ECHO
EUROPEAN COLLABORATION FOR HEALTHCARE OPTIMIZATION

Potentially Avoidable Hospitalisations in England

I. EXECUTIVE SUMMARY

The study of systematic variations in Potentially Avoidable Hospitalisations (PAH) offers a critical view on how healthcare organizations provide care to patients with chronic conditions. In particular, it signals how effectively they are managed in the ambulatory setting

- Potentially Avoidable Hospitalisations (PAH) are defined as admissions due to acute deterioration of a chronic patient which could have been avoided with effective ambulatory care. Therefore, high PAH rates can be interpreted as potential shortcomings in ambulatory management of chronic conditions.

- This report analyses the magnitude and the variation in unplanned hospitalisations from six chronic conditions highly sensitive to ambulatory care: angina, adult asthma, congestive heart failure (CHF), chronic obstructive pulmonary disease (COPD), dehydration and diabetes short-term complications, as well as an additional indicator aggregating admissions for all 6 conditions (All PAH).

- In England along 2009, 228,527 discharges were flagged as a Potentially Avoidable Hospitalisation (PAH), 1.4% of all hospitalisations produced in England that year. In other words, an admission per 194 individuals aged 18 and older.

- The most prevalent PAH condition was COPD, with 21 admissions per 10,000 individuals aged 40 or older in 2009. In turn, diabetes short- term complications was the least frequent, with 2 admissions per 10,000 individuals aged 40 or older.

- Differences across the 326 Local Authorities in the country were patent. Residents in the local authorities with the highest standardised rates experience 2.5 times as many PAH than those living in areas with the lowest. As for specific conditions, the difference ranged from a 5.4-fold rate in the case of diabetes short-term complications to a 2.5-fold in CHF.

- Systematic variation, not amenable to chance, was moderate. The highest systematic variation was found in dehydration admissions, whereas the lowest corresponded to CHF.

- Living in a particular Region (GOR) –i.e. different regional policies- explains variation, up to a 29%, particularly in the cases of dehydration, COPD and angina admissions.

- There is a pattern of high rates in half north of England and in London area for most conditions. On the contrary, southern part of the country exhibit less cases that expected in almost all the conditions

- Between 2002 and 2009, rates of potentially avoidable hospitalisations decreased by 10%, from 61 to 55 admissions per 10,000 inhabitants – from 1 admission per 164 to 1 admission per 182 adult inhabitants. However, systematic variation remained quite stable over this period.

- Taking into consideration the overall rates of potentially avoidable hospitalisations, most deprived areas showed significant higher rates when compared to better-off areas. In examining specific-conditions, this difference becomes smaller over time for dehydration and CHF rates. Nevertheless, for all the other conditions the gap between populations living in better and worse-off local authorities remains constant over the period of analysis.

- In the context of ECHO project, the study of PAH might be considered as a proxy of how effectively and efficiently healthcare organizations in a particular area provide care for chronic patients –the combination of specialised, primary and long term care providers to whom populations are exposed. Thus, studying PAH would imply investigating whether population is exposed to effective primary care, effective continuity of care between primary and specialised levels and good coordination with long-term services (home care, day care, long term care facilities, etc…)

Relatively high rates of potentially avoidable hospitalisations (PAH) should be considered as a symptom of shortcomings in the ambulatory management of chronic patients, warranting assessment of elements such as the existing pathways, mix of providers available and coordination and continuity of care for patients with chronic conditions.

In the case of the English National Health System, the rates of PAH might indicate certain reliance on in-hospital settings in dealing with chronic patients; this poses some questions as to whether there is room for a shifting to community and primary care resources, which may improve effectiveness and efficiency of care for chronic conditions, particularly in those areas with higher deprivation indexes.

II. INTERNATIONAL COMPARISON

Different healthcare systems across Europe, with different organizational features, might obtain different outcomes in chronic care

This section offers a rough picture of potentially avoidable hospitalisations in England, in comparison with what happens in the other ECHO countries. Two insights to be retained: the magnitude of the phenomenon, and the variation across the healthcare areas.

Overall potentially avoidable hospitalisations (PAH)

England exhibits an average rate of potentially avoidable hospitalisations among ECHO countries–1 admission per 194 adult inhabitants in 2009. That means 46% less admissions than the country with the highest rates, Denmark, but 80% more admissions than Portugal, the country with less avoidable hospitalisations (see appendix 1 table 1).

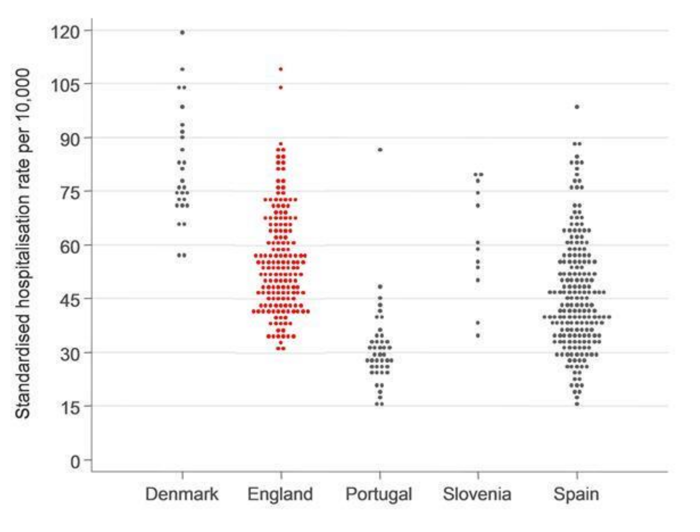

Figure 1.a. Age-sex standardised overall PAH rates per 10,000 inhabitants (natural scale to compare actual rates). Year 2009

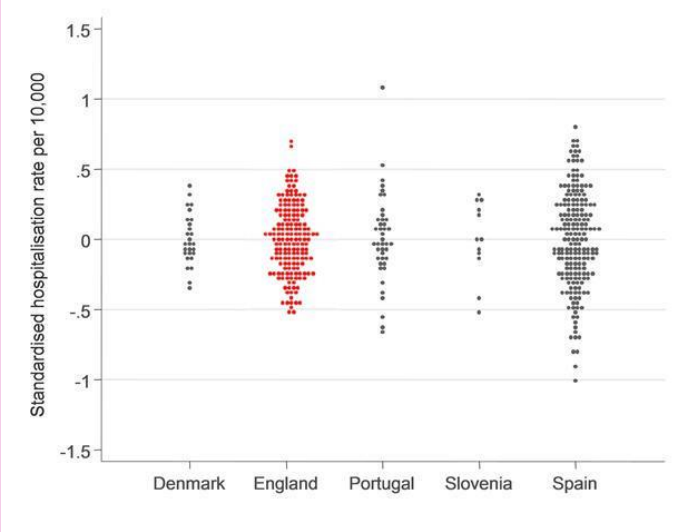

Figure 1.b. Age-sex standardised overall PAH rates per 10,000 inhabitants (normalised scale to compare degree of variation). Year 2009

Each dot represents the relevant administrative area in the country (Local Authorities for England). The y-axis charts the standardised rate per 10,000 inhabitants (+18 age) The figure is built on the total number of interventions in 2009. The population of reference for standardization was 2002 ECHO pooled population. Looking at figure 1.a, the reader will get a sense of the magnitude of PAH in each country whereas figure 1.b provides a picture of the degree of variation across countries.

The ratio between the highest and lowest PAH rate found at local level, is very similar in Denmark, England, Portugal and Slovenia ranging from 1.9 to 2.6 -folded probability of undergoing any PAH for residents in those areas with the highest rates. Only in Spain this ratio increases to more than 3 times (see appendix 1 table 1).

In general, systematic variation (SCV) values are moderately high ranging from 11% to 21% beyond that randomly expected (see appendix 1 table 1); with the Danish exception, which exhibits the highest SCV value being 71% above that expected by chance (see appendix 1 table 1).

Case-mix of Potentially Avoidable Hospitalisations by country

The relative share of cases per specific condition varies across countries (figure 2), contributing to the differences in rates shown in figure 1. Nevertheless, COPD, CHF and angina seem to cause the bulk of potentially avoidable hospitalisations everywhere.

In England, COPD is the cause of the major number of PAH admissions (41%), followed by angina, asthma, CHF, dehydration and diabetes (24%, 14%, 13%, 6% and 2% respectively).

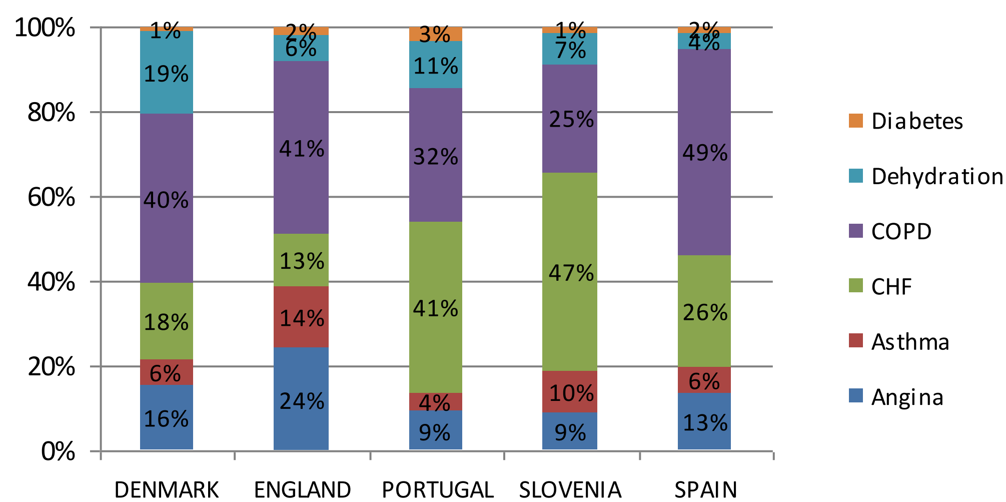

Figure 2. Share of PAH cases by country. Year 2009

** Represents the contribution of each clinical condition in the overall number of avoidable admissions by country.*

The relative share in the number of PAH cases per condition does not always translate onto the relative magnitude of the specific rates (figure 3).

Compared to the other countries, England has the highest rate of asthma, angina and diabetes admissions. On the contrary, it exhibits the lowest rate in CHF hospitalisations. On the other hand, Denmark shows the highest rate in COPD and dehydration; being the latter far from rates detected in the other countries. Slovenia, with moderate PAH rates in general, shows an outstanding CHF rate. In turn, Portugal exhibits the lowest rates for urgent angina, COPD and asthma admission. Whereas, it is Spain which exhibits the lowest rates in dehydration and diabetes hospitalisations (see appendix 1 tables 2-7).

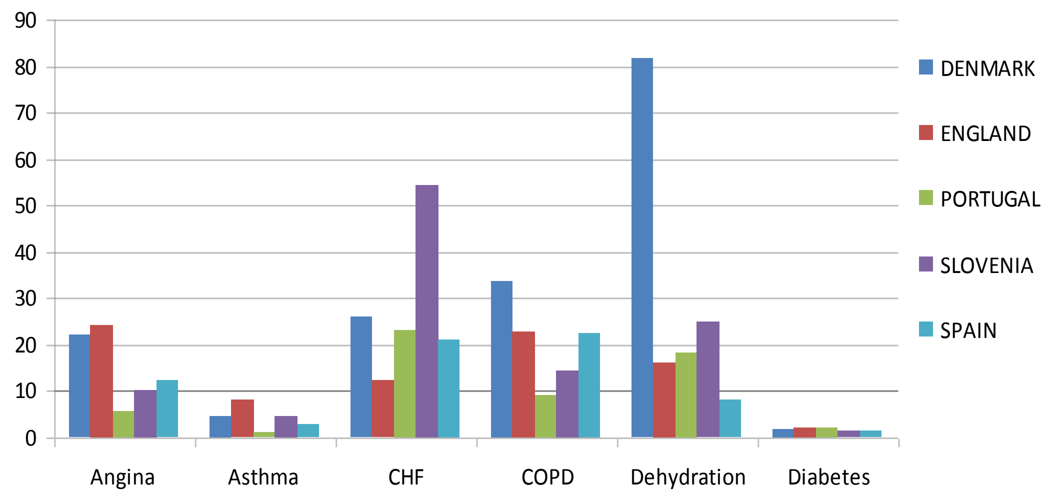

Figure 3. Magnitude of PAH per condition across countries (age-sex standardised rates per 10,000 inhabitants). Year 2009.

III. IN COUNTRY VARIATION

Potentially avoidable hospitalisations in England are frequently observed across the country, COPD admissions being the most frequent in cases number. When comparing rates, angina is the largest followed very closely by COPD admissions (figure 4)

Variation is widespread in all PAH conditions, and a relevant proportion of it is systematic –beyond that randomly expected-, with the least variation across local authorities in CHF and the widest in dehydration admissions (see appendix 1 tables 8-9).

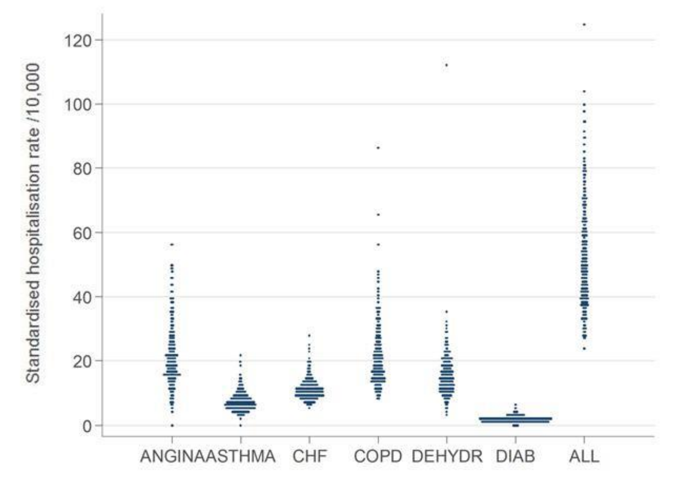

Figure 4. a. Age-sex standardised hospitalisation rates per 10,000 inhabitants (natural scale to compare actual rates). Year 2009

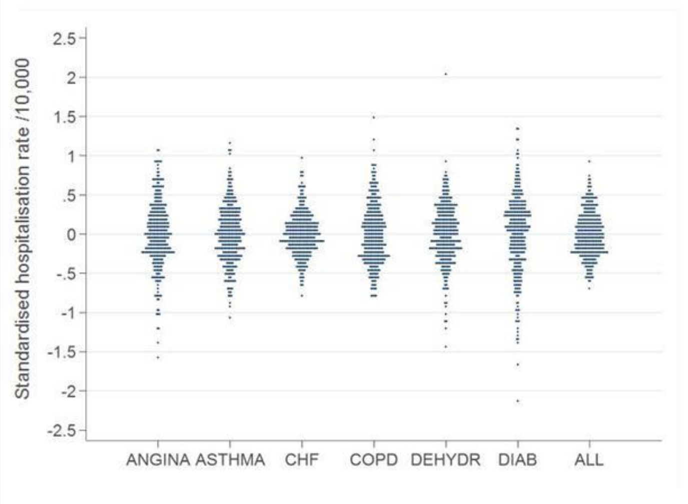

Figure 45.b. Age-sex standardised hospitalisation rates per 10,000 inhabitants (normalised scale to compare degree of variation). Year 2009

** Each dot represents the relevant administrative area in the country (Local Authorities for England). The y-axe charts the Local Authorities rate per 10,000 inhabitants. On the right, given the plausibly different prevalence of PAH conditions, standardised rates are represented in a common comparable scale. Looking at the former, reader will have sense of the magnitude of the PAH phenomenon, overall and for each condition; looking at the latter, reader will have an image of the actual variation across PAH conditions.*

Overall potentially avoidable hospitalisations (PAH)

The higher the rate or the ratio, the worse the performance.

