Dr. Julia Duke-MacRae, Consultant in Public Health

(Julia.dukemacrae@medway.gov.uk)

Contributing Author, Gerrard Abi-Aad: Head of Public Health Intelligence

(Gerrard.Abi-Aad@Kent.gov.uk)

Contents

Executive Summary

Key Findings	4
Implications for Commissioning.....	7
1. Introduction	9
2. Demography.....	10
2.1. Key Points.....	10
2.2. Population Projections.....	10
2.3. Old Age Dependency.....	13
2.4. Ethnicity	14
What does the evidence suggest?	14
Local Analysis	15
2.5. Quadrant Analysis.....	16
3. Stroke Prevalence	17
3.1. Key Points.....	17
3.2. Recorded Prevalence of Stroke.....	18
3.3. Trends in Stroke Prevalence	20
3.4. Projected Stroke Prevalence	22
3.5. Expected Stroke Prevalence.....	23
4. Risk Factors for Stroke	24
4.1. Key Points.....	24
4.2. What does the Evidence Suggest?.....	24
4.3. Recorded Prevalence of Risk Factors	26
4.4. Risk Factor Management in Primary Care	28
4.5. Management of Risk Factors for Stroke in Primary Care.....	30
5. Hospital Admissions	33
5.1. Key Points.....	33
5.2. Stroke	33
5.3. Transient Ischaemic Attack	37
5.4. Management of Risk Factors & Hospital Admissions	40

6.	Stroke related mortality.....	42
6.1.	Key Points.....	42
6.2.	What does the Evidence Suggest?.....	43
6.3.	Deaths within 30 days of Emergency Admission	43
6.4.	Years of Life Lost	45
6.5.	Premature Mortality from Stroke	47
6.6.	Risk factor management and premature mortality related to stroke	48
7.	Conclusion.....	50
8.	Appendices.....	51
8.1.	Appendix A – Summary of Tables	51
8.2.	Appendix B - Methodology	60
8.3.	Appendix C - Regression Line Showing Slope	62
8.4.	Appendix D – Percentage Changes in Stroke Prevalence	63
8.5.	Appendix E – Stroke Related Risk Factors.....	64
8.6.	Appendix F - Recorded Prevalence of Risk Factors	65
8.7	Appendix G - Analysis of Stroke and Primary Care Risk Factors.....	66
8.8	Appendix H - Analysis of Stroke and Risk Factors continued.....	68
8.9	Appendix I – Stroke Related Hospital Admissions Risk Factors.....	73
8.10	Appendix J - Premature Mortality and Stroke Risk Factors.....	78
9.	Glossary.....	83
10.	References.....	84

Acknowledgement

Mark Chambers, Senior Public Health Intelligence Analyst, Medway Council

Executive Summary

Key Findings

Demographics

- The incidence of stroke increases with age. The West Kent region is projected to have a 21% increase in the population age 65 years and over between 2012 and 2020. This is the largest projected percentage increase across Kent. However, East Kent will see the greatest numbers of individuals (n=159,200) within this age group, making upto 42% of the older population of Kent and Medway.
- East Kent shows the largest projected old age dependency ratio at 38.44 per 100 persons by 2020, especially in the South Kent Coast CCG (42.2 per 100 persons) and Thanet CCG (41.2 per 100 persons). The increased elderly population is likely to implicate greater numbers of individuals with care needs and increasing demand on health and social care services.
- Research has demonstrated a higher incidence of stroke within the black ethnic group.⁵ It is estimated that North Kent (excluding Medway) has 1.78% of its population of Black, African and Caribbean origin. This is the region with the highest proportion of Black, African and Caribbean origin in Kent. Exploration of this region at a Clinical Commissioning Group level identifies that 2.27% of the Dartford, Gravesham & Swanley CCG population are of Black, African and Caribbean origin.

Prevalence

- Research has shown a reduced risk of all-cause stroke mortality, and, improved survival in those aged 65 and over within black in comparison to white patients.⁷ This may implicate prolonged disability and greater care needs within this population after stroke. This has been supported by research showing that survey respondents from the black ethnic group demonstrated a greater number of unmet needs than other groups.⁸
- Both East and West Kent regions have the highest prevalence of stroke and Transient Ischaemic Attack (TIA). The prevalence of stroke and TIA is significantly higher in Canterbury & Coastal, South Kent Coast, Thanet and West Kent CCGs but significantly lower in the North Kent region when compared to Kent and Medway as a whole. It is worth noting that, East Kent region has the highest proportion of older people (n=133,000) and this is expected to increase to 159,200 by 2020. From 2006/07 to 2013/14, the prevalence of stroke has increased by 1.34%. across Kent and Medway.
- The East Kent region is projected to have the highest stroke and transient ischaemic attack prevalence at 2.06% by 2016.

Risk Factors

Risk factors for stroke include: hypertension, diabetes, atrial fibrillation, high blood pressure, poor diet, obesity, smoking, physical inactivity and excessive alcohol consumption. These risk factors are modifiable. This report focuses on the first three risk factors.

This report examines the management in primary care of these three risk factors (hypertension, atrial fibrillation and diabetes) in relation to stroke prevalence, mortality, hospital admissions and premature mortality.

Thanet and South Kent Coast CCGs have high prevalence of stroke and TIA, high prevalence of hypertension and diabetes. Ashford, Canterbury & Coastal, South Kent Coast, Thanet and West Kent CCGs have high prevalence of stroke and TIA and high prevalence of atrial fibrillation. The high prevalence of hypertension, diabetes and atrial fibrillation may partially be explained by appropriate case finding but does not necessarily explain the high stroke and TIA prevalence.

Risk Factors Management in Primary Care

The following section examines the management of these risk factors in primary care in these specific areas in relation to outcomes.

Although, there is a high proportion of patients aged 40 and over with a record of blood pressure in the previous five years in primary care in South Kent Coast, Thanet and Ashford CCGs, less than a third of patients with hypertension did not achieve blood pressure control (140/90mmHg). This suggests the need for further improvements in the management of hypertension in primary care. In contrast, the North Kent region appear to record blood pressure and achieving blood pressure control in a high proportion of their patients as indicated by their low level of stroke and TIA prevalence. However, there is still a need for further improvements.

South Kent Coast, Thanet, Ashford, West Kent and Canterbury & Coastal CCGs have about two thirds of their patients with diabetes achieving blood glucose control, but also have high prevalence of stroke and TIA. This suggests that other risk factors may be implicated. This is further confirmed, by findings in North Kent region, where stroke and TIA prevalence is lower and blood glucose control has been achieved in over half of their patients with diabetes. There is a need to improve management of diabetes in primary care in order to achieve good control of blood glucose and thereby avoiding onset of complications.

South Kent Coast, Ashford and Canterbury & Coastal CCGs have high stroke and TIA prevalence but have about half of their patients with a recorded CVD risk score of 20% and over on statin treatment. This is important as it suggests inadequate management of cardiovascular risk in primary care and the need for a more targeted and systematic approach in primary care in identifying more people with a CVD risk score of 20% and over through the NHS Health Checks programme and offering them appropriate interventions. In

contrast, the North Kent region has a higher proportion of patients on statin and lower stroke and TIA prevalence.

Risk Factor Management in Primary Care and Hospital Admissions

Hospital admission rate for stroke is highest in Swale CCG (224.8 per 100,000 populations) and highest for TIA in Canterbury & Coastal and Thanet CCGs (106.8, 105.5 per 100,000 populations respectively).

South Kent Coast, Ashford and Thanet CCGs with high stroke hospital admissions have a lower proportion of patients (two thirds) with hypertension achieving good blood pressure control. Similarly, South Kent Coast, Ashford and Canterbury & Coastal CCGs also have a lower proportion of patients (over half) with CVD risk score of 20% and over receiving statin treatment.

Swale CCG has high stroke related hospital admissions but a lower proportion of patients with diabetes achieving good blood glucose control.

Mortality

Death within 30 days of Emergency Hospital Admissions

Ashford CCG has significantly lower stroke deaths within 30 days of emergency admission when compared with England. All the other CCGs across Kent and Medway did not differ significantly from England.

Premature Mortality

It is worth noting that Dartford, Gravesham and Swanley CCG has a higher proportion of patients with AF receiving stroke risk assessment, patients with CVD risk score of 20% or more receiving statin, patients with hypertension achieving good blood pressure control, but just about two thirds of their patients with diabetes achieving good blood glucose control. However, there are more premature deaths occurring in this area, suggesting that other risk factors for stroke such as smoking and obesity may be playing a contributory role.

Thanet and DGS CCGs also have high premature deaths due to stroke. This is expected as only three fifths of patients with diabetes, achieved good blood glucose control and two thirds of those with CVD risk score of 20% or more received statins. Furthermore, although a higher proportion of patients with hypertension have a record of blood pressure, only about two thirds of these patients achieved blood pressure control.

Medway CCG

The prevalence of stroke in North Kent region is lower than the rest of Kent and Medway as a whole. Medway CCG has a higher proportion of patients with AF assessed for risk of stroke using the CHADs scoring system, a higher proportion of patients with hypertension achieving blood pressure control, two thirds of patients with CVD risk score of 20% or more on statins and just about half of patient with diabetes achieving good blood glucose control. Hospital admission due to stroke and TIA in Medway CCG is significantly lower and stroke related premature death is lower but not significantly so when compared to Kent and Medway as a whole. This is in line with the higher proportion of patients AF receiving an assessment for stroke risk, higher proportion of patients with CVD risk of 20% or more receiving statins, high proportion of patients with hypertension achieving blood pressure control. However, worth noting that only just half of the patients with diabetes are achieving good blood glucose control. This suggests an area for further improvement.

Implications for Commissioning

This report should be read in conjunction with the evidence review for stroke services and also along with the data analysis through Sentinel Stroke National Audit Programme (SSNAP).

Future commissioning of stroke services will need to consider above key findings, in particular risk factors which potentially highlight areas for service improvement in primary care. It is crucial that commissioners map out the care journey of stroke patients to gain detailed understanding of the patients whole pathway, the organisations and professionals involved in stroke care in order to identify potential areas for improvement and where resources can be utilised more efficiently.

The projected increase in the older population (65 years and over) in East and West Kent regions, particularly South Kent Coast, Thanet, Canterbury and Coastal CCGs and in addition, the high old age dependency ratio implies an increased care needs and demand for health and social care services. The higher proportion of Black African and Caribbean in North Kent region in comparison to other areas of Kent and Medway may translate to a higher risk of stroke in that area and thus a need for targeted preventive interventions.

This report highlights the need for further improvements in the management of key risk factors for stroke in primary care. This will in turn impact on stroke incidence and outcomes. Although, there have been some substantial improvements in the identification of key risk factors, this has not necessarily translated into adequate management in primary care. It is worth pointing out that whilst this report does not take into account other risk factors for

stroke such as poor diet, obesity, smoking, physical inactivity and excessive alcohol consumption, it is important to consider these in a wider stroke prevention programme.

For future commissioning of hyperacute and subacute stroke beds, the Stroke Review Programme Board should consider risk factors, our growing older population with changing health needs along with the changing trend of stroke prevalence.

1. Introduction

A stroke is a serious, life-threatening medical condition that occurs when the blood supply to part of the brain is cut off. Stroke is the brain equivalent of a heart attack and is the third cause of deaths and the leading cause of adult severe disability. Strokes are a medical emergency, and therefore urgent treatment is essential because the sooner a person receives treatment for a stroke, the less damage is likely to happen.

This report was commissioned by Kent and Medway Stroke Review Programme Board and focuses on examining the current need and possible future demand on stroke services within Kent & Medway. To inform the stroke review, this report focused on three regional geographies, as well as, Clinical Commissioning Groups within Kent. Table 1 shows the definitions of the regions and Clinical Commissioning Groups referred to within this report.

Region	Clinical Commissioning Group
North¹	Dartford, Gravesham & Swanley CCG Medway CCG Swale CCG
East	Ashford CCG Canterbury & Coastal CCG Thanet CCG South Kent Coast CCG
West	West Kent CCG

The report provides an analysis of various risk factors for stroke and related hospital activity and has additional information to that available through the Sentinel Stroke National Audit Programme (SSNAP).

¹ The report information explicitly highlights when data for Medway populations in data availability is not included due to limitations in availability

2. Demography

2.1. Key Points

Demography
<ul style="list-style-type: none">The West Kent region is projected to have a 21% increase in the population age 65 years and over between 2012 and 2020, this is the largest projected percentage increase across Kent.
<ul style="list-style-type: none">East Kent region is expected to see a 42% increase in the number of people (n=159,200) aged 65 years and over by 2020.
<ul style="list-style-type: none">East Kent region is expected to have the largest projected old age dependency ratio at 38.44 per 100 persons by 2020. This suggests greater number of older people with care needs and thus increased demand on health and social care services.
<ul style="list-style-type: none">North Kent (excluding Medway) has 1.78% of its population of Black, African and Caribbean origin. This is the region with the highest proportion of its population of Black, African and Caribbean origin. Exploration of this region at a Clinical Commissioning Group level identifies that 2.27% of the Dartford, Gravesham & Swanley CCG population are of Black, African and Caribbean origin.

2.2. Population Projections

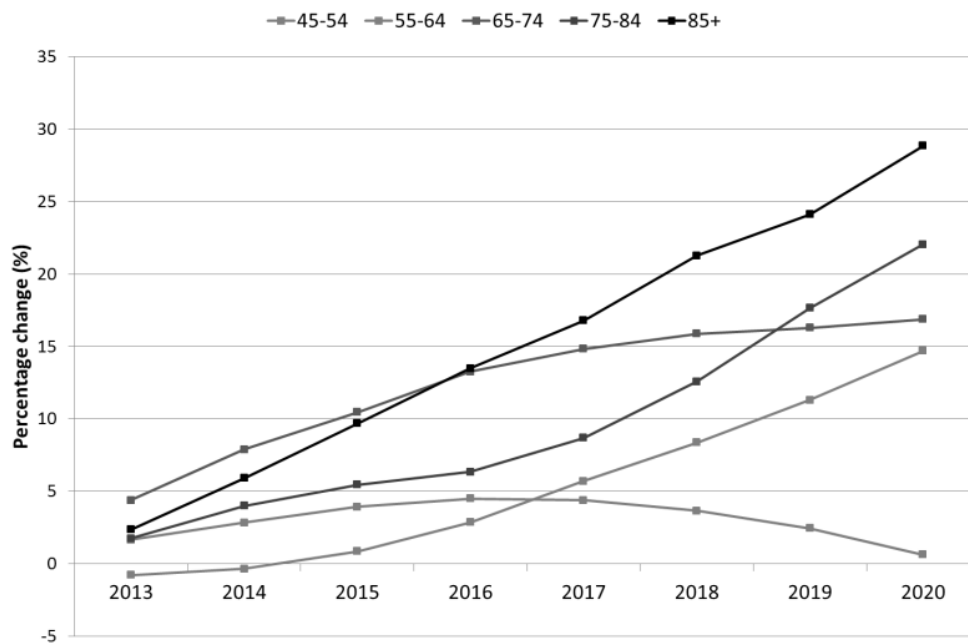
The incidence of stroke increases with age.^{1,2} In addition, the mean age of stroke within individuals aged 15 years and over was estimated to be 69.6 years between 2007-2010.² Figures 1 to 3 show the projected changes in Kent and Medway using the 2012-based population projections from 2013 to 2020.³

In 2012, 42% of the 65 and over Kent & Medway population can be found within East Kent, lower proportions 31% and 26% can be found within North and West Kent respectively.

Figure 1 shows the population projections by age group for Kent & Medway, the highest increase is expected within the older age groups. These are:

- 17% increase in the 65-74 age group
- 22% increase in the 75-84 age group
- 29% increase in the 85 and over population between 2012 and 2020, increasing from 42,300 persons to 54,500 persons respectively.

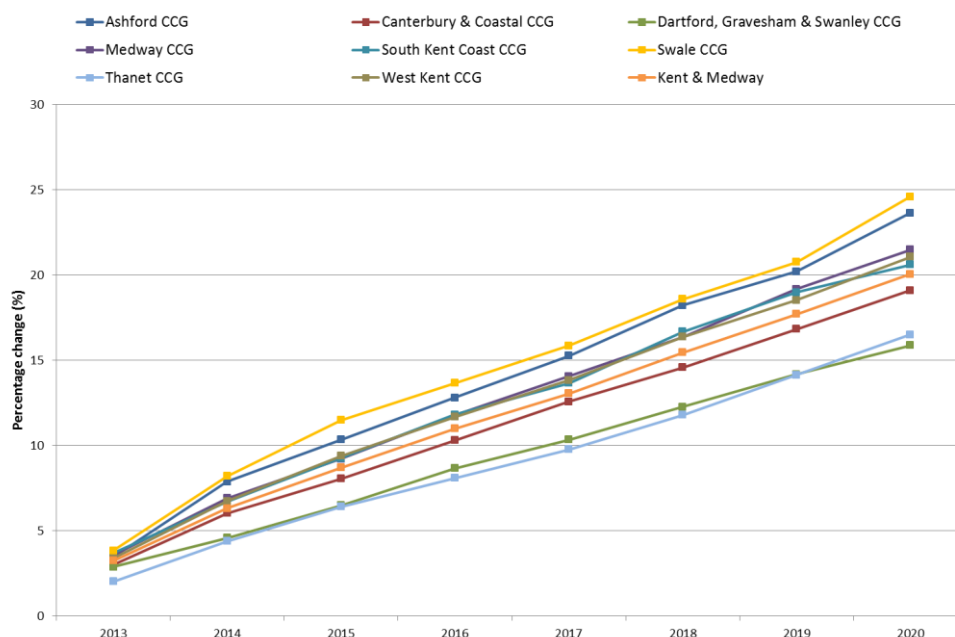
Figure 1: Population projections: percentage change Kent & Medway, 2013 to 2020.



Source: ONS 2014
*2012 based

Figure 2 shows the population projections for those aged 65 years and over by Clinical Commissioning Groups (CCGs) within Kent & Medway. Swale CCG (25%) and Ashford CCG (24%) show the largest increase in the 65 years and over population between 2012 and 2020.

Figure 2: Population projections for 65 and over: percentage change by Clinical Commissioning Groups within Kent & Medway 2013 to 2020.



Source: ONS 2014
*2012 based

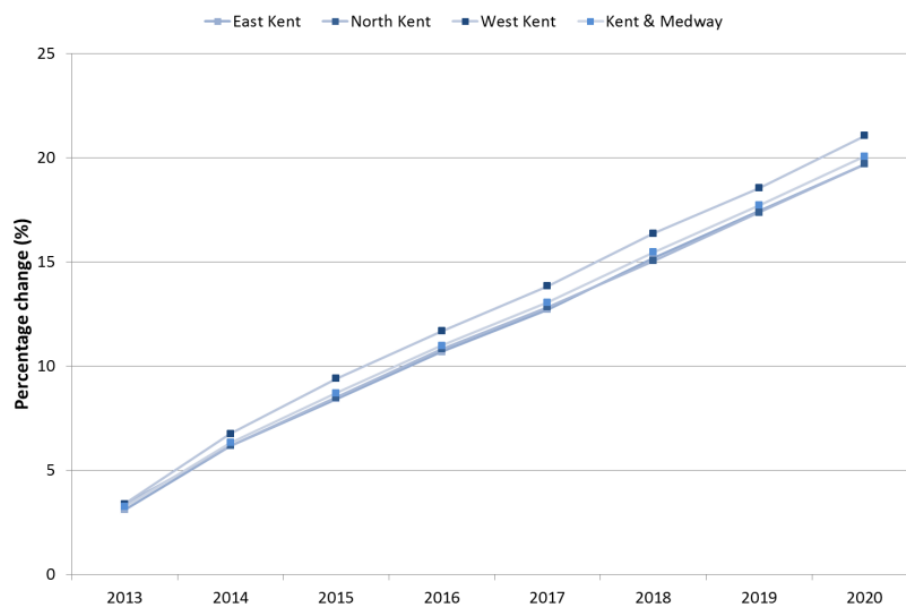
Figure 3 shows the population projections for those aged 65 years and over for Kent regions within Kent & Medway.

- West Kent (21%) shows the largest percentage increase in the 65 population between 2012 and 2020.

By 2020, the estimated proportions of the 65 and over Kent & Medway population within each region will be:

- 42% (n=159,200) within East Kent
- 31% (n=118,500) within North Kent
- 27% (n=100,600) within West Kent

Figure 3: Population projections for 65 and over: percentage change by Kent Region within Kent & Medway, 2013 to 2020.



Source: ONS 2014
*2012 based

2.3. Old Age Dependency

The old age dependency ratio is the ratio of elderly persons (aged 65 and over) to those of working age (ages 15 to 64). Old age dependency ratios can be used to indicate the potential effects from change in population age structure, such as, health and social care needs.

Table 2 shows the old age dependency ratios per 100 persons by Kent CCGs. There were calculated using the 2012 based population figures and the 2020 population projections.

The old age dependency ratio for the United Kingdom was 25.6 per 100 persons in 2012.⁴ In comparison, this ratio was higher in Kent & Medway at 28.26 per 100 persons. Within Kent & Medway, the highest old age dependency ratio was in Thanet CCG in 2012.

In 2020, the old age dependency ratio for Kent & Medway is projected to increase to 33.03 per 100 persons. This represents an increase of approximately 7.5 dependent persons between 2012 and 2020. It is also estimated that, South Kent Coast CCG will have the highest old age dependency ratio at 42.19 persons in 2020.

In 2012, the old age dependency ratio was consistently higher in the East Kent region at 32.23 per 100 persons and is estimated to increase to 38.44 per 100 persons by 2020. The projected increase in the elderly population in the East Kent region in particular, is likely to implicate greater numbers of individuals with care needs, which will have significant impact on health and social care services.

Table 2: Old age dependency ratios per 100 persons: 2012 based and projected estimation in 2020.

	2012	2020
Ashford CCG	26.89	31.81
Canterbury & Coastal CCG	30.90	37.09
Dartford, Gravesham & Swanley CCG	25.79	28.54
Medway CCG	21.90	25.68
South Kent Coast CCG	34.18	42.19
Swale CCG	26.37	31.36
Thanet CCG	36.26	41.19
West Kent CCG	28.35	33.04
East Kent	32.23	38.44
North Kent	24.19	27.78
West Kent	28.35	33.04
Kent & Medway	28.26	33.03

Source: ONS

2.4. Ethnicity

There is a higher risk of stroke in black populations; the South London Stroke Register, 1995 to 2004, report a 27% and 29% higher incidence of stroke within black men and women (respectively) in comparison to white populations.⁵

What does the evidence suggest?

