

## Devon Wide Stroke Group Health Equity Profile for Stroke

---

### 1. Introduction

---

- 1.1 Stroke is a major cause of death and disability. It is primarily a disease of older people – 75% of strokes occur in those aged over 65 years. While stroke is a major cause of death nationally, Devon has an elderly population and stroke therefore has a particular impact in this area on the numbers of people who require services locally.
- 1.2 Health equity profiles identify how fairly services or other resources are distributed in relation to the health needs of different groups and geographical areas, and direct attention to those groups or areas where service provision may not match particular needs.
- 1.3 In any health equity audit or profile, some measure of need for health care is compared with some measure of use of health services to produce a need:use comparison or ratio. In this report, prevalence of and deaths from stroke have been taken as estimates of the need for health care for stroke. Providing health care for stroke is complex; stroke sufferers require acute investigation and management of a diverse range of acute health problems, multi-disciplinary assessment and then rehabilitation. A comprehensive equity audit for stroke might expect to examine several ways of estimating service use, including emergency admissions, time from onset of symptoms to admission, use and timing of acute investigations and treatment such as thrombolysis, admission to stroke units, uptake of rehabilitation and prescribing of preventive treatments such as anti-hypertensive treatment and anti-coagulation for those in atrial fibrillation. In this report, hospital admissions have been used to give an estimate of service use, but future audits should consider extending the range of information included.
- 1.4 It is not possible to give “ideal” values for need:use comparisons in health equity profiles and audits. Variations only give an indication of where further work to understand them may be useful in ensuring that local populations have access to and make best use of health services.

---

### 2. Executive Summary

---

- 2.1 Devon in general has an older than average population. This is more prominent in some districts than others. In East Devon, just over a quarter of the population are aged over 65 and in South Hams, Teignbridge, Torridge and West Devon, just over a fifth of the population are aged 65 and above (Figs 2 and 3).

#### Estimates of Need for Stroke Services

##### Prevalence

- 2.2 The Health Survey for England prevalence data shows a greater prevalence of stroke as age increases and a greater prevalence amongst men than women. When these prevalence figures are applied to the Devon populations the highest numbers of strokes would be expected in East Devon, Teignbridge and Exeter, followed by North Devon and then South Hams. The numbers begin to increase considerably from age 55 and above and this is also more apparent in both East Devon and

Teignbridge There are two estimates of stroke prevalence – from GP stroke and TIA registers (QOF data) and from Health Survey for England. As the latter provides age specific rates and refers to stroke alone it is the one used in this report (Figs 12-14).

### **Mortality**

- 2.3 Three year rolling averages for stroke mortality show a statistically significant drop in rate for Devon overall from 2001-2003 to 2004-2006, both for all ages and under 75 years. All districts except for North Devon show a decline in the all age rate, but only the rate change for Torridge is statistically significant. For the under 75 rate the decline is generally less than for the all ages rate. North Devon shows little change over this time period (Figs 4 and 5).
- 2.4 More variation in mortality is shown at an electoral ward level. Between 2002 and 2006 19 wards had statistically significantly high rates of mortality compared to Devon PCT overall. All local authorities, except Torridge, have some wards with statistically significantly high rates (Figs 5 and 6).
- 2.5 Across Devon, stroke mortality is not associated with deprivation (Figs 7, 8 and 9), despite this association being recognised elsewhere. Most deaths from stroke occur in IMD quintiles 3 and 4, with fewest deaths in quintiles 1 and 5.
- 2.6 Analysis by MOSAIC group shows, not surprisingly, that the highest numbers of deaths are associated with groups describing the elderly (J). High numbers are also seen in group K (rural isolation). Age-standardisation reduces the variation between group rates, with group E (Urban Intelligence) having the highest DASR, followed by groups A, D and J. (Fig ....). Further breakdown by MOSAIC type shows high numbers of deaths in types C17, D25, J53, J54, J55 and K60, while age-standardisation shows that types D25 and E33 have the statistically significantly high rates, showing that age accounts for a large proportion in the other types. E33 is a MOSAIC type largely confined to Exeter and Newton Abbot.

### **Estimates of Use of Health Services**

#### **Admissions**

- 2.7 For the 3 years of data available, the emergency admission rates for Devon show no overall trend. At district level, rates for North Devon, West Devon and South Hams are rising, while Teignbridge rates show no trend and East Devon, Exeter, Mid Devon, and Torridge rates are all falling. However, these trends are not statistically significant (Fig 13).
- 2.8 The variation in rates between districts is relatively small, but widening. North Devon has had statistically significant high rates of emergency admissions for 2004/5 – 2006/7 and 2005/6-2007/8, while South Hams had statistically significant low rates of admissions in 2003/4 – 2005/6 and 2004/5-2006/7 as did East Devon in 2005/6-2007/8. There is variation at electoral ward level with 9 wards, scattered across Devon, having statistically significantly higher rates of admissions than Devon PCT overall (Figs 13, 14 and 15).
- 2.9 In contrast to mortality, emergency admissions for stroke are associated with deprivation (Fig 16). While the highest number of admissions is associated with the middle quintile of deprivation, the most deprived quintile has about twice the admission rate of the least deprived quintile.
- 2.10 MOSAIC data shows the majority of admissions for stroke come from two groups, one associated with the elderly (J) and one rural isolation (K). Age-standardised rates show high admission rates for I (twilight subsistence), but not for J or K. Groups F and G, associated with more deprivation, also show high rates (Figs 22, 23 and 24). Rates vary 2-2.5 fold between MOSAIC groups. The

breakdown of the groups by MOSAIC type shows high admission rates in certain sub-types. Age-standardisation shows the highest rate to be in F39, followed by I48, I50 and I51, with a 4-5 fold variation between highest and lowest rates. Numbers in each group are however small, and the rates in F39 and I51 are not statistically significantly higher than the Devon average. These MOSAIC types are generally widely scattered across Devon, although occurring with differing frequency. Types D25, I48 and I50 have statistically significantly high rates of admissions

**Hospital Length of Stay**

2.11 Length of stay for stroke is very consistent across 3 of the 4 the acute trusts (Fig 17); Torbay has a shorter LOS (8.6 days) than the others, which vary from 13.3 to 14.6 days. For the remaining provider units, not surprisingly, there is enormous variation. LOS for stroke is determined largely by social circumstances (bearing in mind the high proportion of patients who cannot be discharged to their usual place of residence) and the type of disability and clinical severity of the condition. Data on discharge destination show that around 15% patients die before discharge and less than half (around 40%) are discharged to their usual place of residence. The rest are recorded as being discharged to nursing or residential homes or other hospital wards (Fig ).

**Need : Use**

2.12 Comparing the stroke prevalence and admissions by local authority by looking at whether those with the highest prevalence have the highest admissions across the county shows a mixed picture. This is shown in figure 1 below. East Devon has a high prevalence and mortality but one of the lowest admission rates. Teignbridge has a high prevalence and admission rate but a lower mortality rate. Exeter has the highest mortality rate but not the highest rate of admissions or prevalence. North Devon has high mortality and high admission rates. South Hams has low mortality and low admissions. Mid Devon has low mortality and low admissions. Torridge has high mortality and high admissions and West Devon has low mortality and slightly higher admissions. East Devon therefore has the biggest difference between mortality and admissions.

**Figure 1 – Rank of prevalence, mortality rates and admission rates by local authority**

	Prevalence	Mortality rate	Admissions rate
<b>Highest</b>	East Devon	Exeter	North Devon
	Teignbridge	East Devon	Teignbridge
	Exeter	North Devon	Exeter
	North Devon	Teignbridge	West Devon
	South Hams	Torridge	Torridge
	Mid Devon	West Devon	Mid Devon
	Torridge	South Hams	East Devon
	<b>Lowest</b>	West Devon	Mid Devon

2.13 Although generally by local authority the pattern is similar for mortality and admissions, MOSAIC analysis shows a less equitable picture, with a high death rate in group E not matched by a high admission rate, while groups with lower death rates have high admission rates (F, G and I). MOSAIC type analysis shows similar discrepancies. Types E33 and A02 have high death rates not matched by high admission rates, while types F39, F35, I48 and I50 have high admission rates not matched by high death rates. However, numbers in these MOSAIC types are small, so variation may be due to chance.

2.14 To some extent, the high admission rates in the latter types may reflect appropriate use of health services for need, as these types do represent more deprived or elderly sections of the population. It is of concern, however, that the two types with the highest death rates have low admission rates.

---

### **3. Conclusion and Recommendations**

---

- 3.1 In general, need for health care for stroke, as estimated by mortality and prevalence, appears to be met appropriately by emergency admissions to hospital, although there are some variations.
- 3.2 The lack of an association between deprivation and mortality is surprising, and warrants further investigation. The suggestion that the least deprived quintile of the population is more likely to die from stroke and less likely to be admitted to hospital may reflect more support at home, or delays in accessing acute investigation and management as recommended for a successful outcome.
- 3.3 In contrast, emergency admissions for stroke are higher in the most deprived quintile. It is generally well recognised that poorer social circumstances lead to more emergency admissions since support at home is less available and the Devon picture is in line with this view.

#### **Recommendations**

1. The stroke group should consider if other data and information from the stroke pathway and elsewhere would help to give a more complete picture of the health care available to and accessed by stroke sufferers. In particular, the group should review what prescribing data would be helpful in assessing appropriate use of health services for stroke
2. The relationship of deprivation with admissions and mortality needs further investigation.
3. This profile could be extended to include TIA, providing information on service use, e.g. of TIA clinics, where available.
4. The group should consider how best to target the MOSAIC groups and types with the highest risk of stroke with appropriate information; the current national campaign on raising awareness of the need for rapid access to acute care for stroke may provide a useful starting point
5. This profile should be repeated at an appropriate interval set by the group, with additional analyses where and when new information is available

---

### **4. Population Structure**

---

- 4.1 The following tables show the population structure of Devon by local authority and by five year age group. The overall proportion aged 65 or older in the Devon population is 20.9%, compared to 16.1% in the E&W population. There is considerable variation between districts. East Devon has the highest proportion of population aged 65 or over with just over a quarter (26.5%) of the population in this age group; South Hams, Teignbridge, Torridge and West Devon all have around 21% of their populations in this age group, while Mid and North Devon are slightly lower with 19.1% and 20.4% respectively and Exeter has a substantially younger population profile with only 15.1% aged 65 or over.<sup>1</sup>

---

<sup>1</sup> There is a difference across Devon between the resident and the registered populations. There are approximately 20,000 people resident within Devon who are registered with practices in neighbouring Primary Care Trusts and we have approximately 10,000 people registered with Devon Primary Care Trust who are resident outside of Devon Primary Care Trust. At present this data is based on a resident population as it is not possible to get consistent historic resident registered population. This may be adjusted in the future.