In 2009, 228,527 admissions with one of the chronic conditions considered in this report were flagged as potentially avoidable. This figure represents around the 1.4% of all the admissions in 2009. -1 admission out of 194 adult individuals

Variation across extreme areas reached 2.5-fold difference, with a moderate systematic variation – 9% above that expected by chance. The region effect in variation is moderately high, representing the 29% of the PAH rate variation (see appendix 1 table 8, Intra-class Correlation Coefficient).

There is a certain geographic pattern of variation showing local authorities with high rates of avoidable hospitalisations in the northern and central part of the country and in London areas. In most of these areas, residents bear at least 20% more risk of experiencing potentially avoidable hospitalisation (figures 5-6)

Zooming out to the Region level, North West, North East, Yorkshire and the Humber, London and West Midland regions have at least 20% more risk of potentially avoidable admissions than the national average. In turn, residents living in the remaining regions, have 20% less risk of suffering an avoidable hospitalisation (figure 8)

Variation in each PAH condition is represented using two geographic units: local authorities and regions. The first set is composed of 326 units and the second comprises 9 regions. While local authorities would represent local provision of chronic care, regions are used as a surrogate for regional policies affecting all the local authorities within each one.

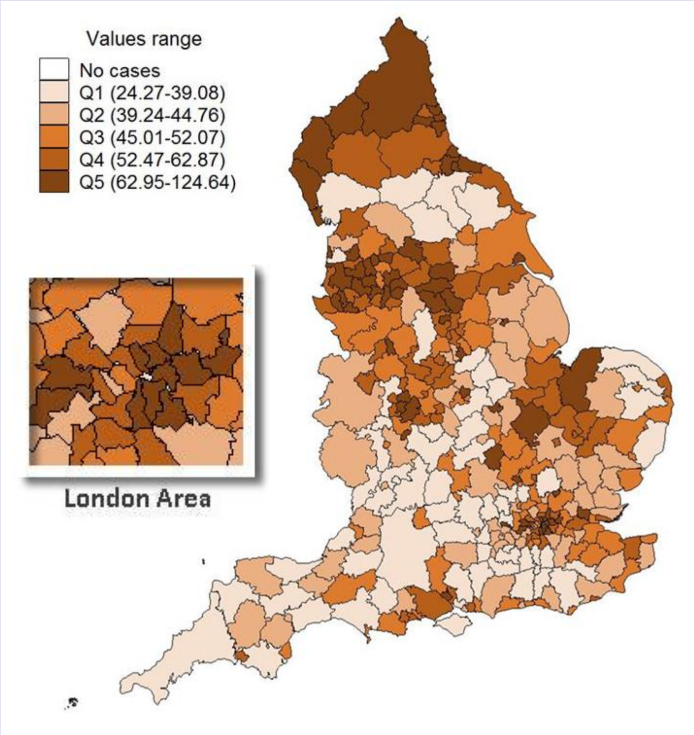

Figure 5. Age-sex standardised all PAH hospitalisation rate per 10,000 inhabitants. 326 Local Authorities. Year 2009

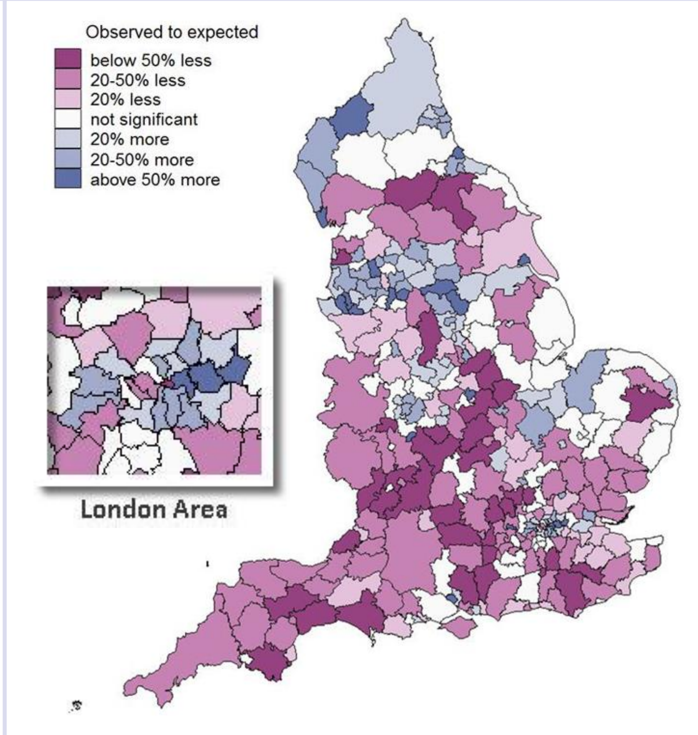

Figure 6. Ratio observed/expected all PAH admissions. 326 Local Authorities. Year 2009

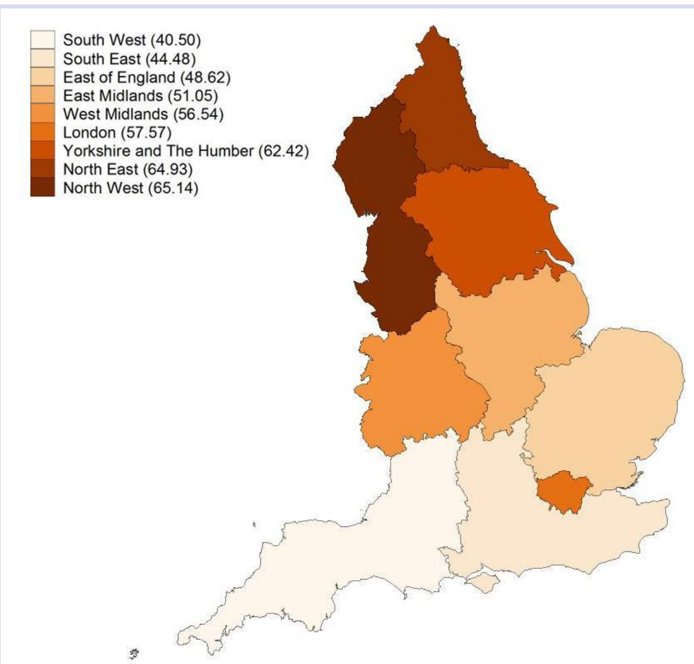

Figure 7. Age-sex standardised all PAH hospitalisation rate per 10,000 inhabitants. 9 regions. Year 2009

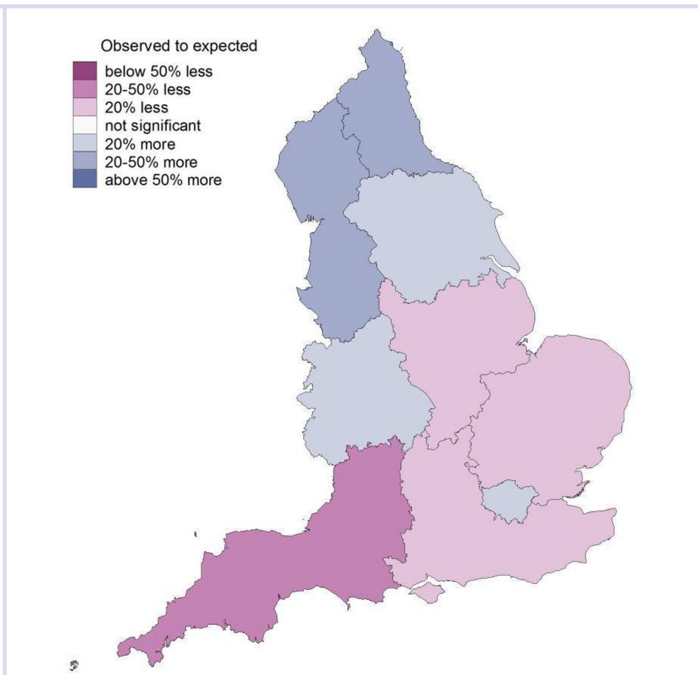

Figure 8. Ratio observed/expected all PAH admissions. 9 regions. Year 2009

** Maps on the left (standardised rates) merely represent the amount of admissions flagged as a potentially avoidable hospitalisation -the darker the colour, the more the number of admission per 10,000 inhabitants. Areas are clustered into 5 quintiles according to their rate value (Q1 to Q5). –legend within the maps provides the range of standardised rates within each quintile. Maps on the right reflect the level of performance in each area using as a proxy the ratio observed to expected number of PAH. Population living in areas with values above 1 (bluish) will be overexposed to PAH (poor performance); population in areas with ratio below 1 (pink) will be underexposed to PAH (good performance).*

Asthma in adults

32,406 discharges with a primary diagnosis of asthma were flagged as potentially avoidable in 2009 – 1 admission per 1,374 adult inhabitants aged 18 or older. Asthma admissions is the second most prevalent condition in number of cases among the PAH analyzed.

A 3.3-fold difference in hospitalisations was found between the extreme areas, with a moderate systematic variation, 13% above the expected by chance. The region effect in variation is only 6% (see appendix 1 table 8, Intra-class Correlation Coefficient).

There is not a clear pattern of rate variation across the local authorities.

At regional level, residents in North West, Yorkshire and the Humber, London and West Midland regions have up to 20% more risk of asthma admissions than the national average (figure 12).

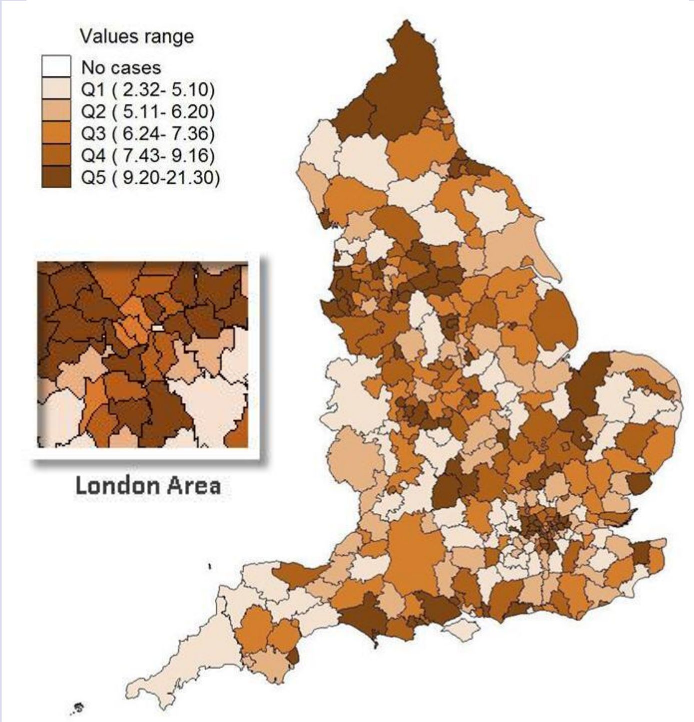

Figure 9. Age-sex standardised Asthma hospitalisation rate per 10,000 inhabitants. 326 Local Authorities. Year 2009

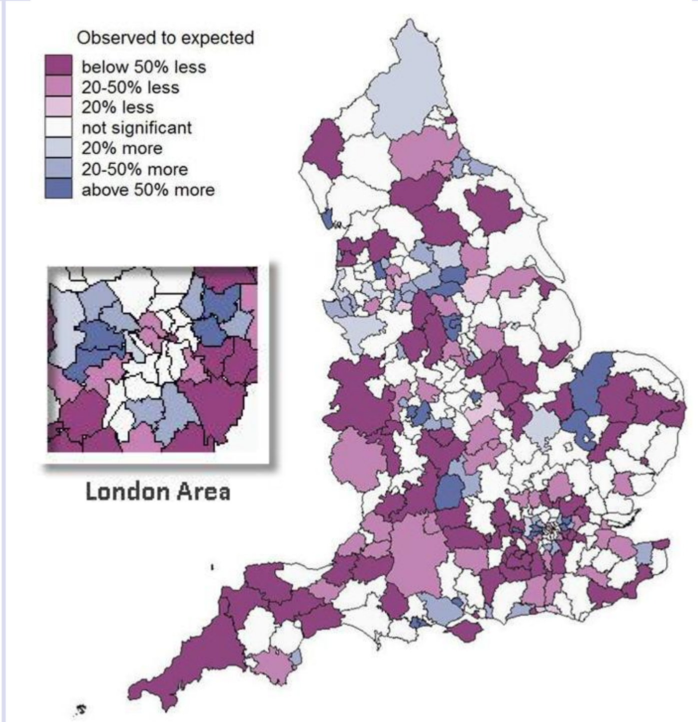

Figure 10. Ratio observed/expected asthma admissions. 326 Local Authorities. Year 2009

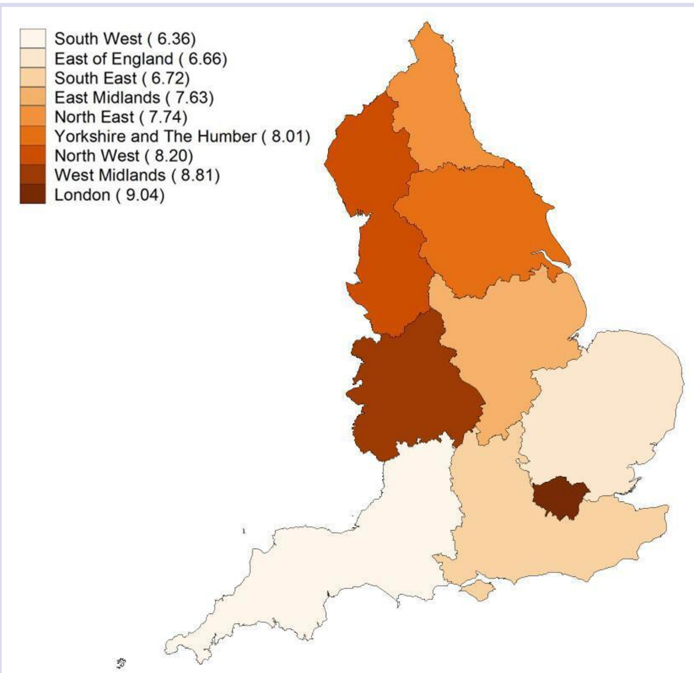

Figure 11. Age-sex standardised Asthma hospitalisation rate per 10,000 inhabitants. 9 regions. Year 2009