The evidence suggests that:

- Stroke occurs at younger ages within black populations in comparison to white populations.^{6,7}
- A 42% reduction in stroke incidence has been reported in white populations within the South London Stroke Register, 1995 to 2010.⁶ However, a reduction in stroke incidence was not reported within the black populations,⁷ suggesting inequality.
- The black population, aged 15-54, have been reported to experience greater proportions of ischaemic and lower proportions of haemorrhagic stroke sub-types. Further, an 82% increase in the proportions of ischaemic stroke has been reported between 1995-2008 and 2007-2010 within the same population group.⁵
- A reduced risk of all-cause-mortality, within Stroke register patients, was found within black in comparison to white patients [Hazard Ratio (HR) 0.61(95% CI 0.49, 0.77) versus HR 0.85 (95% CI 0.74, 0.98)] after accounting for factors that could influence the outcome analysed (such as, stroke type, socioeconomic status).⁷
- Improved survival has been identified within black patients aged 65 and over in comparison to white patients.⁷

The reduction in stroke incidence within the white but not black population may suggest a widening of inequality between these population groups. The reduced risk of all-cause mortality and the improved survival found within the Black population may imply greater burden from disability within this population group. This has been supported by research showing that survey respondents from the black ethnic group demonstrated greater unmet needs than other groups.⁸

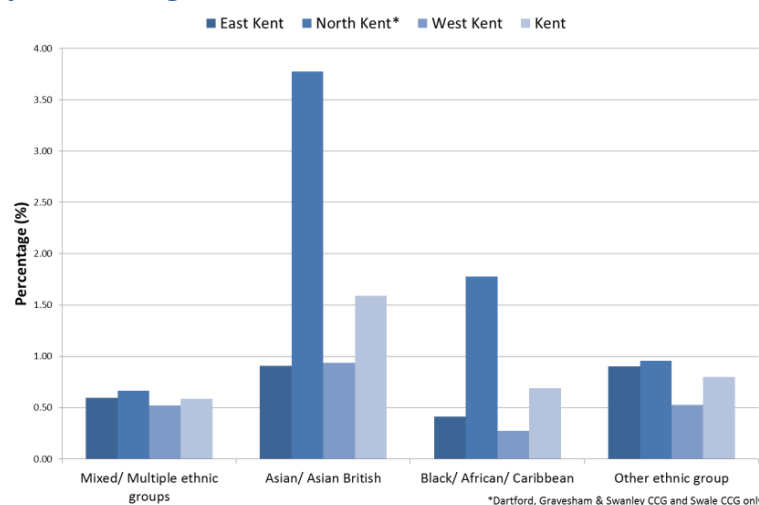
Local Analysis

As Black ethnicity has been identified to be a key risk factor for stroke, an analysis of the local context has been completed. However, due to limitations in data availability this analysis has been undertaken for Kent only and excludes Medway.

Figure 4 shows that the North of Kent region has a greater proportion of Black, African and Caribbean populations (1.78%). It should also be noted that North Kent has been used to represent Dartford, Gravesham & Swanley CCG and Swale CCG only. Exploration of the North Kent region at a CCG level identifies that 2.27% of the Dartford, Gravesham & Swanley CCG and 0.64% of the Swale CCG population admitted to hospital were of Black, African or Caribbean in 2012/13 and 2013/14.

It should be noted that in this instance these are experimental data, which considers all hospital admissions, and is subject to the limitations of ethnicity coding within the hospital record. Therefore, this data may represent populations that seek healthcare and result in hospital admissions.

Figure 4: Ethnicity: in Kent region 2012/13-2013/14



Source: SUS

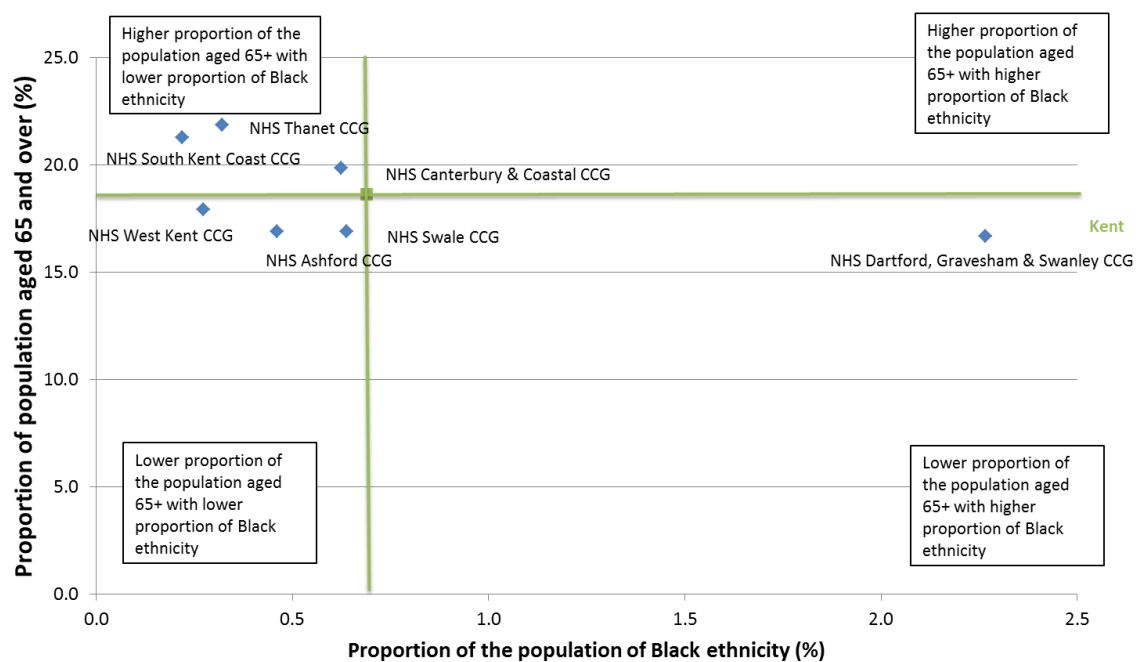
Given ethnicity has been identified as a key risk factor for stroke, the greater proportions of Black, African and Caribbean populations within North Kent is likely to imply greater demand on stroke services. Furthermore, this may implicate more disability and greater care needs within this population group after stroke.

2.5. Quadrant Analysis

Figure 5 shows a quadrant analysis on the proportion of the population aged 65 and over in comparison to the proportion of the population of black ethnicity.

This shows that NHS Dartford, Gravesham & Swanley CCG has a relatively higher proportion of the population of Black ethnicity, as well as, a lower proportion of the population aged 65 and over. Comparatively NHS Canterbury & Coastal CCG, NHS South Kent Coast CCG & NHS Thanet CCG had higher proportions of the population aged 65 and over with lower proportions of Black ethnicity.

Figure 5: Quadrant analysis on the proportion of the population aged 65 and over in comparison to the proportion of the population of black ethnicity, 2012/13 – 2013/14.



3. Stroke Prevalence

3.1. Key Points

Recorded Prevalence
<ul style="list-style-type: none">The East Kent region had the highest prevalence of stroke and TIA at 1.94% in 2013/14.
<ul style="list-style-type: none">The East Kent region had the highest increase in stroke prevalence (Slope 0.035) between 2006/07 and 2013/14.
<ul style="list-style-type: none">The East Kent region is expected to have the highest prevalence of stroke and TIA at 2.06% in 2016.
<ul style="list-style-type: none">Both East and West Kent regions have the highest prevalence of stroke and Transient Ischaemic Attack (TIA). The prevalence of stroke and TIA is significantly higher in Canterbury & Coastal, South Kent Coast, Thanet and West Kent CCGs but significantly lower in the North Kent region when compared to Kent and Medway as a whole. It is worth noting that, East Kent region has the highest proportion of older people (n-133,000) and this is expected to increase to 159,200 by 2020. From 2006/07 to 2013/14, the prevalence of stroke has increased by 1.34% across Kent and Medway.

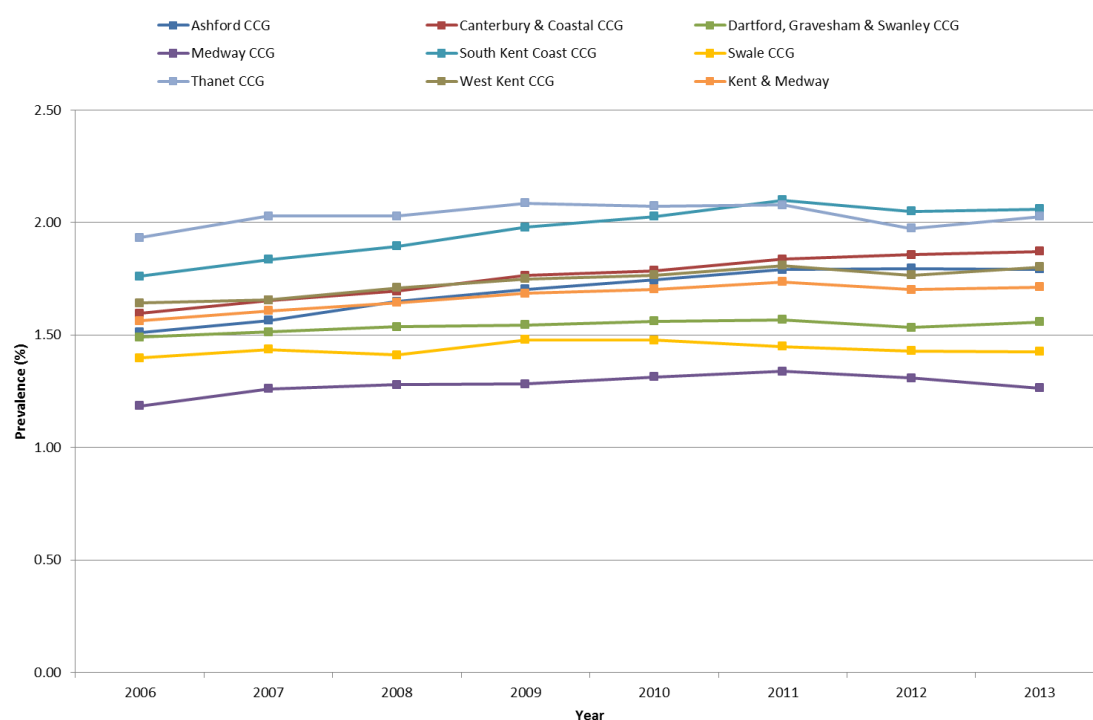
3.2. Recorded Prevalence of Stroke

Figures 6 and 7 show the stroke and transient ischaemic attack (TIA) prevalence between 2006/07 and 2013/14 by Clinical Commissioning Group (CCG) and Kent region.⁹ East Kent; Thanet CCG and South Kent Coast CCG had the higher trends across Kent and Medway between 2006/07 and 2013/14.

The prevalence of stroke has increased by 1.34% across Kent and Medway between 2006/07 and 2013/14. This is in comparison to an increase of 0.94% across England for the same period.

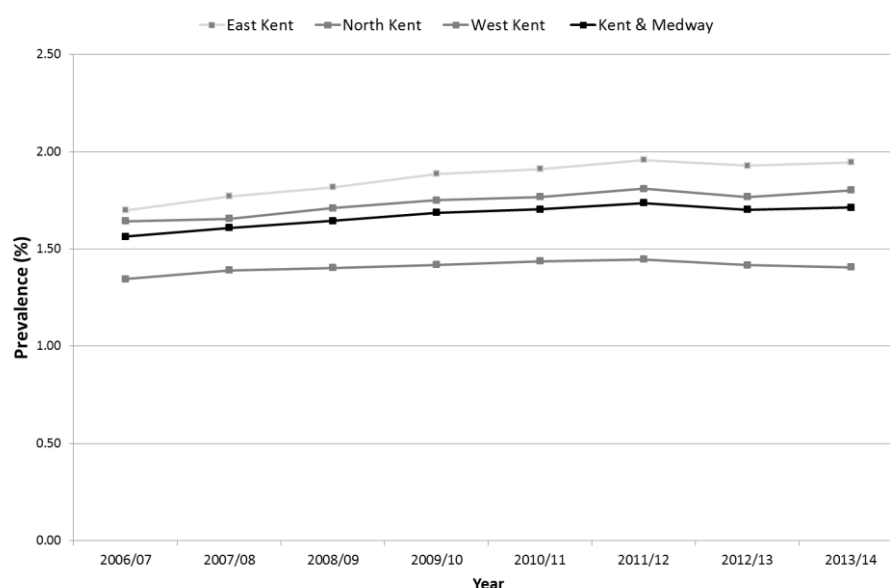
The average annual percentage change in stroke prevalence was calculated between 2006/07 and 2013/14. Ashford CCG (2.49%), Canterbury & Coastal CCG (2.32%) and South Kent Coast CCG (2.29%) demonstrated the greatest increase in stroke prevalence between 2006/07 and 2013/14. The lowest average annual increase in stroke prevalence is observed in Swale CCG (0.30%), Dartford, Gravesham & Swanley CCG (0.64%), and Thanet CCG (0.72%). It should be noted that a comparative analysis may not account for differences in case finding and diagnosis.

Figure 6: Stroke and Transient Ischaemic Attack prevalence by Clinical Commissioning Group - 2006/07 to 2013/14.



Source: QOF

Figure 7: Stroke and Transient Ischaemic Attack prevalence by Kent region - 2006/07 to 2013/14.



Source: QOF

Table 2 shows the numbers and prevalence of stroke and TIA for 2013/14 for each CCG and Kent region. The prevalence of stroke and TIA is significantly higher in Canterbury & Coastal CCG, South Kent Coast CCG, Thanet CCG and West Kent CCG, when compared with Kent and Medway. South Kent Coast CCG has the highest prevalence of stroke and TIA. This parallels the distribution of the elderly population, as greater proportions of the Kent & Medway 65 and over population can be found within East Kent.

Table 2: Stroke and Transient Ischaemic Attack prevalence by Clinical Commissioning Group - 2013/14.

	Stroke and TIA numbers	Registered numbers	Prevalence (95% CI)
Ashford CCG	2,258	125,930	1.79 (1.72, 1.87)
Canterbury & Coastal CCG	4,041	215,852	1.87 (1.81, 1.93)
Dartford, Gravesham & Swanley CCG	3,931	252,340	1.56 (1.51, 1.61)
Medway CCG	3,678	290,818	1.26 (1.22, 1.31)
South Kent Coast CCG	4,157	201,852	2.06 (2.00, 2.12)
Swale CCG	1,532	107,473	1.43 (1.35, 1.50)
Thanet CCG	2,880	142,121	2.03 (1.95, 2.10)
West Kent CCG	8,455	469,334	1.80 (1.76, 1.84)
East Kent	13,336	685,755	1.94 (1.91, 1.98)
North Kent	9,141	650,631	1.40 (1.38, 1.43)
West Kent	8,455	469,334	1.80 (1.76, 1.84)
Kent & Medway	30,932	1,805,720	1.71 (1.69, 1.73)

Source: QOF

3.3. Trends in Stroke Prevalence

This section will explore the change in stroke recorded prevalence over time between 2006/07 to 2013/14. The details of the method used and an explanation for interpretation has been included within Appendix C.

The main result is the slope; this represents the unit change in stroke and TIA prevalence with each passing year between 2006/07 to 2013/14. The slope has been presented with 95% confidence intervals (CI); this enables interpretation of whether a CCG has a unit change in stroke and TIA prevalence which is significantly greater than Kent & Medway.

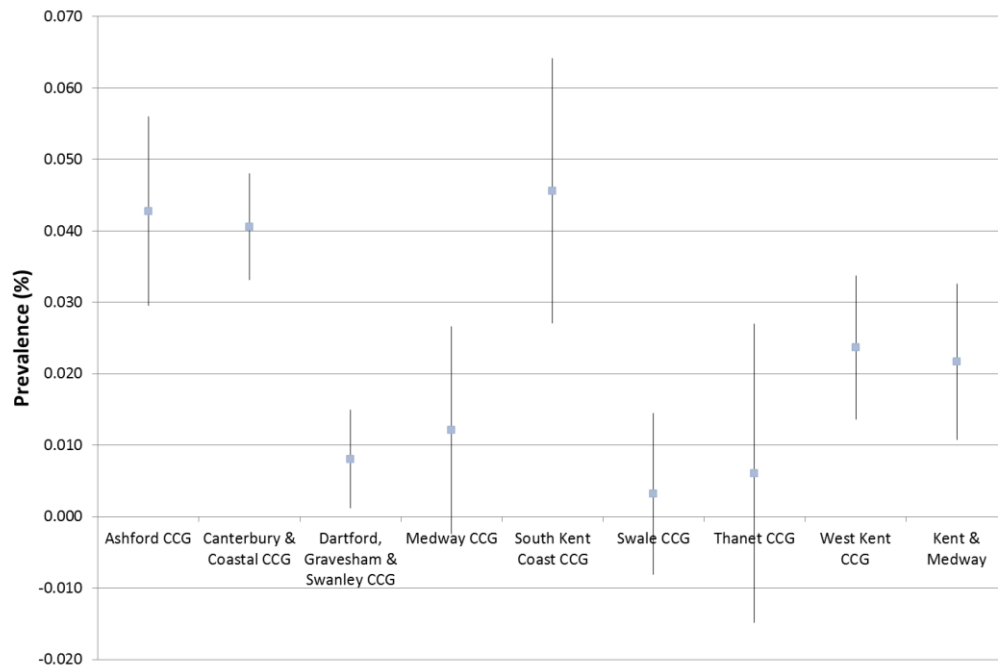
Figures 8 and 9 present the change in stroke and TIA prevalence by CCG and Kent region. Appendix D includes Table 1c which present the change in stroke and TIA prevalence by CCG and Kent region.

- South Kent Coast CCG showed the greatest increases in stroke prevalence, with each passing year, stroke prevalence increased by 0.046%, the (95% CI; 0.027%, 0.064%). This was not significantly greater than Kent & Medway whereby stroke prevalence increased by 0.022% (95% CI; 0.014%, 0.034%).
- East Kent region had the greatest increases in stroke prevalence, with each passing year, stroke prevalence increased by 0.035%, the (95% CI 0.011%, 0.033%). This is greater in comparison to a 0.016% increase across England, (95% CI: 0.007%, 0.024%).

Table 2c, included within Appendix D, presents the period percentage change between 2006/07 to 2013/14. Within Kent & Medway, Stroke and TIA prevalence will increase from 1.56% in 2006/07 to 1.71% in 2013/14, this represents a 9.65% increase in stroke and TIA recorded prevalence within this period.

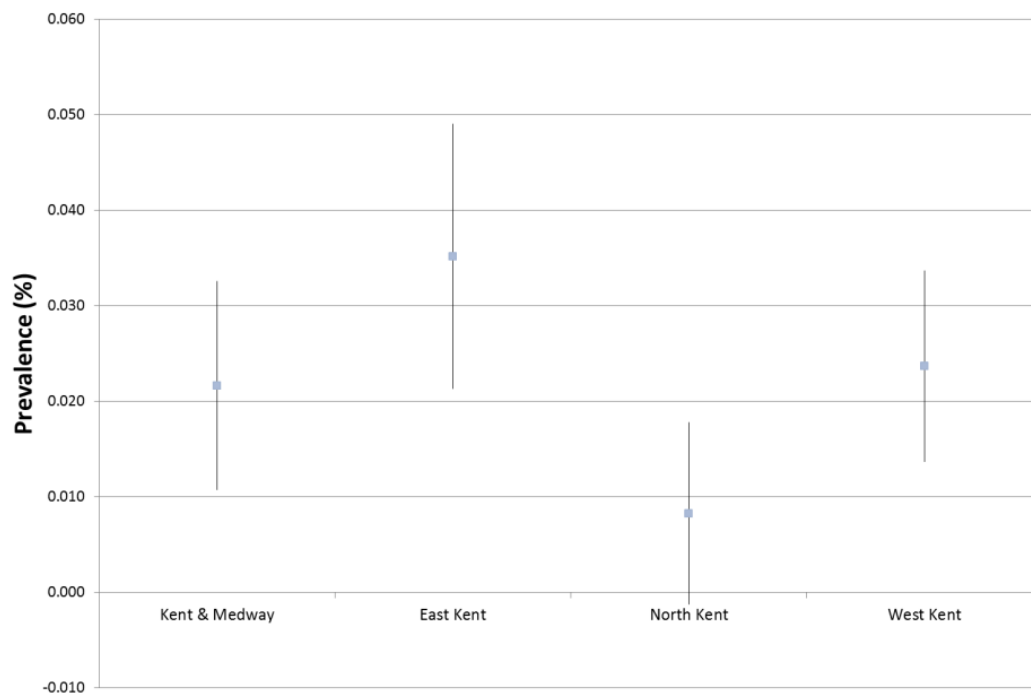
A study which used the General Practice Research Database within the UK identified that the prevalence of stroke has increased by 12.5% between 1999 and 2008.¹⁰ Comparison to the above is limited as our methodology used a different period from 2006/07 to 2013/14.

Figure 8: Quality and Outcomes Framework: Stroke and Transient Ischaemic Attack slope by Clinical Commissioning Group.



Source: QOF 2007 – QOF 2014

Figure 9: Quality and Outcomes Framework: Stroke and Transient Ischaemic Attack slope by Kent region.



Source: QOF 2007 – QOF 2014

3.4. Projected Stroke Prevalence

Table 4 shows that in 2016/17, South Kent Coast CCG and the East Kent region is expected to have the highest prevalence of stroke and transient ischaemic attack.

Table 4: Projected prevalence: Stroke and Transient Ischaemic Attack by Clinical Commissioning Group - 2014/15 to 2016/17.

	2014/15	2015/16	2016/17
Ashford CCG	1.84	1.88	1.93
Canterbury & Coastal CCG	1.92	1.96	2.01
Dartford, Gravesham & Swanley CCG	1.57	1.58	1.59
Medway CCG	1.28	1.29	1.30
South Kent Coast CCG	2.11	2.15	2.20
Swale CCG	1.43	1.43	1.44
Thanet CCG	2.04	2.06	2.07
West Kent CCG	1.83	1.85	1.88
East Kent	1.98	2.02	2.06
North Kent	1.41	1.42	1.43
West Kent	1.83	1.85	1.88
Kent & Medway	1.74	1.76	1.78

Source: QOF 2014

3.5. Expected Stroke Prevalence

Modelled estimates at a general practice level are available for expected hypertension numbers and prevalence. This takes into account age, sex, smoking and the weighted deprivation of the practice population.¹¹

Table 5 shows the recorded hypertension numbers and prevalence versus the expected numbers and prevalence of hypertension in 2011/12. Comparison of the two sources identifies that a greater percentage could be expected to be undiagnosed within NHS Dartford, Gravesham & Swanley CCG and NHS Medway CCG.

Table 5: Recorded versus expected numbers and prevalence of hypertension, 2011/12.

	Recorded numbers	Recorded prevalence	Expected numbers	Expected prevalence	Percentage of recorded	Undiagnosed numbers
NHS Ashford CCG	16,742	13.88	29,084	24.41	58%	12,342
NHS Canterbury & Coastal CCG	27,861	13.37	53,328	25.92	52%	25,467
NHS Dartford, Gravesham & Swanley CCG	35,289	14.46	57,913	24.42	61%	22,624
NHS Medway CCG	39,230	14.27	63,995	23.45	61%	24,765
NHS South Kent Coast CCG	30,873	15.79	55,690	28.55	55%	24,817
NHS Swale CCG	15,287	14.62	26,398	25.48	58%	11,111
NHS Thanet CCG	22,312	16.03	39,433	28.49	57%	17,121
NHS West Kent CCG	60,972	13.19	110,669	24.29	55%	49,697
Kent & Medway	248,566	14.21	436,510	25.27	57%	187,944

Source: QOF, ERPHO

4. Risk Factors for Stroke

4.1. Key Points

Risk Factors
<ul style="list-style-type: none">• In 2013/14, South Kent Coast CCG and Thanet CCG demonstrate significantly higher prevalence of risk factors (hypertension, atrial fibrillation, diabetes) for stroke compared to Kent and Medway as a whole.
<ul style="list-style-type: none">• Ashford CCG, Canterbury & Coastal CCG and West Kent CCG have lower risk factor prevalence but higher stroke and transient ischaemic attack prevalence when compared with Kent and Medway.
<ul style="list-style-type: none">• Ashford CCG and South Kent Coast CCG within the East Kent region have a higher prevalence of stroke & TIA, but lower proportion of patients achieving adequate control of key risk factors. This suggests the need for further improvements in the management of risk factors for stroke in these areas.

