ECHO

EUROPEAN COLLABORATION FOR HEALTHCARE OPTIMIZATION

Potentially Avoidable Hospitalisations in Portugal

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I. EXECUTIVE SUMMARY

The study of systematic variations in Potentially Avoidable Hospitalizations (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 that 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).
- Compared with the other ECHO countries Portugal has the lowest rates of potentially avoidable admissions.
- In Portugal along 2009, 24,252 discharges were flagged as a Potentially Avoidable Hospitalisation (PAH), a 1.3% of all hospitalisations produced in Portugal that year.
- The most prevalent PAH condition was CHF, with 19 admissions per 10,000 individuals aged 40 or older in 2009. In turn, diabetes short-term complications was the less frequent with 2 admissions per 10,000 individuals aged 40 or older.
- Differences across the 278 concelhos in the country were patent. Variation was 3.5-fold in all PAH discharges, ranging from a 17-fold difference in the case of dehydration to a 5-fold difference in COPD.
- There is a pattern of high rates in half north of Portugal (North and Central Regions) in most conditions.
- Systematic variation not amenable to chance is high in almost all the conditions. The highest values were detected in diabetes short-term complications, asthma and dehydration admissions.
- Living in a particular Region –i.e. different regional policies- did not contribute to explain variation in PAH conditions, with the exception of COPD, where region effect accounted for 31% of total variation. This suggests that medical practice at concelho level is more critical than regional policies in chronic diseases management.
- Between 2002 and 2009, PAH rates increased slightly by 5%. Analysing each PAH condition we found that dehydration admission rates increased by 53%,

while emergency angina and diabetes short-term complications had decreased their rates by 20% and 24%, respectively. In turn, asthma, COPD and CHF admissions stayed very stable. Moreover, the observed systematic variation across concelhos suggests an uneven population exposure to PAH across the country.

- Differences across concelhos could stem from their uneven level of wealth since wealthier areas showed significant higher overall PAH rates when compared to most deprived areas. Dehydration admissions were also significantly more frequent in areas with high average income, becoming the gap wider over time. Asthma, CHF and unplanned angina admissions rates were also higher in better-off areas, but differences were not significant all years.

- High-income concelhos show more PAH admissions than most deprived ones. This evidence points out to both, excessive access to hospital beds in those better-off areas and limited access to hospital care in those deprived, translated into fewer admissions both preventable and necessary.

- Recent measures aimed to guarantee effective primary health care provision to the population, as well as efforts to connect the population with long-term care network may have a positive impact. The type of analysis described in this report would be helpful in assessing the results of these reforms.

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.

In the case of the Portuguese Healthcare System, the detected rates of PAH might indicate limited access to hospital care in most deprived areas. Recent measures aimed to guarantee primary health care provision to the population, as well as efforts to connect the population with long-term care, may improve effectiveness and efficiency of care for chronic conditions.

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

II. INTERNATIONAL COMPARISON

This section offers a rough picture of potentially avoidable hospitalisations in Denmark, 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)

Portugal shows the lowest rates of potentially avoidable hospitalisations –1 admission per 364 adult inhabitants in 2009. That means 2.6 times less than Denmark, the country with the highest rates (see appendix 1 table 1).

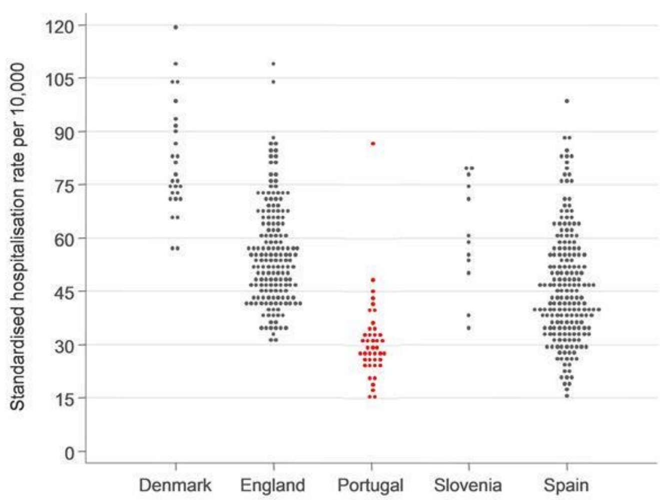


Figure 1.a. Age-sex standardised overall PAH rates per 10,000 inhabitants (natural scale to compare actual rates). Year 2009