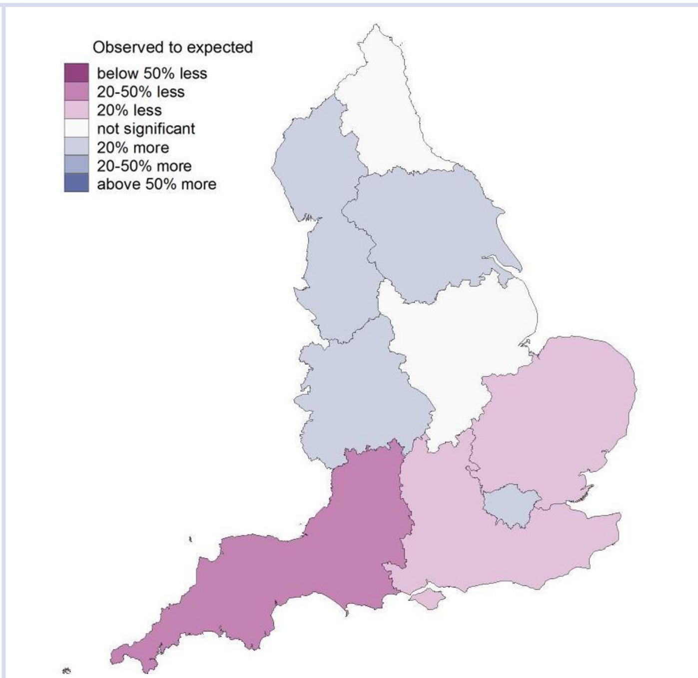

Figure 12. Ratio observed/expected asthma admissions. 9 regions. Year 2009

** Maps on the left (standardised rates) merely represent the amount of admissions flagged as a potentially avoidable hospitalisation -the darker the colour, the more the number of admission per 10,000 inhabitants. Areas are clustered into 5 quintiles according to their rate value (Q1 to Q5). –legend within the maps provides the range of standardised rates within each quintile. Maps on the right reflect the level of performance in each area using as a proxy the ratio observed to expected number of PAH. Population living in areas with values above 1 (bluish) will be overexposed to PAH (poor performance); population in areas with ratio below 1 (pink) will be underexposed to PAH (good performance).*

Congestive Heart Failure relapse admissions (CHF)

29,080 discharges with the diagnosis of Congestive Heart Failure (CHF) were signalled as potentially avoidable in 2009 –1 unplanned admission per 886 adult aged 40 or older.

A 2.5-fold difference was found between local authorities with extreme high and low rates, and the systematic variation was the lowest observed among the PAH conditions, just 8% above the expected by chance.

In 2009, there is a strong pattern of high rates in the western part of the country, and in some central Local Authorities. Most of these areas exhibit a risk of admission 20% above the expected (bluish areas in figure 14).

19% of the variation in CHF admissions is due to the region effect (see appendix 1 table 8, Intra-class Correlation Coefficient). Residents in West Midland and London region have a significant risk above 20% of being hospitalized with CHF. In turn, population living in North East and South West region exhibit lower risk than expected.

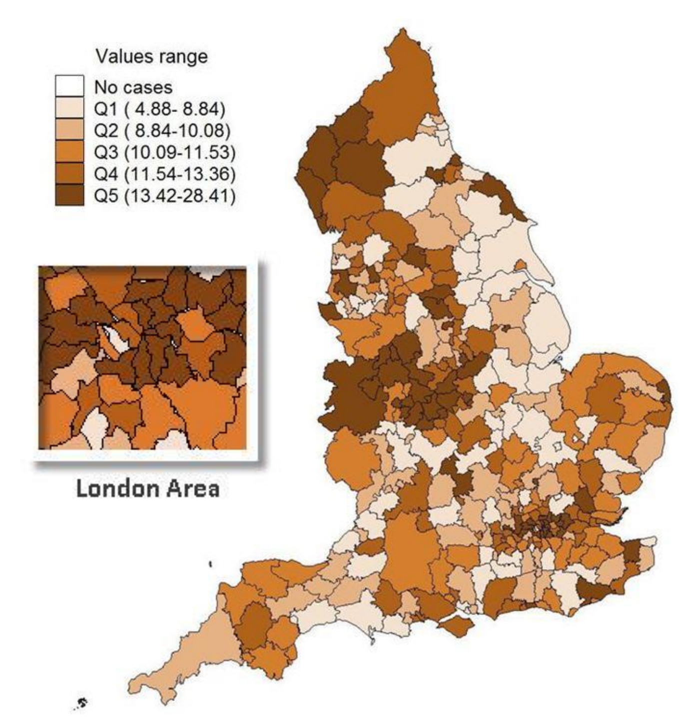

Figure 13. Age-sex standardised CHF hospitalisation rate per 10,000 inhabitants. 326 Local Authorities. Year 2009

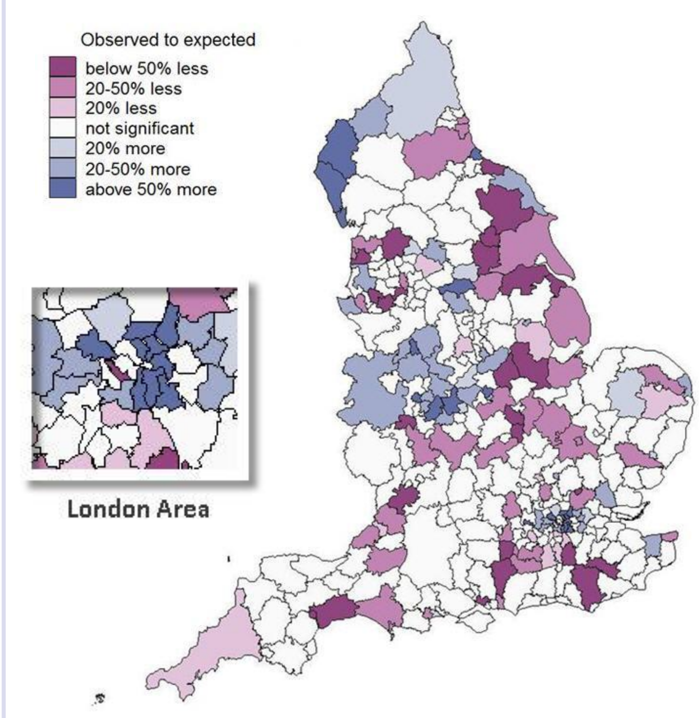

Figure 14. Ratio observed/expected CHF admissions. 326 Local Authorities. Year 2009

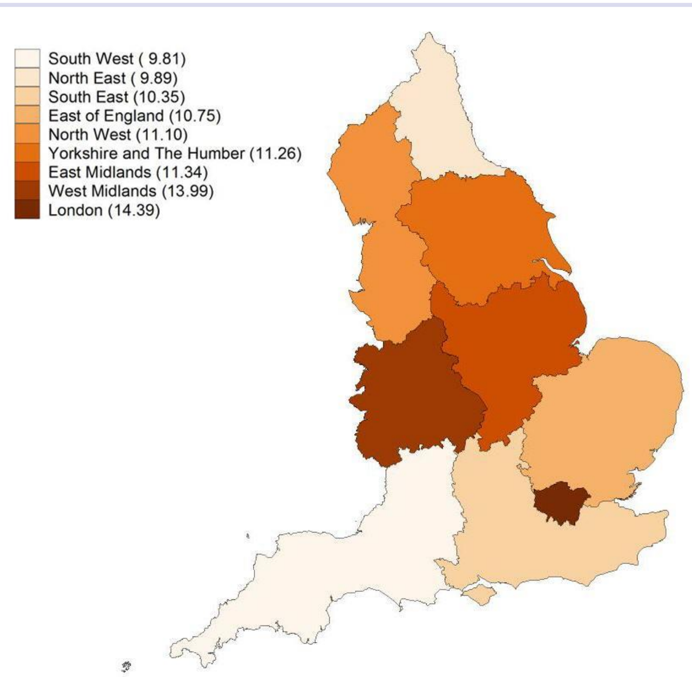

Figure 15. Age-sex standardised CHF hospitalisation rate per 10,000 inhabitants. 9 regions. Year 2009

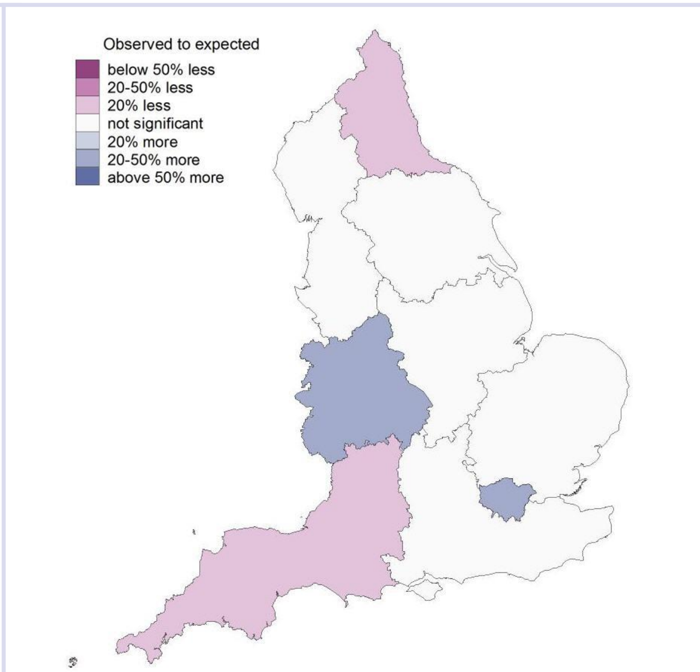

Figure 16. Ratio observed/expected CHF admissions. 9 regions. Year 2009

** Maps on the left (standardised rates) merely represent the amount of admissions flagged as a potentially avoidable hospitalisation -the darker the colour, the more the number of admission per 10,000 inhabitants. Areas are clustered into 5 quintiles according to their rate value (Q1 to Q5). –legend within the maps provides the range of standardised rates within each quintile. Maps on the right reflect the level of performance in each area using as a proxy the ratio observed to expected number of PAH. Population living in areas with values above 1 (bluish) will be overexposed to PAH (poor performance); population in areas with ratio below 1 (pink) will be underexposed to PAH (good performance).*

Chronic Obstructive Pulmonary Disease relapse admissions (COPD)

By far, COPD is the most prevalent HPA condition in number of cases. In 2009, 93,597 COPD admissions were flagged as potentially avoidable –41% of all the admissions considered as such.

The difference between local authorities with extreme rates reached a 3.3-fold factor, while the systematic variation was 19% above that randomly expected. Up to 21% of the observed variation is explained by the region effect (see appendix 1 table 8, Intra-class Correlation Coefficient), which may suggest a role of regional policy in COPD management.

Local authorities with higher COPD admission rates that correlate with significant higher risk of admissions for their residents are found in the half north of the country (figures 17 and 18).

Using regions as the unit of analysis, North West, North East and Yorkshire and the Humber regions show a risk above 20% more than average, whereas South West, South east, East of England and East Midland exhibit significant lower risk than expected (figure 20).

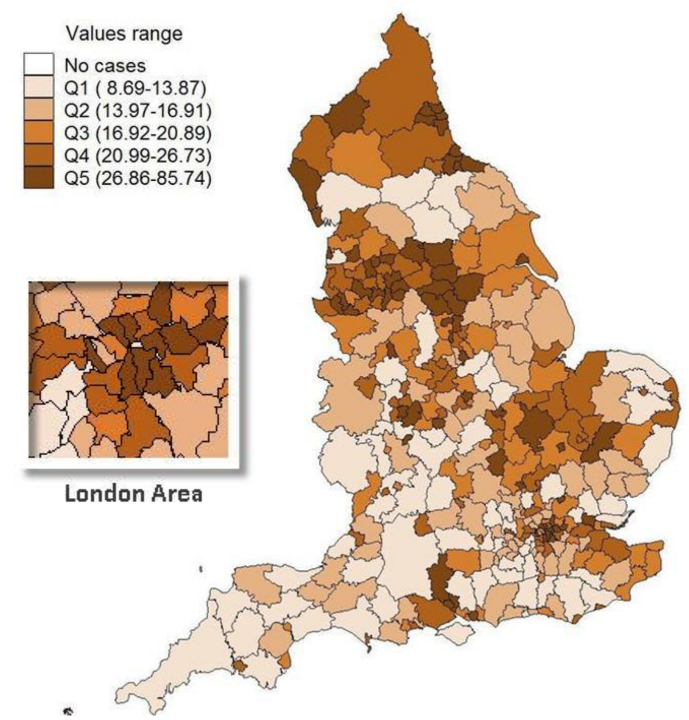

Figure 17. Age-sex standardised COPD hospitalisation rate per 10,000 inhabitants. 326 Local Authorities. Year 2009

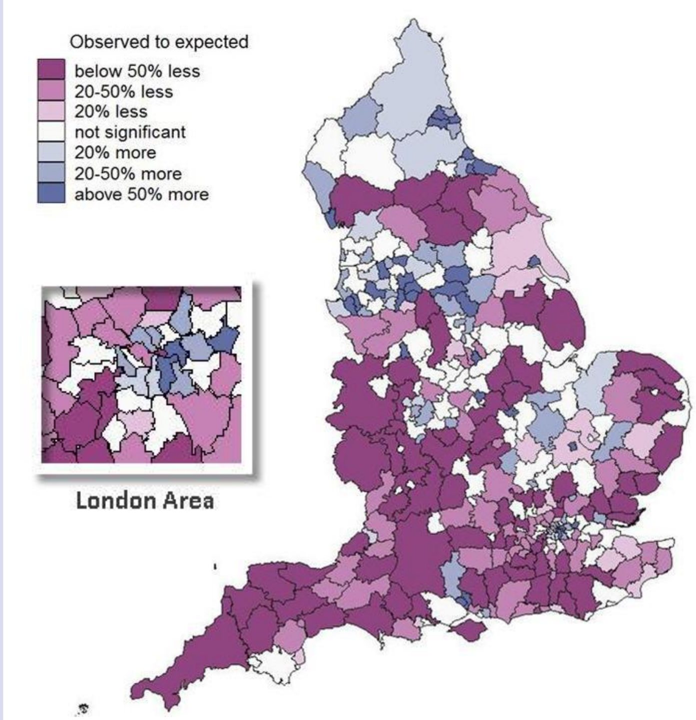

Figure 18. Ratio observed/expected COPD admissions. 326 Local Authorities. Year 2009