**Figure 2 - Resident population – June 2008**

	00-04	05 - 09	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	80 - 84	Over 85	Total
18UB East Devon	5,479	6,288	7,575	7,482	6,165	5,764	5,710	7,959	9,177	8,998	8,551	9,395	11,130	8,919	7,976	7,195	5,830	6,076	135,669
18UC Exeter	6,117	5,507	5,834	8,483	13,443	9,906	8,348	8,427	8,726	7,747	6,671	6,378	6,269	4,628	4,079	3,668	2,913	2,728	119,872
18UD Mid Devon	4,119	4,360	4,853	4,833	3,877	3,867	3,977	5,404	5,981	5,731	5,235	5,400	5,698	4,260	3,480	2,934	2,107	1,995	78,111
18UE North Devon	4,702	4,920	5,921	6,050	5,000	4,990	4,781	6,424	7,181	6,893	6,376	6,599	7,512	5,584	4,590	3,854	2,831	2,873	97,081
18UG South Hams	3,614	4,315	5,047	5,345	4,264	3,894	3,687	5,104	6,411	6,522	6,313	6,717	7,296	5,050	4,295	3,574	2,805	2,628	86,881
18UH Teignbridge	5,876	6,489	7,562	7,744	5,980	5,868	5,963	8,276	9,716	9,518	8,692	9,159	10,056	7,477	6,325	5,447	4,427	4,396	128,971
18UK Torridge	2,932	3,248	3,921	4,040	2,985	2,928	3,016	4,086	4,650	4,638	4,417	4,957	5,400	4,108	3,433	2,712	1,937	1,869	65,277
18UL West Devon	2,436	2,707	3,240	3,303	2,488	2,318	2,265	3,253	3,999	4,045	3,780	3,981	4,495	3,303	2,674	2,185	1,559	1,605	53,636
<b>Total</b>	<b>35,275</b>	<b>37,834</b>	<b>43,953</b>	<b>47,280</b>	<b>44,202</b>	<b>39,535</b>	<b>37,747</b>	<b>48,933</b>	<b>55,841</b>	<b>54,092</b>	<b>50,035</b>	<b>52,586</b>	<b>57,856</b>	<b>43,329</b>	<b>36,852</b>	<b>31,569</b>	<b>24,409</b>	<b>24,170</b>	<b>765,498</b>

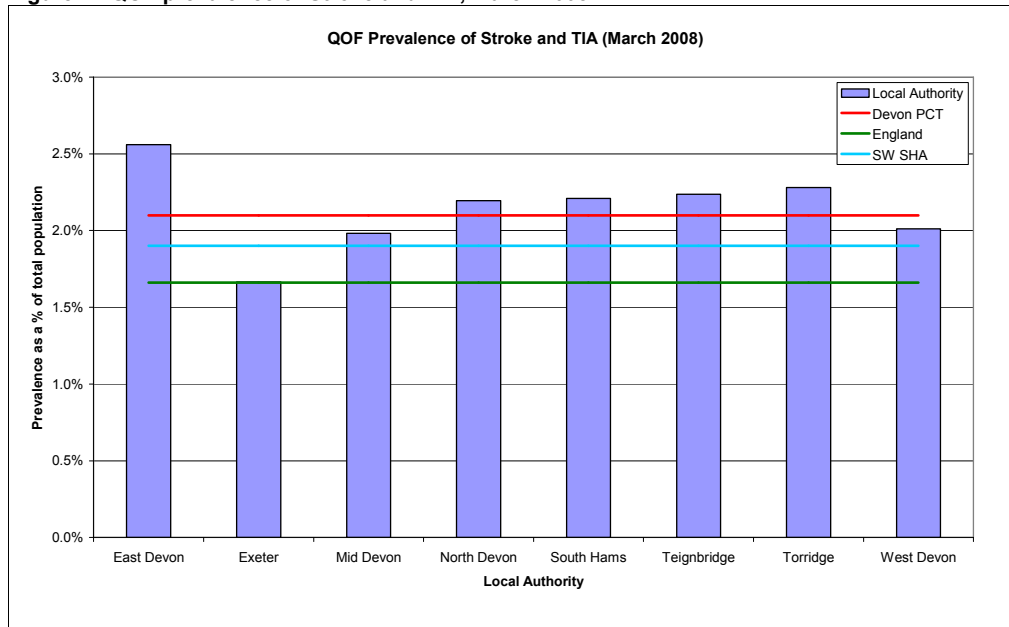
**Figure 3 - Local authority resident population, percentage by age group - June 2008**

	00-04	05 - 09	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79	80 - 84	Over 85	Total
18UB East Devon	4.0	4.6	5.6	5.5	4.5	4.3	4.2	5.9	6.8	6.6	6.3	6.9	8.2	6.6	5.9	5.3	4.3	4.5	135,669
18UC Exeter	5.1	4.6	4.9	7.1	11.2	8.3	7.0	7.0	7.3	6.5	5.6	5.3	5.2	3.9	3.4	3.1	2.4	2.3	119,872
18UD Mid Devon	5.3	5.6	6.2	6.2	5.0	4.9	5.1	6.9	7.7	7.3	6.7	6.9	7.3	5.5	4.5	3.8	2.7	2.6	78,111
18UE North Devon	4.8	5.1	6.1	6.2	5.2	5.1	4.9	6.6	7.4	7.1	6.6	6.8	7.7	5.8	4.7	4.0	2.9	3.0	97,081
18UG South Hams	4.2	5.0	5.8	6.2	4.9	4.5	4.2	5.9	7.4	7.5	7.3	7.7	8.4	5.8	4.9	4.1	3.2	3.0	86,881
18UH Teignbridge	4.6	5.0	5.9	6.0	4.6	4.6	4.6	6.4	7.5	7.4	6.7	7.1	7.8	5.8	4.9	4.2	3.4	3.4	128,971
18UK Torridge	4.5	5.0	6.0	6.2	4.6	4.5	4.6	6.3	7.1	7.1	6.8	7.6	8.3	6.3	5.3	4.2	3.0	2.9	65,277
18UL West Devon	4.5	5.0	6.0	6.2	4.6	4.3	4.2	6.1	7.5	7.5	7.1	7.4	8.4	6.2	5.0	4.1	2.9	3.0	53,636
<b>Total</b>	<b>4.6</b>	<b>4.9</b>	<b>5.7</b>	<b>6.2</b>	<b>5.8</b>	<b>5.2</b>	<b>4.9</b>	<b>6.4</b>	<b>7.3</b>	<b>7.1</b>	<b>6.5</b>	<b>6.9</b>	<b>7.6</b>	<b>5.7</b>	<b>4.8</b>	<b>4.1</b>	<b>3.2</b>	<b>3.2</b>	<b>765,498</b>

## 5. Prevalence

- 5.1 There are a variety of sources of prevalence data available for stroke. It is difficult to identify a clear and definitive prevalence, partly due to the nature of the disease and the differing severity it can take. The next few paragraphs give an overview of the QOF prevalence data and the Health Survey for England prevalence data.
- 5.2 The QOF prevalence is calculated from the GP practice stroke registers and is a prevalence of both Stroke and TIA combined. The prevalence is not age adjusted and only includes people who have been recorded by their GP as having had a stroke or TIA. As completeness of recording may vary between practices, it is likely that stroke and TIA prevalence for the PCT and some practices is under-estimated by this dataset. These data are not ideal for this analysis as stroke and TIA cannot be separated. To compare this prevalence with other indicators in this report would not be comparing like with like as TIA has not been considered elsewhere. The QOF data are presented below by local authority district. Devon overall has a higher prevalence than both the south-west region and nationally but as the data are not age adjusted we would expect this with Devon having an older than average population. The districts with the highest prevalence tend to be those with older populations, but it is also possible that the practices in the local authorities with highest prevalence are also more complete in their data recording.

**Figure 4– QOF prevalence of Stroke and TIA, March 2008**



- 5.3 NHS comparators has attempted to assess the number of people who are not on the GP disease registers (those who have suffered a stroke but not been diagnosed and those that are diagnosed but are not recorded on the disease register) They have used models to calculate expected prevalence by GP practice and they have then calculated ratios between the actual and expected prevalence. This data is not currently available as a possible problem has been identified with the model used which suggests it is not comparing like with like. When this problem is resolved then this data will be updated.
- 5.4 The Health Survey for England (HSE) is an annual survey commissioned by the Department of Health and is designed to provide regular information on various aspects of the nation's health. Each year a different demographic group and health issue is focused on and in 2003 this was cardiovascular disease. This asked questions around stroke and TIA and provides a separate prevalence estimate for each. This prevalence is obviously based on answers given by respondents rather than their medical records. The questions around stroke do however ask about doctor diagnosed stroke. Figure 5 below shows the stroke prevalence from the HSE. Figure 6 shows these prevalence figures applied to the local authority resident populations.

Figure 5 - Stroke prevalence (HSE 2003)

	16-24	25-34	35-44	45-54	55-64	65-74	75+	Total
<b>Men</b>	0.1%	0.4%	0.3%	1.2%	2.2%	7.5%	13.3%	2.4%
<b>Women</b>	0.2%	0.3%	0.6%	0.9%	2.5%	5.3%	8.8%	2.2%

Figure 6 – HSE stroke prevalence applied to Devon populations

LAD	Sex	16-24	25 - 34	35 - 44	45 - 54	55 - 64	65 - 74	Over 75	Total
<b>East Devon</b>	F	12	17	53	82	266	470	1,010	<b>1,910</b>
	M	6	23	25	103	217	612	1,017	<b>2,002</b>
<b>Exeter</b>	F	21	27	49	63	159	247	517	<b>1,083</b>
	M	10	38	27	89	140	306	463	<b>1,072</b>
<b>Mid Devon</b>	F	8	12	34	50	138	209	367	<b>818</b>
	M	4	16	17	65	123	291	384	<b>900</b>
<b>North Devon</b>	F	10	14	41	61	177	278	505	<b>1,085</b>
	M	5	20	20	79	155	376	515	<b>1,171</b>
<b>South Hams</b>	F	8	11	36	59	177	253	473	<b>1,018</b>
	M	4	16	17	76	153	349	486	<b>1,100</b>
<b>Teignbridge</b>	F	12	18	55	84	244	382	757	<b>1,551</b>
	M	6	24	26	108	208	506	759	<b>1,638</b>
<b>Torridge</b>	F	6	9	26	42	133	198	339	<b>752</b>
	M	3	12	13	54	112	290	365	<b>848</b>
<b>West Devon</b>	F	5	7	22	36	108	163	289	<b>630</b>
	M	3	9	11	46	92	226	286	<b>673</b>
<b>Devon</b>	F	<b>81</b>	<b>115</b>	<b>316</b>	<b>477</b>	<b>1,402</b>	<b>2,200</b>	<b>4,256</b>	<b>8,846</b>
	M	<b>41</b>	<b>157</b>	<b>156</b>	<b>620</b>	<b>1,199</b>	<b>2,956</b>	<b>4,274</b>	<b>9,405</b>

- 5.5 As expected figure 6 shows the highest numbers of strokes are in the districts with the highest elderly populations and highest total populations. It does however give a clear breakdown of the expected numbers by age and gender. The numbers begin to increase a great deal from age 55 and above and this is again more apparent in both East Devon and Teignbridge.
- 5.6 As the HSE prevalence data enables us to look at stroke without TIA and provides a complete age and gender breakdown this is the prevalence that will be used to compare need with aspects of stroke services.

## 6. Mortality

- 6.1 Figure 7 below shows directly age standardised stroke mortality rates for all ages by local authority. The three year rolling averages show a statistically significant drop in rate for Devon overall. All districts except for North Devon show a decline in rates, but only the rate change for Torridge is statistically significant.
- 6.2 Figure 8 Shows the directly age standardised stroke mortality rates for people aged under 75. Rates are much lower than for the all age mortality rate, demonstrating the clear relationship between age and stroke mortality. A similar time trend emerges as for the all ages mortality rate; the overall Devon rate is falling, although less steeply than the all ages rate. Most districts show the same trend, with the exception of North Devon, Teignbridge and West Devon. None of these trends are statistically significant.

Figure 7 – Directly age standardised mortality rates from Stroke, all ages

Local Authority	2001 - 2003			2002 - 2004			2003 - 2005			2004 - 2006		
	Rate per 100,000	LLCI	ULCI	Rate per 100,000	LLCI	ULCI	Rate per 100,000	LLCI	ULCI	Rate per 100,000	LLCI	ULCI
East Devon	61.9	57.0	66.7	58.6	54.0	63.1	54.0	49.8	58.2	53.0	48.7	57.2
Exeter	65.4	58.5	72.3	61.7	55.0	68.3	60.5	53.8	67.1	57.9	51.5	64.3
Mid Devon	59.9	52.6	67.2	58.4	51.3	65.5	52.2	45.7	58.7	46.6	40.5	52.7
North Devon	52.8	46.8	58.9	54.5	48.4	60.7	52.1	46.1	58.2	50.1	44.3	56.0
South Hams	57.2	50.8	63.7	51.9	45.9	57.8	50.9	45.0	56.8	47.0	41.4	52.6
Teignbridge	59.0	53.9	64.1	57.0	52.0	62.0	55.2	50.1	60.3	49.6	44.8	54.4
Torrige	68.7	60.5	77.0	62.7	54.8	70.5	58.3	50.9	65.6	47.5	41.0	53.9
West Devon	61.1	52.5	69.7	55.5	47.1	63.9	54.4	45.9	62.9	47.3	39.6	55.0
Devon	60.4	58.2	62.6	57.6	55.4	59.7	54.7	52.6	56.8	50.5	48.5	52.5

Figure 8 – Directly age standardised mortality rates from Stroke aged under 75

Local Authority	2001 - 2003			2002 - 2004			2003 - 2005			2004 - 2006		
	Rate per 100,000	LLCI	ULCI	Rate per 100,000	LLCI	ULCI	Rate per 100,000	LLCI	ULCI	Rate per 100,000	LLCI	ULCI
East Devon	15.1	11.8	18.4	12.2	9.3	15.1	9.5	7.0	11.9	11.4	8.7	14.2
Exeter	17.4	12.9	21.8	15.7	11.5	20.0	15.6	11.3	19.9	14.4	10.5	18.4
Mid Devon	15.8	11.2	20.4	14.0	9.8	18.2	11.0	7.3	14.7	10.1	6.5	13.6
North Devon	13.3	9.6	17.0	14.9	10.9	18.8	14.5	10.5	18.5	14.4	10.4	18.3
South Hams	15.0	10.8	19.1	11.5	8.0	15.0	12.3	8.7	16.0	11.8	8.3	15.4
Teignbridge	11.5	8.6	14.5	12.3	9.2	15.3	14.5	11.1	17.8	13.6	10.4	16.8
Torrige	15.3	10.4	20.1	13.7	9.1	18.3	11.4	7.4	15.4	7.8	4.6	11.0
West Devon	11.6	6.9	16.3	13.2	8.1	18.4	14.8	9.1	20.5	11.9	7.0	16.8
Devon	14.3	12.9	15.7	13.3	11.9	14.6	12.8	11.5	14.1	12.2	10.9	13.4

6.3 Figure 9 below shows the number of deaths by age group and local authority between 2002 and 2006. This shows the numbers of deaths are low in the under 75s. They are then considerably higher in the older age groups and there is considerable difference in numbers between local authorities.