4.2. What does the Evidence Suggest?

Figure 10 and 11 summarise the before stroke risk factors and treatments identified from a UK study which used the General Practice Research Database between 1998-2008.¹⁰

The study, based on a sample of 32,151 people, found:

- 65.2% (n=20,959) of the participants had hypertension,
- 44.2% (n=14,225) smoked
- 38.7% (n=12,440) had hypercholesterolaemia,
- 11.8 % (n=3,784) had GP coded diabetes,
- 10.8% (n=3,483) had atrial fibrillation
- 6.2% (n=2,008) had previous TIA.

The treatments prior to stroke, included:

- 50.1% (n=16,102) were prescribed antihypertensives,
- 29.5% (n=9,500) were prescribed antiplatelet drugs,
- 13.1% (n=4,225) were prescribed lipid regulating drugs
- 4.6% (n=1,490) were prescribed anticoagulants.

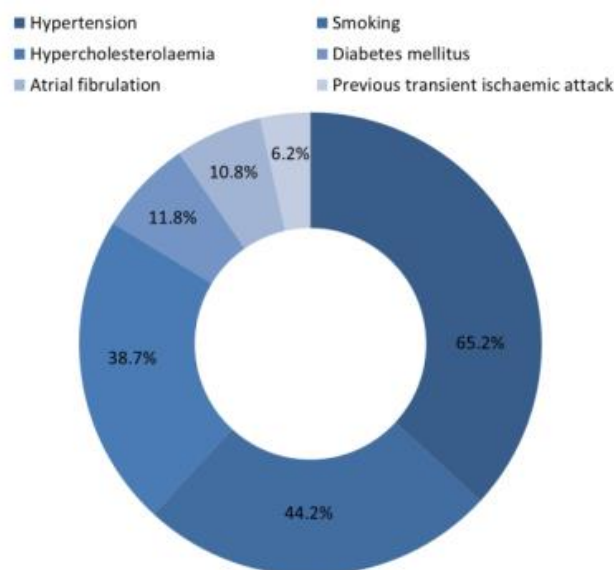
This study concluded that overall the risk factor management for the prevention of stroke had improved during the period studied.⁹ However, they reported that there was scope for improvement in the detection of atrial fibrillation and the use of thromboprophylaxis.¹⁰

Difference in the prevalence of risk factors between the black and white population groups had been identified within the 1999 to 2005, South London Ethnicity and Stroke Study.⁶

- The black population had a higher prevalence of diabetes, hypertension, and increased body mass index .
- The white population had a higher prevalence of smoking, previous myocardial infarction, peripheral vascular disease and atrial fibrillation.

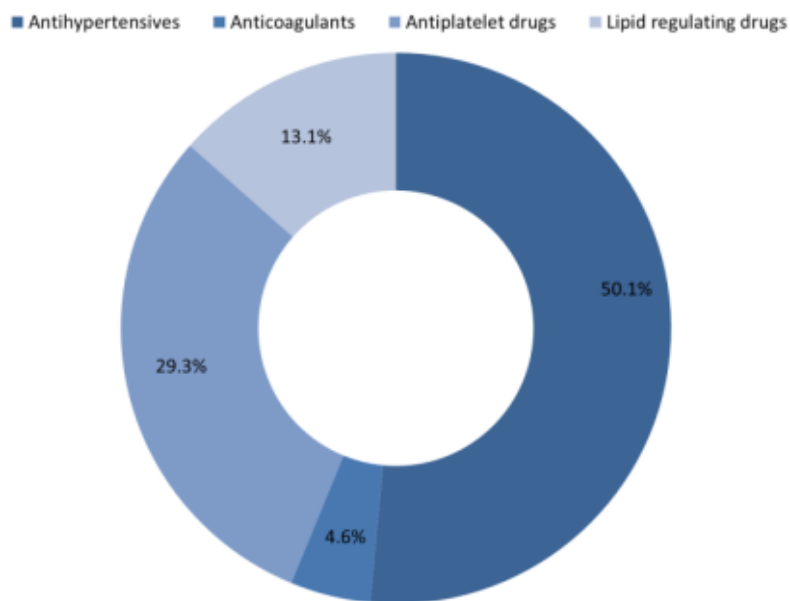
The white ethnic group have seen reductions in risk factors for stroke, but this had not been identified within the black ethnic group within the South London Stroke Register between 1994 and 2004.⁵

Figure 10: Before stroke risk factors.



Source: Lee et al (2011)

Figure 11: Before stroke treatments.



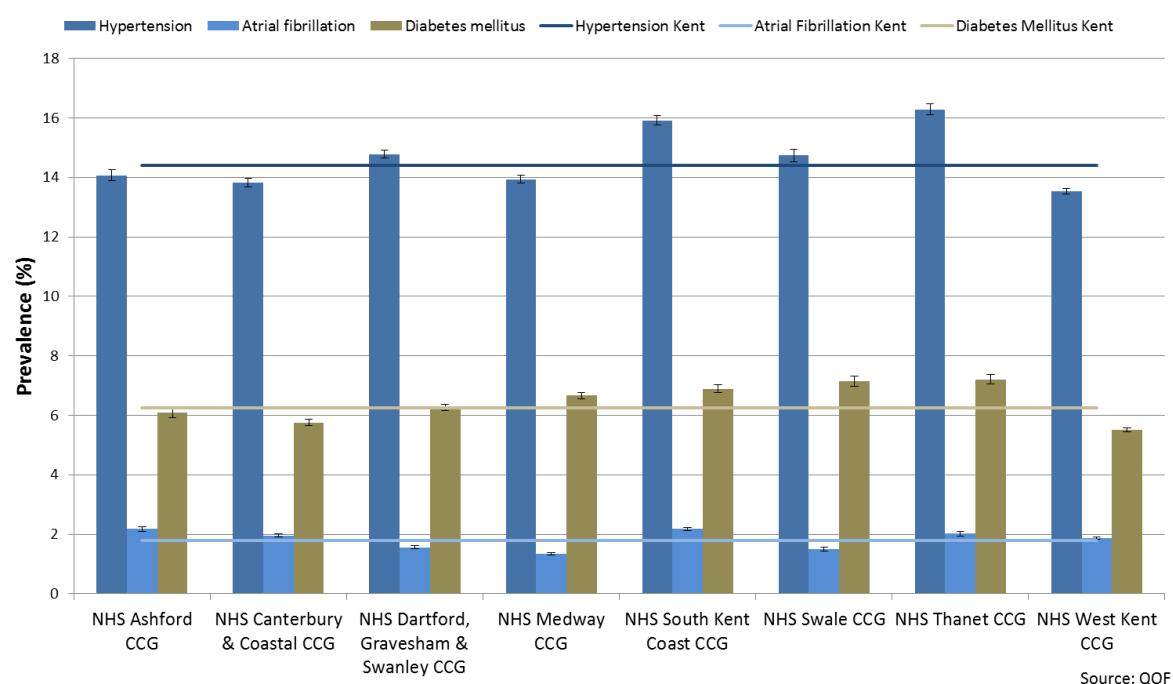
Source: Lee et al (2011)

4.3. Recorded Prevalence of Risk Factors

Figure 12 show the prevalence of stroke risk factors (hypertension, atrial fibrillation (AF) and diabetes) for each Clinical Commissioning Group (CCG) and Kent region. The numbers recorded to have the stroke risk factors (hypertension, atrial fibrillation (AF) and diabetes) have been included in Appendix F.

It should be noted that the following analysis does not account for individuals who have not been identified to have the above risk factors; therefore, this does not represent the expected prevalence and unmet need from the above risk factors.

Figure 12: Recorded prevalence of stroke risk factors by Clinical Commissioning Group, 2013/14.



- The highest prevalence of hypertension is observed in NHS South Kent Coast CCG and Thanet CCG.
- The highest prevalence of atrial fibrillation is observed in NHS Ashford and NHS South Kent Coast CCG.
- The highest prevalence of diabetes mellitus is observed in NHS Swale CCG and NHS Thanet CCG.
- The North Kent region has a significantly higher recorded prevalence of hypertension and a higher recorded prevalence of diabetes, when compared with Kent and the remaining Kent regions. The East Kent region has a significantly higher recorded prevalence of atrial fibrillation when compared with Kent and the remaining Kent regions.

Table 5 shows a summary of CCGs and Kent Region with **significantly** higher risk factor prevalence compared with Kent and Medway as a whole. This shows that South Kent Coast CCG and Thanet CCG demonstrate significantly greater prevalence of all three risk factors for stroke in comparison with the rest of Kent.

Table 5: Summary table of risk factor prevalence.

	Hypertension	Atrial Fibrillation	Diabetes
Ashford CCG		×	
Canterbury & Coastal CCG		×	
Dartford, Gravesham & Swanley CCG	×		
Medway CCG			×
South Kent Coast CCG	×	×	×
Swale CCG	×		×
Thanet CCG	×	×	×
West Kent CCG		×	
East Kent		×	
North Kent	×		×
West Kent			

Source: QOF

4.4. Risk Factor Management in Primary Care

Risk factors for stroke include: hypertension, diabetes, atrial fibrillation, high blood pressure, poor diet, obesity, smoking, physical inactivity and excessive alcohol consumption. These risk factors are modifiable. The report focuses on the first three risk factors.

The report examines the management in primary care of these three risk factors (hypertension, atrial fibrillation and diabetes) in relation to stroke prevalence, mortality, hospital admissions and premature mortality, (Appendix G, figures 13-15)

Figure 13 in Appendix G highlights that the East Kent region, South Kent Coast CCG and Thanet CCG have a higher prevalence of hypertension, stroke and TIA. This may imply better identification of people with hypertension, which is one of the key risk factors for stroke, as well as, the need for improvement in the management of hypertension and other risk factors.

<ul style="list-style-type: none"> • Ashford CCG, • Canterbury & Coastal CCG • West Kent CCG. 	<p>Have a lower prevalence of hypertension but a higher stroke and TIA prevalence implying greater demand on services in this area in comparison to North Kent, as well as, the need to improve the identification of people with undiagnosed hypertension.</p>
--	---

Figure 14 (Appendix G) shows that East Kent, West Kent, Ashford CCG, Canterbury & Coastal CCG, South Kent Coast CCG, Thanet CCG and West Kent CCG have a higher atrial fibrillation

(AF) along with higher stroke and TIA prevalence. This may imply identification of AF, which is a key risk factor for stroke but also indicates a greater demand on services in this area due to high stroke prevalence, suggesting the need for improvement in the identification and management of other risk factors for stroke.

North Kent, Dartford, Gravesham & Swanley CCG, Medway CCG and Swale CCG have lower atrial fibrillation and stroke and TIA prevalence, suggesting a lower demand on services in this area.

East Kent region, South Kent Coast CCG and Thanet CCG have higher prevalence of diabetes along with stroke and TIA prevalence. This may imply greater demand on services due to the higher stroke and TIA prevalence but also the need for improvement of other risk factors for stroke (Figure 15).

<ul style="list-style-type: none"> • Ashford CCG, • Canterbury & Coastal CCG, • West Kent CCG. 	Have lower prevalence of diabetes, higher prevalence of stroke and TIA suggesting the need for improvement in the identification of people with undiagnosed diabetes, as well as, improvement in the management of other risk factors for stroke and TIA.
---	---

Table 6 summarises the three risk factor scatter plots (Appendix G, figures 13-15) , whereby, the left upper quadrants identify lower risk factor prevalence; but, higher stroke and transient ischaemic attack prevalence

This shows that Ashford CCG, Canterbury & Coastal CCG and West Kent CCG have lower prevalence of diabetes and hypertension but higher stroke and TIA prevalence. This suggests the need for improvement in the identification and management of people with undiagnosed diabetes and hypertension and also other risk factors.

Table 6: Stroke and TIA prevalence with risk factor recorded prevalence, 2013/14.

	Lower hypertension, as well as, higher stroke and TIA prevalence	Lower diabetes, as well as, higher stroke and TIA prevalence
Ashford CCG	×	×
Canterbury & Coastal CCG	×	×
Dartford, Gravesham & Swanley CCG		
Medway CCG		
South Kent Coast CCG		
Swale CCG		
Thanet CCG		
West Kent CCG	×	×
East Kent		
North Kent		
West Kent	×	×

Source: QOF

4.5. Management of Risk Factors for Stroke in Primary Care

Appendix H figures 16 - 20 show analysis of stroke and TIA prevalence by proportion of patients receiving risk factor interventions. The analysis highlights that:

<ul style="list-style-type: none"> • Ashford CCG, • South Kent Coast CCG • Thanet CCG • East Kent • West Kent 	Have higher prevalence of stroke, but lower proportion of AF patients receiving interventions i.e. in whom stroke risk has been assessed using the CHADS2 risk stratifications scoring system in the previous 12 months (Figure 16).
--	--

<ul style="list-style-type: none"> • Canterbury & Coastal CCG, • West Kent CCG. 	Have higher stroke and TIA prevalence but lower proportion of patients aged 40 and over with a blood pressure (BP) record in the previous 5 years (Figure 17).
---	--

This suggests the need for improvement in the recording of blood pressure within primary care.

<ul style="list-style-type: none"> • Ashford CCG, • South Kent Coast CCG, • Thanet CCG, • East Kent, • West Kent. 	Have higher stroke and TIA prevalence but lower proportions of patients with hypertension achieving blood pressure control (Figure 18)
--	--

This suggests the need for improvement in the management of hypertension within primary care.

<ul style="list-style-type: none"> • Ashford CCG, • Canterbury & Coastal CCG, • South Kent Coast CCG, • East Kent. 	Have a higher prevalence of stroke and TIA but lower proportion of patients with a recorded CVD risk assessment score of 20% or more on statin treatment. This could imply inadequate management of cardiovascular risk within primary care Figure 19.
--	--

Figure 20 (Appendix H) does not identify any CCG with high prevalence of stroke and low proportion of patients with diabetes achieving good diabetes control. However, North Kent region, Medway CCG, Dartford, Gravesham & Swanley CCG and Swale CCG do demonstrate a lower proportion of patients with diabetes achieving good diabetes control.

A summary of the management of the three risk factors is shown below (Table 7).

This would suggest the need for improvement in the management of patients with AF, hypertension and those newly diagnosed with hypertension with CVD risk score of 20 or more in Ashford, South Kent Coast CCGs within the East Kent region.

Table 7: Risk factor Management, 2013/14.

	Proportion of patients with AF with a stroke risk assessment	Proportion of patients with a record of blood pressure	Proportion of patients with CVD risk receiving statins	Proportion of patients with diabetes achieving glycaemic control	Proportion of patients aged 79 or under achieving blood pressure control
Ashford CCG	x		x		x
Canterbury & Coastal CCG		x	x		
Dartford, Gravesham & Swanley CCG				x	
Medway CCG				x	
South Kent Coast CCG	x		x		x
Swale CCG				x	
Thanet CCG	x				x
West Kent CCG		x			
East Kent	x		x		x
North Kent					
West Kent	x	x			x

Source: QOF

5. Hospital Admissions

5.1. Key Points

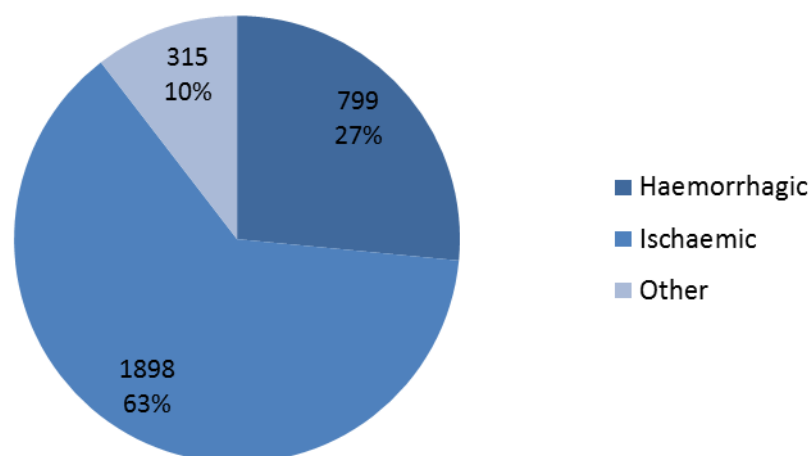
Hospital Admissions
<ul style="list-style-type: none">The East Kent region has the highest stroke hospital admissions with age standardised rates of 211.49 per 100,000 registered population.
<ul style="list-style-type: none">The East Kent region has the highest transient ischaemic attack hospital admissions with age standardised rates of 99.72 per 100,000 registered population.
<ul style="list-style-type: none">Ashford CCG and South Kent Coast CCG within East Kent region have lower proportion of patients managed adequately for AF, Diabetes and hypertension, and higher stroke related hospital admissions.

5.2. Stroke

Figure 21 shows a higher proportion of admissions in 2013/14 were due to ischaemic stroke in comparison to haemorrhagic stroke.

An analysis of the quality of primary health care in relation to hospital admissions for stroke suggests that deprivation and smoking were key risk factors for hospital admission.¹² Of the stroke quality indicators explored, a cholesterol measurement of $\leq 5\text{mmol/L}$ was protective against hospital admission.¹²

Figure 21: Stroke admissions by type (haemorrhagic I60-I62; ischaemic I63, others, I64) within Kent in 2013/14.



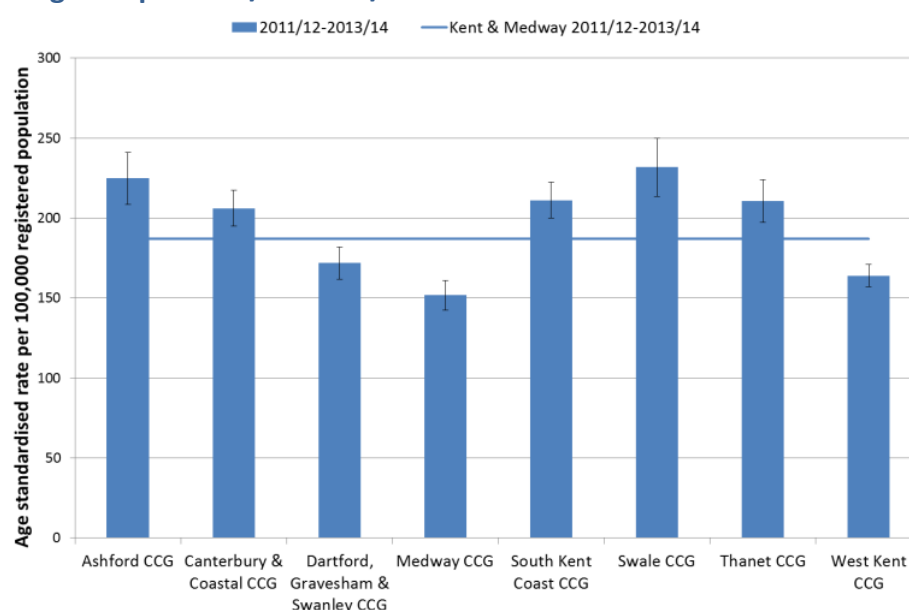
Source: SUS

Figures 22 and 23 highlight the age standardised hospital admission rate for stroke by CCG and Kent region 2011/12 - 2013/14. This shows that stroke related hospital admissions rate were significantly higher in Ashford CCG, Canterbury & Coastal CCG, South Kent Coast CCG, Swale CCG and Thanet CCG when compared with Kent & Medway between 2011 and 2013. In contrast, hospital admissions due to stroke were significantly lower in Dartford, Gravesham & Swanley CCG, Medway CCG and West Kent CCG when compared with Kent between 2011/12 - 2013/14. Similarly, stroke related hospital admission rate is significantly higher in East Kent region when compared with North Kent and West Kent

Figure 24 shows the annual age standardised stroke related hospital admission rates by CCG between 2007/08 and 2013/14. It shows that significant increases have occurred in Canterbury & Coastal CCG, Dartford, Gravesham & Swanley CCG, Swale CCG and Thanet CCG between this period. The greatest annual increase occurred in Canterbury & Coastal CCG (13.02 stroke related hospital admissions per 100,000 registered persons). This may suggest that these areas have higher concentrations of factors known to increase risk of hospital admission, including; deprivation and smoking, as well as, poorer primary care management of glycaemic control.¹² The latter is consistent with the findings in Figure 20 which shows that Dartford, Gravesham & Swanley CCG and Swale CCG have a lower proportion of patients with diabetes achieving good diabetes control.

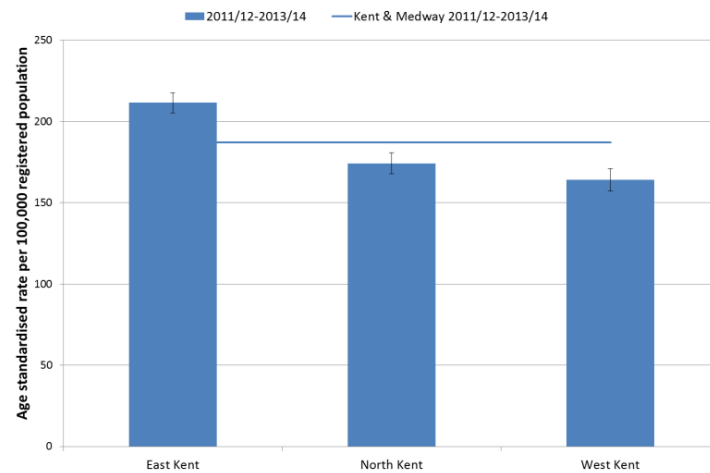
Table 8 shows the numbers of stroke hospital admissions by Clinical Commissioning Group and Kent region between 2011/12 and 2013/14. Figure 25 shows the age standardised rate of stroke admissions by age per 100,000 registered population, 2011/12 to 2013/14; this shows a peak within the 75-79 age group.

Figure 22: Age standardised stroke related hospital admissions rate by Clinical Commissioning Groups: 2011/12-2013/14.



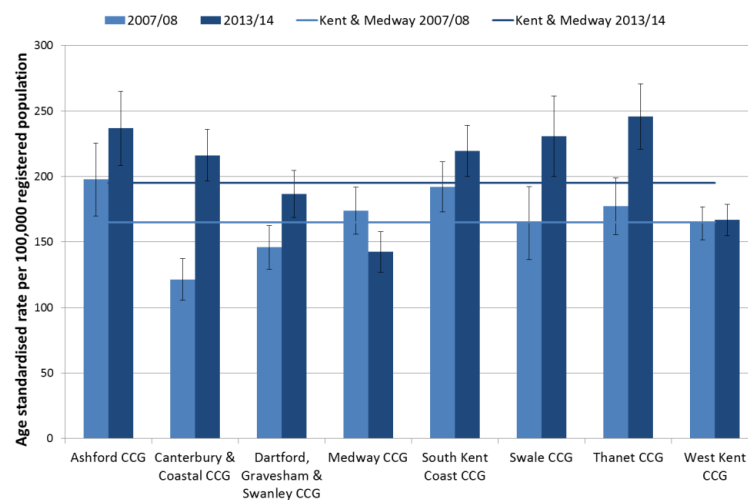
Source: SUS

Figure 23: Age standardised stroke related hospital admissions rate by Kent region: 2011/12-2013/14.