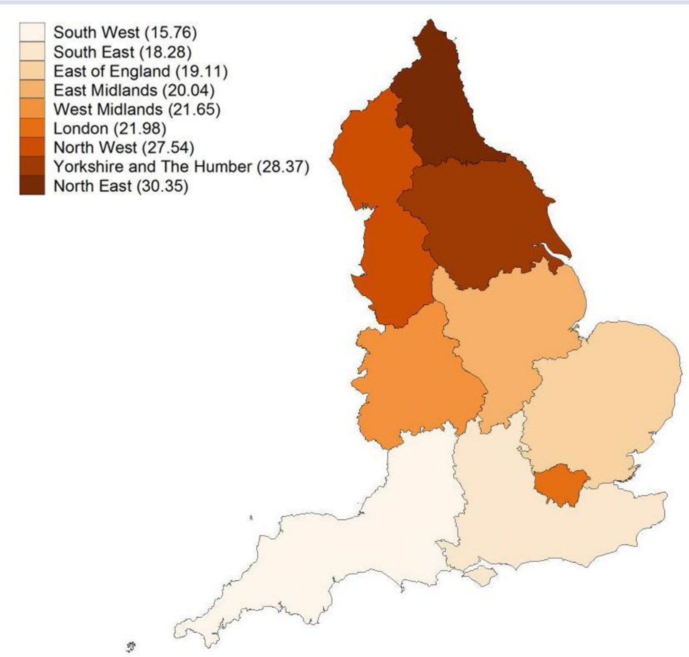

Figure 19 Age-sex standardised COPD hospitalisation rate per 10,000 inhabitants COPD. 9 regions. Year 2009

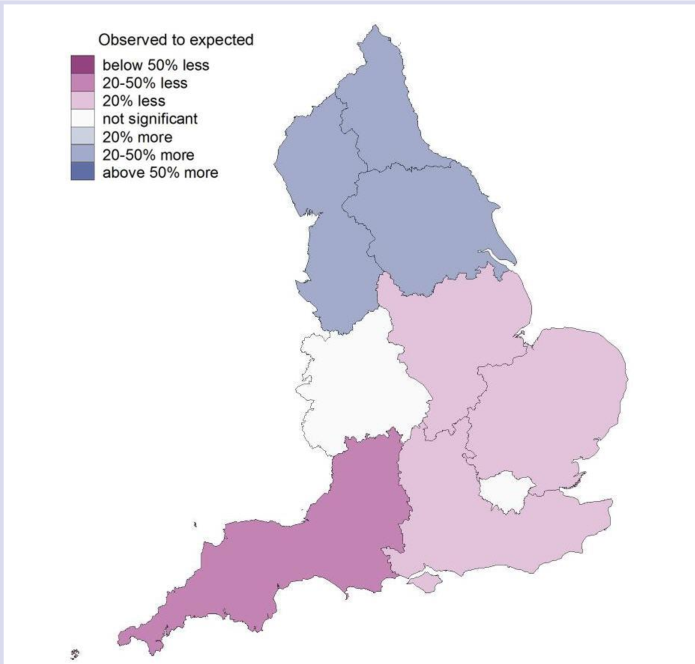

Figure 20. Ratio observed/expected COPD admissions. 9 regions. Year 2009

** Maps on the left (standardised rates) merely represent the amount of admissions flagged as a potentially avoidable hospitalisation -the darker the colour, the more the number of admission per 10,000 inhabitants. Areas are clustered into 5 quintiles according to their rate value (Q1 to Q5). –legend within the maps provides the range of standardised rates within each quintile. Maps on the right reflect the level of performance in each area using as a proxy the ratio observed to expected number of PAH. Population living in areas with values above 1 (bluish) will be overexposed to PAH (poor performance); population in areas with ratio below 1 (pink) will be underexposed to PAH (good performance).*

Dehydration admissions

12,981 dehydration admissions were flagged as potentially avoidable in 2009 –1 admission in 641 inhabitants aged 65 or older.

A 3.2-fold difference was found between local authorities with extreme rates, with a moderate-high systematic variation 20% over that randomly expected. The regional level does barely explain 5% of the variation, suggesting that the main driver is medical practice at local authority level.

As observed in figure 24, the higher dehydration rates are observed in northern and central western parts of the country, with some of these local authorities showing significantly higher risks of admission than average (bluish areas in figure 22). In turn, 21% of local authorities have risk of admission below the expected (pink areas in figure 22).

When the analysis is performed at regional level: residents in North West, North East, West Midlands and London regions have a risk of dehydration admission above 20% more than expected; whereas population living in South West and Yorkshire ant the Humber exhibit a risk 20-50% lower than expected (figure 24).

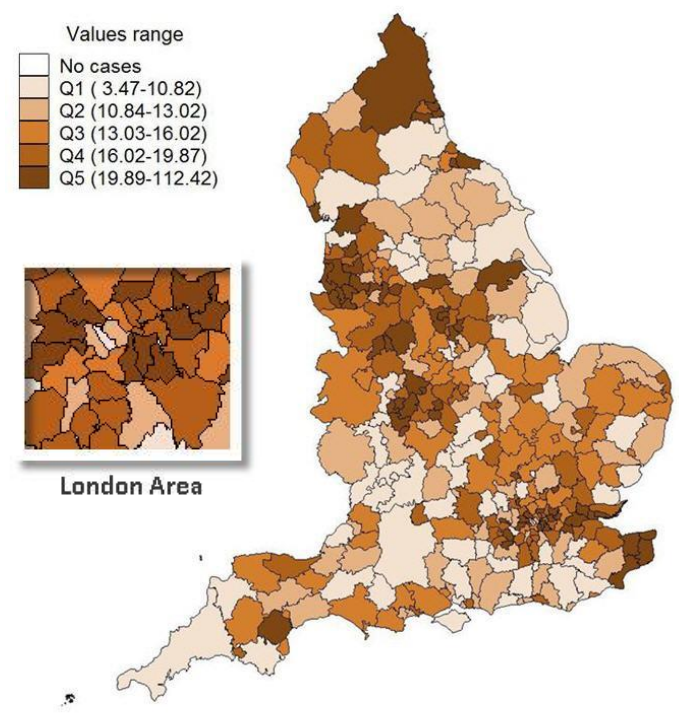

Figure 21. Age-sex standardised Dehydration hospitalisation rate per 10,000 inhabitants. 326 Local Authorities. Year 2009

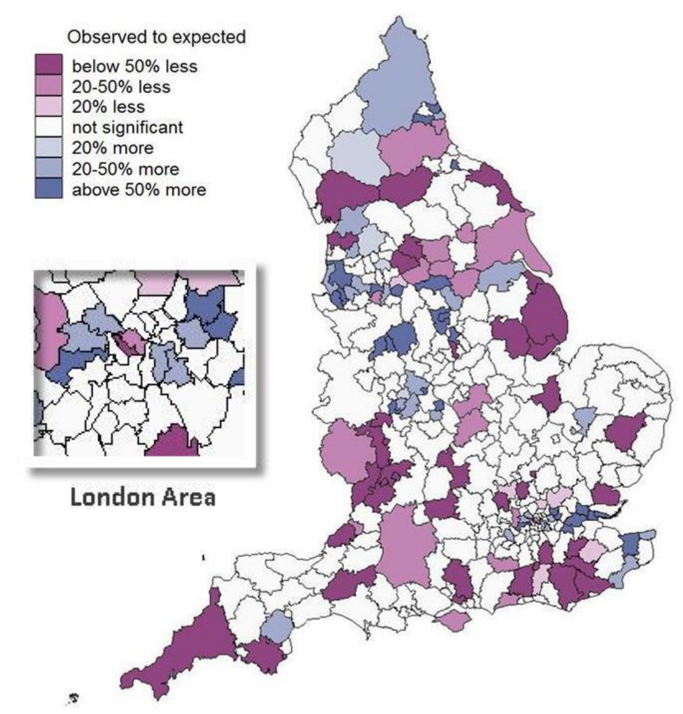

Figure 22. Ratio observed/expected dehydration admissions. 326 Local Authorities. Year 2009

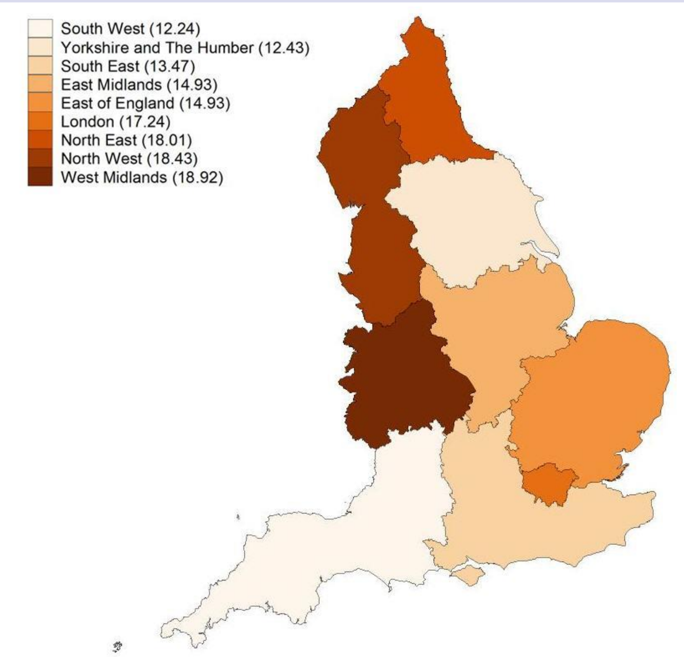

Figure 23. Age-sex standardised Dehydration hospitalisation rate per 10,000 inhabitants. 9 regions. Year 2009

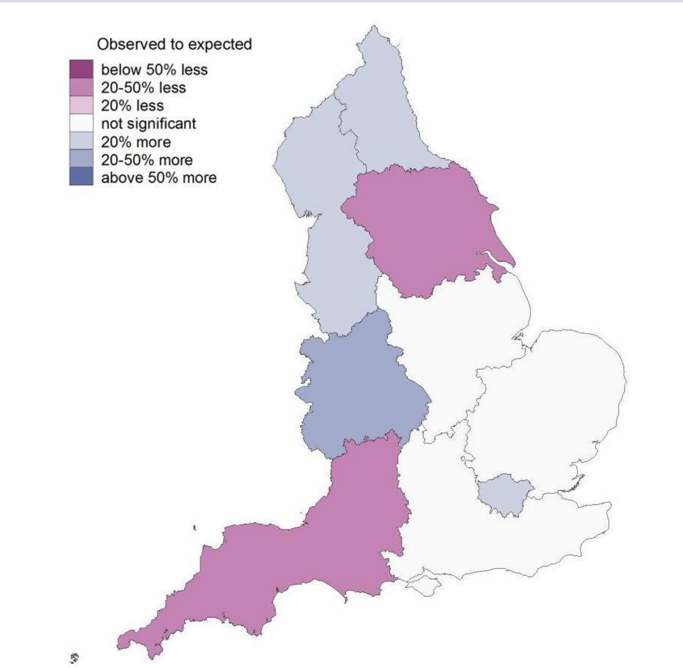

Figure 24. Ratio observed/expected dehydration admissions. 9 regions. Year 2009

** Maps on the left (standardised rates) merely represent the amount of admissions flagged as a potentially avoidable hospitalisation -the darker the colour, the more the number of admission per 10,000 inhabitants. Areas are clustered into 5 quintiles according to their rate value (Q1 to Q5). –legend within the maps provides the range of standardised rates within each quintile. Maps on the right reflect the level of performance in each area using as a proxy the ratio observed to expected number of PAH. Population living in areas with values above 1 (bluish) will be overexposed to PAH (poor performance); population in areas with ratio below 1 (pink) will be underexposed to PAH (good performance).*

Diabetes admissions caused by a short-term complication

Admissions from Diabetes short-term complications are the least frequent PAH condition. In 2009, 4,667 admissions with a short-term complication of diabetes were signalled as potentially avoidable – around 1 per 5,556 inhabitants aged 40 or older.

Variation between local authorities with extreme rates was the largest among the PAH conditions, though –reaching 5.4 -fold difference. Systematic variation was moderate, 13% above that expected by chance. Figure 28 shows this heterogeneous behaviour across the country, with some local authorities with high rates in the south- eastern part of the country (figure 26).

In this case, just a 12% of the variation in diabetes admissions could be attributed to regional frameworks (see appendix 1 table 8, Intra-class Correlation Coefficient). Residents in London have 20% more risk of being admitted by diabetes than expected (figure 28).

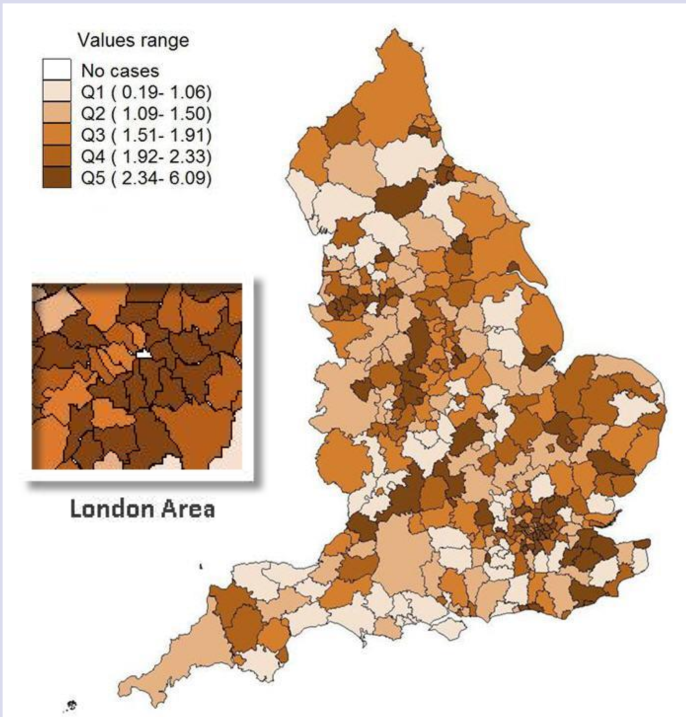

Figure 25. . Age-sex standardised diabetes hospitalisation rate per 10,000 inhabitants. 326 Local Authorities. Year 2009

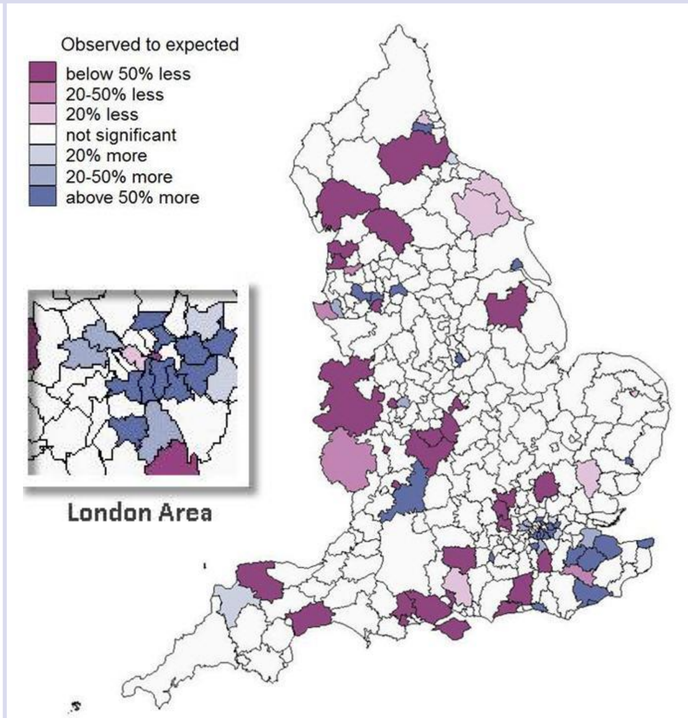

Figure 26. . Ratio observed/expected diabetes admissions. 326 Local Authorities. Year 2009