Figure 9 – Numbers of deaths by age group (2002-2006)

Age group	East Devon	Exeter	Mid Devon	North Devon	South Hams	Teignbridge	Torrige	West Devon	Total
Under 65	46	38	22	40	33	40	17	21	257
65-74	116	82	50	64	61	93	45	28	539
75-84	499	239	165	197	230	383	177	138	2028
85 and above	845	412	249	340	305	532	282	203	3168
Total	1506	771	486	641	629	1048	521	390	5992

6.4 Figure 10 below shows a map of the rates of mortality as quintiles for Devon. This shows that there are wards with high and low rates of mortality from stroke in all local authorities. Figure 11 shows the electoral wards with statistically significantly high and low rates of stroke mortality compared to Devon PCT overall. There are 19 wards with statistically significant high rates of mortality, scattered across 7 of the 8 districts in Devon: 4 wards in East Devon (Honiton St Michael's, Sidmouth Rural, Sidmouth Town and Trinity); 4 in Exeter (Alphington, Newtown, Polsloe and St James); 2 in Mid Devon, (Castle and Cullompton North); 2 in North Devon (Fremington and Ilfracombe Central); 2 in South Hams (Bickleigh and Shaugh and Ivybridge Central); 2 in Teignbridge, (Ambrook and College) and 3 in West Devon (Buckland Monachorum, Mary Tavy and Okehampton West).



Figure 10 – Map of Directly age standardised rates of stroke mortality

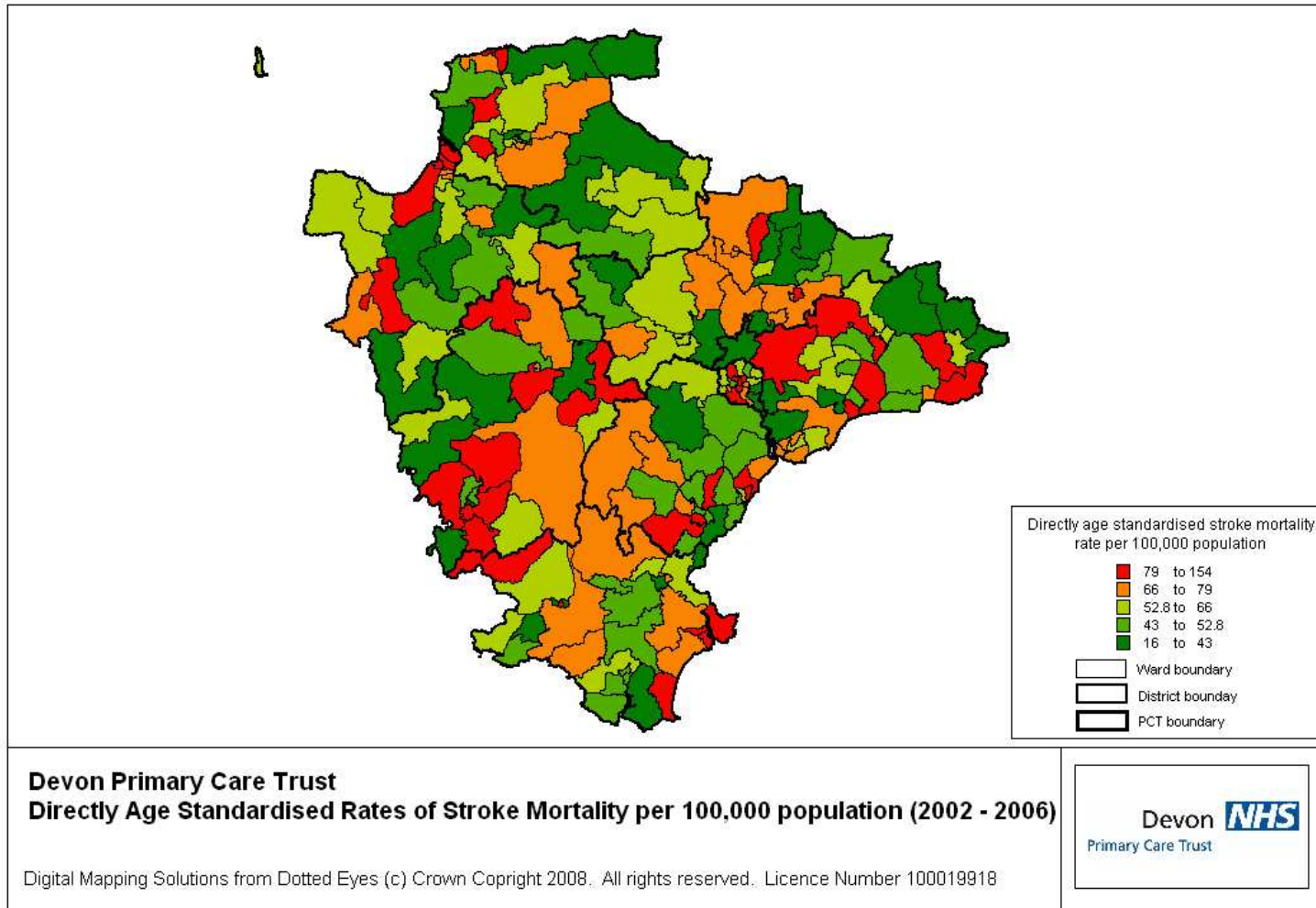
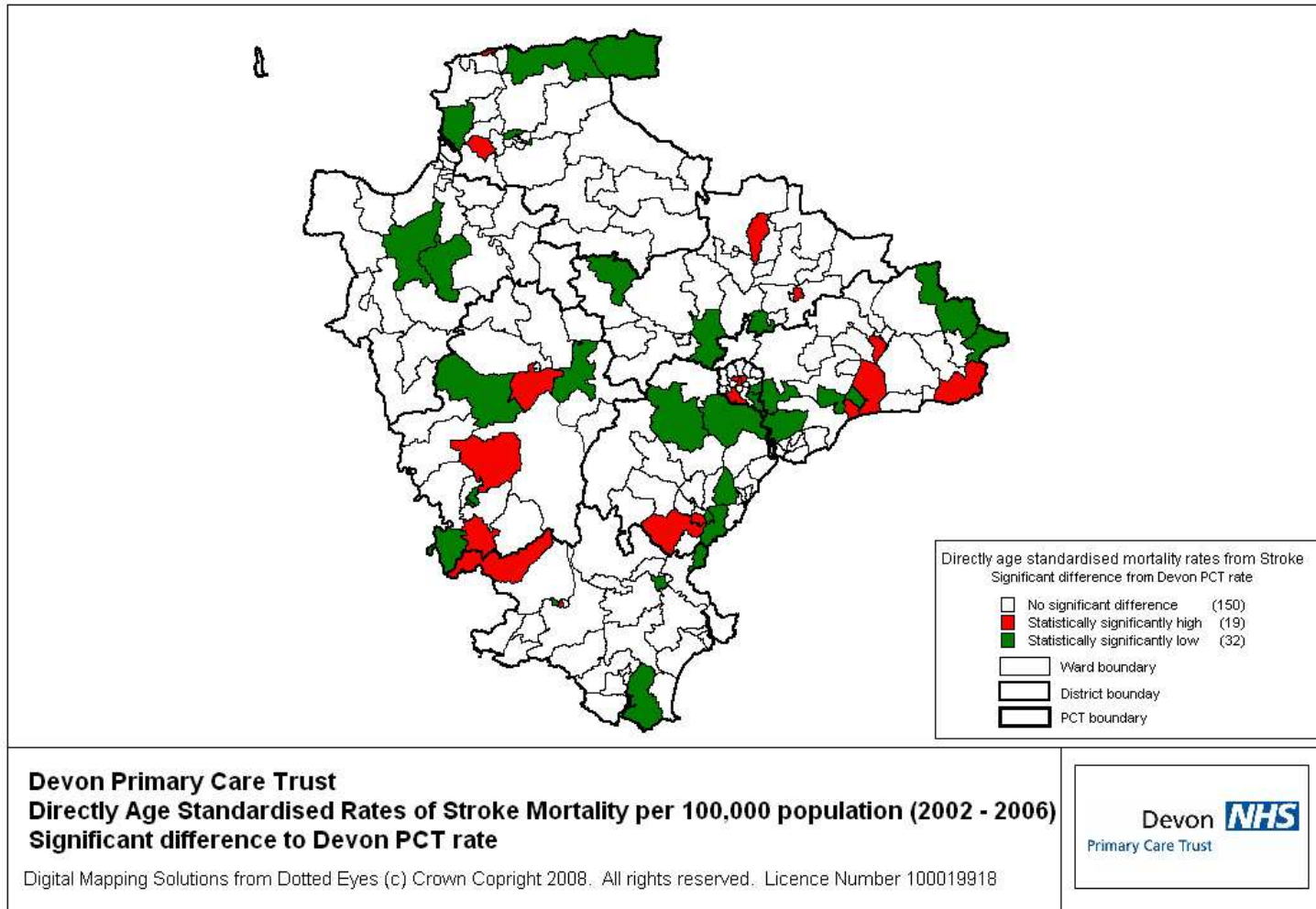
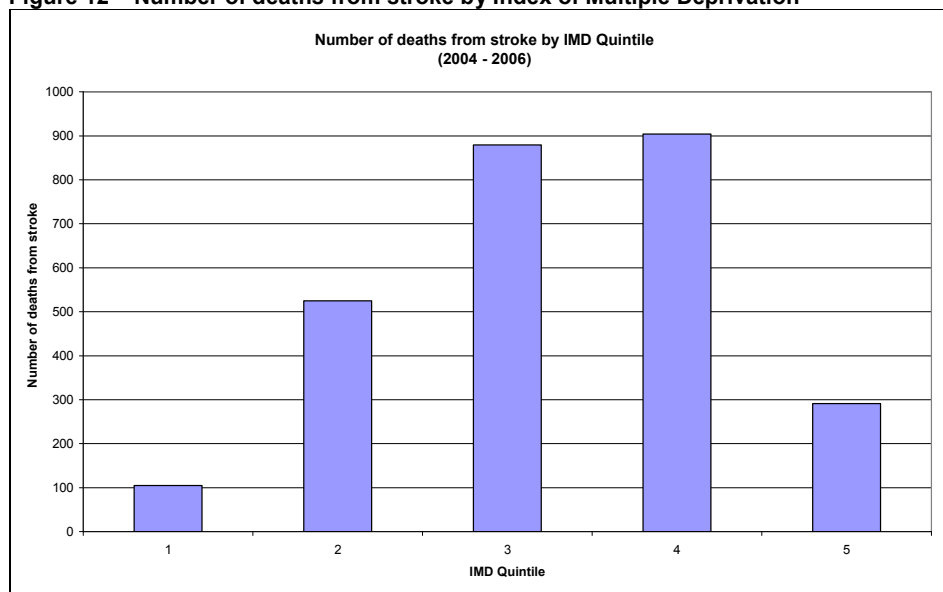


Figure 11 - Map of statistical difference between directly age standardised rates of stroke mortality

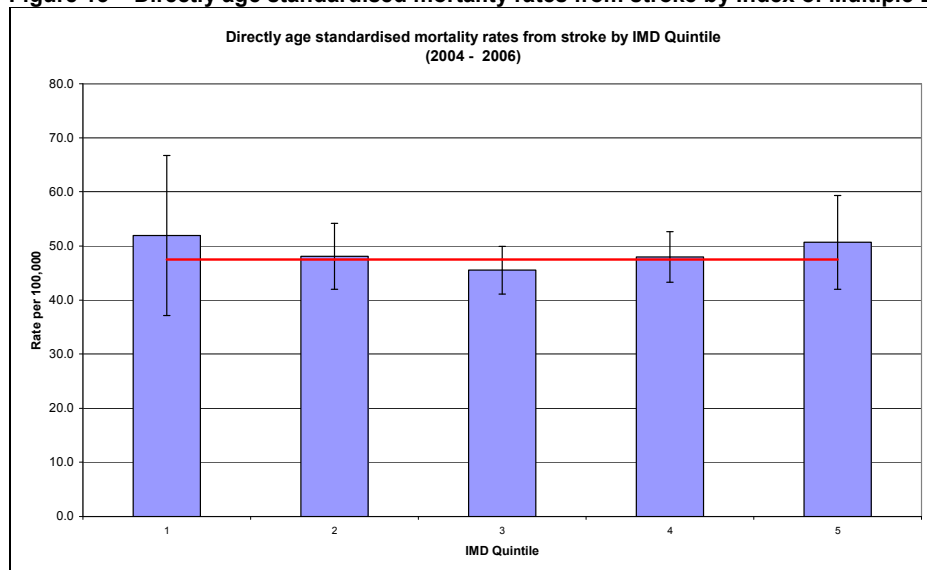


6.5 Figures 12 and 13 below show the numbers and directly age standardised rates of mortality by index of multiple deprivation quintile. In Devon there are relatively low numbers of people in both the most and least deprived quintiles. This is reflected in the numbers of deaths from stroke by quintile. Unexpectedly there is little variation in mortality from stroke by deprivation. The most and least deprived quintiles have the highest rates but there are no statistically significant differences.