Source: SUS

Figure 24: Age standardised stroke related hospital admissions rate by Clinical Commissioning Group: 2007/08 and 2013/14.



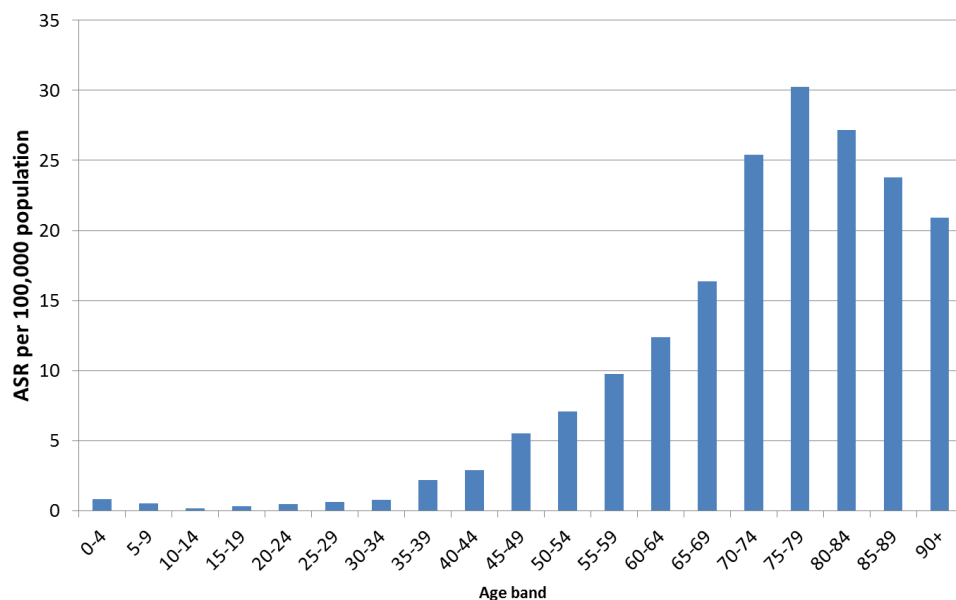
Source: SUS

Table 8: Numbers of stroke related hospital admissions with percentage change between 2011/12 and 2013/14 by Clinical Commissioning Group and Kent region.

	2011/12	2012/13	2013/14	Percentage change (%)
Ashford CCG	239	241	272	13.81
Canterbury & Coastal CCG	481	361	467	-2.91
Dartford, Gravesham & Swanley CCG	356	360	421	18.26
Medway CCG	357	362	336	-5.88
South Kent Coast CCG	448	452	490	9.38
Swale CCG	234	190	222	-5.13
Thanet CCG	297	290	383	28.96
West Kent CCG	714	715	757	6.02
East Kent	1465	1344	1612	10.03
North Kent	947	912	1140	20.38
West Kent	714	715	757	6.02

Source: SUS

Figure 25: Age standardised rate of stroke admissions by age per 100,000 registered population, Kent & Medway, 2011/12 to 2013/14.



Source: SUS

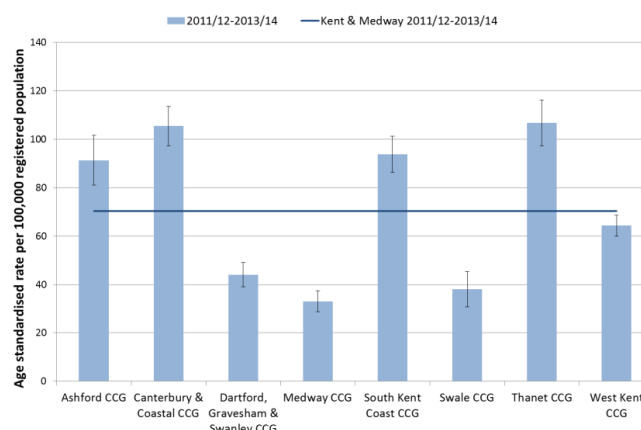
5.3. Transient Ischaemic Attack

Figures 26 and 27 show the age standardised rate of TIA hospital admissions by CCG and Kent region between 2011/12 - 2013/14. This shows that the hospital admissions due to TIA are significantly higher in Ashford CCG, Canterbury & Coastal CCG, South Kent Coast CCG and Thanet CCG when compared with Kent & Medway between 2011/12 and 2013/14. In contrast, Dartford, Gravesham & Swanley CCG, Medway CCG, Swale CCG and West Kent CCG have significantly lower hospital admissions due to TIA when compared with Kent & Medway. Similarly, East Kent region have significantly higher TIA related hospital admission rates at 99.72 per 100,000 registered population, with North and West Kent showing significantly lower rates when compared with Kent & Medway.

Figure 28 shows the annual age standardised TIA hospital admission rates by CCG in 2007/08 and 2013/14. A significant increase in TIA related hospital admissions occurred in Ashford CCG, Canterbury & Coastal CCG, South Kent Coast CCG, Thanet CCG and West Kent CCG. The greatest annual increase at 15.7 TIA hospital admissions per 100,000 registered persons occurred in South Kent Coast CCG.

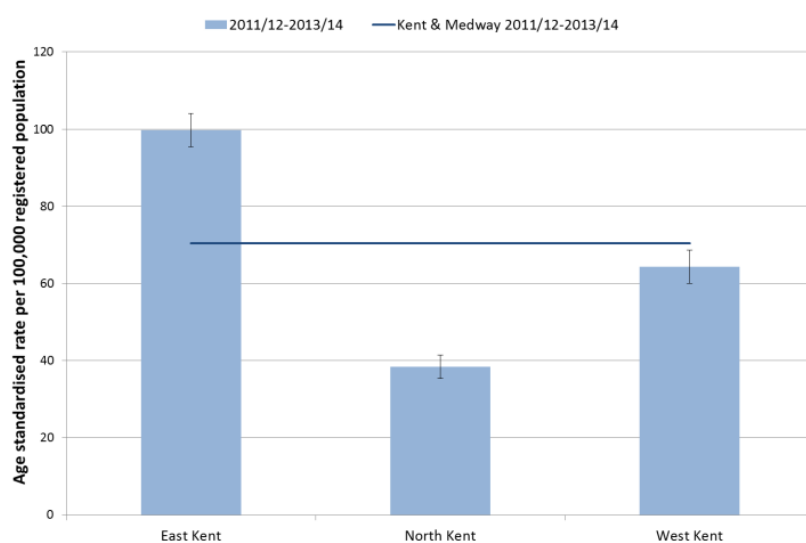
Table 9 shows the numbers of TIA admissions by Clinical Commissioning Group and Kent region between 2011/12 and 2013/14. Figure 29 shows the age standardised rate of TIA admissions by age per 100,000 registered population, 2011/12 to 2013/14; this shows a peak within the 75-79 age group.

Figure 26: Age standardised Transient Ischaemic Attack related hospital admission rates by Clinical Commissioning Group 2011/12-2013/14.



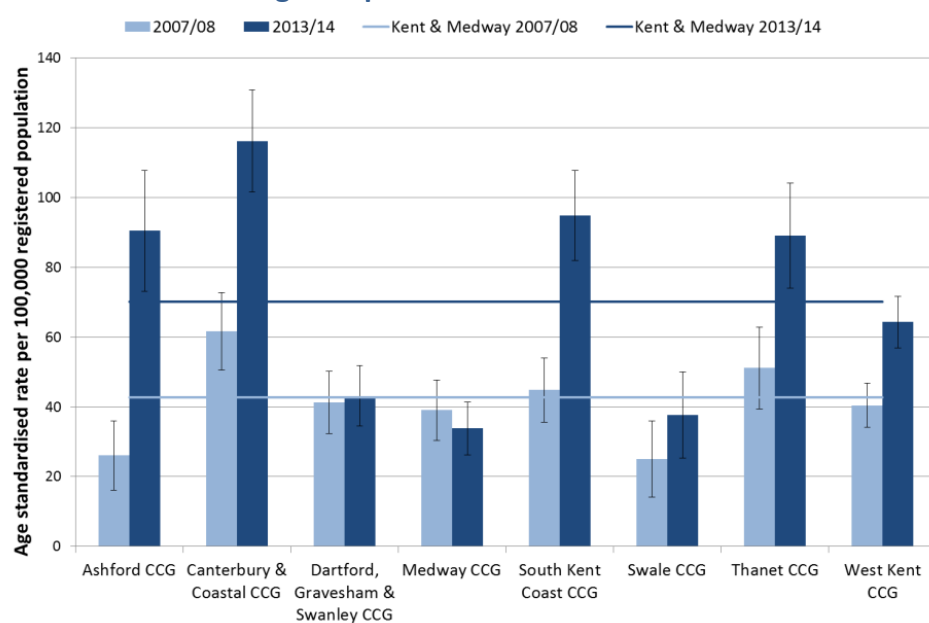
Source: SUS

Figure 27: Age standardised Transient Ischaemic Attack related hospital admission rates by Kent region: 2011-2013.



Source: SUS

Figure 28: Age standardised Transient Ischaemic Attack related hospital admission rates by Clinical Commissioning Group: 2007-2013.



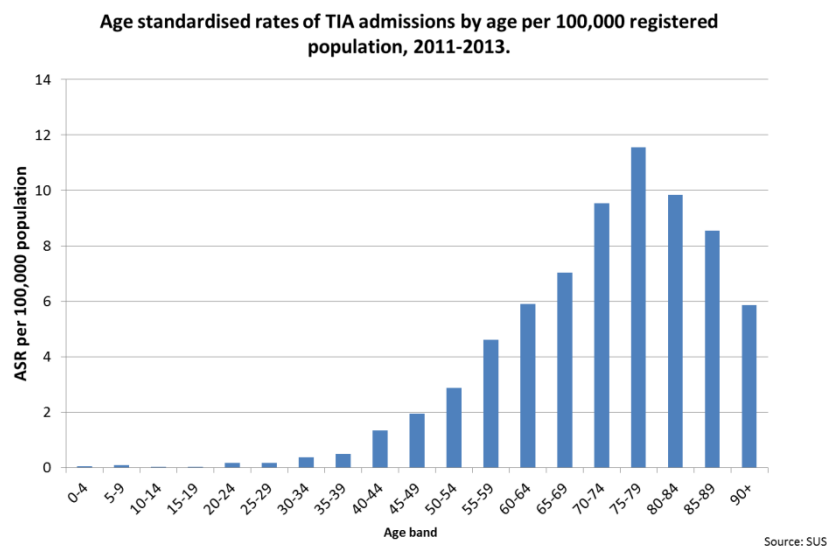
Source: SUS

Table 9: Numbers of Transient Ischaemic Attack admissions with percentage change between 2011/12 and 2013/14 by Clinical Commissioning Group and Kent region.

	2011/12	2012/13	2013/14	Percentage change (%)
Ashford CCG	96	106	106	10.42
Canterbury & Coastal CCG	196	217	248	26.53
Dartford, Gravesham & Swanley CCG	92	103	97	5.43
Medway CG	80	70	79	-1.25
South Kent Coast CCG	204	197	209	2.45
Swale CCG	43	27	36	-16.28
Thanet CCG	185	170	137	-25.95
West Kent CCG	301	264	291	-3.32
East Kent	681	954	736	8.08
North Kent	215	200	212	-1.40
West Kent	301	264	291	-3.32

Source: SUS

Figure 29: Age standardised rates of Transient Ischaemic Attack admissions by age per 100,000 registered population, Kent & Medway, 2011/12 – 2013/14.



5.4. Management of Risk Factors & Hospital Admissions

Appendix I summarises analysis of stroke related hospital admissions (age standardised rate per 100,000 registered populations) with achievements in risk factors management (Figure 30 – 34).

Key points from the analysis suggests that:

<ul style="list-style-type: none">• Ashford CCG,• South Kent Coast CCG,• Swale CCG,• Thanet CCG,• East Kent	Have higher hospital admissions for stroke patients with low level of patients with AF that are receiving stroke risk assessment using CHADS2 risk stratification screening systems. This could imply the need for more patients being assessed for the risk of stroke but also improvement in the management of patients with AF (Figure 30)
---	---

Analysis also highlights that Canterbury & Coastal CCG have higher hospital admissions and a lower proportion of patients aged 40 or over with a record of a BP, suggesting a need for improvements in the recording of blood pressure in primary care suggests (Figure 31).

It is to be noted that in some areas there are higher stroke related hospital admissions and lower proportions of patients achieving blood pressure control in primary care using the QOF indicator for the 79 or under hypertensive practice population (Figure 32), these are:

<ul style="list-style-type: none">• Ashford CCG,• South Kent Coast CCG,• Thanet CCG,• East Kent.	Have a higher prevalence of stroke but lower proportion of patients with hypertension who have their BP controlled (140/90 mm Hg). This suggests the need to improve the management of hypertension in primary care (Figure 32)
---	---

Analysis also suggests that shows higher stroke hospital admissions and lower proportions of patients receiving the intervention for cardiovascular risk .i.e. newly diagnosed patients with hypertension receiving statins with a recorded CVD risk score of 20% or more in the last 12 months (Figure 33). Key points of this analysis are:

<ul style="list-style-type: none">• Ashford CCG,• Canterbury & Coastal CCG,• South Kent Coast CCG,• East Kent.	Have higher hospital admissions but a lower proportion of new hypertension patients with CVD risk score 20% and above receiving statins (Figure 33).
---	--

This may suggest inadequate management of cardiovascular risk within primary care, a key risk factor for stroke and therefore an area for further improvement in management.

With regards to diabetes and stroke related admissions the analysis suggests that Swale CCG has higher stroke hospital admissions, but lower proportion of patients with diabetes on the disease register with good diabetes control (59mmol/mol or less). However, the North Kent region; Medway CCG, Dartford, Gravesham & Swanley CCG have both lower stroke hospital admission and lower proportion of patients achieving good diabetes control, (figure 34). This may be an indication that other stroke risk factors are being managed adequately in primary care.

Table 11 summarises the three risk factor scatter plots (Appendix I figures 30-34). It shows that the management of three key risk factors in primary care is lower in Ashford CCG and South Kent Coast in the East Kent region and these areas also have a higher stroke related hospital admissions. This suggests the need for improved management of key stroke risk factors in primary care.

Table 11: Quality & Outcomes Framework: stroke hospital admissions and risk factors, 2013/14.

	Proportion of patients with AF with a stroke risk assessment	Proportion of patients aged 79 or under achieving blood pressure control	Proportion of patients with CVD risk receiving statins	Proportion of patients with diabetes achieving glycaemic control	Proportion of patients with a record of blood pressure
Ashford CCG	x		x		x
Canterbury & Coastal CCG		x	x		
Dartford, Gravesham & Swanley CCG					
Medway CCG					
South Kent Coast CCG	x		x		x
Swale CCG	x			x	
Thanet CCG	x				x
West Kent CCG					
East Kent	x		x		x
North Kent					
West Kent					

Source: QOF 2013/14

6. Stroke related mortality

The following section presents indicators of mortality, including deaths within 30 days of emergency admission, years of life lost and premature mortality within the under 75 population.

It should be noted that this method of comparing mortality data is limited due to the lack of acknowledgement of variation in mortality by care provision, case mix (such as, stroke severity, comorbidities and risk factors) and demographic factors.

6.1. Key Points

Hospital Admissions
<ul style="list-style-type: none">Ashford CCG shows significantly lower deaths within 30 days of emergency admissions to hospital.
<ul style="list-style-type: none">Ashford CCG and Dartford, Gravesham & Swanley CCG show greater years of life lost within those aged under 75.
<ul style="list-style-type: none">Dartford, Gravesham & Swanley CCGs have an age standardised rate for premature mortality that is significantly higher than Kent for the years 2011-2013.
<ul style="list-style-type: none">Ashford CCG has lower proportion of patients with AF assessed for stroke risk, lower proportion of patients achieving blood pressure control and also blood glucose control with higher stroke premature mortality.

6.2. What does the Evidence Suggest?

Care provision has been shown to influence stroke mortality. The organisation of stroke services and care processes were explored for the effect on 30 day mortality of patients admitted with acute ischaemic stroke within 62% of hospitals in England:¹³

- A 52% reduced risk of 30 day mortality from the following care processes; the provision of antiplatelet therapy and adequate nutrition and hydration within the first 72 hours [Odds Ratio 0.46 (95% CI 0.42, 0.50)].¹³

Socioeconomic deprivation has also been found to influence stroke mortality. The South London Stroke Register from 1995 to 2011 was explored for the effect of socioeconomic deprivation on stroke mortality:

- A 23% increased risk of mortality at 3 months was found within the most deprived group [Hazard Ratio 1.23 (95% CI 1.05, 1.44)].¹⁴

In England, death from stroke decreased in people aged 40 to 69 years between 1979 and 2005.¹⁵ However, this has been reported to have stabilised within this age group, due to the management of modifiable stroke risk factors.¹⁵

6.3. Deaths within 30 days of Emergency Admission

The findings within this section relate to district, residence based information.

Table 12 shows the indirectly standardised rate per 1,000 population for deaths that occurred in hospital and after discharge within 0 and 29 days after emergency admission to hospital due to stroke in 2011/12. The indirectly age and sex standardised rate represents the ratio of deaths experienced within a district in comparison to the number of deaths expected if the district experienced the same rate as England.

Table 12 shows that district deaths within 30 days of a stroke related emergency hospital admission was not significantly different from England; a mortality rate of 171.64 persons per 1,000 population. However, the highest rates were seen within Dartford (a mortality rate of 219.66 persons per 1,000 population), Maidstone (a mortality rate of 201.80 persons per 1,000 population), Tonbridge & Malling (a mortality rate of 199.58 persons per 1,000 population) and Gravesham (a mortality rate of 188.65 persons per 1,000 population).

The numbers of inpatient spells for stroke and the subsequent numbers of deaths for Kent; indicate that of the 2,161 inpatient spells for stroke there were 385 deaths. This suggests that one in six inpatient spells resulted in death. In England, of the 68,835 inpatient spells,

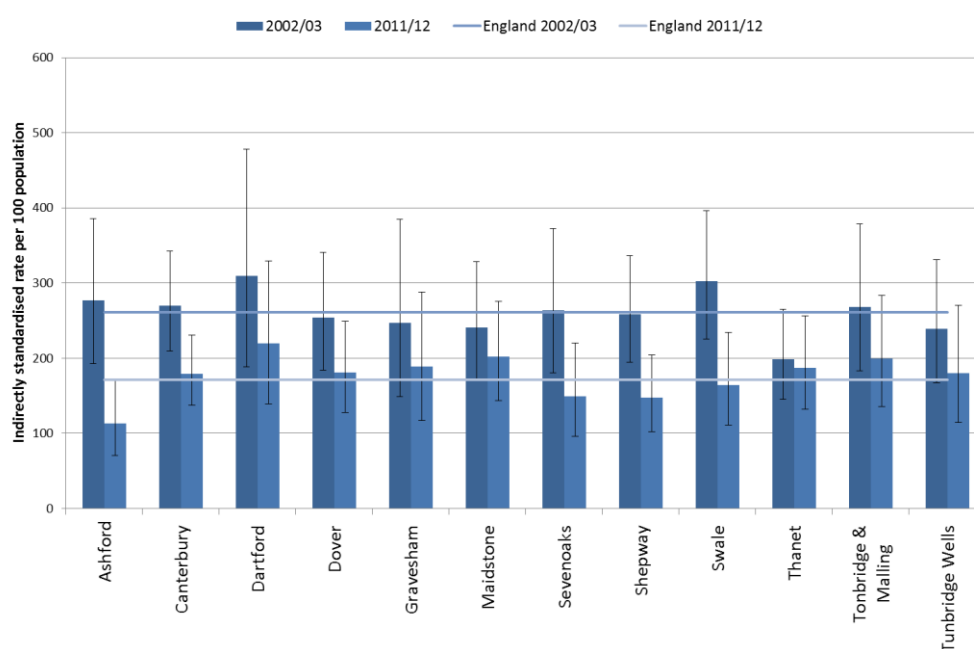
11,736 resulted in death, also suggesting that one in six inpatient spells resulted in death. The levels of deaths within thirty days of emergency admission to hospital with stroke are similar in Kent and England.

Table 12: Deaths within 30 days of emergency admissions to hospital with stroke 2011/12.

	Indirectly age and sex standardised rate per 1000 population with 95% confidence interval	
Ashford	113.19	(70.91, 171.38)
Canterbury	179.59	(137.37, 230.70)
Dartford	219.66	(139.20, 329.61)
Dover	181.07	(127.47, 249.59)
Gravesham	188.65	(116.73, 288.38)
Maidstone	201.80	(143.48, 275.88)
Medway	184.24	(133.86, 247.34)
Sevenoaks	148.89	(963.29, 219.81)
Shepway	147.14	(102.47, 204.64)
Swale	164.02	(110.64, 234.16)
Thanet	186.87	(132.22, 256.51)
Tonbridge and Malling	199.58	(135.58, 283.29)
Tunbridge Wells	180.19	(114.19, 270.39)
Kent	173.22	(156.34, 191.41)
South East England	175.33	(168.55, 174.77)
England	171.64	(167.48, 183.46)

Source: HSCIC

Figure 35: Deaths within 30 days of emergency admissions to hospital with stroke 2002/03 and 2011/12.



Source: HSCIC

6.4. Years of Life Lost

Years of life lost due to stroke is an indicator of premature mortality to help quantify social and economic loss. This indicator aims to estimate the length of time a person would have lived had they not died prematurely in order to estimate the burden within a population. Therefore, this indicator gives greater weight to deaths occurring at a younger age.

Table 13 shows the directly standardised rate for years of life lost (under 75 stroke mortality) per 100,000 resident population for the years 2010-2012 by CCG and England. Between 2010 and 2012, there was greater impact from stroke mortality observed in Dartford, Gravesham & Swanley CCG and Ashford CCG. Lower impacts from stroke mortality can be seen in South Kent Coast CCG and West Kent CCG.

Table 13: Years of life lost: stroke mortality, <75 years, directly standardised rate per 100,000 resident population 2010-2012.