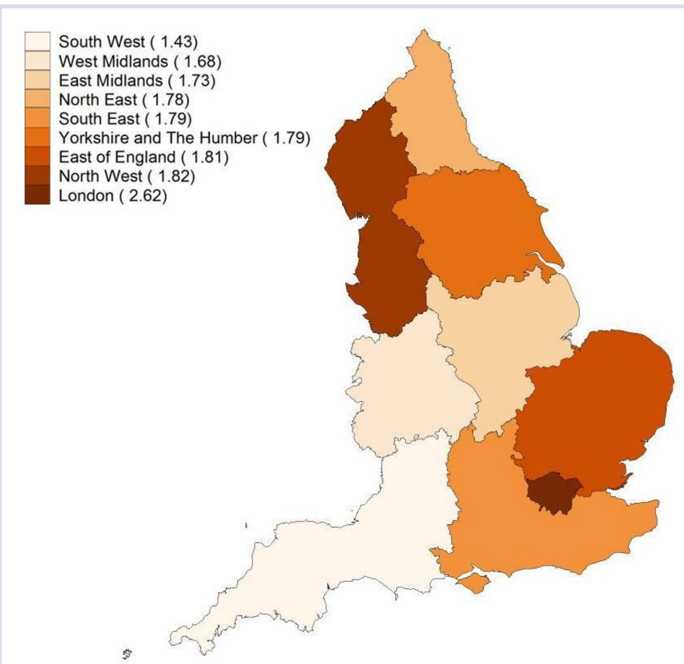

Figure 27. . Age-sex standardised diabetes hospitalisation rate per 10,000 inhabitants. 9 regions. Year 2009

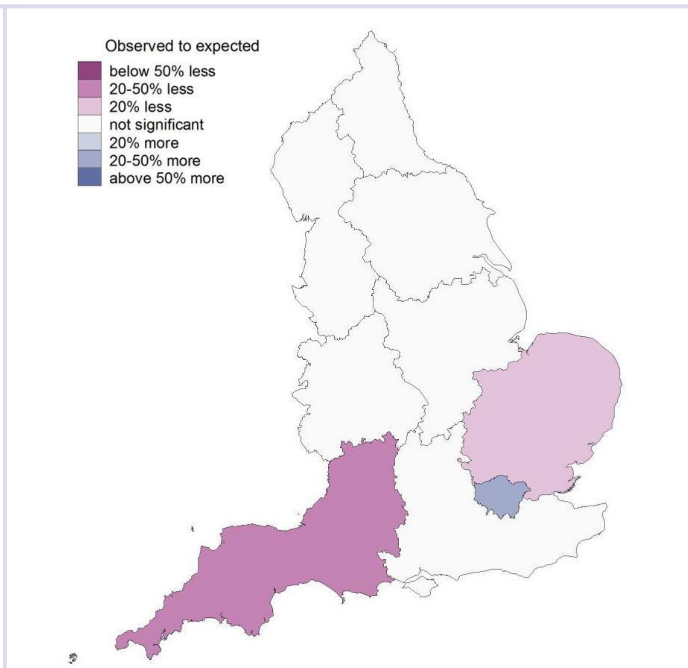

Figure 28. Ratio observed/expected diabetes admissions. 9 regions. Year 2009

** Maps on the left (standardised rates) merely represent the amount of admissions flagged as a potentially avoidable hospitalisation -the darker the colour, the more the number of admission per 10,000 inhabitants. Areas are clustered into 5 quintiles according to their rate value (Q1 to Q5). –legend within the maps provides the range of standardised rates within each quintile. Maps on the right reflect the level of performance in each area using as a proxy the ratio observed to expected number of PAH. Population living in areas with values above 1 (bluish) will be overexposed to PAH (poor performance); population in areas with ratio below 1 (pink) will be underexposed to PAH (good performance).*

Angina- with no concurrent procedure admissions

55,805 emergency angina admissions were flagged as potentially avoidable in 2009 –1 admission per 470 inhabitants aged 40 or older.

An extreme difference of 4.3 times was found across local authorities. Systematic variation was 19% over that expected by chance - up to 2.4-times the variation found in CHF, the condition with the lowest variation.

Besides, there is a relevant regional effect in the variation, explaining up to 31% of variation in local authorities' behaviour (see appendix 1 table 8, Intra-class Correlation Coefficient)

Figure 29 shows quite marked geographical pattern of excess risk in the north half of the country; nevertheless, all along the country, the proportion of local authorities showing significantly lower risk of angina hospitalisation than expected exceeds those flagged as bearing excess risk (figure 30).

At regional level the risk of undergoing an urgent angina admission is at least 50% higher than the average in North West, North East and Yorkshire and the Humber regions. In turn, population living in South West, South East, East of England and East Midlands stands risk 20-50% lower than expected. In this case, residents in London region bear average risk of admission.

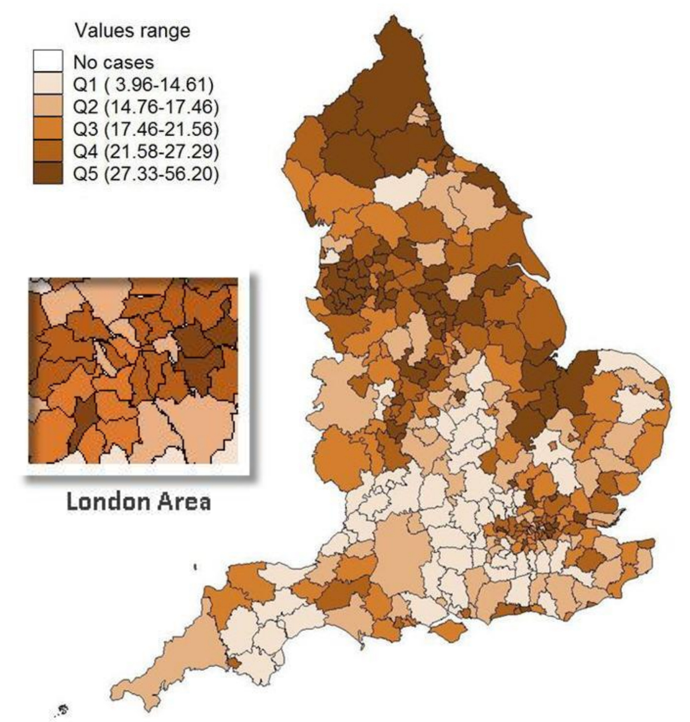

Figure 29. Age-sex standardised angina hospitalisation rate per 10,000 inhabitants. 326 Local Authorities. Year 2009

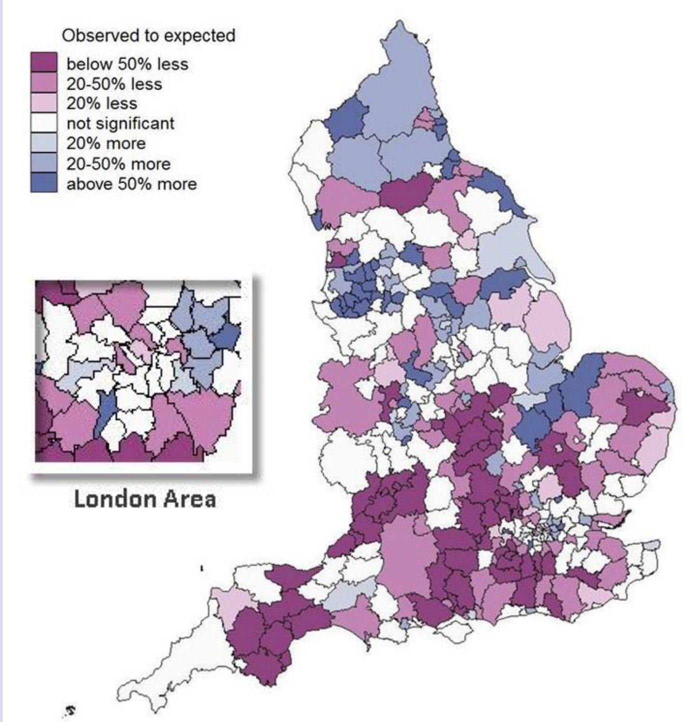

Figure 30. Ratio Observed/expected angina admissions. 326 Local Authorities. Year 2009

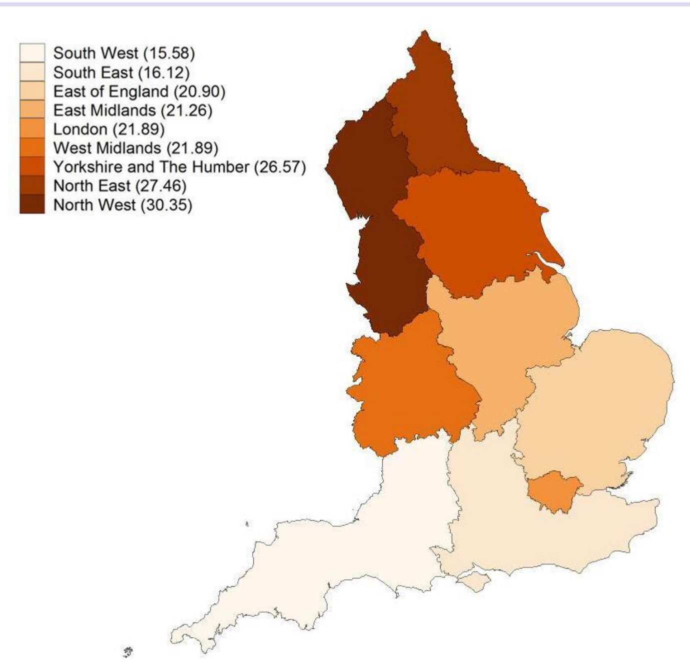

Figure 31. Age-sex standardised angina hospitalisation rate per 10,000 inhabitants. 9 regions. Year 2009

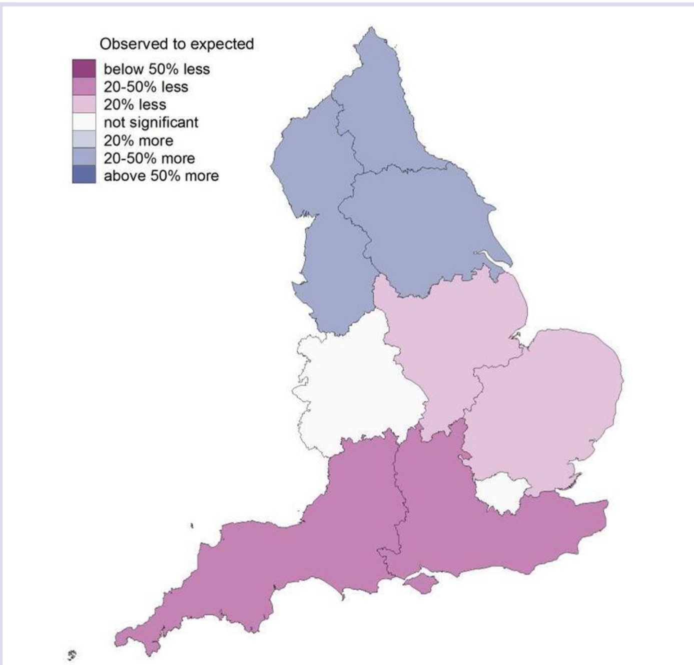

Figure 32. Ratio observed/expected angina admissions. 9 regions. Year 2009

** Maps on the left (standardised rates) merely represent the amount of admissions flagged as a potentially avoidable hospitalisation -the darker the colour, the more the number of admission per 10,000 inhabitants. Areas are clustered into 5 quintiles according to their rate value (Q1 to Q5). –legend within the maps provides the range of standardised rates within each quintile. Maps on the right reflect the level of performance in each area using as a proxy the ratio observed to expected number of PAH. Population living in areas with values above 1 (bluish) will be overexposed to PAH (poor performance); population in areas with ratio below 1 (pink) will be underexposed to PAH (good performance).*

Avoidable hospitalisation rates have slightly decreased in the period 2002 to 2009, while systematic variation has remained stable

IV. EVOLUTION OVER TIME

Between 2002 and 2009, rates of potentially avoidable hospitalisations decreased by 10%, from 61 to 55 admissions per 10,000 inhabitants – from 1 admission per 164 to 1 admission per 182 adult inhabitants. However, systematic variation remained quite stable over this period (see appendix 1 table 10)

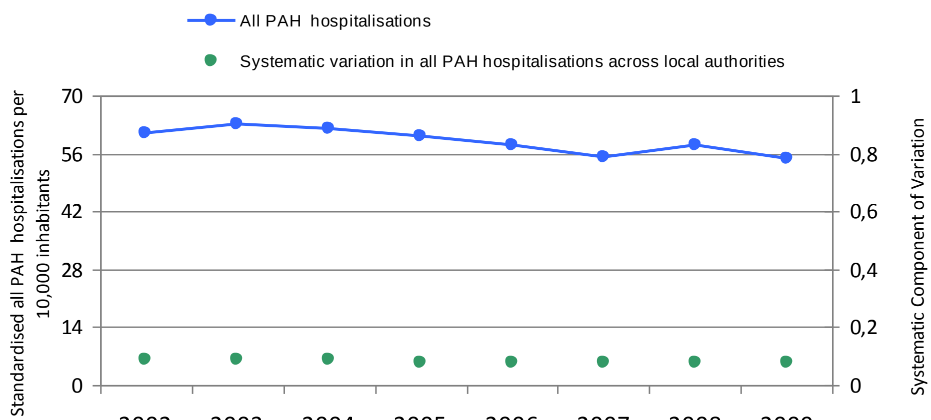

Figure 33. Evolution of standardised rates (blue lines) and systematic variation (green dots) over time

Dehydration showed a high increase of 83%, from 9 admissions in 2002 to 17 in 2009 per 10,000 inhabitants aged 65 or older. Diabetes short-term complications rate also increased in 22% over the period, whereas asthma and COPD admissions exhibit a slightly increase (see appendix 1 tables 11-15). On the contrary, urgent angina and CHF show constant decrease overtime, resulting in 34 and 33% decrease respectively.

We should look first at the evolution of the rate –an increasing trend would be a bad result regardless the evolution of the variation. The best result will be a decline both in the rate and the variation. A decrease in the rate concurrent with larger variation should lead us to further analysis on the drivers in those specific areas departing from the general trend.

With regard to systematic variation, it increases significantly in dehydration admissions and to a lesser extent in angina. In turn it decreases in diabetes.