**Figure 12 – Number of deaths from stroke by Index of Multiple Deprivation**

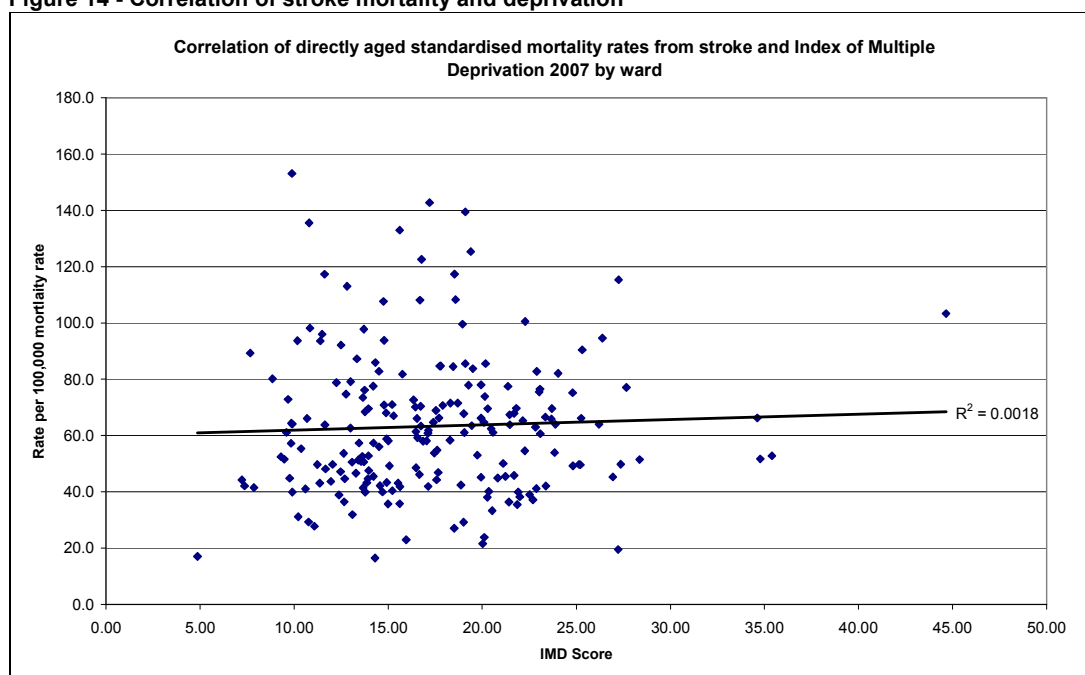


**Figure 13 – Directly age standardised mortality rates from stroke by Index of Multiple Deprivation**



- 6.6 Figure 14 below shows the correlation between mortality rates and Index of Multiple Deprivation scores by electoral ward. Again, the graph shows there is very little correlation between stroke mortality and deprivation.

**Figure 14 - Correlation of stroke mortality and deprivation**



## 7. Emergency Admissions

- 7.1 In interpreting hospital activity data for stroke, it is assumed that patients who suffer a stroke are usually admitted directly to an acute trust for urgent scanning and management in an acute stroke unit, as set out in the NICE guidelines and National Stroke Strategy (<http://www.nice.org.uk/CG68>). At some point, they are likely to be transferred for further rehabilitation, which may take place in the acute unit or a community hospital before discharge. In general, around half of stroke patients who survive to discharge from hospital are unable to return to their previous home.
- 7.2 Clinical practice, however, is likely to vary across Devon, as the 4 acute hospitals have different service configurations of their stroke units, which will be reflected in their admission and transfer data.
- 7.3 The table below presents the directly age standardised rates of emergency admissions for stroke by local authority. The rates are calculated using data for three financial years to ensure they are statistically robust. In 2003/4 – 2005/6 and 2004/5 – 2006/7 South Hams had statistically significant low rates of admissions as did East Devon in 2005/6 – 2007/8. North Devon had statistically significant high rates of admissions from 2004/5

through to 2007/8. There were no statistically significant changes in rates in Devon overall or by local authority between 2003/04 and 2007/08

- 7.4 Devon rates overall are steady or slightly falling. There is some district variation: East Devon, Exeter, Mid Devon, Torridge are all falling, while North Devon, West Devon and South Hams are rising and Teignbridge shows no trend.

**Figure 15 – Directly age standardised rates of emergency hospital admissions for stroke**

	2003/4 - 2005/6			2004/5 - 2006/7			2005/6 - 2007/8		
	Rate per 100,000	LLCI	ULCI	Rate per 100,000	LLCI	ULCI	Rate per 100,000	LLCI	ULCI
<b>East Devon</b>	84.3	77.8	90.7	81.4	75.1	87.7	76.8	70.8	82.9
<b>Exeter</b>	96.9	87.8	106.1	95.2	86.0	104.4	93.4	84.3	102.5
<b>Mid Devon</b>	87.2	77.3	97.1	81.5	72.1	90.9	78.6	69.4	87.8
<b>North Devon</b>	96.5	87.6	105.5	102.3	93.1	111.5	102.2	93.1	111.3
<b>South Hams</b>	69.2	61.8	76.6	72.7	65.1	80.2	76.7	68.9	84.5
<b>Teignbridge</b>	96.4	88.8	104.0	96.1	88.5	103.7	97.8	90.2	105.4
<b>Torridge</b>	94.4	84.0	104.7	89.7	79.7	99.6	83.6	74.0	93.1
<b>West Devon</b>	86.4	74.6	98.2	88.4	77.0	99.9	90.9	79.8	102.0
<b>Devon</b>	<b>88.9</b>	<b>85.8</b>	<b>91.9</b>	<b>88.3</b>	<b>85.3</b>	<b>91.3</b>	<b>87.2</b>	<b>84.3</b>	<b>90.2</b>

- 7.5 Figure 16 shows the numbers of emergency admissions by age. This shows the highest numbers of admissions are in East Devon, Teignbridge and North Devon. There are higher numbers of younger admissions from Teignbridge.

**Figure 16 – Numbers of emergency hospital admissions for stroke by age (2002-2006)**

Age group	East Devon	Exeter	Mid Devon	North Devon	South Hams	Teignbridge	Torridge	West Devon	Total
Under 65	88	87	64	88	35	108	42	32	544
65-74	136	87	62	115	80	152	67	50	749
75-84	332	171	110	203	190	293	110	121	1530
85 and above	278	127	83	161	130	234	115	95	1223
<b>Total</b>	<b>834</b>	<b>472</b>	<b>319</b>	<b>567</b>	<b>435</b>	<b>787</b>	<b>334</b>	<b>298</b>	<b>4046</b>

- 7.6 There is variation in emergency admission rates within local authorities and to try and identify this, rates have been calculated at electoral ward level. The numbers of admissions in some areas are however very low and therefore give very wide confidence intervals.
- 7.7 The map in figure 17 below shows quintiles of admission rates across Devon wards for 2005/6-2007/8. This shows there are areas within all of the local authorities with higher rates of emergency admissions but there are large areas of North Devon, West Devon, Teignbridge and South Hams with higher emergency admissions.
- 7.8 The map in figure 18 shows the electoral wards with statistically significant high and low rates of emergency admissions. The significantly high rates were in Honiton St Michael's in East Devon, Westexe in Mid Devon, Thrushel in West Devon, Totnes Town in South Hams, Ilfracombe Central and Central Town in North Devon and Bushell, Dawlish South West and Teignmouth East in Teignbridge.

Figure 17 – Map of Directly age standardised emergency admission rates for stroke