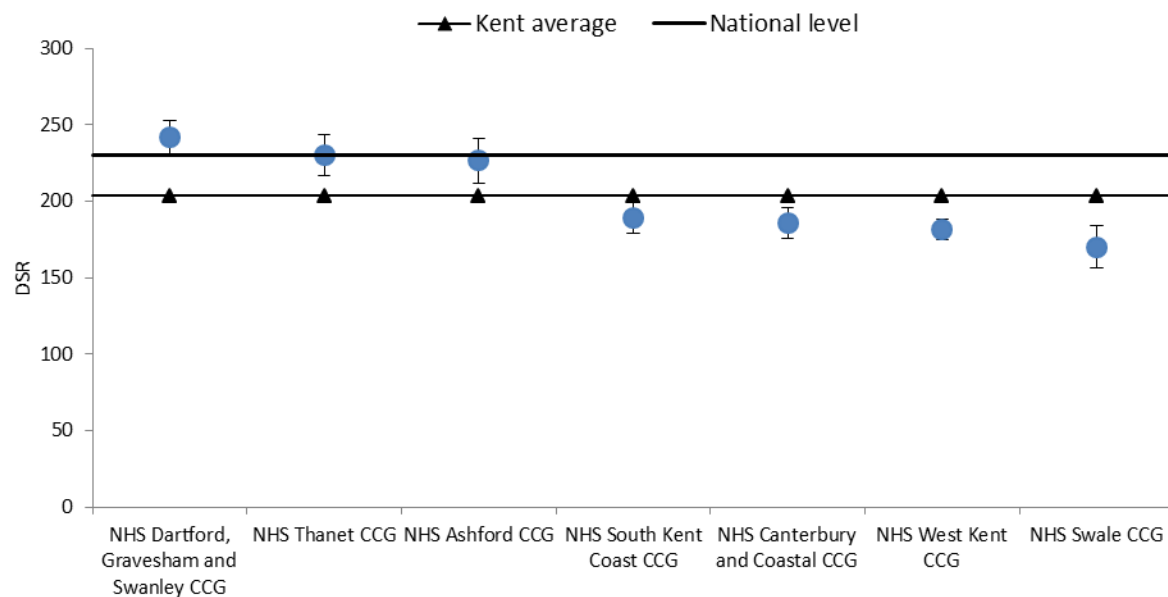
	Directly standardised rate per 100,000 resident population
Ashford CCG	286.53
Canterbury & Coastal CCG	238.85
Dartford, Gravesham & Swanley CCG	305.73
Medway CCG	274.82
South Kent Coast CCG	209.84
Swale CCG	274.01
Thanet CCG	274.66
West Kent CCG	226.22
England	283.14

Source: Public Health England, 2014

Figures 36 presents a comparison of the potential years of life lost due to stroke for Kent CCGs, 2011-12;¹⁶ this is based on a Kent County Council report that does not include Medway CCG. This shows that Dartford, Gravesham & Swanley CCG, Thanet CCG and Ashford CCG demonstrate significantly higher trends than England.

Table 14 shows the percentage change in potential years of life lost due to stroke over the period 2009-11 and 2011-13.¹⁶ Swale CCG showed the greatest percentage reductions in potential years of life lost due to stroke over the period 2009-11 and 2011-13.

Figure 36: Comparison of potential years of life lost due to stroke for Kent CCGs, 2011-2013.



* - Directly age-standardised potential years of life lost per 100,000 patients

Source: HSCIC.

Table 14: Percentage change in potential years of life lost due to stroke over the period 2009-11 - 2011-13

	Percentage change
Ashford CCG	8.5
Canterbury & Coastal CCG	-0.4
Dartford, Gravesham & Swanley CCG	-12.5
South Kent Coast CCG	-12.6
Swale CCG	-53.7
Thanet CCG	-14.1
West Kent CCG	-12.6

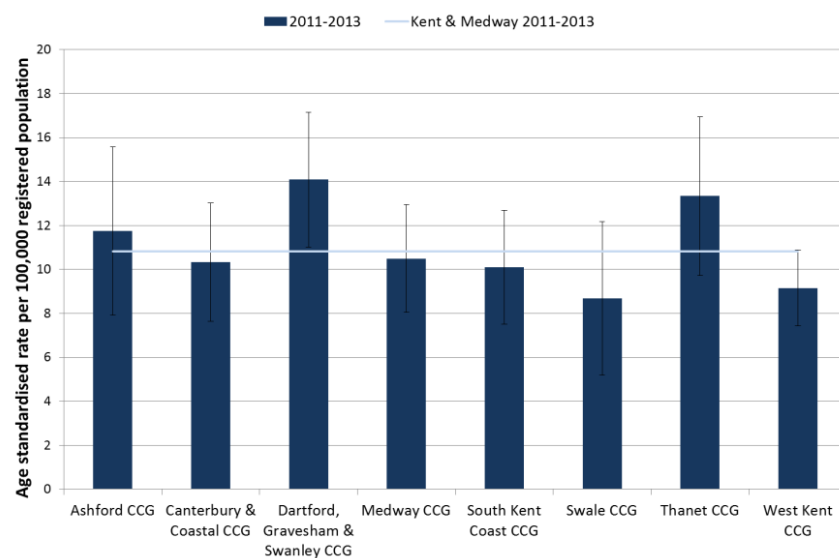
Source: HSCIC.

6.5. Premature Mortality from Stroke

Premature mortality represents deaths due to stroke in people aged under 75 years.

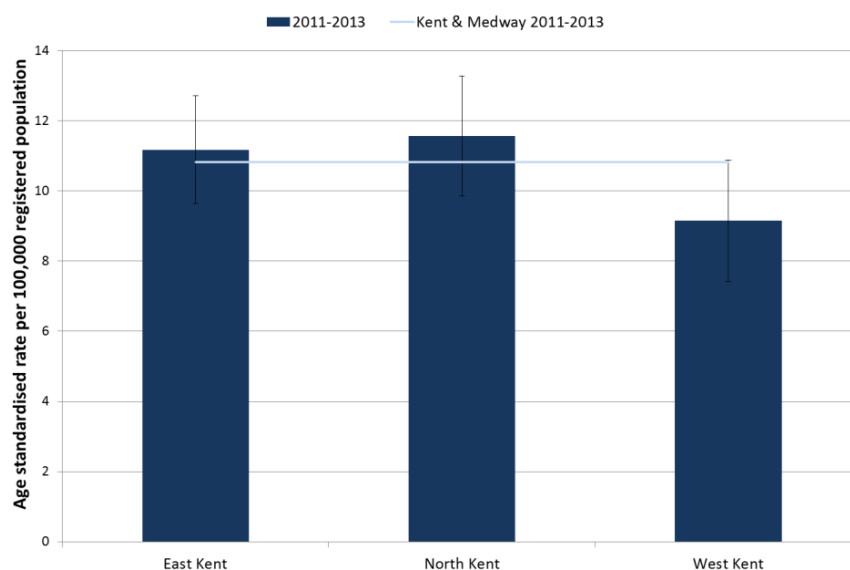
Figures 37 and 38 show the age standardised stroke premature mortality rate by CCG and Kent region between 2011-2013. This shows that Dartford, Gravesham & Swanley CCGs had significantly higher premature deaths from stroke when compared with Kent and Medway as a whole during this period. For the Kent regions, neither areas show significantly different rates in comparison to Kent between 2011-2013.

Figure 37: Age standardised rate of premature (ages <75) stroke mortality by CCG 2011-2013.



Source: SUS

Figure 38: Age standardised rate of premature (ages <75) stroke mortality by Kent region 2011-2013.



Source: SUS

6.6. Risk factor management and premature mortality related to stroke

Further analysis was undertaken to understand relationship between stroke premature mortality (2011/12-2013/14) and risk factors such as proportion of patients with Atrial Fibrillation receiving intervention (2013/14) in primary care (Appendix J figure 39-43). This may represent poorer management of patients with atrial fibrillation; a key risk factor for stroke. The analysis suggests that:

<ul style="list-style-type: none">• Ashford CCG,• Thanet CCG,• East Kent	Have higher stroke deaths in the under 75s but lower proportion of patients with AF receiving an assessment using a CHADs2 risk stratification scoring system (Figure 39)
--	---

This may imply the need to improve the assessment of the risk of stroke in patient with AF and possibly other risk factors for stroke.

The analysis did not identify (Figure 40) any areas with higher premature stroke mortality, and low proportions of patients with a record of blood pressure. This would suggest the recording of blood pressure in primary care may not be of particular concern and that the premature deaths may be due to management of other risk factors.

It also suggests that DGS, Thanet, Ashford CCGs, North Kent region have higher premature deaths from stroke despite higher proportion of patients with records of blood pressure in primary care. In addition, Ashford and Thanet CCGs have a lower proportion of patients achieving blood pressure control (Figure 43), thus implying inadequate management of blood pressure within primary care in these areas.

Further analysis of stroke premature mortality (2011/12-2013/14) with, the proportion of patients achieving BP control (2013/14) highlights: (figure 41)

<ul style="list-style-type: none">• Ashford CCG,• Thanet CCG,• East Kent.	Have higher stroke premature mortality, but lower proportion of patients aged 79 or under achieving BP control (140/90 mm) thus suggesting inadequate management of blood pressure in primary care (Figure 41)
---	--

In relation to stroke premature mortality (2011/12-2013/14) and the proportion of patients with CVD risk score of 20% receiving statins (2013/14) (figure 42) the highlights are:

<ul style="list-style-type: none">• Ashford CCG,• East Kent.	Have higher premature stroke deaths and lower proportion of patients with CVD risk score 20% or and above receiving statin. This implies inadequate management of cardiovascular risk factors (hypertension and hypercholesterolaemia in primary care) (Figure 42)
---	--

With regards to stroke premature mortality (2011/12-2013/14) and the proportion of patients achieving glycaemic control (2013/14) (figure 43), the highlights are:

<ul style="list-style-type: none"> Dartford, Gravesham & Swanley CCG North Kent 	Have higher premature stroke deaths but lower proportion of patients receiving intervention for diabetes suggesting inadequate management of patients with diabetes in primary care (Figure 43).
---	--

Table 15 summarises management of risk factors in primary care in relation to stroke premature mortality.

Ashford CCG shows lower risk factor performance for three indicators (proportion of patients with AF with a stroke risk assessment, proportion of patients with CVD risk receiving statins and proportion of patients with a record of blood pressure); however, higher stroke premature mortality. This may indicate inadequate management of these risk factors within primary care.

Table 15: Risk factor management in primary care 2013/14.

	Proportion of patients with AF with a stroke risk assessment	Proportion of patients aged 79 or under achieving blood pressure control	Proportion of patients with CVD risk receiving statins	Proportion of patients with diabetes achieving glycaemic control	Proportion of patients with a record of blood pressure
Ashford CCG	x		x		x
Canterbury & Coastal CCG					
Dartford, Gravesham & Swanley CCG				x	
Medway CCG					
South Kent Coast CCG					
Swale CCG					
Thanet CCG	x				x
West Kent CCG					
East Kent	x		x		x
North Kent				x	
West Kent					

Source: QOF 2013/14

7. Conclusion

This report should be read in conjunction with the evidence review for stroke services and also along with the data analysis through Sentinel Stroke National Audit Programme (SSNAP).

Future commissioning of stroke services will need to consider above key findings, in particular, risk factors which potentially highlight areas for service improvement in primary care. It is crucial that commissioners map out the care journey of stroke patients to gain detailed understanding of the patients whole pathway and of the organisations and professionals involved in stroke care in order to identify potential areas for improvement and where resources can be utilised more efficiently.

The projected increase in the older population (65 years and over) in East and West Kent regions, particularly South Kent Coast, Thanet, Canterbury and Coastal CCGs and in addition, the high old age dependency ratio implies increased care needs and demand for health and social care services. The higher proportion of Black African and Caribbean in North Kent region in comparison to other areas of Kent and Medway may translate to a higher risk of stroke in that area and thus a need for targeted preventive interventions.

This report highlights the need for further improvements in the management of key risk factors for stroke in primary care. This will in turn impact on stroke incidence and outcomes. Although, there have been some substantial improvements in the identification of key risk factors, this has not necessarily translated into adequate management in primary care. It is worth pointing out that whilst this report does not take into account other risk factors for stroke such as poor diet, obesity, smoking, physical inactivity and excessive alcohol consumption, it is important to consider these in a wider stroke prevention programme.

For future commissioning of hyperacute and subacute stroke beds, the Stroke Review Programme Board should consider risk factors, our growing older population with changing health needs along with the changing trend of stroke prevalence

8. Appendices

8.1. Appendix A – Summary of Tables

Table 1a: Overview table for stroke indicators for the Kent regions

Indicator	Indicator description	East Kent	North Kent	West Kent	Source
Population aged 65 and over.	Total population aged 65+ years in 2020.	133,000	99,000	83,100	Office for National Statistics (2014)
	Expected change within 65 and over population between 2012 and 2020.	19.7% +26,200	19.7% +19,500	21.1% +17,500	Office for National Statistics (2014)
Black population group.	Proportion of total population with black ethnicity using experimental Hospital Episode Statistics data 2012/13- 2013/14.	0.41%	1.78%	0.27%	Secondary User Service (2012/13- 2013/14)
Stroke prevalence 2013/14	Calculated using numbers recorded with stroke and TIA alongside GP practice numbers within each Kent region.	1.94	1.40	1.80	Quality and Outcomes Framework (2014)
Stroke prevalence trend analysis 2006/07 – 2013/14	Calculated using numbers recorded with stroke and TIA alongside GP practice numbers within each Kent region.	0.035	0.008	0.024	Quality and Outcomes Framework (2006/07- 2013/14)
Risk factor prevalence 2013/14	Hypertension	14.99	14.40	13.54	Quality and Outcomes Framework (2014)
	Atrial fibrillation	2.08	1.45	1.87	
	Diabetes	6.45	6.59	5.51	

Risk factor performance and stroke prevalence	Quadrant analysis to identify higher stroke and transient ischaemic attack prevalence, as well as, lower proportion of patients receiving interventions for: (1) patients with AF with a stroke risk assessment, (2) patients with CVD risk receiving statins, (3) patients with diabetes achieving glycaemic control and (4) patients with a record of blood pressure.	x	x		Quality and Outcomes Framework (2014)
Hospital admissions	Stroke 2011/12-2013/14	211.49	174.16	164.01	Secondary User Service (2011/12-2013/14)
	Transient ischaemic attack 2011/12-2013/14	99.72	38.36	64.32	
Risk factor performance and hospital admissions.	Quadrant analysis to identify higher stroke hospital admissions, as well as, lower proportion of patients receiving interventions for: (1) patients with AF with a stroke risk assessment, (2) patients with CVD risk receiving statins, (3) patients with diabetes achieving glycaemic control, (4) patients with a record of blood pressure and (5) patients aged 79 or under achieving blood pressure control.	x			Secondary User Service Quality and Outcomes Framework (2014)
Premature stroke mortality	Stroke (ICD10 I60-I64.9) mortality in ages <75 2011/12-2013/14.	11.18	12.38	9.15	PCMD (2011/12-2013/14)

	<p>Quadrant analysis to identify higher stroke premature mortality, as well as, lower proportion of patients receiving interventions for: (1) patients with AF with a stroke risk assessment, (2) patients with CVD risk receiving statins, (3) patients with diabetes achieving glycaemic control and (4) patients with a record of blood pressure.</p>	x			<p>PCMD (2011/12-2013/14) Quality and Outcomes Framework (2014)</p>
--	--	---	--	--	---

Indicator	Indicator description	Ashford CCG	Canterbury & Coastal CCG	Dartford, Gravesham & Swanley CCG	Medway CCG	South Kent Coast CCG	Swale CCG	Thanet CCG	West Kent CCG	Source
Population aged 65 and over.	Total population aged 65+ years.	25,100	47,400	48,200	47,500	52,100	22,800	34,600	100,600	Office for National Statistics (2014)
	Expected population change by 2020.	23.7% 4,800	19.1% 7,600	15.9% 6,600	21.5% 8,400	20.6% 8,900	24.6% 4,500	16.5% 4,900	21.1% 175,00	Office for National Statistics (2014)
Black population group.	Proportion of total population with black ethnicity using experimental Hospital Episode Statistics data 2012/13-2013/14.	0.46%	0.62%	2.27%	0.22%	0.64%	0.32%	0.27%	0.69%	Secondary User Service (2012/13-2013/14)
Stroke prevalence 2013/14	Calculated using numbers recorded with stroke and TIA alongside GP practice numbers within each Kent region.	1.79	1.87	1.56	1.26	2.06	1.43	2.03	1.80	Quality and Outcomes Framework (2014)
Stroke prevalence trend	Calculated using numbers recorded with	0.043	0.041	0.008	0.012	0.046	0.003	0.006	0.024	Quality and Outcomes Framework

Indicator	Indicator description	Ashford CCG	Canterbury & Coastal CCG	Dartford, Gravesham & Swanley CCG	Medway CCG	South Kent Coast CCG	Swale CCG	Thanet CCG	West Kent CCG	Source
analysis 2006/07 – 2013/14	stroke and TIA alongside GP practice numbers within each Kent region.									(2014)
Risk factor prevalence 2013/14	Hypertension	14.07	13.82	14.78	13.93	15.91	14.74	16.28	13.54	Quality and Outcomes Framework (2014)
	Atrial fibrillation	2.18	1.96	1.57	1.34	2.18	1.50	2.02	1.87	
	Diabetes	6.08	5.75	6.26	6.66	6.90	7.14	7.21	5.51	
Risk factor performance and stroke prevalence	Quadrant analysis to identify higher stroke and transient ischaemic attack prevalence, as well as, lower percentage of patients receiving the intervention:	(1) patients with AF with a stroke risk assessment(2) patients with CVD risk receiving statins and (4) patients aged 79 or under achieving blood pressure control.	(1) patients with CVD risk receiving statins, (2) patients with a record of blood pressure			(1) patients with AF with a stroke risk assessment, (2) patients with CVD risk receiving statins, (3) patients with a record of blood pressure and (4) patients aged 79 or under achieving blood pressure control.		(1) patients with AF with a stroke risk assessment and (2) patients with a record of blood pressure	(1) patients with AF with a stroke risk assessment (2) patients with a record of blood pressure and (3) patients aged 79 or under achieving blood pressure control.	Quality and Outcomes Framework (2014)

Indicator	Indicator description	Ashford CCG	Canterbury & Coastal CCG	Dartford, Gravesham & Swanley CCG	Medway CCG	South Kent Coast CCG	Swale CCG	Thanet CCG	West Kent CCG	Source
Hospital admissions	Stroke age standardised rate per 100,000 registered population 2011/12-2013/14	224.81	206.21	171.85	151.70	211.14	231.76	210.49	164.01	Secondary User Service (2011/12-2013/14)
	Stroke age standardised rate per 100,000 registered population 2007/08 to 2013/14 comparison.		Significant increase.	Significant increase.			Significant increase	Significant increase		Secondary User Service (2007/08-2013/14)
	Transient ischaemic attack age standardised rate per 100,000 registered population 2011/12-2013/14	91.3	105.49	44.02	33.00	93.73	38.04	106.80	64.32	Secondary User Service (2011/12-2013/14)

Indicator	Indicator description	Ashford CCG	Canterbury & Coastal CCG	Dartford, Gravesham & Swanley CCG	Medway CCG	South Kent Coast CCG	Swale CCG	Thanet CCG	West Kent CCG	Source
	Transient ischaemic attack age standardised rate per 100,000 registered population 2007/08 to 2013/14 comparison.	Significant increase.	Significant increase.			Significant increase.		Significant increase.	Significant increase.	Secondary User Service (2007/08-2013/14)
Risk factor performance and hospital admissions.	Quadrant analysis to identify higher hospital admissions, as well as, lower percentage of patients receiving the intervention:	(1) patients with AF with a stroke risk assessment(2) patients with CVD risk receiving statins and (3) patients aged 79 or under achieving blood pressure control.	(1) patients with CVD risk receiving statins, (2) patients with a record of blood pressure			(1) patients with AF with a stroke risk assessment(2) patients with CVD risk receiving statins, (3) patients aged 79 or under achieving blood pressure control.	(1) patients with AF with a stroke risk assessment(2) patients with diabetes achieving glycaemic control.	(1) patients with AF with a stroke risk assessment(2) patients with CVD risk receiving statins and (3) patients aged 79 or under achieving blood pressure control.		Quality and Outcomes Framework (2014)

Indicator	Indicator description	Ashford CCG	Canterbury & Coastal CCG	Dartford, Gravesham & Swanley CCG	Medway CCG	South Kent Coast CCG	Swale CCG	Thanet CCG	West Kent CCG	Source
Premature stroke mortality	Stroke (ICD10 I60-I64.9) mortality in ages <75, age standardised rate per 100,000 registered population 2011-2013.	11.75	10.33	14.09		10.10	8.69	13.34	9.15	Secondary User Service (2011-2013)
	Potential years of life lost, age standardised rate per 100,000 patients 2011-2013.	226.7	185.5	242.0	-	188.8	170.0	230.3	181.7	HSCIC

Indicator	Indicator description	Ashford CCG	Canterbury & Coastal CCG	Dartford, Gravesham & Swanley CCG	Medway CCG	South Kent Coast CCG	Swale CCG	Thanet CCG	West Kent CCG	Source
	Quadrant analysis to identify higher stroke premature mortality, as well as, lower percentage of patients receiving the intervention:	(1) patients with AF with a stroke risk assessment(2) patients with CVD risk receiving statins and (3) patients aged 79 or under achieving blood pressure control.		(2) patients with diabetes achieving glycaemic control.				(1) patients with AF with a stroke risk assessment (2) patients aged 79 or under achieving blood pressure control.		PCMD (2011/12-2013/14) Quality and Outcomes Framework (2014)

8.2. Appendix B - Methodology

To inform the stroke review this report focused on three regional geographies, as well as, Clinical Commissioning Groups within Kent. Table 1 shows the definitions of the regions and Clinical Commissioning Groups referred to within this report.

Table 1b: Regions and Clinical Commissioning Groups.

Region	Clinical Commissioning Group
North	Dartford, Gravesham & Swanley CCG
	Medway CCG
	Swale CCG
East	Ashford CCG
	Canterbury & Coastal CCG
	Thanet CCG
	South Kent Coast CCG
West	West Kent CCG

This report focused on examining the current need and possible future demand on stroke services within Kent. The following indicators were used:

- Population projections using the 2012 – based Clinical Commissioning Group estimates published by the Office for National Statistics (2014).
- Ethnicity profile using experimental data from Hospital Episode Statistics in 2012/13 and 2013/14. It should be noted that these are subject to the limitations of ethnicity coding within the hospital record. Therefore, this data may represent populations that seek healthcare and result in hospital admissions.
- Stroke recorded prevalence was explored using GP practice stroke numbers and practice registers within each Clinical Commissioning Group published by the Quality & Outcomes Framework.
- Regression analysis was used to understand the relationship between stroke recorded prevalence and time in years by CCG and Kent region. This can help understanding of the change in stroke and TIA recorded prevalence by unit change of time in years. The slope is tested in relation to the null value of 0.
- The projected prevalence of stroke and TIA was calculated using linear extrapolation based on the average annual percentage change in 2013/14.
- The Quality and Outcomes Framework (QOF) GP practice patient registers and list sizes were used to calculate recorded prevalence for the risk factors; hypertension, atrial fibrillation and diabetes. Risk factor recorded prevalence was explored at a Clinical Commissioning Group level.

- The Quality & Outcomes Framework performance for stroke were explored using the clinical domain indicators. The analysis of clinical indicators will explore management of the above identified risk factors.
- Hospital Episode Statistics were explored, including; stroke and transient ischaemic attack admissions. This used any diagnosis of stroke (ICD 10 I600 to I649) or transient ischaemic attack (ICD 10 G45*) within the primary and first twelve diagnosis fields.
- Stroke mortality and premature mortality from stroke were explored.
- The Health and Social Care Information Centre produce statistics regarding deaths within 30 days of emergency admission to hospital. The indirectly age and sex standardised rate represents the ratio of deaths experienced within a district in comparison to the number of deaths expected if the district experienced the same rate as England.
- Public Health England (2014) produce a directly standardised rate for the years of life lost due to stroke mortality, within the under 75 population and per 100,000 of the resident population by CCG, the 2010-2012 pooled rate. Public Health England (2014) also produce a fitted trend for years of life lost due to stroke mortality for the years 2002 to 2018.
- Premature mortality represents deaths due to stroke in people with an underlying cause of stroke (ICD 10 I60 – I64.9) within persons aged under 75 years. A directly age standardised rate was calculated using the European Standard Population, 2013. Interpretation of this indicator recognises that mortality is higher within older populations, as well as, accounts for the different age profiles between areas.