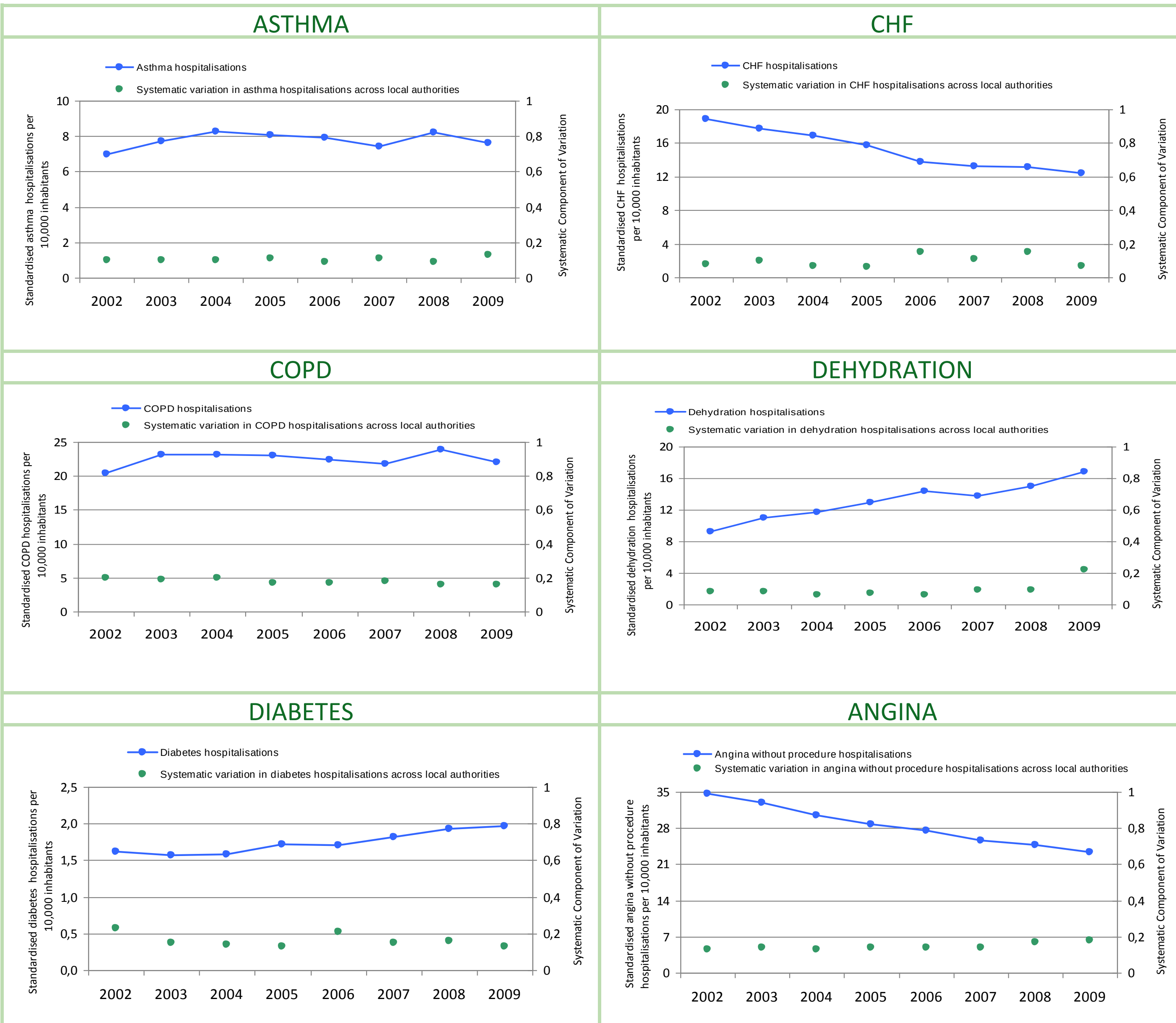

Figure 34 . Evolution of standardised rates (blue lines) and systematic variation (green dots) over time

Trends in those areas within the lowest and highest quintiles of admission rates in 2002 - overall potentially avoidable hospitalisations

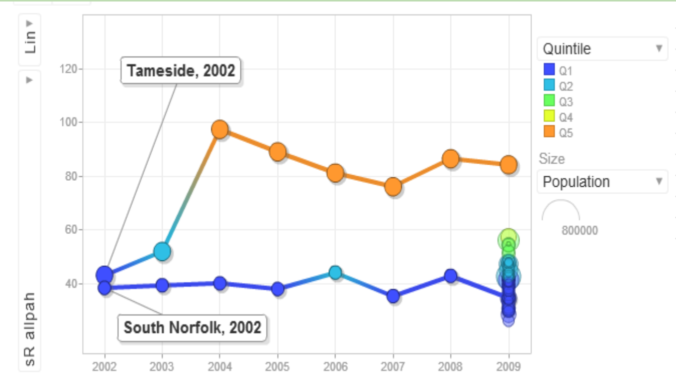

Figure 35. Trends in all PAH rates. in areas with lowest levels (Q1) in 2002

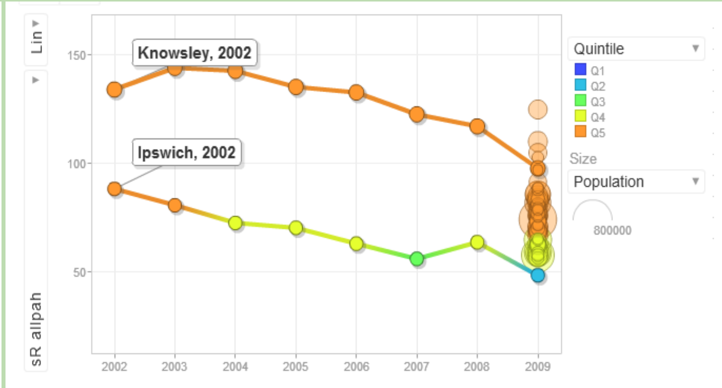

Figure 36. Trends in all PAH rates in areas with highest levels (Q5) in 2002

** Bubbles represent the local authorities. The bigger the bubble, the larger the population living in the area. Dark-blue corresponds to the lowest rates of PAH in the country (1st quintile Q), while orange represents the highest rates of PAH (5th quintile Q5). Bubbles (local authorities) will remain in the same colour or shift to another depending on where their admission rates seat each year. Colour change allows for the tracking of changes in the behaviour of individual local authorities over the period of analysis.*

Taking as an example South Norfolk and Tameside, both areas showed a good performance (among the lowest levels of PAH) in 2002. The evolution of these two areas was utterly divergent. While South Norfolk has maintained its low rates of PAH, Tameside has experienced a steady increase to the highest levels in the country by the end of the period (figure 35).

It can be observed that areas with the highest levels of PAH in 2002 (Q5 in orange) also experienced uneven evolution over the period. Thus, while Knowsley remained in the same quintile over time, the PAH rate in Ipswich (with similar size) decreased over time until second quintile of exposure (figure 36)

In the following figures (figures 37-48), similar patterns can be observed in each of the specific chronic conditions studied in this Atlas report

You can track the evolution of individual local authorities at:

http://www.echo-health.eu/handbook/quintiles_pah_eng.html

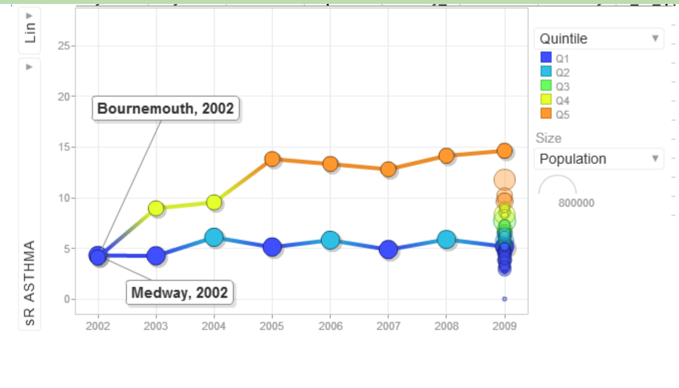

Figure 37. Trends in asthma rates in areas with lowest levels (Q1) in 2002.

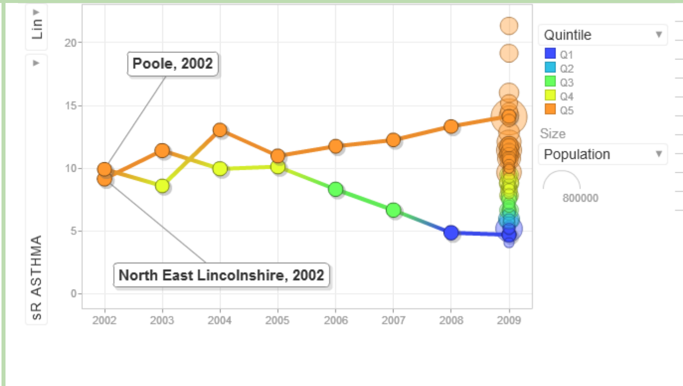

Figure 38. Trends in asthma rates in areas with highest levels (Q5) in 2002.

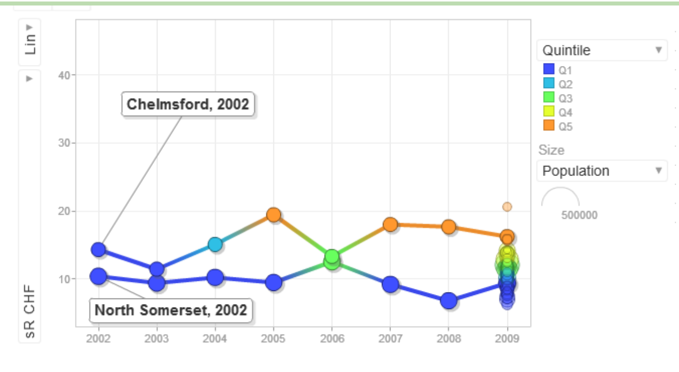

Figure 39. Trends in CHF rates in areas with lowest levels (Q1) in 2002.

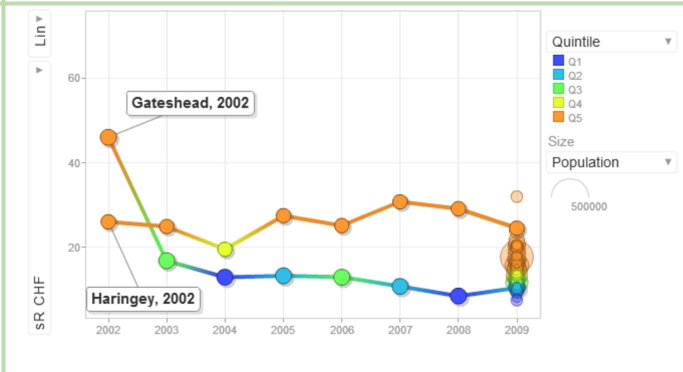

Figure 40. Trends in CHF rates in areas with highest levels (Q5) in 2002.

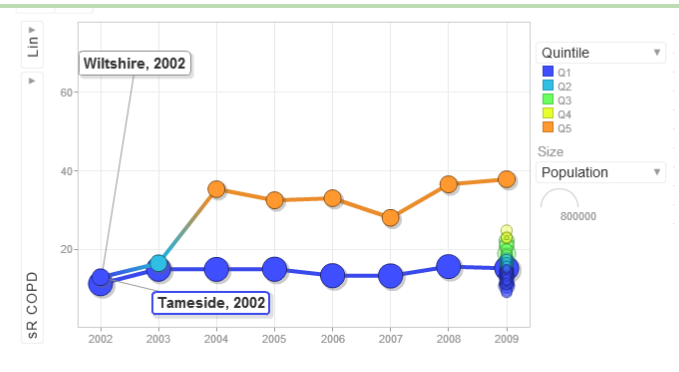

Figure 41. Trends in COPD rates in areas with lowest levels (Q1) in 2002

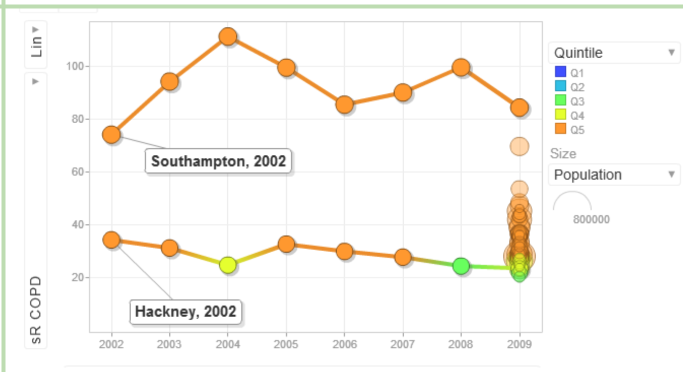

Figure 42. Trends in COPD rates in areas with highest levels (Q5) in 2002.

** Bubbles represent the local authorities. The bigger the bubble, the larger the population living in the area. Dark-blue corresponds to the lowest rates of PAH in the country (1st quintile Q1), while orange represents the highest rates of PAH (5th quintile Q5). Bubbles (local authorities) will remain in the same colour or shift to another depending on where their admission rates seat each year. Colour change allows for the tracking of changes in the behaviour of individual local authorities over the period of analysis.*

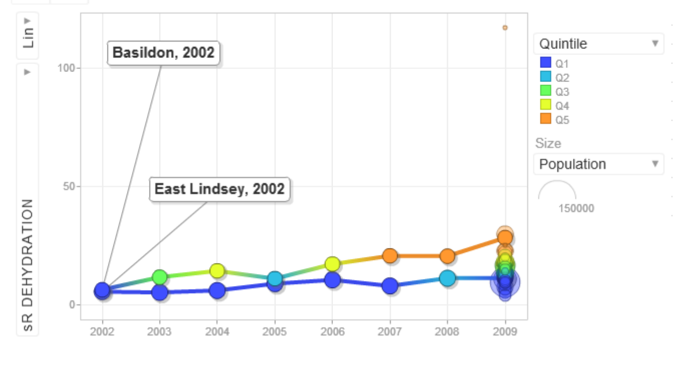

Figure 43. Trends in dehydration rates in areas with lowest levels (Q1) in 2002.

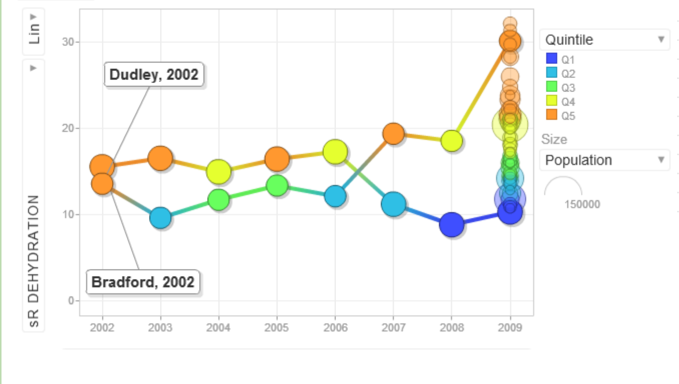

Figure 44. Trends in dehydration rates in areas with highest levels (Q5) in 2002.

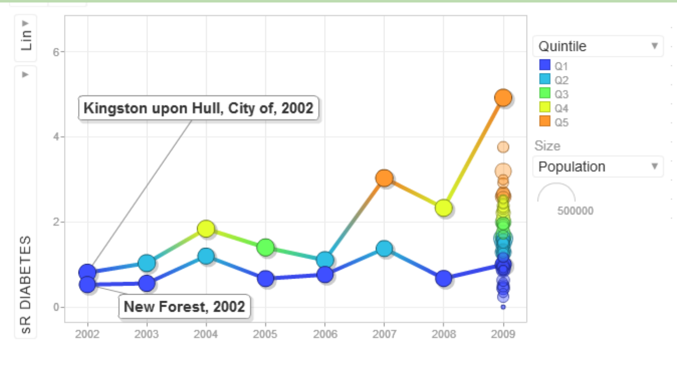

Figure 45. Trends in diabetes rates in areas with lowest levels (Q1) in 2002.