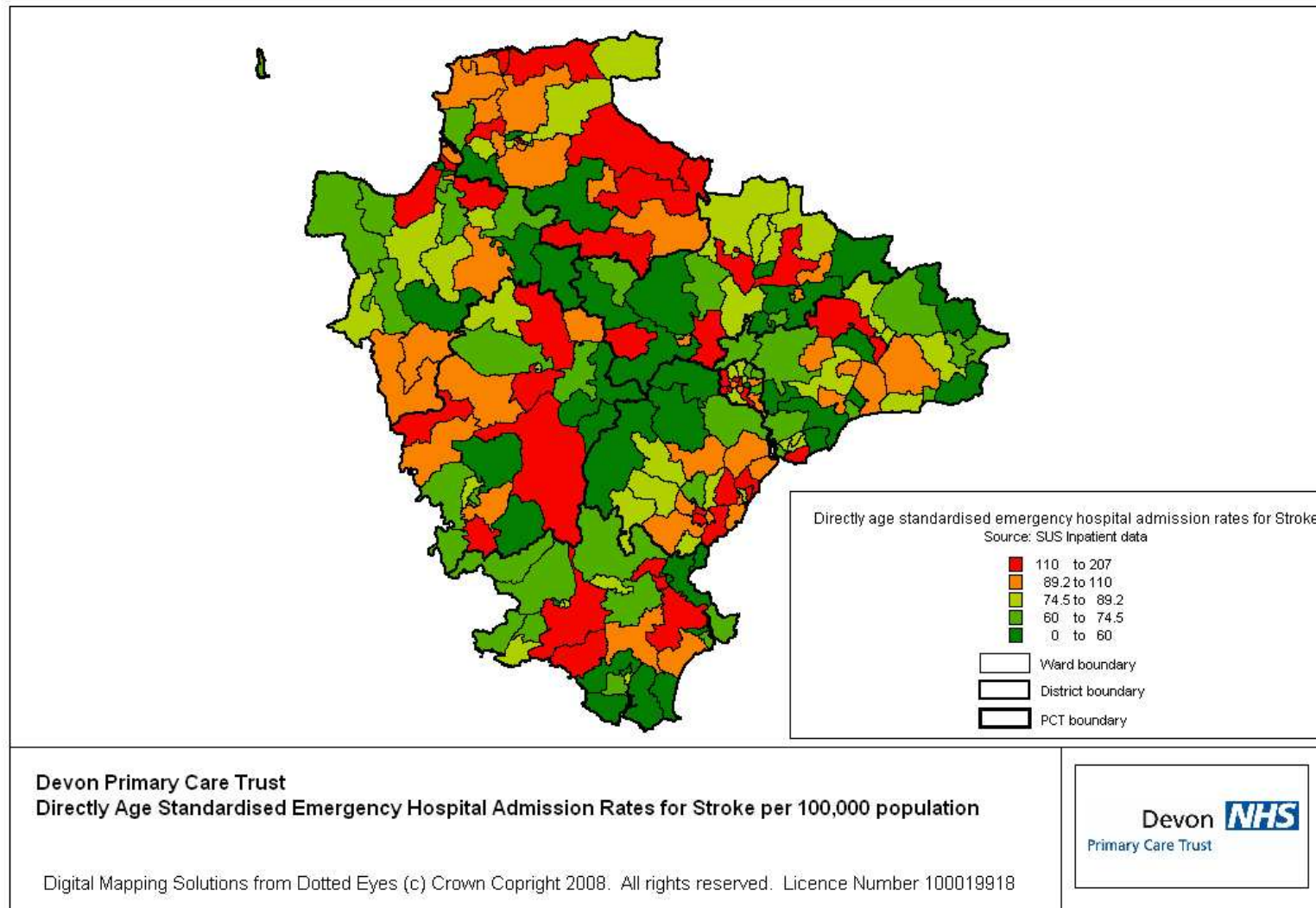
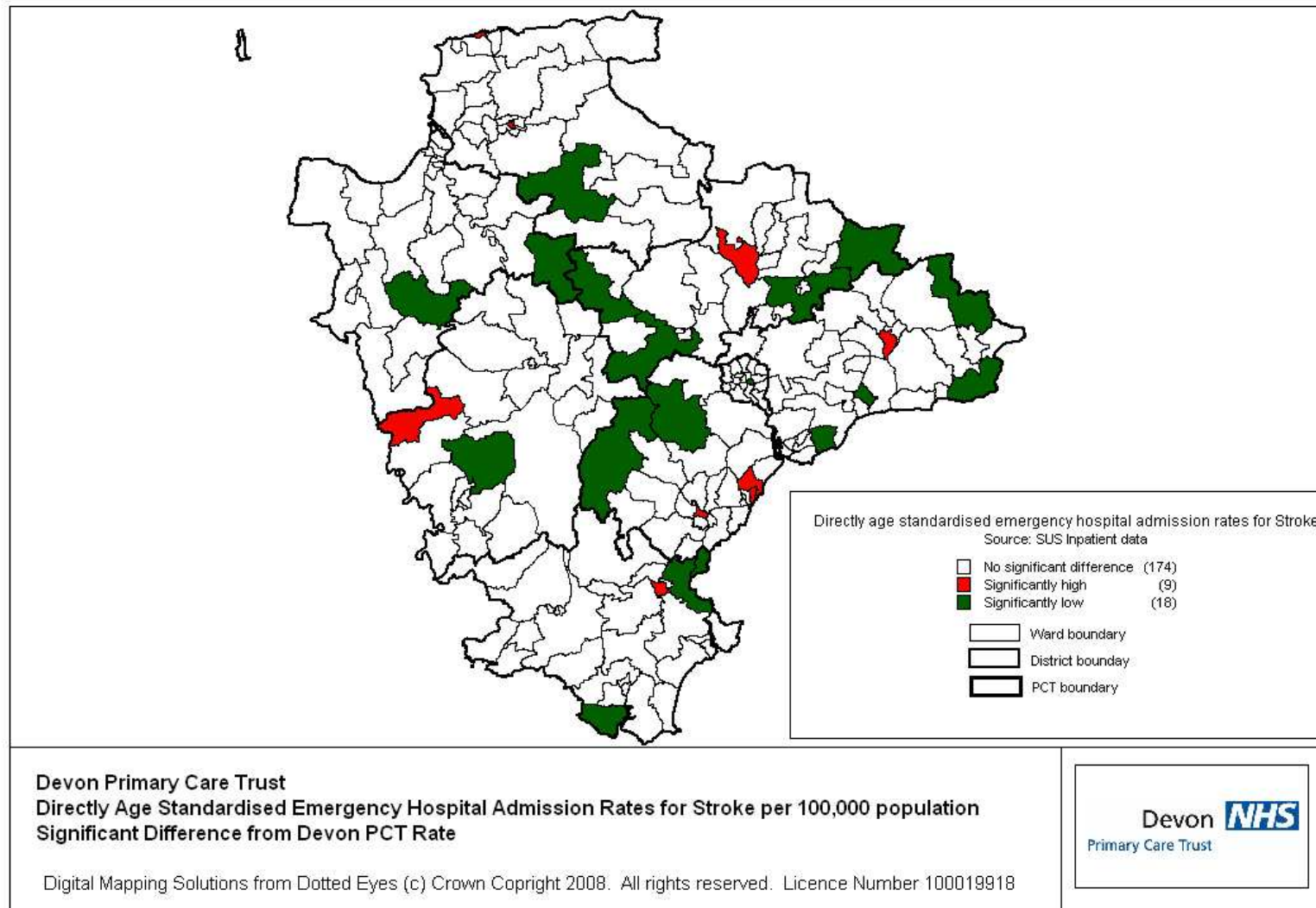


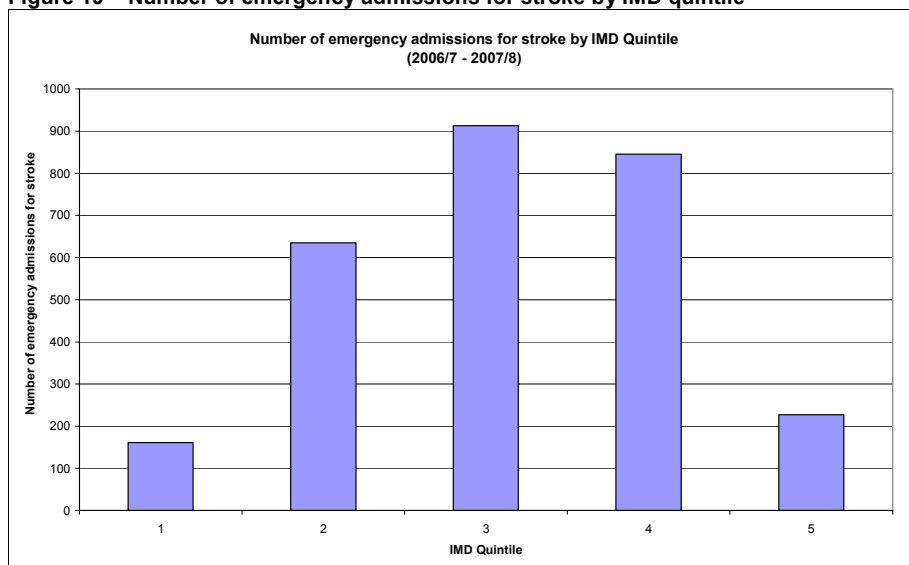
Figure 18 - Map of statistical difference between directly age standardised emergency admission rates for stroke





7.9 The following graphs and tables show emergency admissions by Index of Multiple Deprivation quintile, with 1 being the most deprived and 5 the least deprived. Figure 19 shows the number of admissions, figure 20 shows the number of admissions by IMD quintile and age and figure 21 shows the directly age standardised rates of admissions. There are higher numbers of admissions from the middle quintiles but although the numbers are lower in the most deprived quintile there are higher proportions of people admitted from the younger age groups. The directly age standardized rates clearly shows there are proportionally more emergency admissions from the more deprived populations.

**Figure 19 – Number of emergency admissions for stroke by IMD quintile**

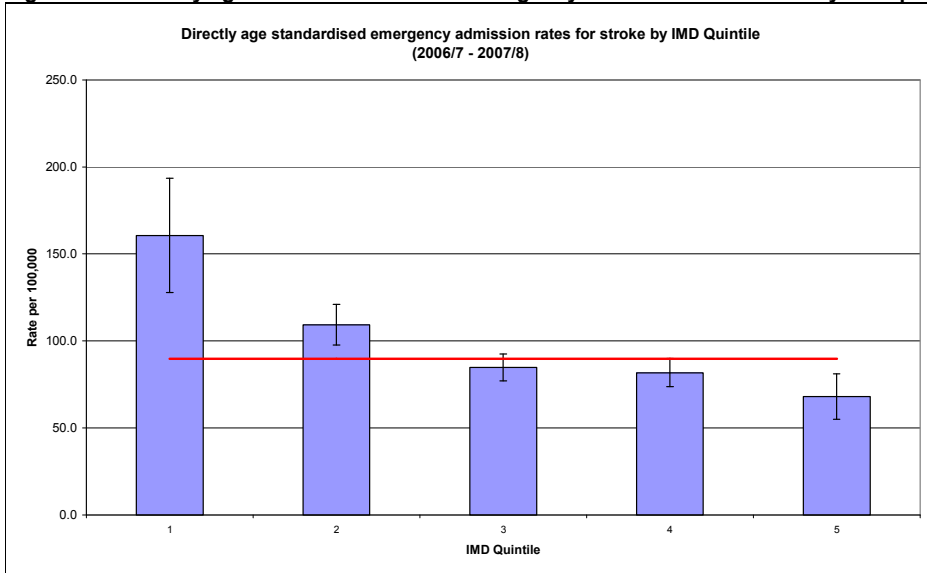


**Figure 20 – Number of emergency admissions for stroke by IMD quintile and age**

Age groups	Most Deprived Quintile			Least Deprived Quintile	
	30	118	133	93	13
Under 65	30	118	133	93	13
65-74	37	108	176	147	40
75-84	49	233	337	320	101
85 and above	45	176	267	285	73
<b>Total</b>	<b>161</b>	<b>635</b>	<b>913</b>	<b>845</b>	<b>227</b>

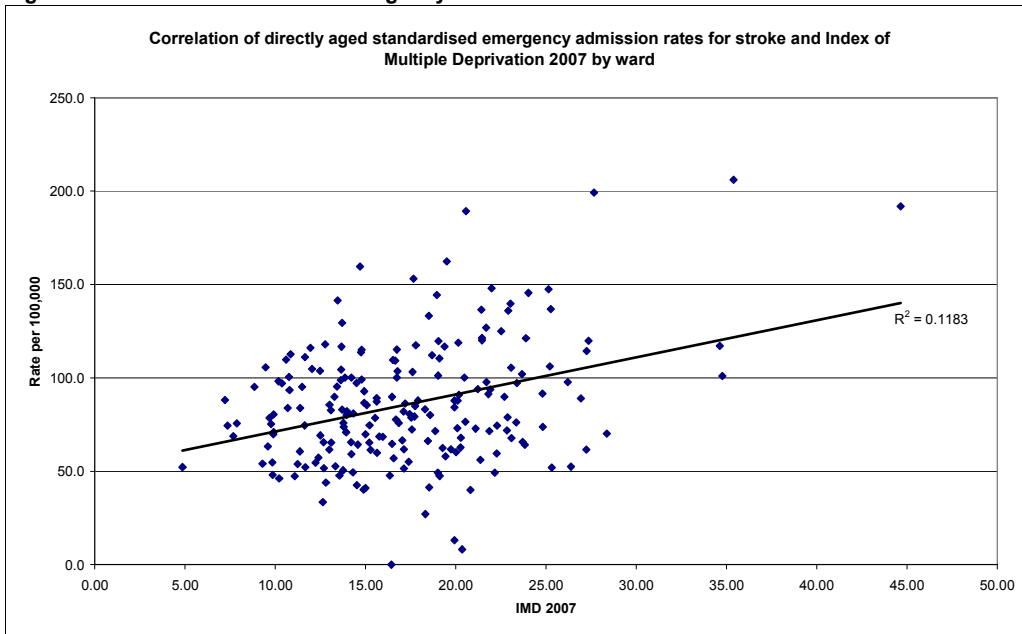


**Figure 21 – Directly age standardised rate of emergency admissions for stroke by IMD quintile**



7.10 Figure 22 below takes this to a smaller geographic area and shows the correlation between rates of emergency admissions by electoral ward and deprivation. The graph shows that some of the variation in admission rates at ward level can be attributed to deprivation.