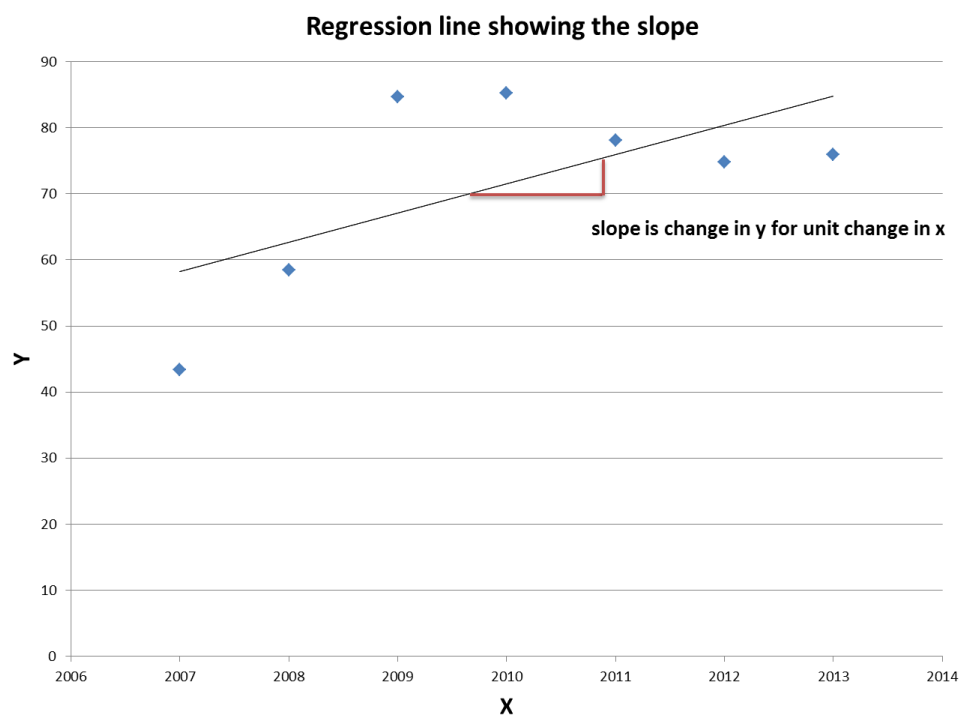
8.3. Appendix C - Regression Line Showing Slope

Figure 1c helps to explain the use of the term 'slope' within the context of the analyses reported within this document.

Slope is the change in the variable on the Y axis by unit change in the variable on the X axis. For example, for Figure 1c, the line represents the 'best fit' of the data to predict mean values. A slope of 2 would suggest that with each year presented, variable Y increases by 2 units.

Within this report, the slope has been presented with 95% Confidence Intervals to enable exploration of the precision of the estimates, as well as, to explore significance.

Figure 1c: Regression line showing slope.



8.4. Appendix D – Percentage Changes in Stroke Prevalence

Table 1c: Quality and Outcomes Framework: Stroke and Transient Ischaemic Attack slope with 95% Confidence Intervals by Clinical Commissioning Group and Kent region.

	Slope (95% Confidence Interval)
Ashford CCG	0.043 (0.030, 0.056)
Canterbury & Coastal CCG	0.041 (0.033, 0.048)
Dartford, Gravesham & Swanley CCG	0.008 (0.001, 0.015)
Medway CCG	0.012 (-0.002, 0.027)
South Kent Coast CCG	0.046 (0.027, 0.064)
Swale CCG	0.003 (-0.008, 0.014)
Thanet CCG	0.006 (-0.015, 0.027)
West Kent CCG	0.024 (0.014, 0.034)
East Kent	0.035 (0.011, 0.033)
North Kent	0.008 (0.021, 0.049)
West Kent	0.024 (-0.001, 0.018)
Kent & Medway	0.022 (0.014, 0.034)

Source: QOF 2007 – QOF 2014

Table 2c: Quality and Outcomes Framework: Stroke and Transient Ischaemic Attack period percentage change by Clinical Commissioning Group and Kent region.

	Period percentage change (%)
Ashford CCG	18.64
Canterbury & Coastal CCG	17.36
Dartford, Gravesham & Swanley CCG	4.48
Medway CCG	6.76
South Kent Coast CCG	16.99
Swale CCG	1.96
Thanet CCG	4.84
West Kent CCG	9.70
East Kent	14.47
North Kent	4.45
West Kent	9.70
Kent & Medway	9.65

Source: QOF 2007 – QOF 2014

8.5. Appendix E – Stroke Related Risk Factors

The risk factor achievement for stroke can be explored using the Quality & Outcomes Framework clinical domain indicators. The analysis of clinical indicators will explore management of the above identified risk factors.

For 2013/14, there were five clinical indicators identified to be relevant to stroke. Table 1c summarises the indicators and definitions used.

Table 1d: Summary of indicators and definition.

Indicator	Definition
AF002	The percentage of patients with atrial fibrillation in who stroke risk has been assessed using the CHADS2 risk stratification scoring system in the preceding 12 months (excluding those who are previous CHADS2 score is greater than 1).
BP001	The percentage of patients aged 40 or over that have a record of blood pressure in the preceding 5 years.
HY003	The percentage of patients aged 79 or under with hypertension in whom the last blood pressure reading (measured in the preceding 9 months) is 140/90 mmHg or less.
CVD-PP001	The percentage of a defined group of patients who are currently treated with statins. The defined group of patients are individuals with a new diagnosis of hypertension, recorded between the preceding contract year, who have a recorded CVD risk assessment score of 20% or greater within the preceding 12 months. This includes individuals aged 30 or over and aged under 75. This indicator excludes those with pre-existing coronary heart disease, diabetes, stroke and/or transient ischaemic attack.
DM007	The percentage of patients with diabetes, on the register, in whom the last HbA1c, a measure of long term diabetes control, is 59 mmol/mol or less in the preceding 12 months.

Source: QOF,

The above clinical indicators to represent risk factor achievement will be explored using quadrant plots alongside stroke and TIA prevalence.

8.6. Appendix F - Recorded Prevalence of Risk Factors

Table 1e: Prevalence of hypertension by Clinical Commissioning Group, Kent region - 2013/14.

	Hypertension numbers	Registered numbers	Prevalence (95% CI)
Ashford CCG	17,715	125,930	14.07 (13.88, 14.26)
Canterbury & Coastal CCG	29,838	215,852	13.82 (13.68, 13.97)
Dartford, Gravesham & Swanley CCG	37,305	252,340	14.78 (14.65, 14.92)
Medway CCG	40,524	290,818	13.93 (13.81, 14.06)
South Kent Coast CCG	32,115	201,852	15.91 (15.75, 16.07)
Swale CCG	15,837	107,473	14.74 (14.52, 14.95)
Thanet CCG	23,143	142,121	16.28 (16.09, 16.48)
West Kent CCG	63,529	469,334	13.54 (13.44, 13.63)
East Kent	102,811	685,755	14.99 (14.35, 14.45)
North Kent	93,666	650,631	14.40 (14.91, 15.08)
West Kent	63,529	469,334	13.54 (13.44, 13.63)
Kent & Medway	260,006	1,805,720	14.40 (14.31, 14.48)

Source: QOF 2013/14

Table 2e: Prevalence of atrial fibrillation (AF) by Clinical Commissioning Group, Kent region - 2013/14.

	Atrial fibrillation numbers	Registered numbers	Prevalence (95% CI)
Ashford CCG	2,750	125,930	2.18 (2.10, 2.26)
Canterbury & Coastal CCG	4,222	215,852	1.96 (1.90, 2.01)
Dartford, Gravesham & Swanley CCG	3,950	252,340	1.57 (1.52, 1.61)
Medway CCG	3,886	290,818	1.34 (1.29, 1.38)
South Kent Coast CCG	4,392	201,852	2.18 (2.11, 2.24)
Swale CCG	1,611	107,473	1.50 (1.43, 1.57)
Thanet CCG	2,872	142,121	2.02 (1.95, 2.09)
West Kent CCG	8,789	469,334	1.87 (1.83, 1.91)
East Kent	14,236	685,755	2.08 (2.04, 2.11)
North Kent	9,447	650,631	1.45 (1.42, 1.48)
West Kent	8,789	469,334	1.87 (1.83, 1.91)
Kent & Medway	32,472	1,805,720	1.80 (1.78, 1.82)

Source: QOF 2013/14

Table 3e: Diabetes prevalence by Clinical Commissioning Group, and Kent region - 2013/14.

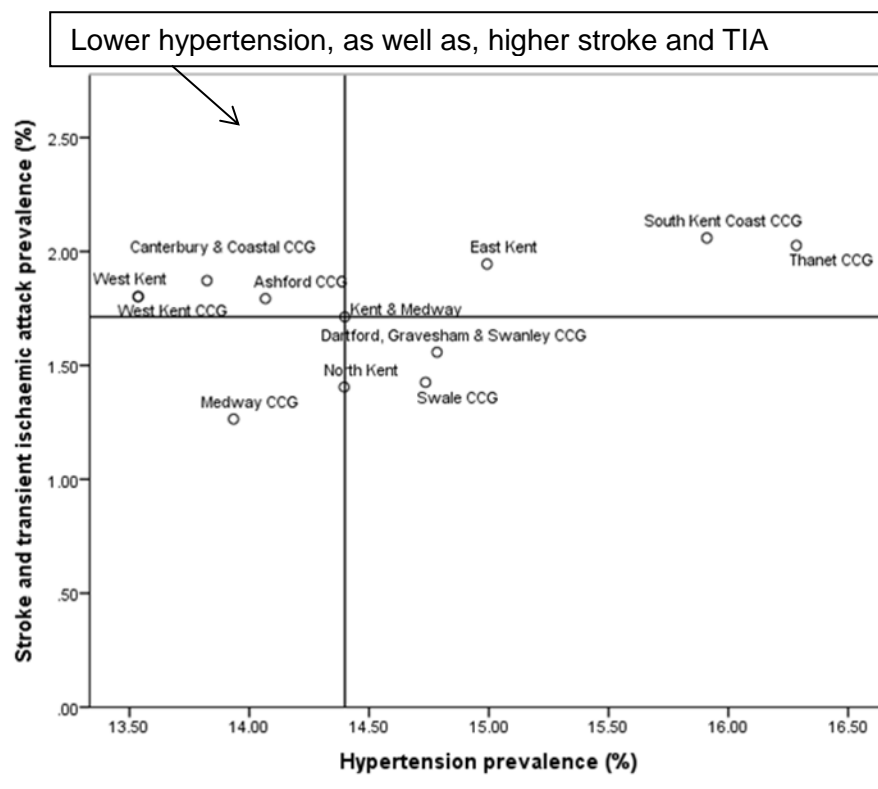
	Diabetes numbers	Registered numbers aged 17+	Prevalence (95% CI)
Ashford CCG	6,037	99,286	6.08 (5.93, 6.23)
Canterbury & Coastal CCG	10,307	179,125	5.75 (5.65, 5.86)
Dartford, Gravesham & Swanley CCG	12,466	198,996	6.26 (6.16, 6.37)
Medway CCG	15,256	228,962	6.66 (6.56, 6.77)
South Kent Coast CCG	11,325	164,243	6.90 (6.77, 7.02)
Swale CCG	6,042	84,653	7.14 (6.96, 7.31)
Thanet CCG	8,232	114,151	7.21 (7.06, 7.36)
West Kent CCG	20,485	371,682	5.51 (5.44, 5.58)
East Kent	35,901	556,806	6.45 (6.38, 6.51)
North Kent	33,764	512,611	6.59 (6.52, 6.65)
West Kent	20,485	371,682	5.51 (5.44, 5.58)
Kent & Medway	90,150	1,441,098	6.26 (6.22, 6.30)

8.7 Appendix G – Analysis of Stroke and Primary Care Risk Factors

The horizontal and vertical lines represent the Kent & Medway prevalence figures for stroke and hypertension respectively. The right upper quadrant identifies higher risk factor prevalence and higher stroke and TIA prevalence. Higher risk factor prevalence may indicate better identification of key risk factors for stroke.

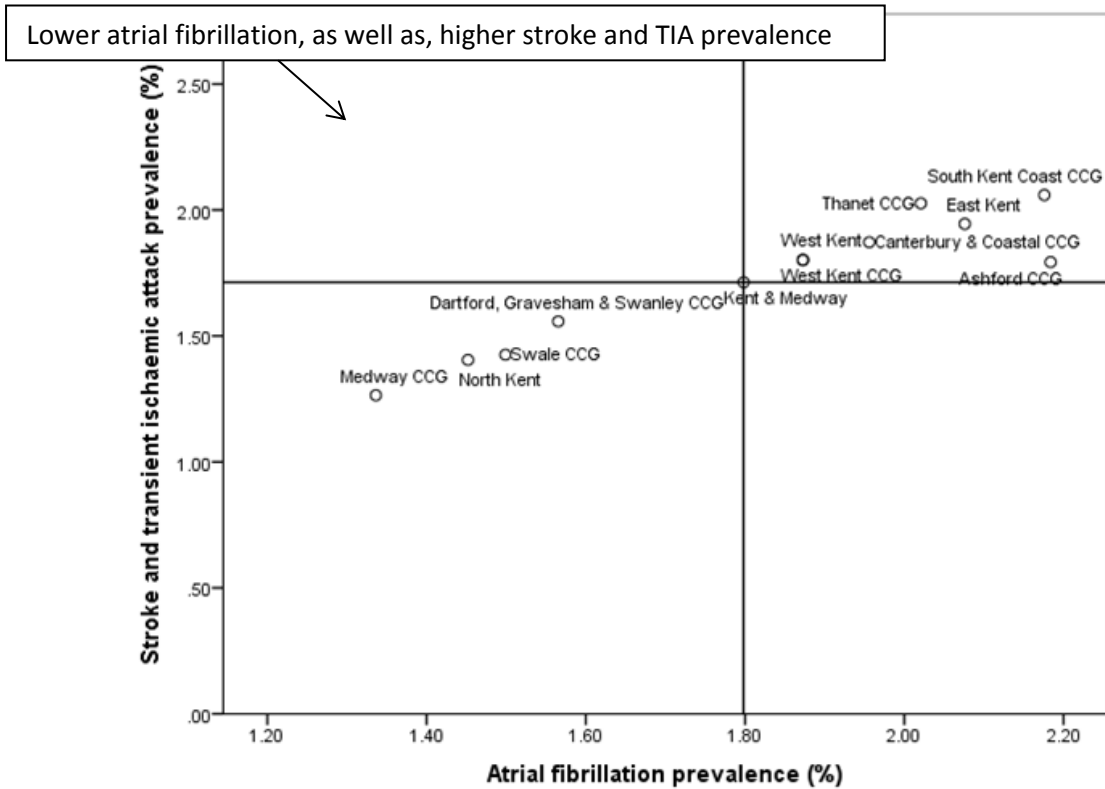
The left upper quadrant indicates lower risk factor prevalence; but, higher stroke and TIA prevalence. This may imply higher stroke prevalence but lower identification of key risk factors for stroke. Both of these quadrants imply higher demand on services from higher stroke prevalence. The two lower quadrants indicate lower demand on services from lower stroke prevalence.

Figure 13: Scatterplot of stroke and Transient Ischaemic Attack prevalence and hypertension prevalence 2013/14.



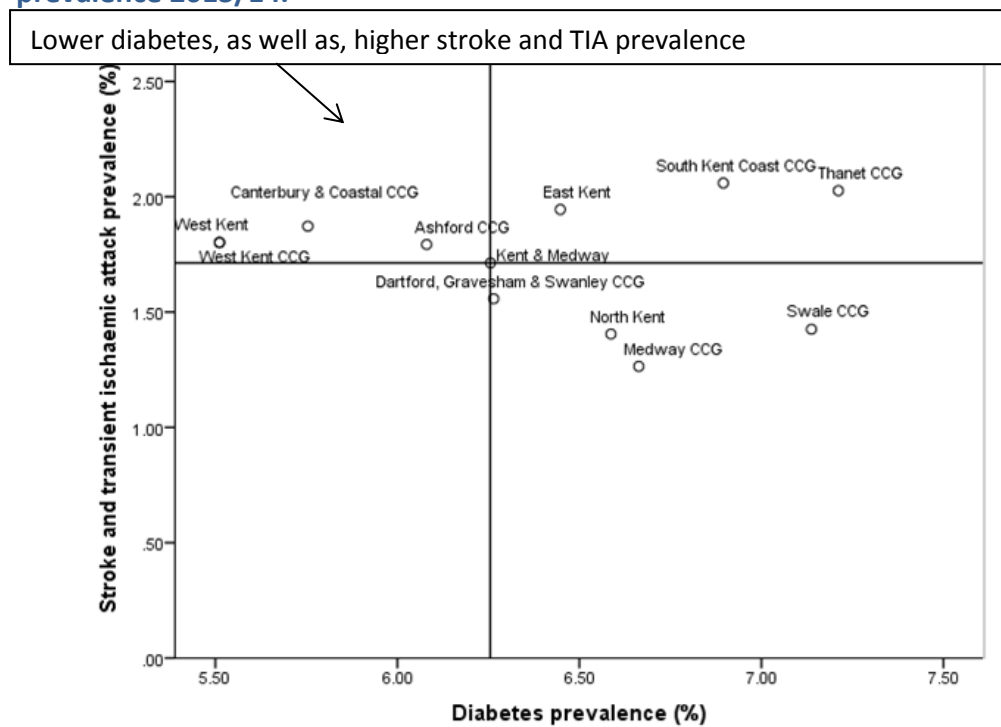
Source QOF

Figure 14: Scatterplot of Stroke and Transient Ischaemic Attack prevalence with atrial fibrillation prevalence 2013/14.



Source: QOF

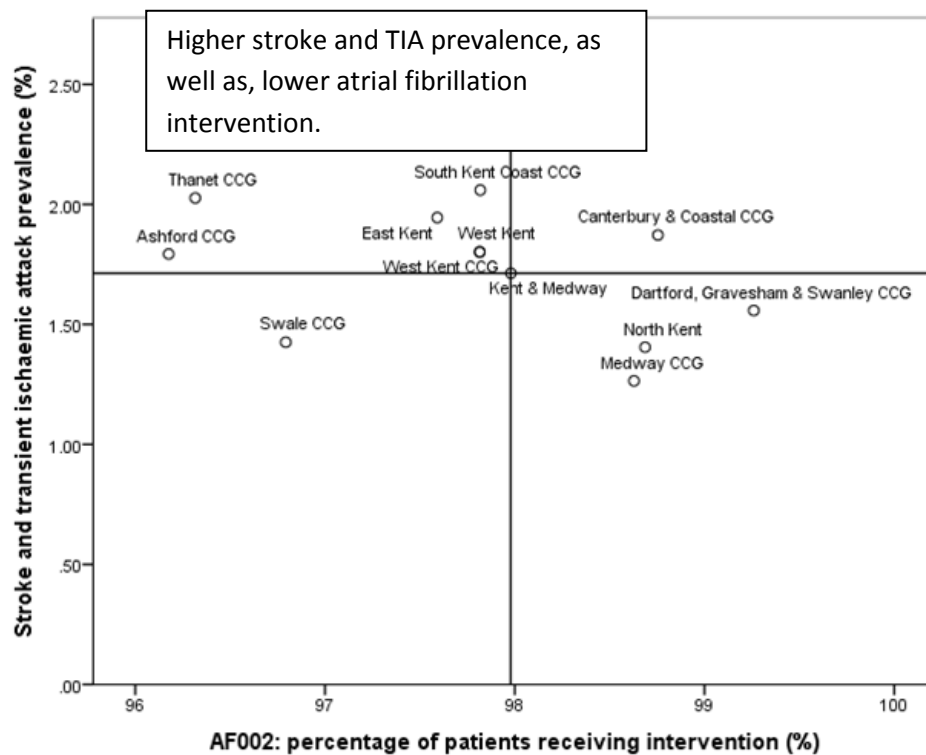
Figure 15: Scatterplot of Stroke and Transient Ischaemic Attack prevalence with diabetes prevalence 2013/14.



Source: QOF

8.8 Appendix H – Analysis of Stroke and Risk Factors continued

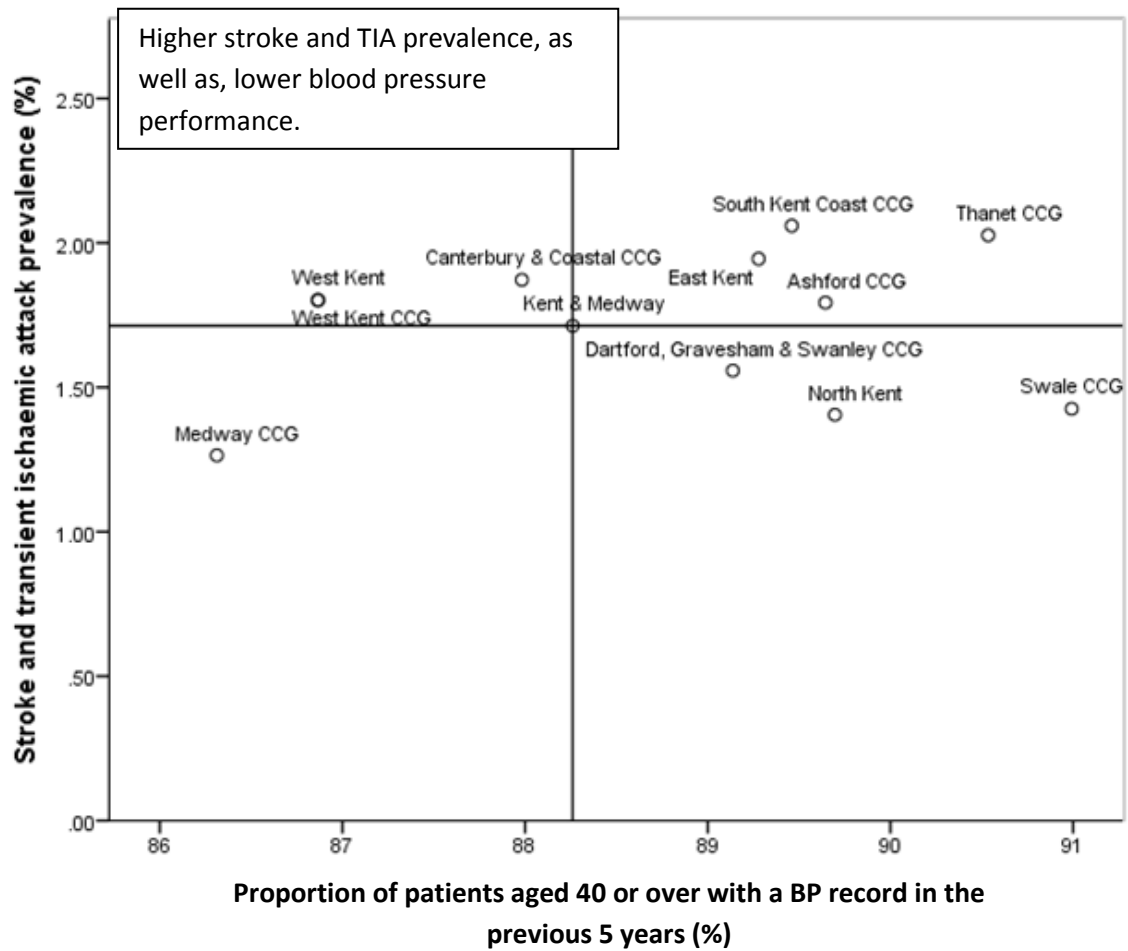
Figure 16: Scatterplot of Stroke and Transient Ischaemic Attack prevalence by proportion of AF patients assessed for stroke risk using CHADS2 scoring system (2013/14).