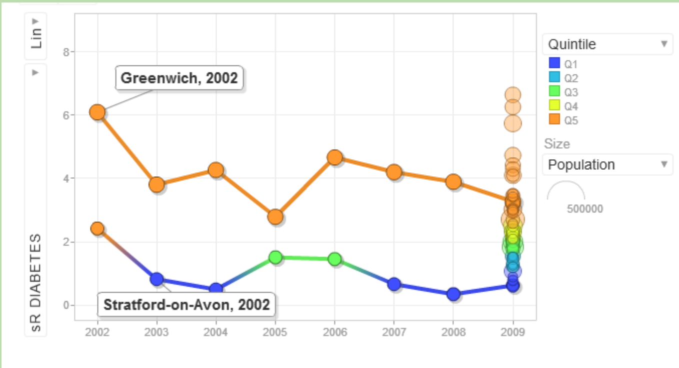

Figure 46. Trends in diabetes rates in areas with highest levels (Q5) in 2002

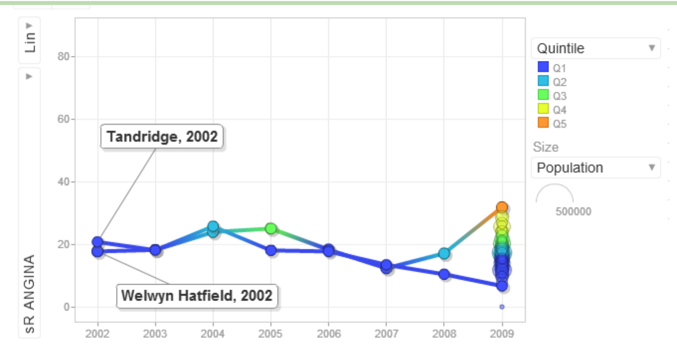

Figure 47. Trends in angina rates in areas with lowest levels (Q1) in 2002.

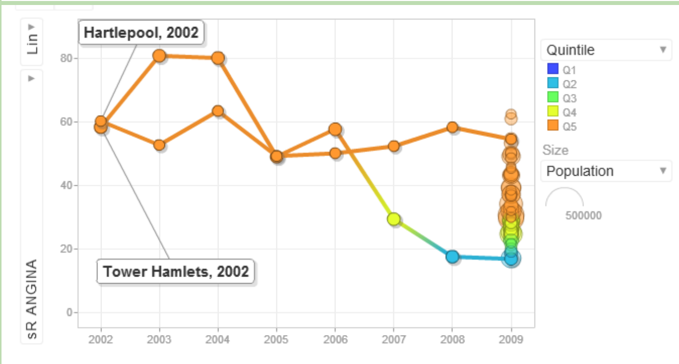

Figure 48. Trends in angina rates in areas with highest levels (Q5) in 2002

** Bubbles represent the local authorities. The bigger the bubble, the larger the population living in the area. Dark-blue corresponds to the lowest rates of PAH in the country (1st quintile Q1), while orange represents the highest rates of PAH (5th quintile Q5). Bubbles (local authorities) will remain in the same colour or shift to another depending on where their admission rates seat each year. Colour change allows for the tracking of changes in the behaviour of individual local authorities over the period of analysis.*

V. SOCIAL GRADIENT

In England, most deprived local authorities showed significantly higher rates of potentially avoidable hospitalisations when compared to the wealthiest ones

Taking into consideration the overall rates of potentially avoidable hospitalisations, most deprived local authorities showed significantly higher overall rates of potentially avoidable hospitalisations when compared to wealthier areas. Even though the rates have shown a slightly downwards trend in both cases, the gap seems to have remained unchanged over the period of analysis (figure 49).

Graphs in this section aim at providing some sense of the behaviour of potentially avoidable hospitalisations depending on the average level of affluence in the local authority. At a glance it will show whether there are differences between the better-off and the worse-off areas, and if these differences vary over time.

Overall potentially avoidable hospitalisations

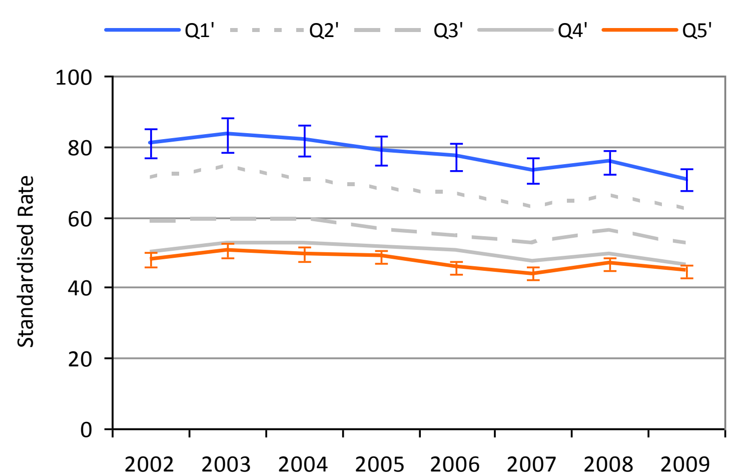

Figure 49. Trend in PAH standardised rates by average income quintile

** Areas are divided in 5 categories of wealth (deprivation index): from Q1 (blue) corresponding to the worse-off areas, to Q5 (orange) corresponding to the better off areas. Each line in the graph corresponds to the evolution of PAH rates in a wealth level (evolution in Q1 in blue and in Q5 in orange). Statistical differences across income quintiles will occur just when the confidence intervals (whiskers) for different quintiles do not overlap.*

In examining condition-specific rates, the same phenomenon arises: areas with higher deprivation index show significantly higher admission rates for any condition. Only in dehydration and CHF admissions the difference narrows over time (figure 50). Thus, the differences across local authorities described in previous sections could be partly driven by differences in the level of wealth across local authorities.

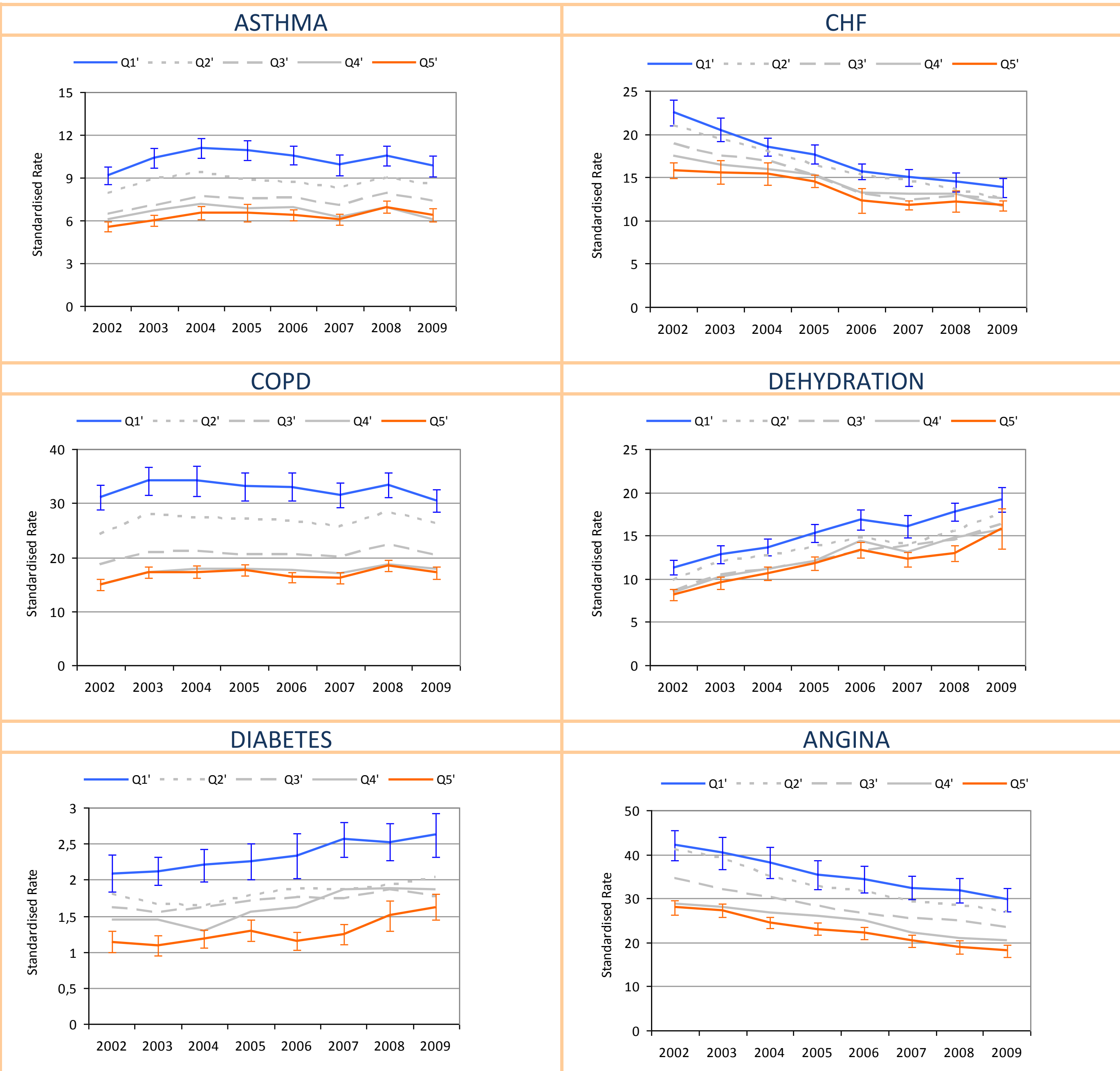

Figure 50. Trend in PAH standardised rates by income quintile and clinical condition

** Areas are divided in 5 categories of wealth (deprivation index): from Q1 (blue) corresponding to the worse-off areas, to Q5 (orange) corresponding to the better off areas. Each line in the graph corresponds to the evolution of PAH rates in a wealth level (evolution in Q1 in blue and in Q5 in orange). Statistical differences across income quintiles will occur just when the confidence intervals (whiskers) for different quintiles do not overlap.*

VI. POLICY IMPLICATIONS

In England, potentially avoidable hospitalisation rates have decreased along the period 2002-2009. Despite this downwards trend, England shows quite high PAH rates compared to other ECHO countries. Variation not amenable to random phenomena is moderate, suggesting relative systematic heterogeneity in behaviour across local authorities.

These PAH rates, would warrant further investigation of the underlying causes. In the literature, different factors have been suggested to explain differences in PAH:

- Barriers in access to primary care and/or failures in the quality of the services provided by physicians and staff nurses in primary care settings
- Lack of continuity of care between primary and specialised care.
- Distance to a hospital and/or diverse supply of hospital care. For instance, high concentration of hospital care very often leads to hospital utilisation (more patients are derived from ambulatory consultation in case of relapse). Besides, some countries have developed special hospital units dedicated to deal with chronic patients' relapses
- Different discharging policies. For instance: premature discharges from acute episodes could increase the overall number of admissions on the basis of a rise in the number of readmissions.
- Socio-economic differences. Socioeconomic conditions have been described to have a major impact on prevalence and severity of chronic conditions and patient's ability to self-care and to seek healthcare or navigate available resources.
- Supply of long-term and home-care. When community and home care are insufficient, reliance on hospital care becomes more critical to assure control of chronic patients.

In England, primary care is provided by a range of health care professionals and organizations and the responsibility for its coordination and delivery rests with Primary Care Trusts (PCTs), which must ensure that the appropriate range of services is available to their populations[1].

There is some evidence that higher continuity of care with a General Practitioner (GP) is itself associated with lower risk of emergency hospital admission[1]. In this line of thought, the pattern of high PAH rates in the north of England would match with the fact that these areas have long been undersupplied with doctors. The intention of government was that unequal distribution of GPs would be addressed locally by PCTs through the procurement from alternative providers of new capacity in areas undersupplied with doctors.

Furthermore, from 2014/15 some GP practices will pilot extended opening hours, so that people can see their GP from 8am to 8pm seven days a week. It will be interesting to see if greater availability of primary care in these pilot areas does indeed lead to a reduction in emergency admissions

The number of GPs in England has increased by 39% since 1989, this has led to a reduction in GP list size of almost 29% between 1989 and 2009[1]. This reduction in GP list could have helped to the decrease in PAH rates along the period 2002-2009 found in this report.

Despite this decrease, GP list size shows considerable geographical variation, reaching differences up to 80%, which may partly explain the variation in PAH rates observed across the country.

Otherwise, coordination with specialised care as well as supply of long-term and home-care may also play a role in reducing the number of avoidable hospitalisations. It would be worth exploring this effect in the areas with the lowest rates. If those areas were better endowed in this type of services, their role might be confirmed and they could be taken as good practices of reference.

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[1] All background information on English Health System can be consulted at European Observatory of Health Systems and policy platform: Health Systems Policy Monitor http://www.hspm.org/countries/england11032013/countrypage.aspx

Other issue worth exploring in more detail is that it seems that depending on the average level of wealth in the area the risk of potentially avoidable admissions is significantly increased for residents. This might be signalling inequitable access to ambulatory care for chronic conditions for those populations living in the most deprived areas.

Potentially avoidable hospitalisations rates have decreased In England along the period 2002-2009. Despite this trend, England still shows quite high PAH rates compared to other ECHO countries. Furthermore, the variation across local authorities suggests uneven population exposure to PAH across the country which has proven related to deprivation levels.