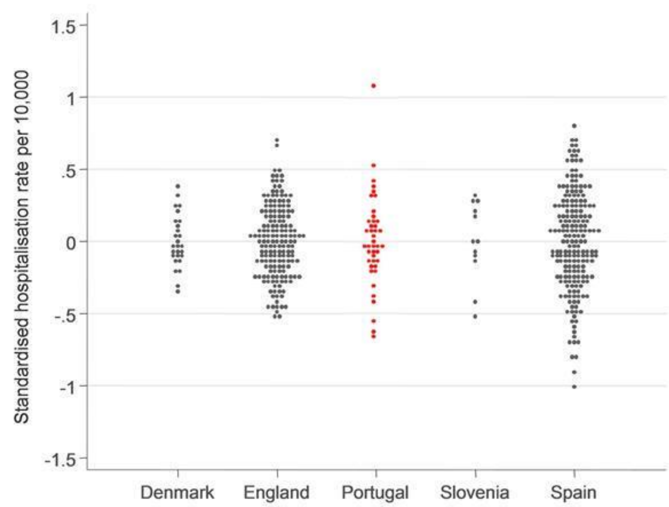


Figure 1.b. Age-sex standardised overall PAH rates per 10,000 inhabitants (normalised scale to compare degree of variation). Year 2009

** Each dot represents the relevant administrative area in the country (Concelhos for Portugal). 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 (EQ5-95), is very similar across countries ranging from a 1.9-fold difference in Denmark to a 2.6-fold probability of undergoing any PAH for Portuguese residents in those areas with extreme 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% in Spain above that randomly expected, to 21% in Portugal (see appendix 1 table 1). Denmark exhibits the highest SCV value being 71% above that expected by chance (see appendix 1 table 1).

Mixed 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 Portugal, CHF is the cause of the major number of PAH admissions (41%), followed by COPD, dehydration, angina, asthma and diabetes (32%, 11%, 9%, 4% and 3%, respectively).

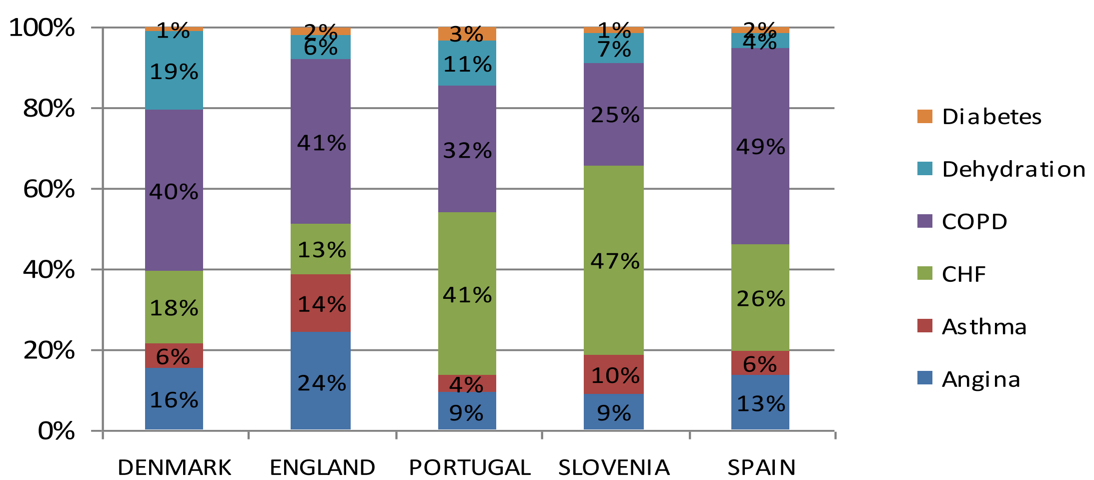


Figure 2. Share of PAH cases by country. Year 2009

Figure 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 into the relative magnitude of the specific rates (figure 3).