Proportion of AF patients assessed for stroke risk using CHADS2 scoring system (%)

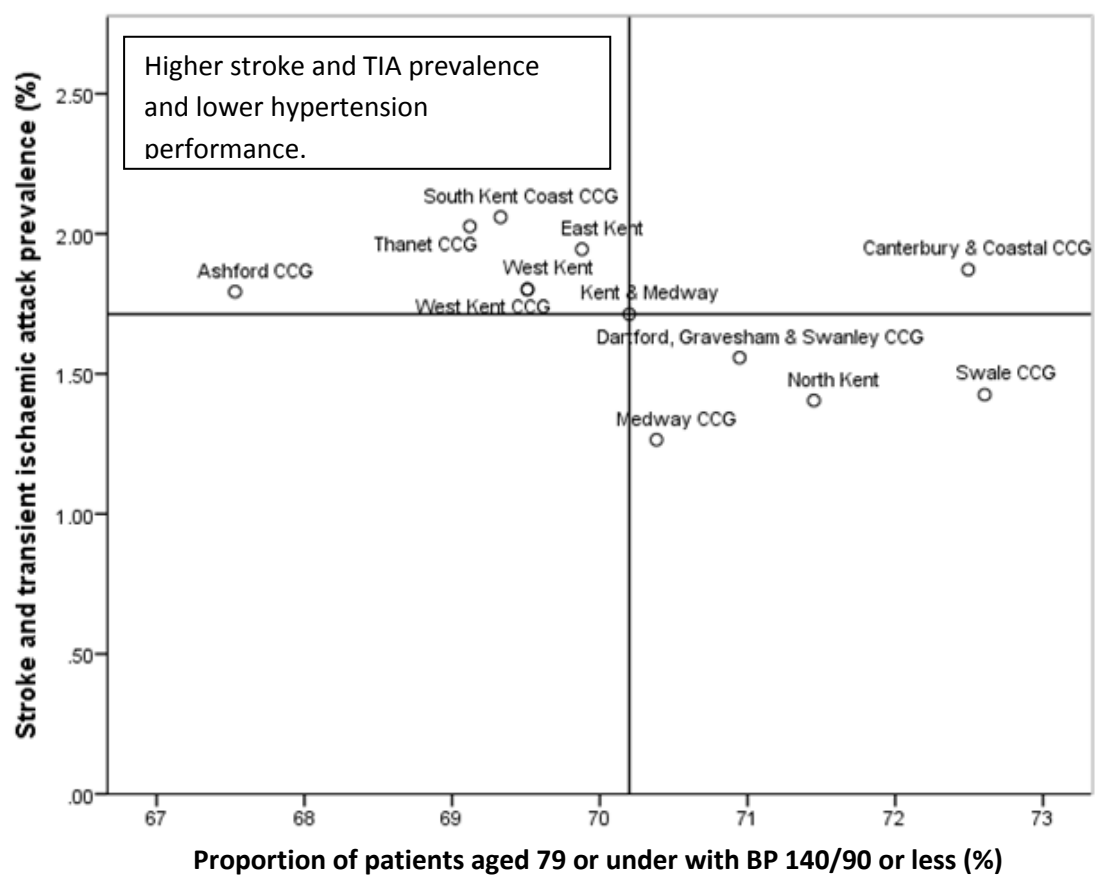
Source: QOF

Figure 17: Scatterplot of Stroke and Transient Ischaemic Attack versus proportion of patients aged 40 or over with a BP record in the previous 5 years (2013/14).



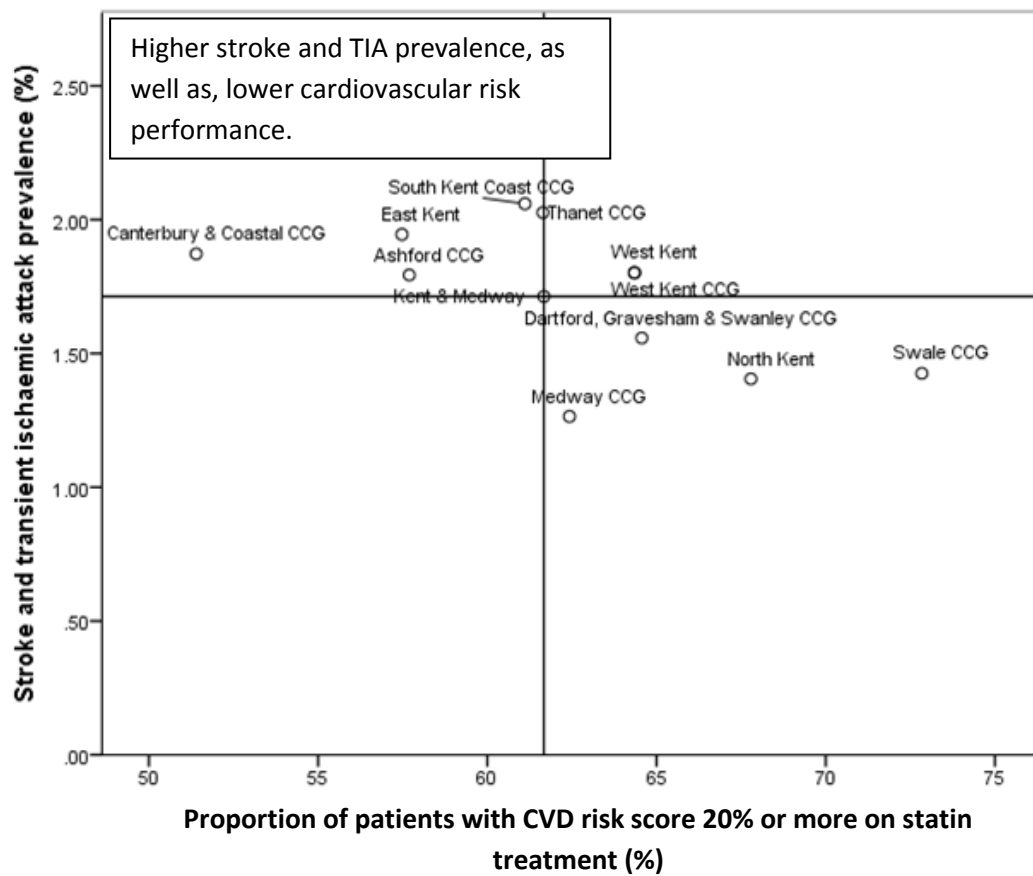
Source: QOF

Figure 18: Scatterplot of Stroke and Transient Ischaemic attack versus proportion of patients aged 79 or under with BP 140/90mmHg or less (2013/14).



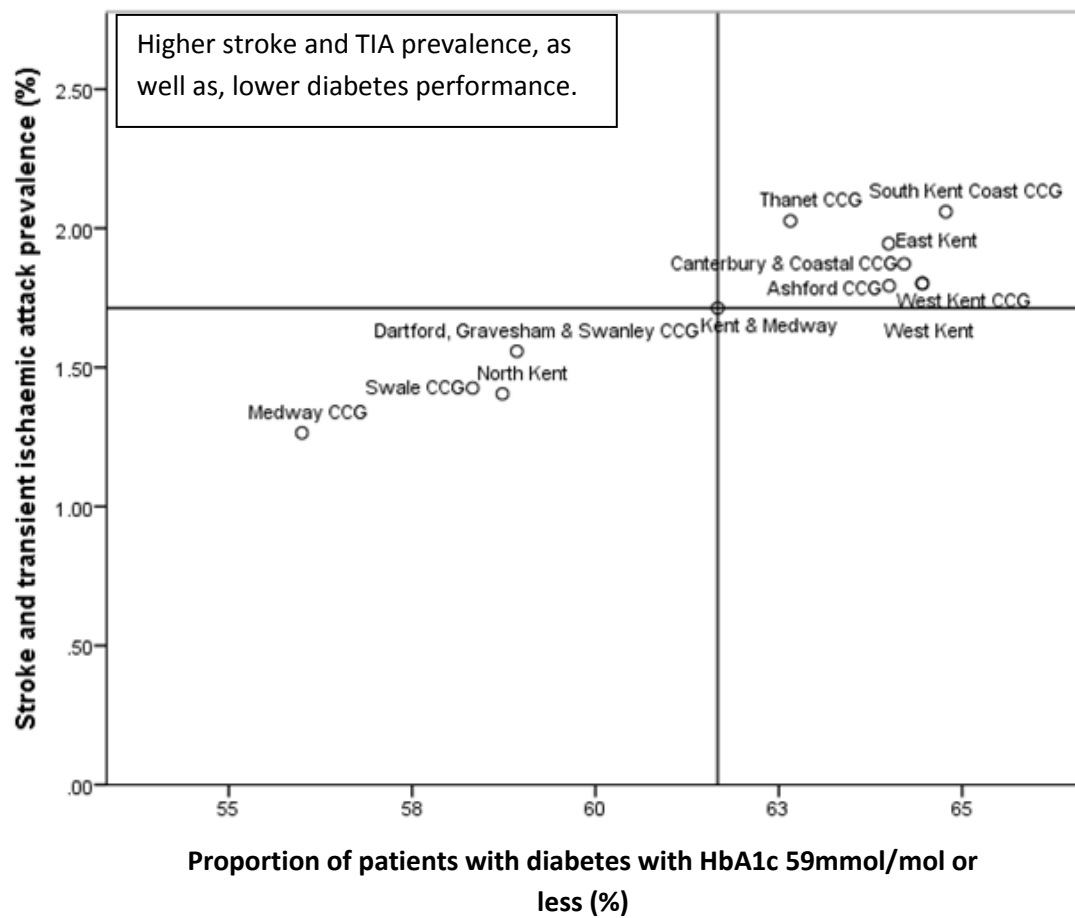
Source: QOF

Figure 19: Scatterplot of Stroke and Transient Ischaemic Attack versus proportions of patients with CVD risk score 20% or more on statin treatment (2013/14).



Source: QOF 2013/14

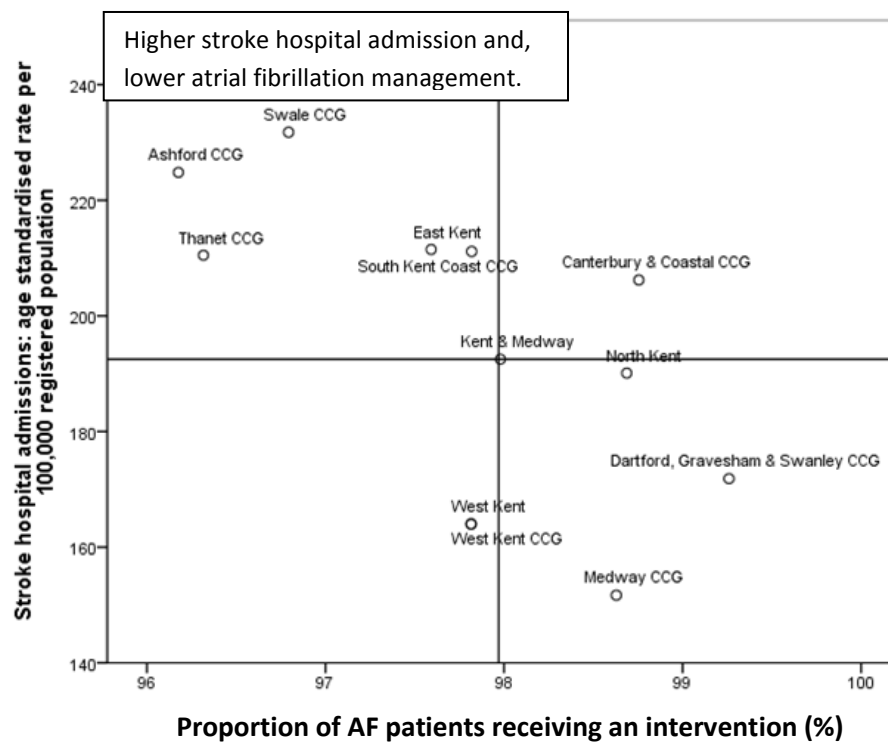
Figure 20: Scatterplot of Stroke and Transient Ischaemic Attack versus proportions of patients with diabetes with HbA1c 59mmol/mol or less (2013/14).



Source: QOF

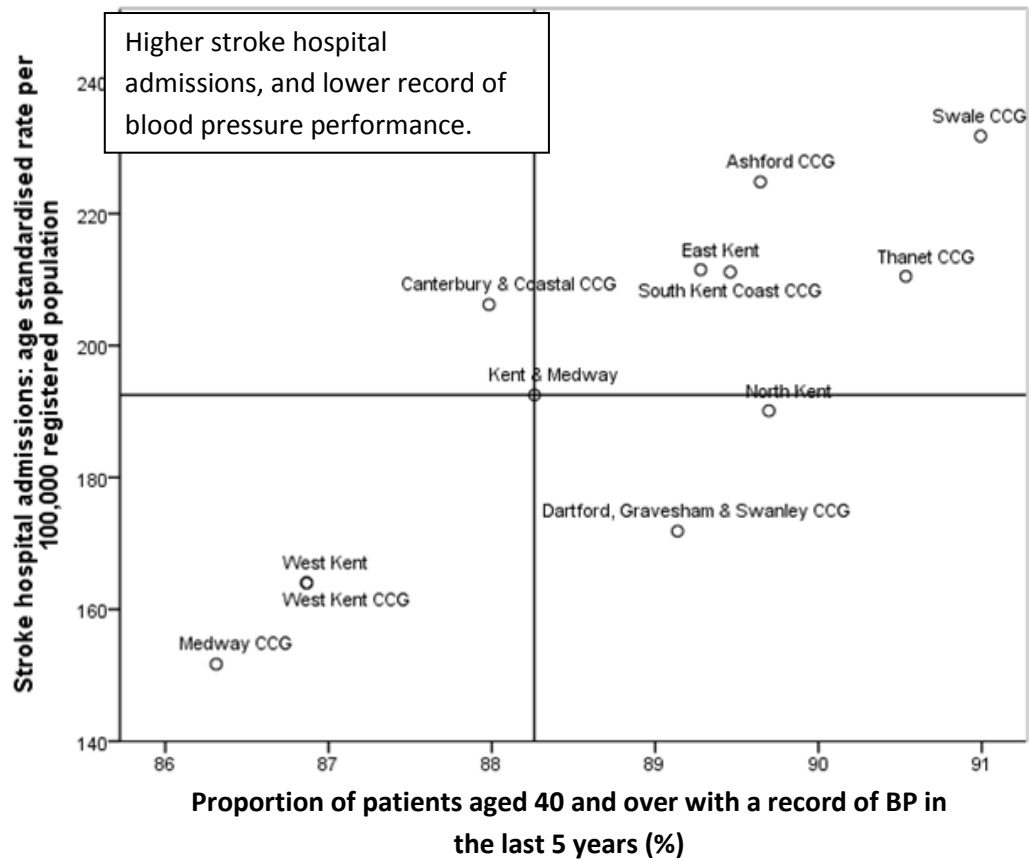
8.9 Appendix I – Stroke Related Hospital Admissions Risk Factors

Figure 30: A scatterplot of stroke related hospital admissions (age standardised rate per 100,000 registered population), versus proportion of AF patients receiving an intervention (2013/14).



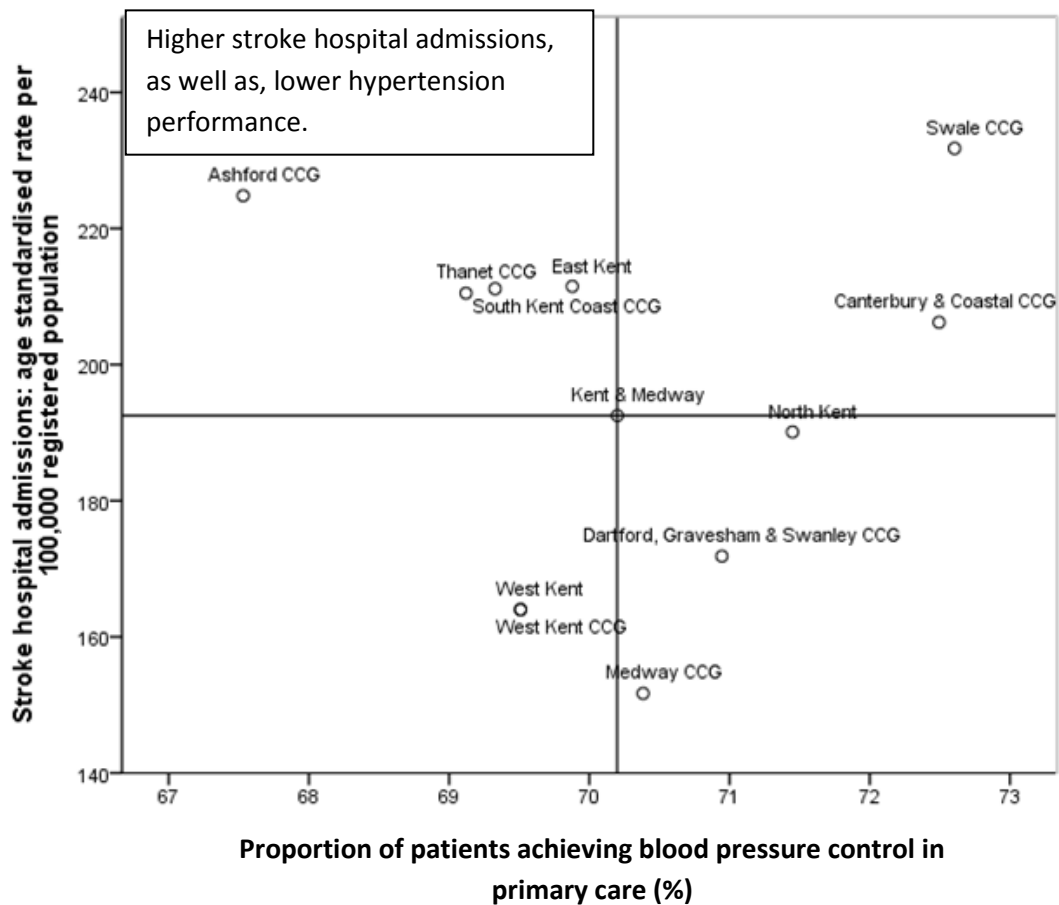
Source: SUS, QOF

Figure 31: A scatterplot of stroke related hospital admissions (age standardised rate per 100,000 registered population) (2013/14) versus proportion of patients aged 40 or over with a record of BP in the last 5 years.



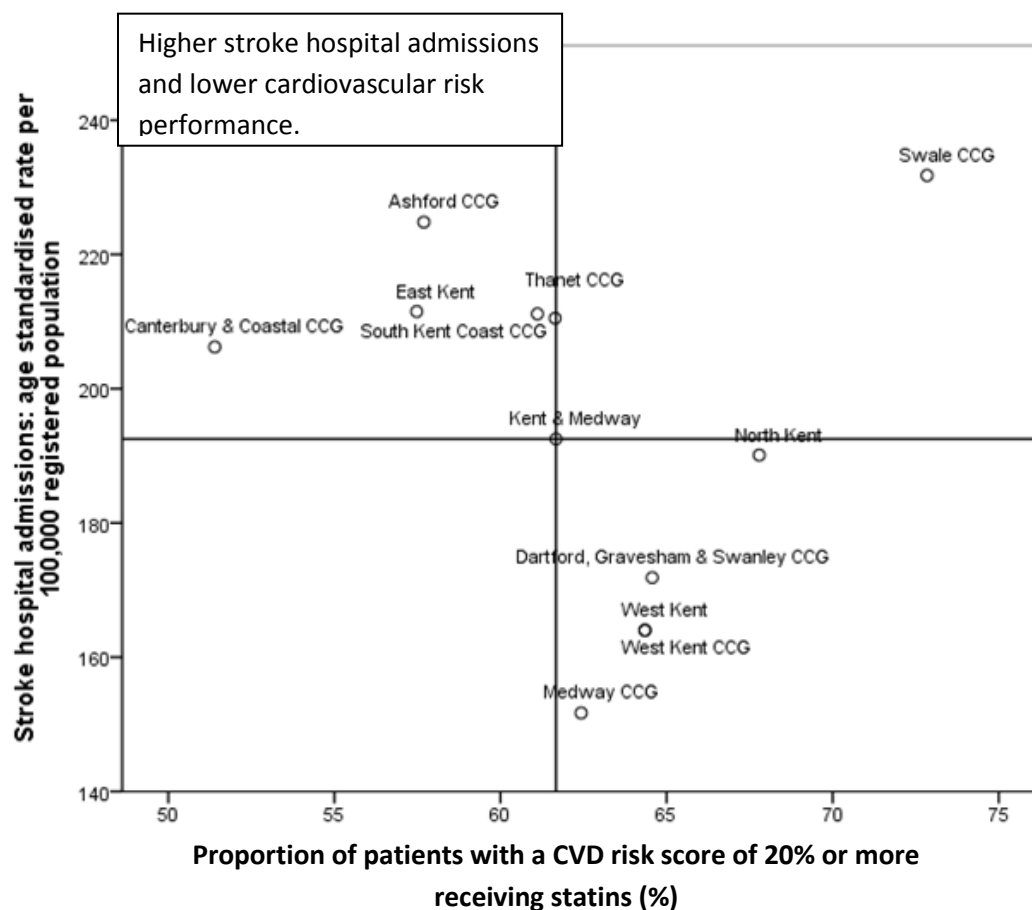
Source: SUS, QOF

Figure 32: A scatterplot of stroke hospital admissions (age standardised rate per 100,000 registered population) by proportion of patient achieving blood pressure control in primary care (2013/14).