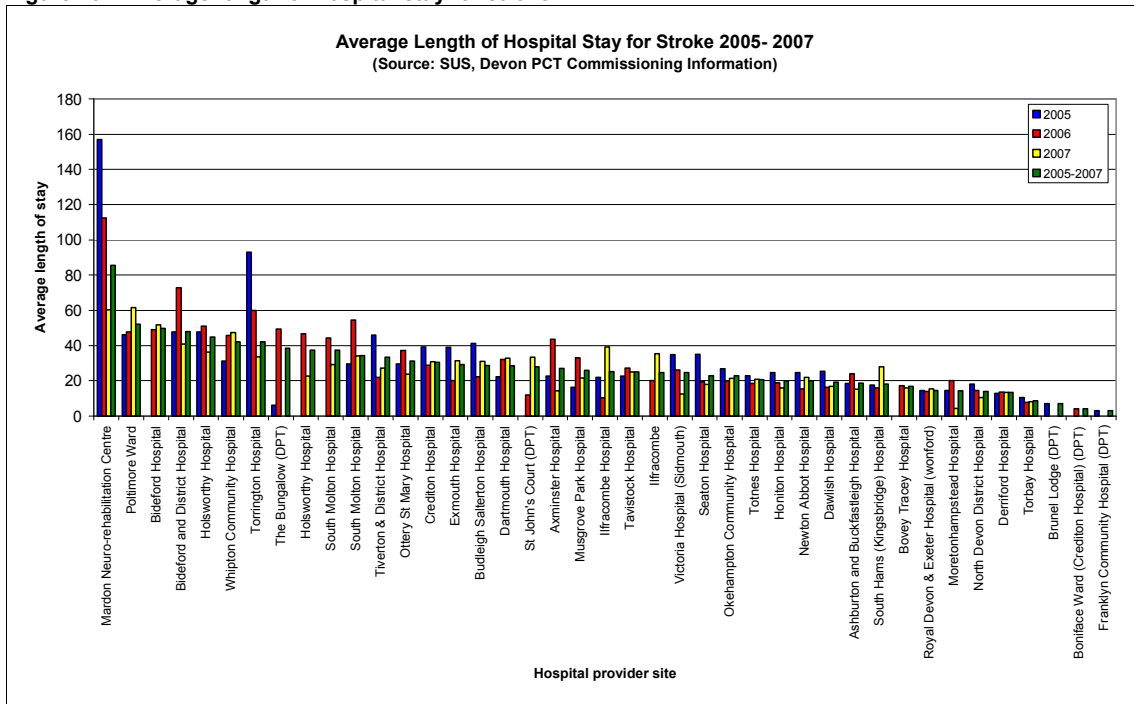
**Figure 22 - Correlation between emergency admissions for stroke and IMD 2007**



## 8. Length of Hospital Stay

8.1 Figure 23 below shows the average length of stay from stroke by hospital provider site over the three years 2005-2007. There is variation between the different provider sites and also between the different years.

Figure 23 – Average length of hospital stay for stroke



8.2 It is not possible to standardise this data in any way and as a result there may be some providers with low numbers of long stays which will give long average lengths of stay. Appendix 1 shows the figures by number and lengths of stays.

---

## 9. Hospital Discharge Destination

---

- 9.1 Figure 24 below shows the discharge destination of patients admitted with an HRG code for stroke. There is variation between different providers and there is also a variation in the recording which needs further investigation.

**Figure 24 - Destination on discharge of patients admitted with an HRG code for stroke**

	2005		2006		2007	
	Number	%	Number	%	Number	%
19 Usual place of Residence	571	37%	887	41%	952	44%
29 Temporary place of Residence	61	4%	100	5%	76	4%
51 NHS Hospital Provider - general ward	276	18%	620	29%	622	29%
53 NHS Hospital Provider - mental ward	3	0%	8	0%	3	0%
54 NHS Nursing Home	19	1%	13	1%	17	1%
65 LA Part 3 residential accommodation	40	3%	44	2%	35	2%
79 Patient Died or Stillbirth	227	15%	301	14%	344	16%
85 Non-NHS run Residential Care Home	32	2%	63	3%	74	3%
86 Non-NHS run Nursing Home	3	0%	0	0%	0	0%
87 Non-NHS run Hospital	4	0%	9	0%	0	0%
98 Not applicable	308	20%	123	6%	34	2%
99 Not known	0	0%	1	0%	1	0%
Grand Total	1544	100%	2171	100%	2160	100%

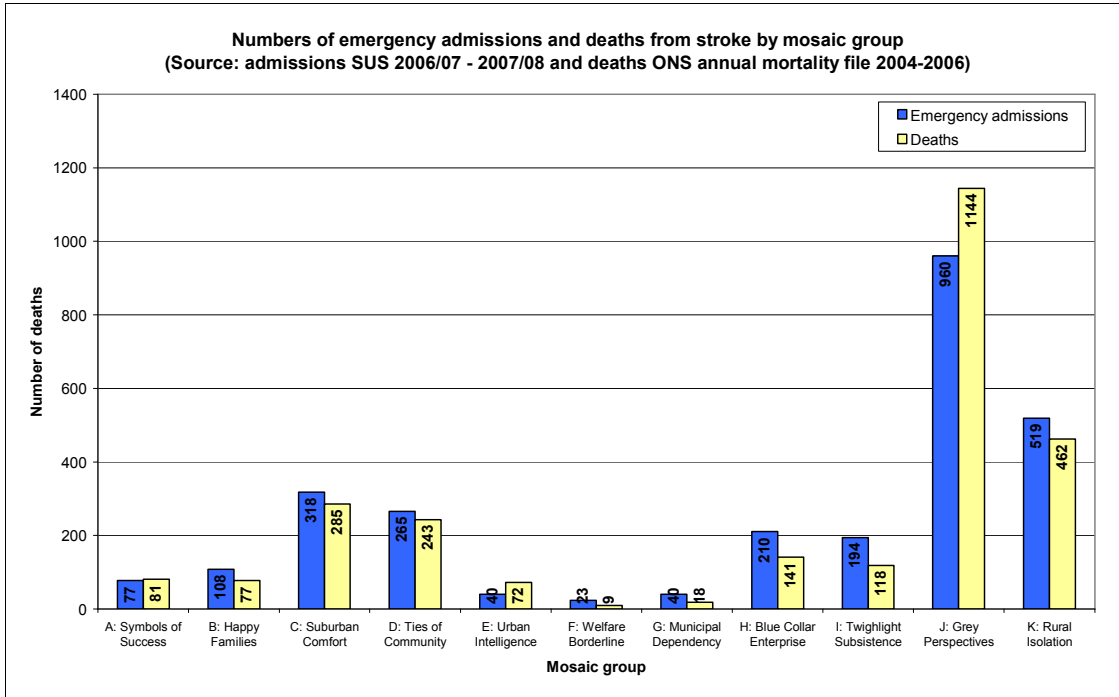
---

## 10. MOSAIC

---

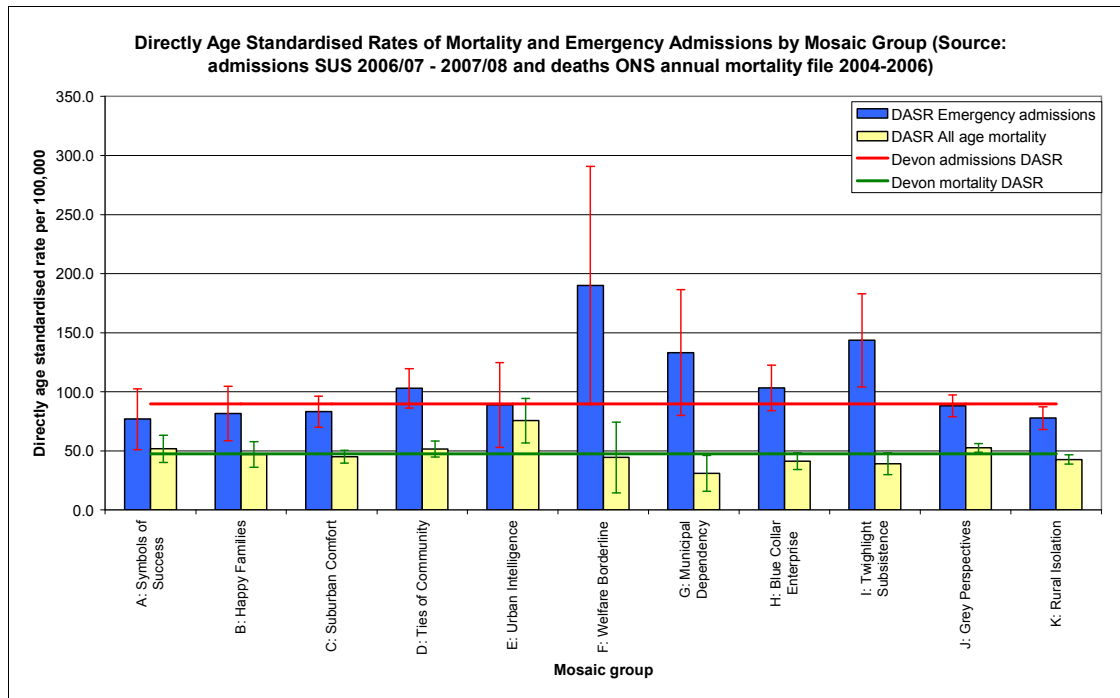
- 10.1 MOSAIC is a classification system which assists in defining populations and supporting policy, communications activity and resource strategies. Each postcode is allocated a MOSAIC type and there are detailed descriptions of each type. There are 61 types and these can be combined into 11 groups.
- 10.2 Figure 25 below shows the numbers of emergency admissions and deaths from stroke by mosaic group. The groups with the highest number of admissions and deaths are groups J and K both of which have a high proportion of older people.

**Figure 25 - Numbers of emergency admissions and deaths from stroke by mosaic group**



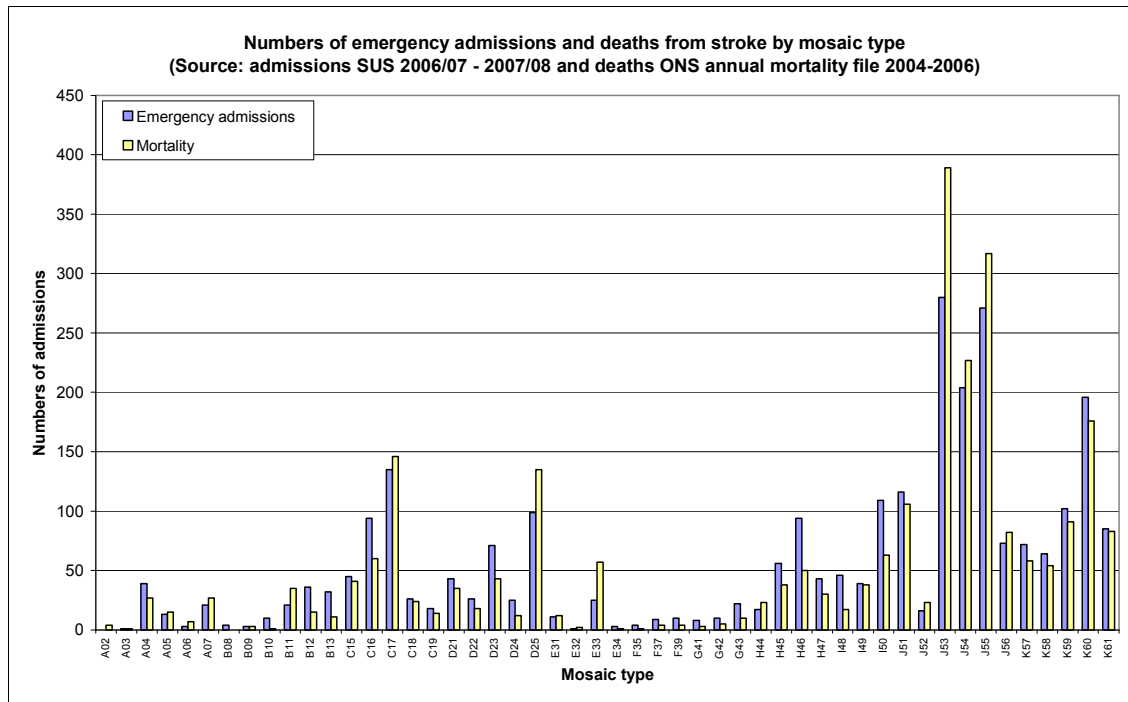
10.3 Figure 26 shows the admissions as directly age standardised rates. Groups I has a statistically significantly high directly age standardised rate of emergency admissions and group E has a statistically significantly high directly age standardised rates of mortality compared with Devon overall.