Compared to the other countries, Portugal has the lowest rates of urgent angina, asthma and COPD admissions. On the contrary, it shows high rates in diabetes admissions due to short-term complications.

Otherwise, Denmark shows the highest rate in COPD and dehydration; being the latter far from rates detected in the other countries. England has the highest rate of asthma, angina and diabetes admissions. Conversely, it exhibits the lowest rate in CHF hospitalisations. Slovenia, with moderate PAH rates in general, shows an outstanding CHF rate. Spain exhibits the lowest rates in dehydration and diabetes hospitalisations (see appendix 1 tables 2-7).

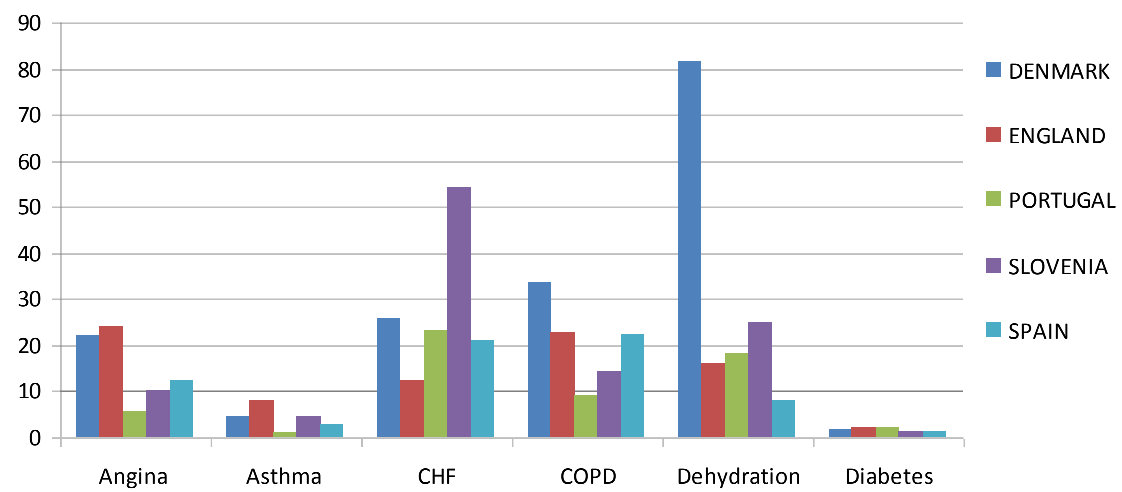


Figure 3. Magnitude of PAH per condition across countries (age-sex standardised rates per 10,000 inhabitants). Year 2009.

III. IN COUNTRY VARIATION

Potentially avoidable hospitalisations in Portugal are observed across the country, being the most frequent in cases number CHF and COPD. When we analyse the standardised rates, CHF is still the condition most frequent, followed by dehydration admissions.

Variation is widespread in all PAH conditions, and a relevant proportion of it is systematic –beyond that randomly expected- in all of them, with the least variation across concelhos in COPD and the widest in short-term diabetes complications (see appendix 1 tables 8-9).

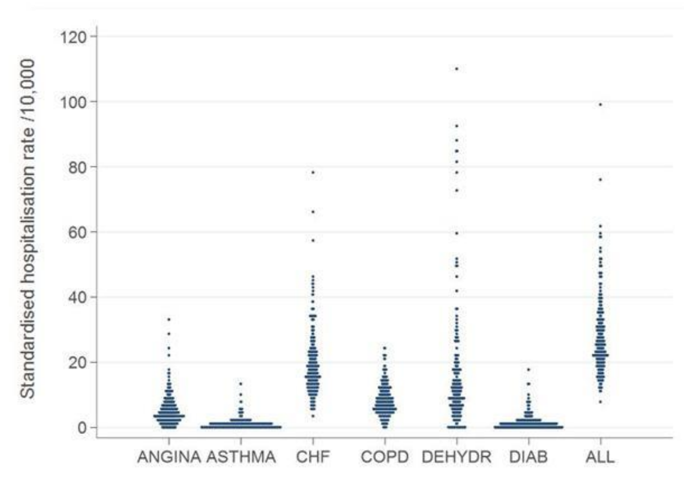


Figure 4. a. Age-sex standardised hospitalisation rates per 10,000 inhabitants (natural scale to compare actual rates). Year 2009