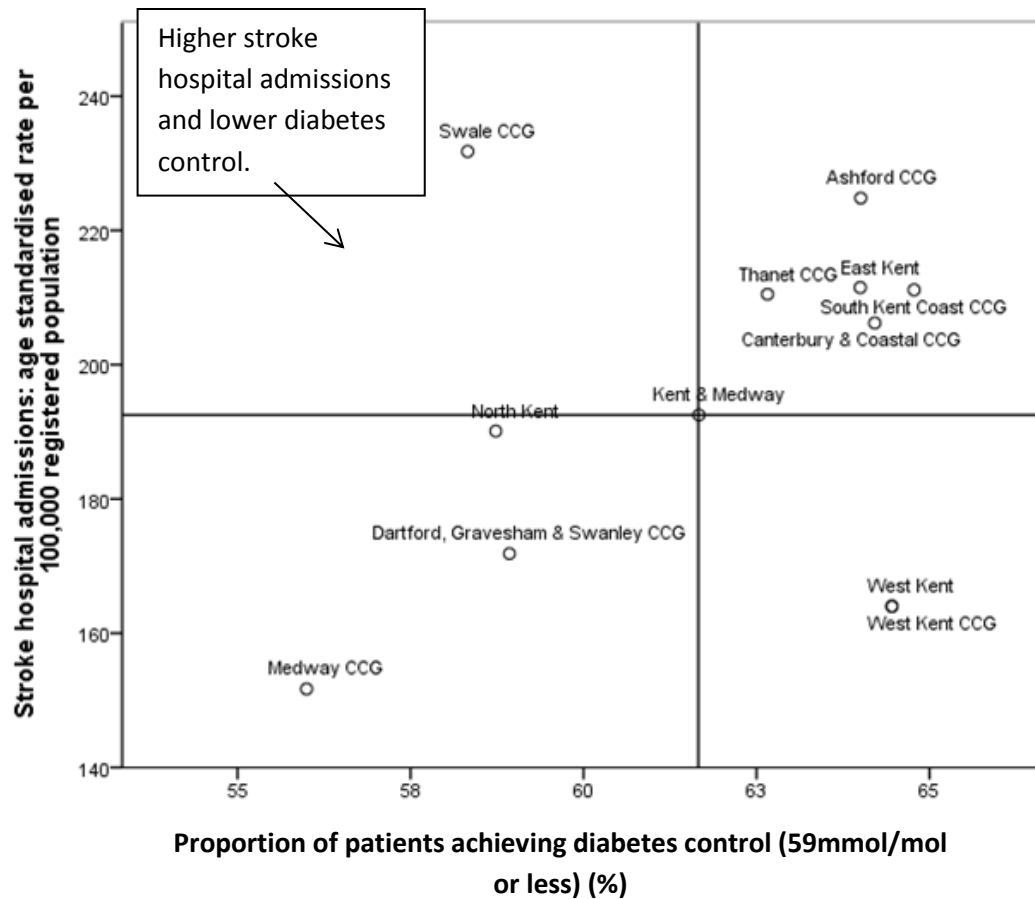
Source: SUS, QOF

Figure 33: A scatterplot of stroke related hospital admissions (age standardised rate per 100,000 registered population) versus proportion of patients with CVD risk score of 20% or more receiving statins (2013/14).



Source: SUS, QOF

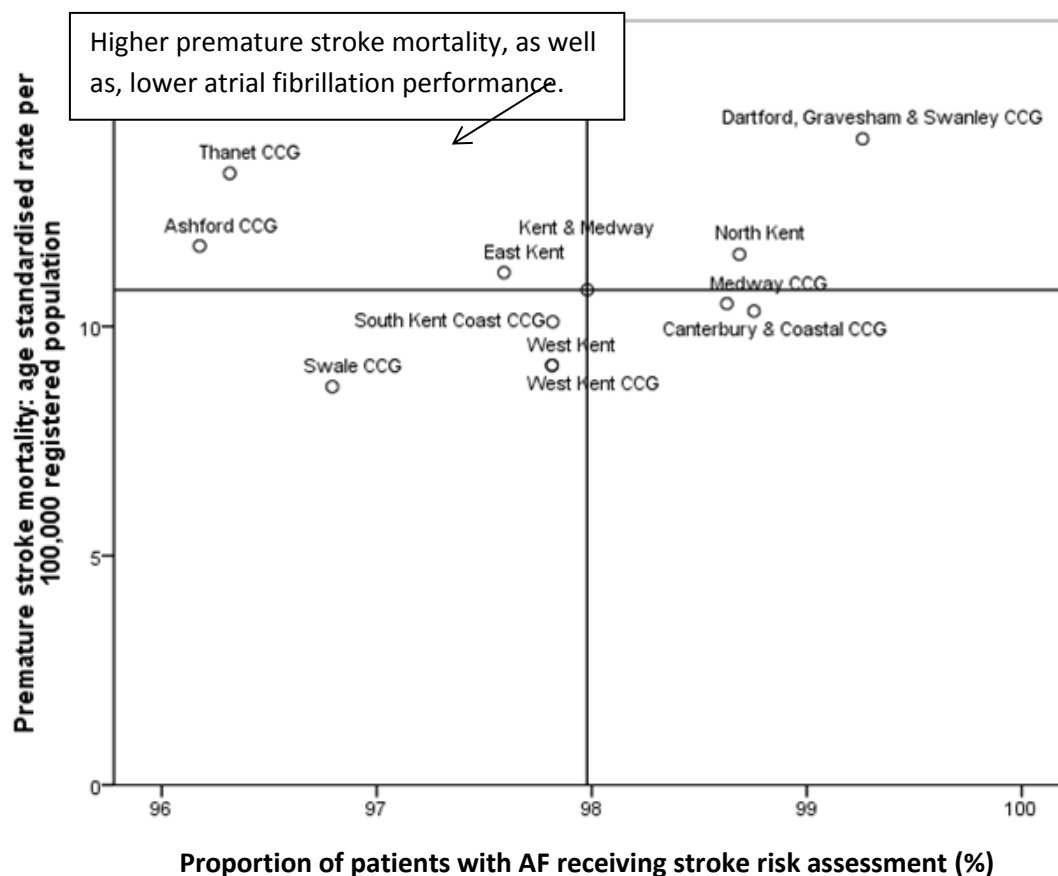
Figure 34: A scatterplot of stroke hospital admissions (age standardised rate per 100,000 registered population) versus proportion of patients achieving diabetes control (59mmol/mol or less) (2013/14).



Source: SUS, QOF

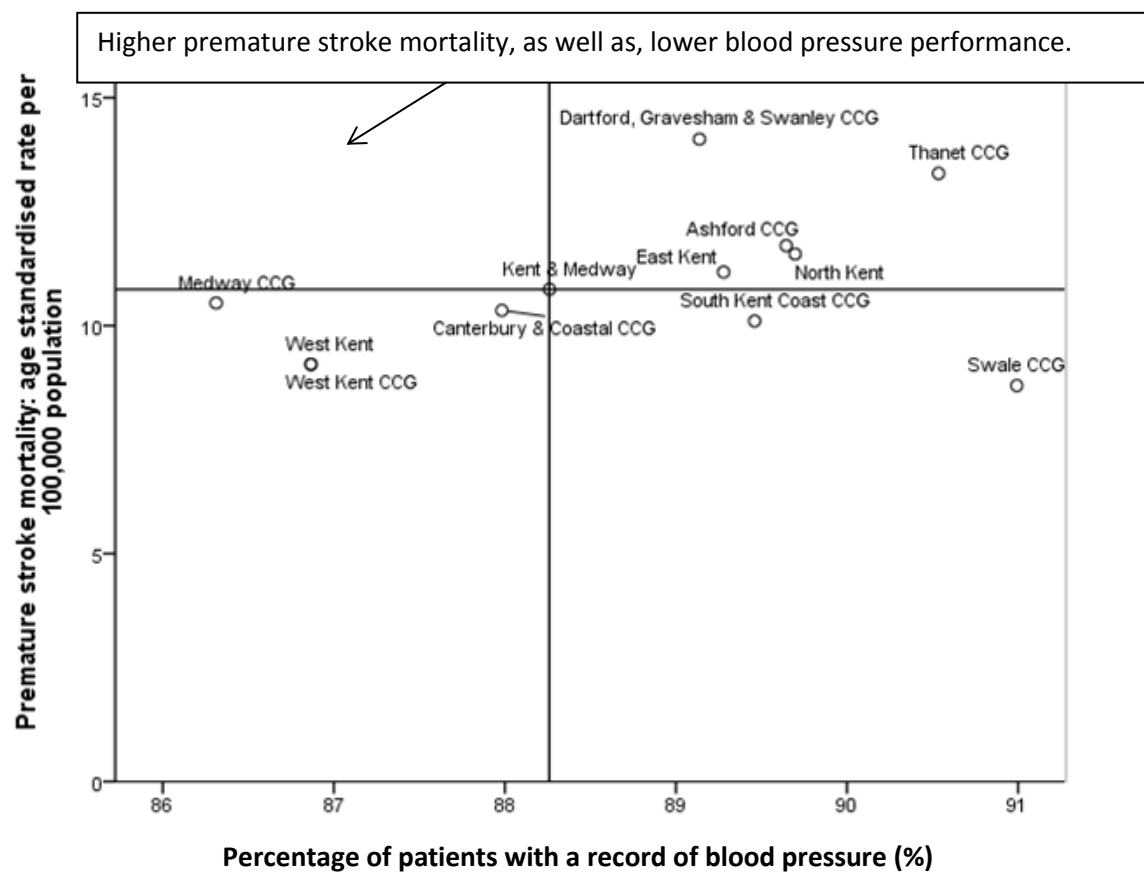
8.10 Appendix J – Premature Mortality and Stroke Risk Factors

Figure 39: Scatterplot of stroke premature mortality (2011/12-2013/14) proportion of patients with AF receiving Stroke risk assessment.



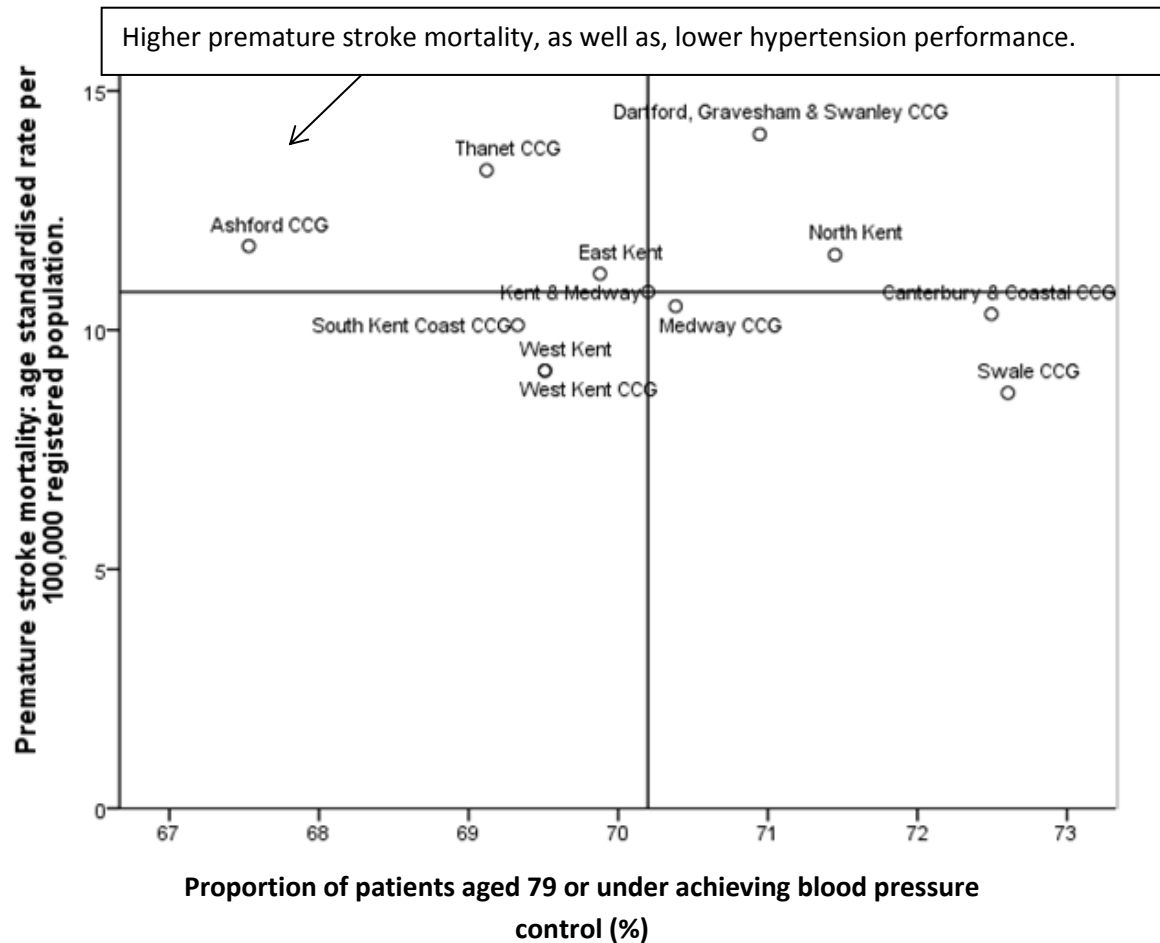
Source: PCMD, QOF

Figure 40: Scatterplot of stroke premature mortality (2011/12-2013/14) and proportion of patients aged 40 years and over with a record of blood pressure (2013/14).



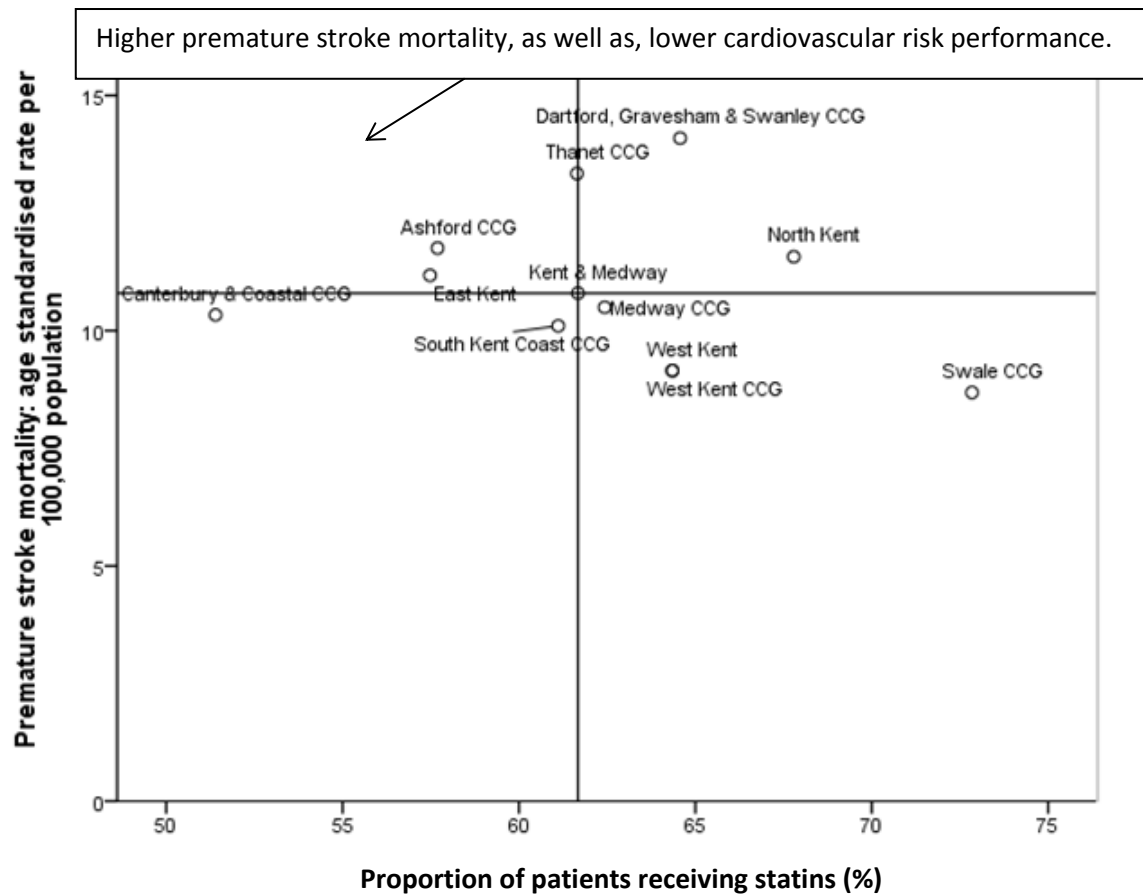
Source: PCMD, QOF

Figure 41: Scatterplot of stroke premature mortality (2011/12-2013/14) versus proportions of patients aged 79 or under with BP achieving BP control (140/90 mm) (2013/14).



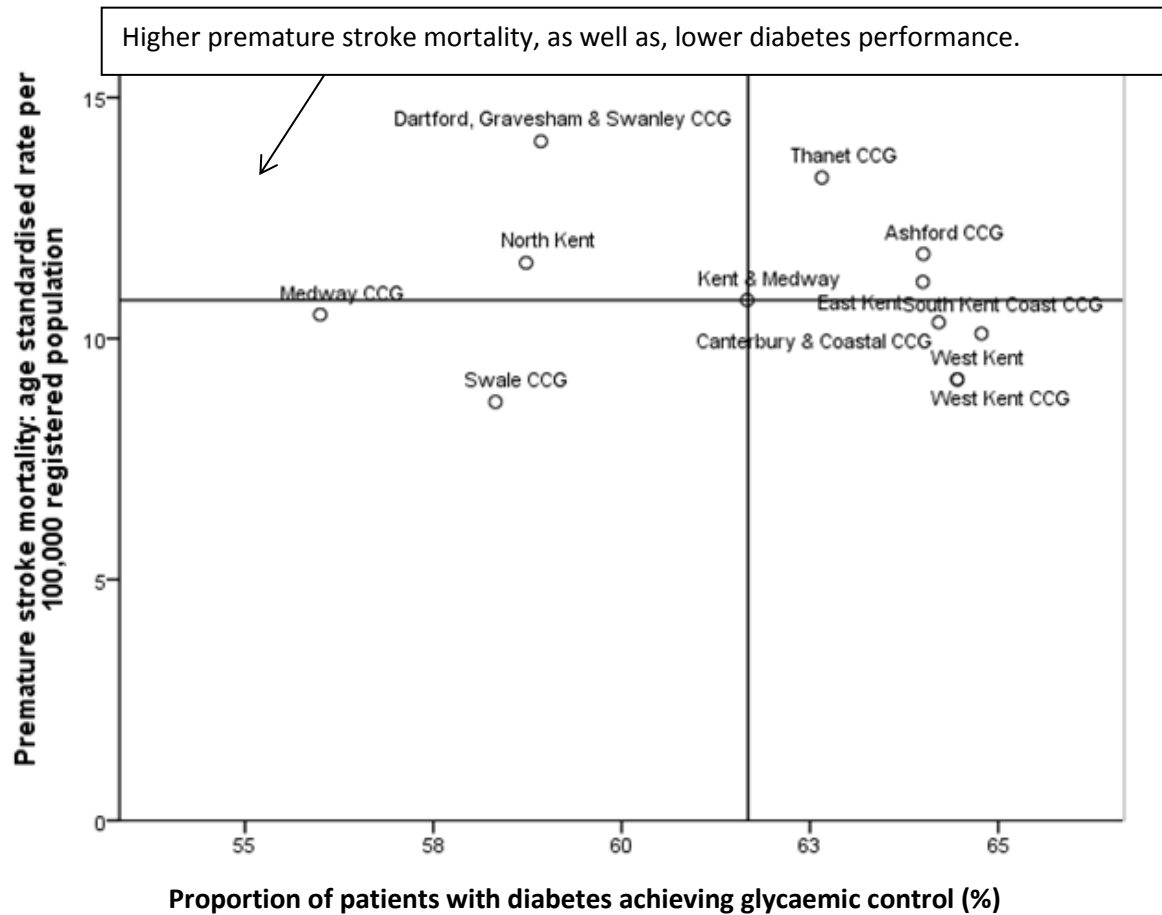
Source: PCMD, QOF

Figure 42: Scatterplot of stroke premature mortality (2011/12-2013/14) versus proportion of patients with CVD risk score of 20% and above receiving statins



Source: PCMD, QOF

Figure 43: Scatterplot of stroke premature mortality (2011/12-2013/14) and proportion of patients with diabetes achieving glycaemic control (59mmol/mol) (2013/14).



Source: PCMD, QOF

9. Glossary

Sourced from Porta (2008). *A dictionary of epidemiology*. Oxford; International Epidemiological Association

Term	Definition
Confidence interval	A range of values that indicate the precision of an estimate.
Confounding	The distortion of a measure of effect of an exposure on an outcome due to an association of the exposure with other factors that influence the occurrence of the outcome.
Directly age standardised rate per 100,000	The specific rates in a study population are averaged, using as weights the distribution of a specified standard population. The directly standardised rate represents what the crude rate would have been in the study population if that population had the same distribution as the standard population.
Hazard ratio	The ratio of hazards or risks of outcome in two groups.
Incidence	The number of new cases of a given condition occurring within a specific time period.
Odds ratio	A measure of the odds between two groups.
Old age dependency ratio	Ratio is the ratio of elderly persons (aged 65 and over) to those of working age (ages 15 to 64).
Prevalence	Total number of people who have a disease or attribute at a particular time divided by the population at risk of having the attribute or disease at that time or midway through the period.
Premature mortality	Used to indicate deaths before the age of 75 years.
Simple linear regression	A statistical method to estimate the nature of a linear relationship between two continuous variables.
Years of life lost	An indicator of premature mortality to estimate the burden within a population, this estimates the length of time a person would have lived had they not died prematurely.

10. References

1. Rothwell P.M., et al (2004) Change in stroke incidence, mortality, case-fatality, severity, and risk factors in Oxfordshire, UK 1981 to 2004. *The Lancet*, 363: 1925-33
2. Wang, Y. et al (2013) Age and ethnic disparities in incidence of stroke over time: the South London Stroke Register. *Stroke*, 44: 3298-3304.
3. Office for National Statistics (2014) 2012-based subnational population projections for England. Accessed 26th March 2015; <http://www.ons.gov.uk/ons/rel/snpp/sub-national-population-projections/2012-based-projections/stb-2012-based-snpp.html>
4. Eurostat (2014) Old age dependency ratio. Accessed 26th March 2015; <http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=tsdde510&plugin=1>
5. Heuschmann, P., et al (2008) Ethnic group disparities in 10-year trends in stroke incidence and vascular risk factors: the South London Stroke Register. *Stroke*, 39: 2204-2210.
6. Markus, H.S., et al (2007) Differences in stroke subtypes between black and white patients with stroke: the South London Ethnicity and Stroke study. *Stroke*, 116: 2157-2164.
7. Wang, Y. et al (2013a) Trends and survival between ethnic groups after stroke: the South London Stroke Register. *Stroke*, 44:380-387.
8. McKevitt, C. et al. (2011) Self reported long-term needs after stroke. *Stroke* 42(5) 1398-1403
9. Health & Social Care Information Centre (2015) Quality & Outcomes Framework. Accessed 26th March 2015; <http://www.hscic.gov.uk/gof>
10. Lee et al (2011) UK stroke incidence, mortality and cardiovascular risk management 1999-2008: time-trend analysis from the General Practice Research Database. *BMJ Open*, 1, e000269
11. ERPHO (2011) Stroke prevalence estimates. Accessed June 2015; <http://www.apho.org.uk/resource/item.aspx?RID=111124>
12. Soljak, M., et al (2011) Does higher quality primary health care reduce stroke admissions? *British Journal of General Practice*, e801 –e807
13. Bray et al (2013) Associations between the organisation of stroke services, processes of care, and mortality in England: prospective cohort study. *BMJ*, 346: 12827

14. Chen R., (2014) Socioeconomic deprivation and survival after stroke: findings from the prospective South London Stroke Register of 1995 to 2011. *Stroke*, 45: 217-223.
15. Sutton et al (2010) Changing stroke mortality trends in middle aged people: an age-period-cohort analysis of routine mortality data in persons aged 40 to 69 in England. *Journal of Epidemiology and Community Health*, 64, 523-529
16. Varshney, M., & Barlow J. (2015) Comparative analysis of headline indicators for potential years of life lost. Kent County Council.