**Figure 26 – Directly age standardized rates of emergency admissions and mortality from stroke by mosaic group**



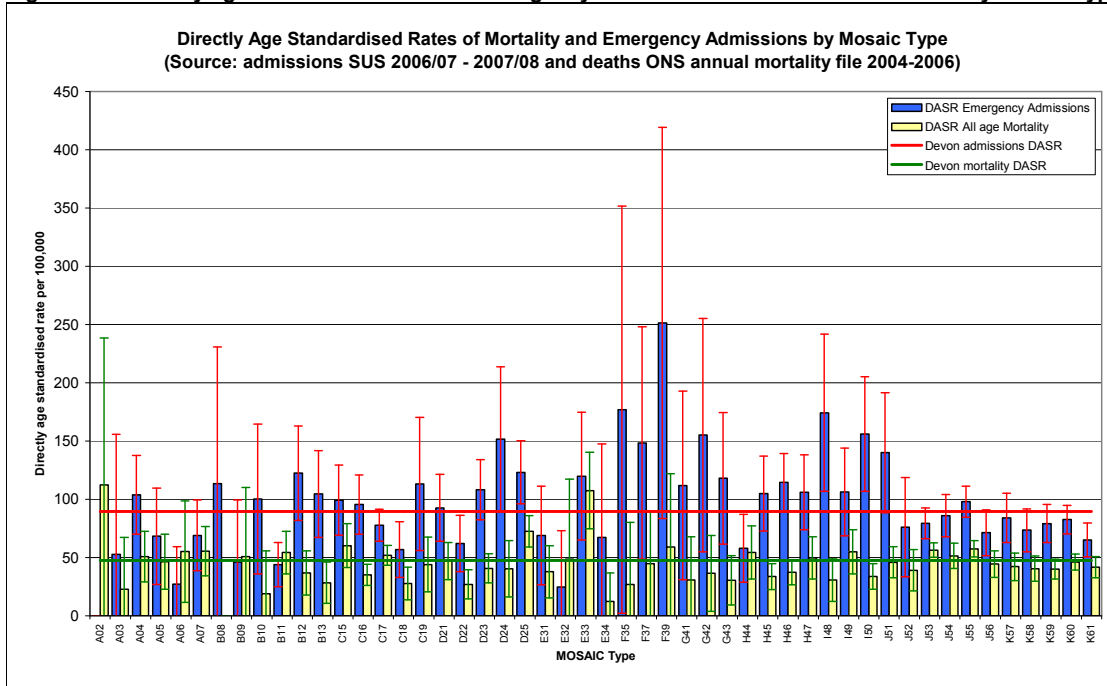
10.4 The data can be broken down further by looking at mosaic types. Figure 27 below shows numbers of emergency admissions and deaths by mosaic type. There are a number of types with very low numbers of admissions and deaths and this makes any rates calculated from them less robust. The types with the highest number of admissions and deaths were C17, J53, J54, J55 and K60. Both admissions and deaths generally show similar patterns, but there are a few types where they differ. There are many types where numbers of admissions are higher than the number of deaths and this is predominantly in the types with slightly younger age profiles. Deaths in J types are higher than the admissions. These types have an older age profile so given stroke being a disease greatly associated with age this is perhaps an expected pattern. Although the numbers are lower, types B11, D25 and E33 all show higher numbers of deaths than admissions. These types do not usually have an old population.

**Figure 27 - Numbers of emergency admissions and deaths from stroke by mosaic type**



10.5 Figure 28 below looks at admissions and mortality as age standardised rates. Types D25, I48 and I50 have statistically significantly high directly age standardised rates of emergency admissions. Types A06, B11, C18, E32 and K61 all have statistically significantly low rates of admissions. Types D25, E33, J53 and J55 have statistically significantly high directly age standardised rates of mortality. Types C16, C18, D22, E34 H45 and I50 all have statistically significantly low rates of mortality. Appendix 2 shows maps of Devon highlighting where people in types D25, E33, J53, J55, I48 and I50 are resident in Devon.

**Figure 28 – Directly age standardised rates of emergency admissions and deaths from stroke by mosaic type**



10.6 The mosaic groups where emergency admissions occur and where deaths from stroke occur differ. The table below shows the admissions and the mortality directly age standardised rates by mosaic groups from the highest to the lowest rates. The most striking differences here are in groups E, A and also B. These groups have low admissions but high mortality and they are generally groups that would not be associated as having an older population. The data does however show that although the numbers of older people are low, it is predominantly the older populations in these groups who are dying from stroke.

**Figure 29 – Rank of directly age standardised rates of emergency admissions and deaths from stroke by mosaic group**

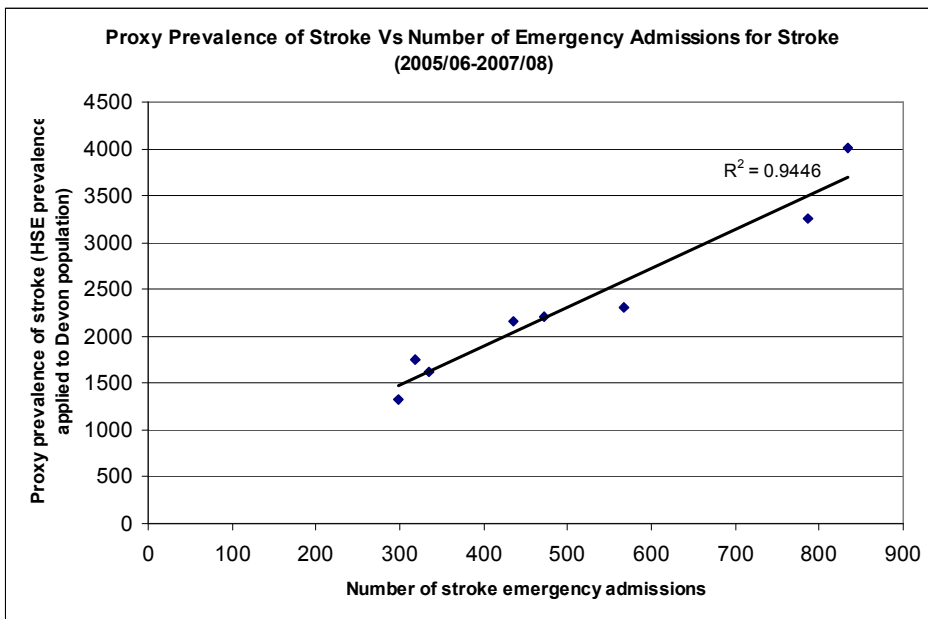
	Emergency Admissions DASR	Mortality DASR
Highest	F: Welfare Borderline	E: Urban Intelligence
	I: Twilight Subsistence	J: Grey Perspectives
	G: Municipal Dependency	A: Symbols of Success
	H: Blue Collar Enterprise	D: Ties of Community
	D: Ties of Community	B: Happy Families
	E: Urban Intelligence	C: Suburban Comfort
	J: Grey Perspectives	F: Welfare Borderline
	C: Suburban Comfort	K: Rural Isolation
	B: Happy Families	H: Blue Collar Enterprise
	K: Rural Isolation	I: Twilight Subsistence
Lowest	A: Symbols of Success	G: Municipal Dependency

- 10.7 Using the mosaic groups and types public awareness campaigns can be more accurately delivered. This could be in relation to preventative work to begin to try and reduce the incidence of stroke and it could also be in relation to public awareness raising around treating stroke and stroke symptoms as a medical emergency.
- 10.8 The profiles associated with the different mosaic groups and types gives information about the types of media people in the groups are most and least receptive to and also where people go to shop and for services etc to help locate publicity appropriately.

**11. Need for services Vs use of services**

- 11.1 Correlations are used in this section to begin to draw conclusions about the relationship between the level of need around stroke in the population and the level of use of stroke services. A strong positive correlation shows a good provision of services in relation to need.
- 11.2 Figure 30 below shows the correlation between numbers of strokes, based on the HSE prevalence data applied to the local populations, and the number of emergency admissions for stroke. This shows a very strong correlation and therefore suggests people in areas with high need are accessing stroke services.

**Figure 30 – Correlation between proxy prevalence and numbers of emergency admissions for stroke by local authority**

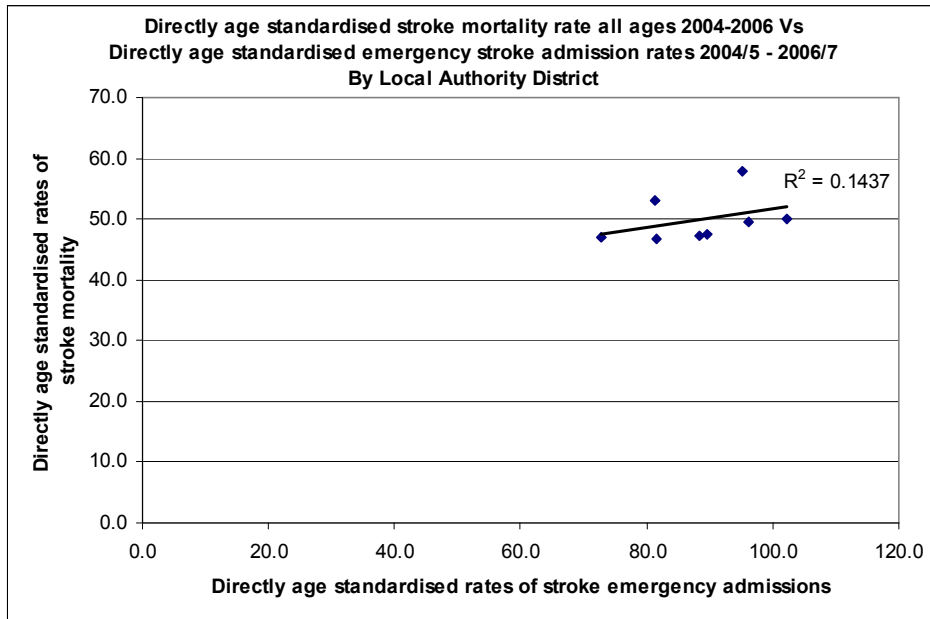


- 11.3 Figure 31 below shows the correlation between directly age standardised rates of mortality from stroke and directly age standardised emergency admission rates for stroke by local authority. This shows a weak positive correlation and therefore those local authorities with the highest mortality are



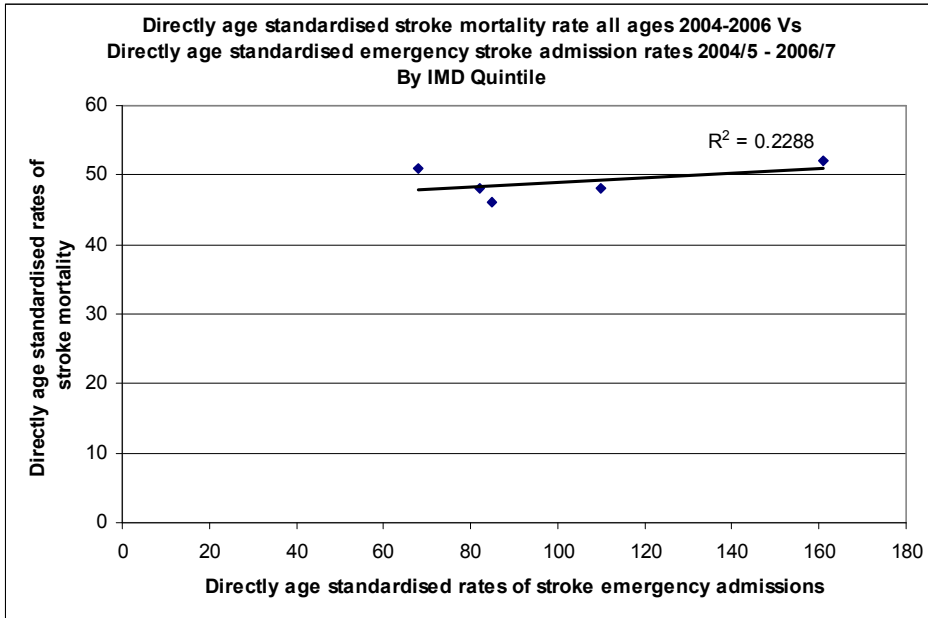
not always the ones with the highest service use. There are two particular outliers and these are Exeter and East Devon.

Figure 31 – Correlation between mortality and emergency admissions for stroke by local authority



11.4 Figure 32 below shows the correlation between directly age standardised rates of mortality from stroke and directly age standardised emergency admission rates for stroke by Index of Multiple Deprivation Quintile. There is a stronger relationship between mortality and admission rates by IMD quintile. The rates of mortality are similar for all quintiles; however there is variation in the use of services, with the most deprived quintile having the highest rate of admissions. It is noticeable that the least deprived quintile (left hand point on the graph below) is an outlier. If this point was removed from the graph, the other quintiles would show a much stronger positive correlation. This suggests that people in the least deprived quintile are more likely to die from stroke and less likely to be admitted than other quintiles, but the variation is small.