Recent measures aimed to increase availability of 24 hours GP services as well as efforts to enhance continuity of care and coordination across different types of services may have a positive impact. The type of analysis described in this report would be helpful in assessing the extent and distribution of such effect

APPENDIX 1:

Tables International Comparison 2009

Table 1

	ALL PAH				
	DENMARK	ENGLAND	PORTUGAL	SLOVENIA	SPAIN
Cases	35,052	228,527	24,252	7,303	155,776
Stand. Rate	81.44	55,65	30.90	60.95	46.19
EQ5-95	1.87	2.34	2.64	2.25	3.22
SCV	0.71	0.15	0.21	0.15	0.11

** sR: Age-sex Standardised Rate per 10,000 inhabitants (Reference population: ECHO countries 2009); EQ: Extremal Quotient; SCV:Systematic Component of Variation;*

Table 2

	ASTHMA				
	DENMARK	ENGLAND	PORTUGAL	SLOVENIA	SPAIN
Cases	2,029	32,406	932	703	9,552
Stand. Rate	4.63	7.96	1.05	4.71	2.84
EQ5-95	2.89	2.18	6.97	4.01	6.18
SCV	0.13	0.77	0.69	0.07	0.37

** sR: Age-sex Standardised Rate per 10,000 inhabitants (Reference population: ECHO countries 2009); EQ: Extremal Quotient; SCV:Systematic Component of Variation;*

Table 3

	CHF				
	DENMARK	ENGLAND	PORTUGAL	SLOVENIA	SPAIN
Cases	6,420	29,080	9,862	3,442	41,056
Stand. Rate	25.83	12.36	23.03	54.14	20.93
EQ5-95	2.21	1.85	2.21	3.34	2.58
SCV	0.77	0.1	0.65	6.56	0.29

** sR: Age-sex Standardised Rate per 10,000 inhabitants (Reference population: ECHO countries 2009); EQ: Extremal Quotient; SCV:Systematic Component of Variation;*

Table 4

	COPD				
	DENMARK	ENGLAND	PORTUGAL	SLOVENIA	SPAIN
Cases	14,206	93,597	7,709	1,853	76,362
Stand. Rate	33.7	22.69	9.09	14.2	22.25
EQ5-95	1.98	2.37	4.16	2	3.53
SCV	0.58	0.22	0.39	0.13	0.27

** sR: Age-sex Standardised Rate per 10,000 inhabitants (Reference population: ECHO countries 2009); EQ: Extremal Quotient; SCV:Systematic Component of Variation;*

APPENDIX 1:

Tables International Comparison 2009

Table 5

	DEHYDRATION				
	DENMARK	ENGLAND	PORTUGAL	SLOVENIA	SPAIN
Cases	6,906	12,981	2,674	548	5,672
Stand. Rate	81.65	16.11	18.19	24.7	8.13
EQ5-95	2.94	2.26	4.5	6.83	4.24
SCV	26.3	0.1	1.04	1.42	0.29

** sR: Age-sex Standardised Rate per 10,000 inhabitants (Reference population: ECHO countries 2009); EQ: Extremal Quotient; SCV:Systematic Component of Variation;*

Table 6

	DIABETES				
	DENMARK	ENGLAND	PORTUGAL	SLOVENIA	SPAIN
Cases	406	4667	772	100	2420
Stand. Rate	1.74	2.02	2.01	1.51	1.32
EQ5-95	3.58	2.6	12.87	11.3	4.67
SCV	0.26	0.36	2.5	0.41	0.11

** sR: Age-sex Standardised Rate per 10,000 inhabitants (Reference population: ECHO countries 2009); EQ: Extremal Quotient; SCV:Systematic Component of Variation;*

Table 7

	ANGINA				
	DENMARK	ENGLAND	PORTUGAL	SLOVENIA	SPAIN
Cases	5,507	55,805	2,303	661	20,856
Stand. Rate	22,08	24.29	5.45	10.23	1.9
EQ5-95	4,41	2.68	4.88	9.74	4.41
SCV	0,69	0.73	0.56	0.26	0.25

** sR: Age-sex Standardised Rate per 10,000 inhabitants (Reference population: ECHO countries 2009); EQ: Extremal Quotient; SCV:Systematic Component of Variation;*

APPENDIX 1:

Tables England 2009

Table 8

	Asthma	CHF	COPD	Dehydration	Diabetes	Angina	All PAH
Cases	32406	29080	93597	12981	4667	55805	228527
Population	42,734,036	25,435,816	42,734,036	8,434,529	25,435,816	25,435,816	42,734,036
Crude Rate	7.03	11.29	21.01	15.46	1.77	21.24	52.27
Stand. Rate	7.28	11.29	20.84	15.59	1.80	21.27	51.57
sR Min.	2.32	4.88	8.69	3.47	0.19	3.96	24.27
sR Max.	21.30	28.41	85.74	112.42	6.09	56.20	124.64
sR. P5	3.73	7.03	11.02	7.89	0.62	9.26	31.54
sR. P25	5.31	9.12	14.51	11.49	1.18	15.59	39.99
sR. P50	6.76	10.78	18.72	14.59	1.70	19.50	48.56
sR. P75	8.63	12.68	24.56	18.62	2.17	25.36	59.91
sR. P95	12.32	17.53	36.62	25.58	3.35	39.60	80.13
EQ5-95	3.30	2.49	3.32	3.24	5.36	4.27	2.54
EQ25-75	1.62	1.39	1.69	1.62	1.85	1.63	1.50
ICC	0.06	0.19	0.21	0.05	0.12	0.31	0.29

**sR: Age-sex Standardised Rate per 10,000 inhabitants (Reference population: national 2009); sR Px: percentile x of sR distribution; EQ: Extremal Quotient; ICC: Intra class Correlation Coefficient*

Table 9

	Asthma	CHF	COPD	Dehydration	Diabetes	Angina	All PAH
SUR Mín.	0.25	0.42	0.40	0.23	0.11	0.18	0.45
SUR Máx.	2.88	2.59	3.85	6.48	2.99	2.63	2.26
SUR P5	0.50	0.62	0.50	0.52	0.36	0.43	0.58
SUR P25	0.68	0.81	0.66	0.75	0.64	0.71	0.75
SUR P50	0.86	0.95	0.86	0.94	0.93	0.89	0.90
SUR P75	1.11	1.11	1.12	1.20	1.19	1.15	1.11
SUR P95	1.62	1.55	1.67	1.65	1.80	1.81	1.52
SCV	0.13	0.08	0.19	0.20	0.13	0.19	0.09

**SUR:Standarised Utilization Ratio (observed/expected); SUR Px: percentile x of the SUR distribution; SCV:Systematic Component of Variation*

APPENDIX 1:

Tables England 2002-2009

Table 10

	ALL PAH							
	2002	2003	2004	2005	2006	2007	2008	2009
Cases	257,565	267,471	263,067	254,269	243,978	232,877	243,215	228,527
Stand. Rate	60.79	63.03	61.86	60.05	57.89	55.28	57.89	54.66
sR Q1.	47.89	50.4	49.49	48.93	45.78	43.98	46.75	44.69
sR Q5.	80.83	83.3	81.81	78.9	77.07	73.34	75.53	70.68
SCV	0.09	0.09	0.09	0.08	0.08	0.08	0.08	0.08

** sR: Age-sex Standardised Rate per 10,000 inhabitants (Reference population: national 2002); sR Qx: quintile of sR distribution; SCV:Systematic Component of Variation;*

Table 11

	Asthma							
	2002	2003	2004	2005	2006	2007	2008	2009
Cases	29,437	33,222	35,713	34,592	33,985	31,849	35,047	32,406
Stand. Rate	6.96	7.72	8.27	8.04	7.91	7.43	8.23	7.6
sR Q1.	5.58	6.01	6.55	6.55	6.39	6.08	6.96	6.37
sR Q5.	9.12	10.4	11.09	10.94	10.56	9.89	10.57	9.82
SCV	0.1	0.1	0.1	0.11	0.09	0.11	0.09	0.13

** sR: Age-sex Standardised Rate per 10,000 inhabitants (Reference population: national 2002); sR Qx: quintile of sR distribution; SCV:Systematic Component of Variation;*

Table 12

	CHF							
	2002	2003	2004	2005	2006	2007	2008	2009
Cases	45,124	41,945	39,893	37,44	32,523	31,454	30,324	29,08
Stand. Rate	18.88	17.74	16.85	15.72	13.8	13.25	13.17	12.43
sR Q1.	15.8	15.6	15.43	14.52	12.31	11.79	12.2	11.74
sR Q5.	22.51	20.53	18.52	17.67	15.68	14.97	14.51	13.8
SCV	0.08	0.1	0.07	0.06	0.15	0.11	0.15	0.07

** sR: Age-sex Standardised Rate per 10,000 inhabitants (Reference population: national 2002); sR Qx: quintile of sR distribution; SCV:Systematic Component of Variation;*

APPENDIX 1:

Tables England 2002-2009

Table 13

	COPD							
	2002	2003	2004	2005	2006	2007	2008	2009
Cases	88,436	100,276	100,044	98,369	96,225	92,776	101,703	93,597
Stand. Rate	20.4	23.1	23.16	22.96	22.41	21.74	23.87	22.07
sR Q1.	14.85	17.2	17.25	17.66	16.28	16.27	18.42	17.11
sR Q5.	31.07	34.1	34.13	33.1	33.05	31.52	33.33	30.54
SCV	0.2	0.19	0.2	0.17	0.17	0.18	0.16	0.16

** sR: Age-sex Standardised Rate per 10,000 inhabitants (Reference population: national 2002);*
sR Qx: quintile of sR distribution; SCV:Systematic Component of Variation;

Table 14

	Dehydration							
	2002	2003	2004	2005	2006	2007	2008	2009
Cases	7,510	8,931	9,430	10,240	11,421	11,044	11,928	12,981
Stand. Rate	9.23	10.97	11.74	12.92	14.41	13.78	14.98	16.86
sR Q1.	8.13	9.58	10.6	11.77	13.36	12.28	12.93	15.79
sR Q5.	11.3	12.81	13.61	15.3	16.87	16.05	17.8	19.17
SCV	0.08	0.08	0.06	0.07	0.06	0.09	0.09	0.22

** sR: Age-sex Standardised Rate per 10,000 inhabitants (Reference population: national 2002);*
sR Qx: quintile of sR distribution; SCV:Systematic Component of Variation;

Table 15

	Diabetes							
	2002	2003	2004	2005	2006	2007	2008	2009
Cases	3,736	3,674	3,837	4,147	4,091	4,383	4,568	4,667
Stand. Rate	1.62	1.57	1.58	1.72	1.71	1.82	1.93	1.97
sR Q1.	1.14	1.09	1.19	1.3	1.15	1.24	1.5	1.62
sR Q5.	2.09	2.12	2.21	2.25	2.33	2.56	2.52	2.62
SCV	0.23	0.15	0.14	0.13	0.21	0.15	0.16	0.13

** sR: Age-sex Standardised Rate per 10,000 inhabitants (Reference population: national 2002);*
sR Qx: quintile of sR distribution; SCV:Systematic Component of Variation;

APPENDIX 1:

Tables England 2002-2009

Table 16

	Angina							
	2002	2003	2004	2005	2006	2007	2008	2009
Cases	85,401	81,458	76,088	72,017	67,922	63,695	61,944	57,96
Stand. Rate	35.38	33.75	31.16	29.55	28.22	26.46	25.5	24.19
sR Q1.	27.94	27.23	24.38	23.07	22.13	20.34	18.99	18.08
sR Q5.	42.08	40.31	38.15	35.38	34.32	32.44	31.82	29.68
SCV	0.14	0.14	0.14	0.14	0.15	0.15	0.17	0.19

** sR: Age-sex Standardised Rate per 10,000 inhabitants (Reference population: national 2002);*

sR Qx: quintile of sR distribution; SCV:Systematic Component of Variation;

APPENDIX 2: Technical note

Potentially avoidable hospitalisations are conceived as geographical indicators, within the ECHO performance model.

This fact entails some implications, both for methodology and in interpreting results. The report is based on ecologic analyses –data aggregated at a certain geographical level which becomes the unit of analysis for this report; thus, the correct interpretation of the findings highlights the risk of being exposed to avoidable hospitalisations for the population living in a certain area (as opposed to the risk for an individual patient).

Main endpoints:

This report maps out standardised utilisation rates per geographical area. As a summary measure of variation, the report includes the classical statistics Ratio of Variation and Component of Systematic Variation.

Instruments:

Being an ecologic study, each admission was allocated to the place of residence of the patient, which in turn is referred to a meaningful geographic unit – the 326 Local Authorities and the 9 Regions composing the English National Health System.

The operational definitions for each indicator are detailed in the coding table in appendix 3. Indicators are based on those in use in the international arena as proposed by AHRQ and OECD. For its use in the analysis of variations across countries they were subject to a construct validity process developed by the Atlas VPM project in Spain and cross-walking across different diseases and procedures classifications underwent a face-validation carried out as a task within the ECHO project.

This report is based on the hospital admissions registered in the Hospital Episode Statistics (HES). Cross- and within-country sections were built upon 2009 discharges, whereas time-trends and social gradient analyses used 2002 to 2009 data.

Social gradient data were obtained from the UK National Statistics official data for LAs on average annual income deprivation (people in households on low income benefits).

APPENDIX 3:

Definitions of indicators

	Diagnosis codes ICD10 and Procedures codes OPCS					
	Primary diagnosis		Secondary diagnosis2-30		Procedures	
	Inclusions	Exclusions	Inclusions	Exclusions	Inclusions	Exclusions
Asthma +18 Age	J45 J46 J96.0 IF "diag2-30"=A		A) J45	Pregnancy, childbirth and the puerperium: O00-O99 CHF: I50 I09.9 I11.0 I13.0 I13.2 Cystic fibrosis: E84.0-E84.9 Q25.1-Q25.4 Q30 Q31 Q32 Q33 Q34 Q39 Q89.3 P26 Mental disorders: F10-F19 F20 F21 F22 F23 F24 F25 F29 F30 F31 F32 F33 F34 F38 F39 F40-F45 F44 F48 F50-52 F54 F60 F63 F68 F28 F53 F55 F59 F61 F62 F69 Respiratory diseases: J47 J84.10 J98 J99 COPD: J41.1 J41.8 J42 J43 J44 J47		
Congestive Heart Failure +40 Age	I09.9 I11.0 I13.0 I13.2 I50			Pregnancy, childbirth and the puerperium: O00-O99 COPD: J41.1 J41.8 J42 J43 J44 J47 Ischaemic disease: I20 I21 I22 I24.0 I24.8 Kidney failure: I12 I13.1 N17 N18 N19		

	Diagnosis codes ICD10 and Procedures codes OPCS					
	Primary diagnosis		Secondary diagnosis2-30		Procedures	
	Inclusions	Exclusions	Inclusions	Exclusions	Inclusions	Exclusions
Chronic obstructive pulmonary disease (COPD) +18 Age	J42 J43 J44 J47 J41.1 J41.8 J20 IF DX= "A)" J40 IF DX= "A)" J96.0 IF DX= "B)" J96.9 IF DX= "B)"		A) J42 J43 J44 J47 J41.1 J41.8 B) J42 J44.9 J47	Pregnancy, childbirth and the puerperium: O00-O99 CHF: I50 I09.9 110 I130 I132 Cystic fibrosis: E84.0-E84.9 Q25.1-Q25.4 Q30 Q31 Q32 Q33 Q34 Q39 Q89.3 P26 Mental disorders: F10-F19 F20 F21 F22 F23 F24 F25 F29 F30 F31 F32 F33 F34 F38 F39 F40-F45 F44 F48 F50-F52 F54 F60 F63 F68 F28 F53 F55 F59 F61 F62 F69		
Dehydration Admission +65 Age	E86 E87.0 E87.1					
Diabetes short-term complication +40 Age	E10.0 E10.1 E11.0 E11.1 E13.0 E13.1			Pregnancy, childbirth and the puerperium: O00-O99 Mental Disorders: F10-19 F20 F21 F22 F23 F24 F25 F29 F30 F31 F32 F33 F34 F38 F39 F40-F45 F44 F48 F50-F52 F54 F60 F63 F68 F28 F53 F55 F59 F61 F62 F69		
Angina without procedure +40 Age Urgent admissions	I20.0 I24.0 I24.8 I20.8 I20.1 I20.9			Pregnancy, childbirth and the puerperium: O00-O99		Cardiac Procedures (Annex 1)