Figure 32 – Correlation between mortality and emergency admissions for stroke by IMD Quintile



## Appendix 1

### Length of Stay for stroke by hospital provider site

PROVIDER	Provider_Site	Data	2005	2006	2007	Grand Total
RA9 - SOUTH DEVON HEALTHCARE NHS FOUNDATION TRUST	RA901 - TORBAY HOSPITAL	Volume	195	260	334	789
		LOS	2046	2021	2704	6771
		Average LOS	10.5	7.8	8.1	8.6
RBA - TAUNTON AND SOMERSET NHS FOUNDATION TRUST	RBA11 - MUSGROVE PARK HOSPITAL	Volume	6	16	13	35
		LOS	97	530	280	907
		Average LOS	16.2	33.1	21.5	25.9
RBZ - NORTHERN DEVON HEALTHCARE NHS TRUST	RBZ12 - NORTH DEVON DISTRICT HOSPITAL	Volume	227	337	331	895
		LOS	4080	4879	3483	12442
		Average LOS	18.0	14.5	10.5	13.9
	5FQ02 - HOLSWORTHY HOSPITAL	Volume	14	20	18	52
		LOS	670	951	516	2137
		Average LOS	47.9	47.6	28.7	41.1
	5FQ05 - BIDEFORD AND DISTRICT HOSPITAL	Volume	39	70	85	194
		LOS	1865	3855	3709	9429
		Average LOS	47.8	55.1	43.6	48.6
	5FQ08 - TORRINGTON HOSPITAL	Volume	1	1	8	10
		LOS	93	60	268	421
		Average LOS	93.0	60.0	33.5	42.1
	5FQ11 - ILFRACOMBE HOSPITAL	Volume	12	22	16	50
		LOS	262	383	601	1246
		Average LOS	21.8	17.4	37.6	24.9
5FQ19 - SOUTH MOLTON HOSPITAL	Volume	16	19	41	76	
	LOS	472	882	1335	2689	
	Average LOS	29.5	46.4	32.6	35.4	
RH8 - ROYAL DEVON AND EXETER NHS FOUNDATION TRUST	RH801 - ROYAL DEVON & EXETER HOSPITAL (WONFORD)	Volume	506	618	624	1748
		LOS	7289	8567	9607	25463
		Average LOS	14.4	13.9	15.4	14.6
RH868 - MARDON NEURO-REHABILITATION CENTRE	Volume	1	3	6	10	
	LOS	157	337	362	856	
	Average LOS	157.0	112.3	60.3	85.6	
RK9 - PLYMOUTH HOSPITALS NHS TRUST	RK950 - DERRIFORD HOSPITAL	Volume	173	254	234	661
		LOS	2220	3440	3146	8806
		Average LOS	12.8	13.5	13.4	13.3
RWV - DEVON PARTNERSHIP NHS TRUST	RWV14 - BRUNEL LODGE	Volume	1	0	0	1
		LOS	7	0	0	7
		Average LOS	7.00	0.00	0.00	7.00
	RWV24 - BONIFACE WARD (CREDITON HOSPITAL)	Volume	0	1	0	1
		LOS	0	4	0	4
		Average LOS	0.0	4.0	0.0	4.0
	RWV52 - ST JOHN'S COURT	Volume	0	1	3	4
		LOS	0	12	100	112
		Average LOS	0.0	12.0	33.3	28.0
	RWV88 - THE BUNGALOW	Volume	1	3	0	4
		LOS	6	148	0	154
		Average LOS	6.0	49.3	0.0	38.5
RWV98 - FRANKLYN COMMUNITY HOSPITAL	Volume	1	0	0	1	
	LOS	3	0	0	3	
	Average LOS	3.0	0.0	0.0	3.0	

PROVIDER	Provider Site	Data	2005	2006	2007	Grand Total
5QQ - DEVON PCT	5QQ03 - TAVISTOCK HOSPITAL	Volume	9	11	15	35
		LOS	203	299	375	877
		Average LOS	22.6	27.2	25.0	25.1
	5QQ60 - NEWTON ABBOT HOSPITAL	Volume	71	114	100	285
		LOS	1749	1753	2179	5681
		Average LOS	24.6	15.4	21.8	19.9
	5QQ01 - TOTNES HOSPITAL	Volume	16	19	17	52
		LOS	364	353	353	1070
		Average LOS	22.8	18.6	20.8	20.6
	5QQ02 - DARTMOUTH HOSPITAL	Volume	11	10	7	28
		LOS	245	320	229	794
		Average LOS	22.3	32.0	32.7	28.4
	5QQ62 - DAWLISH HOSPITAL	Volume	9	10	11	30
		LOS	229	162	184	575
		Average LOS	25.4	16.2	16.7	19.2
	5QQ42 - AXMINSTER HOSPITAL	Volume	11	9	8	28
		LOS	248	391	114	753
		Average LOS	22.5	43.4	14.3	26.9
	5QQ32 - WHIPTON COMMUNITY HOSPITAL	Volume	14	21	15	50
		LOS	437	960	709	2106
		Average LOS	31.2	45.7	47.3	42.1
	5QQ31 - POLTIMORE WARD	Volume	23	29	29	81
		LOS	1057	1384	1785	4226
		Average LOS	46.0	47.7	61.6	52.2
	5QQ44 - EXMOUTH HOSPITAL	Volume	13	17	13	43
		LOS	507	340	408	1255
		Average LOS	39.0	20.0	31.4	29.2
	5QQ54 - TIVERTON & DISTRICT HOSPITAL	Volume	27	23	13	63
		LOS	1239	504	353	2096
		Average LOS	45.9	21.9	27.2	33.3
	5QQ52 - CREDITON HOSPITAL	Volume	11	71	71	153
		LOS	431	2044	2193	4668
		Average LOS	39.2	28.8	30.9	30.5
5QQ43 - VICTORIA HOSPITAL (SIDMOUTH)	Volume	14	10	13	37	
	LOS	489	261	161	911	
	Average LOS	34.9	26.1	12.4	24.6	
5QQ45 - BUDLEIGH SALTERTON HOSPITAL	Volume	30	88	76	194	
	LOS	1234	1956	2358	5548	
	Average LOS	41.1	22.2	31.0	28.6	
5QQ51 - OKEHAMPTON COMMUNITY HOSPITAL	Volume	17	20	6	43	
	LOS	456	399	128	983	
	Average LOS	26.8	20.0	21.3	22.9	
5QQ46 - SEATON HOSPITAL	Volume	8	13	10	31	
	LOS	281	251	179	711	
	Average LOS	35.1	19.3	17.9	22.9	
5QQ40 - HONITON HOSPITAL	Volume	18	25	14	57	
	LOS	444	470	223	1137	
	Average LOS	24.7	18.8	15.9	19.9	
5QQ41 - OTTERY ST MARY HOSPITAL	Volume	13	19	12	44	
	LOS	384	705	285	1374	
	Average LOS	29.5	37.1	23.8	31.2	
5QQ63 - BOVEY TRACEY HOSPITAL	Volume	0	7	3	10	
	LOS	0	120	48	168	
	Average LOS	0.0	17.1	16.0	16.8	
5QQ04 - SOUTH HAMS (KINGSBRIDGE) HOSPITAL	Volume	11	7	2	20	
	LOS	192	112	56	360	
	Average LOS	17.5	16.0	28.0	18.0	
5QQ53 - MORETONHAMPSTEAD HOSPITAL	Volume	2	5	3	10	
	LOS	29	100	13	142	
	Average LOS	14.5	20.0	4.3	14.2	
5QQ64 - ASHBURTON AND BUCKFASTLEIGH HOSPITAL	Volume	7	4	6	17	
	LOS	130	96	91	317	
	Average LOS	18.6	24.0	15.2	18.6	



## Appendix 2

### Map of mosaic type D25 across Devon



**Mosaic Type D25 - Town Centres of small market towns and resorts containing many hostels and refuges**

Digital Mapping Solutions from Dotted Eyes (c) Crown Copyright 2008. All rights reserved. Licence Number 100019918





Map of mosaic type E33 across Devon



**Mosaic Type E33 - Older neighbourhoods increasingly taken over by short term student renters**

Digital Mapping Solutions from Dotted Eyes (c) Crown Copyright 2008. All rights reserved. Licence Number 100019918



Map of mosaic type I48 across Devon



**Mosaic Type I48 - Older people living in small council and housing association flats**

Digital Mapping Solutions from Dotted Eyes (c) Crown Copyright 2008. All rights reserved. Licence Number 100019918





Map of mosaic type I50 across Devon



**Mosaic Type I50 - Older people receiving care in homes or sheltered accommodation**

Digital Mapping Solutions from Dotted Eyes (c) Crown Copyright 2008. All rights reserved. Licence Number 100019918



Map of mosaic type J53 across Devon



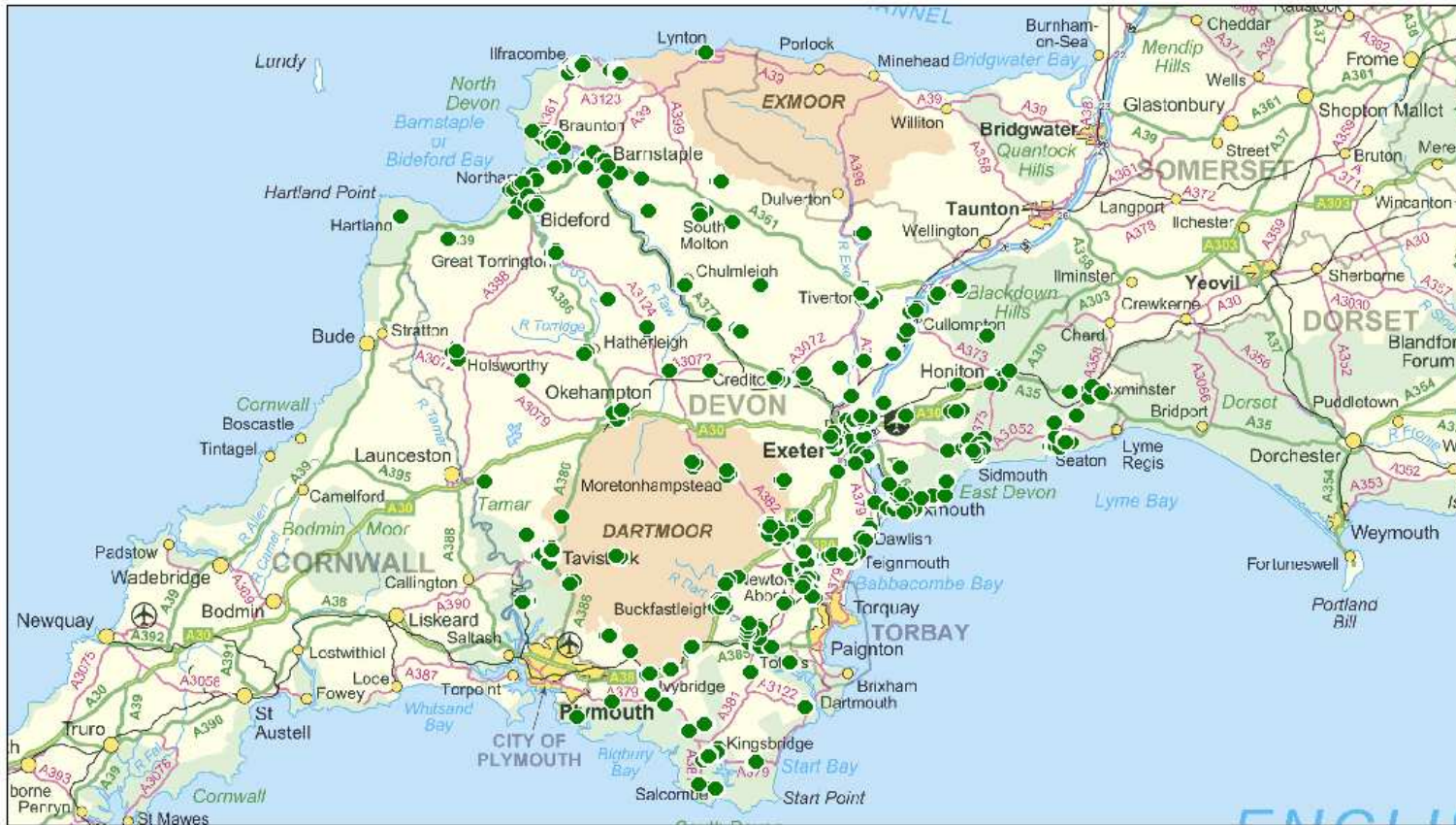
**Mosaic Type J53 - Financially secure and physically active older people, many retired to semi rural locations**

Digital Mapping Solutions from Dotted Eyes (c) Crown Copyright 2008. All rights reserved. Licence Number 100019918





### Map of mosaic type J55 across Devon



**Mosaic Type J55 - Older people preferring to live in familiar surroundings in small market towns**



Digital Mapping Solutions from Dotted Eyes (c) Crown Copyright 2008. All rights reserved. Licence Number 100019918

Kirsty Priestley  
Public Health Information Analyst

March 2009

Y:\K.Priestley\Stroke\HNA\Stroke HEP March 2009.doc

**Formatted:** Font: (Default)  
Arial, 10 pt

**Formatted:** Indent: First line:  
1.27 cm, Tabs: Not at 2.06 cm