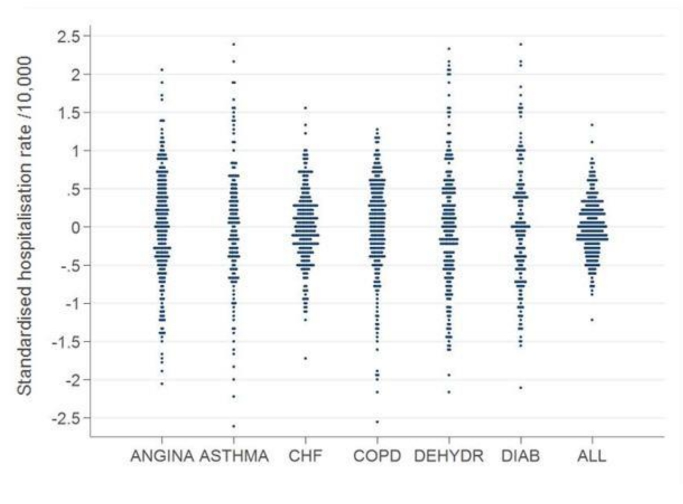


Figure 4.b. Age-sex standardised hospitalisation rates per 10,000 inhabitants (normalised scale to compare degree of variation). Year 2009

Each dot represents the relevant administrative area in the country (Concelhos for Portugal). The y-axis charts the Concelho 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, 24,252 admissions with one of the chronic conditions considered in this report were flagged as potentially avoidable. This figure represents around 1.3% of all the admissions that occurred in Portugal in 2009 -1 admission out of 364 adult individuals.

Variation across extreme areas reached 3.5-fold difference and about 14% of this observed variation exceeds what could be randomly expected. Besides, it seems to be entirely amenable to factors operating within the concelho, since the regional level play null role in explaining such variation (see appendix 1 table 8, Intra-class Correlation Coefficient).

There was a certain geographic pattern in the north-eastern part of the country and in some central concelhos (figure 5). In many of these concelhos with high admission ratios, their residents bear 50% more risk of admission than average (bluish areas in figure 6).

Zooming out to the Region level, residents in Central Region faced up to 20% more risk of potentially avoidable admissions than the national average. In turn, population living in North Region and Lisbon had 20% less risk of suffering an avoidable hospitalisation (figure 8).

Variation in each PAH condition is represented using two geographic units: concelhos and regions. The first set is composed of 278 units and the second comprises 5 regions. While concelhos would represent local provision of chronic care, regions are used as a surrogate for regional policies affecting all the concelhos within each one.

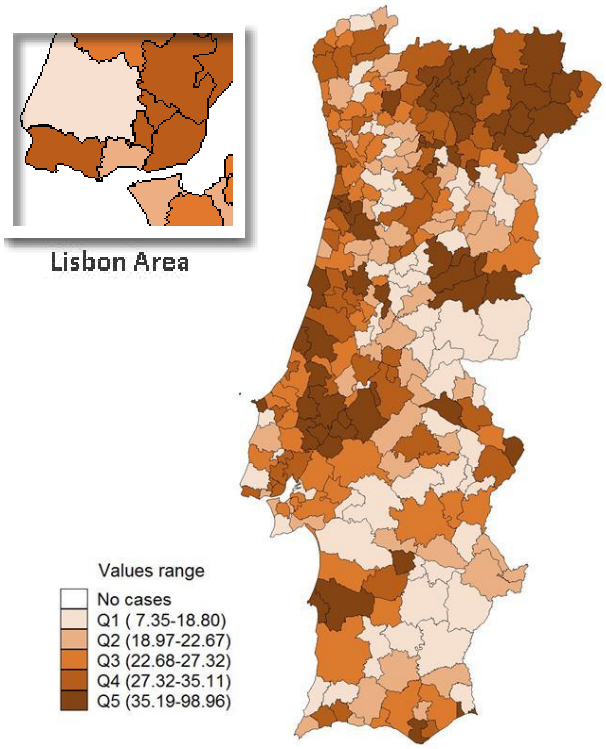


Figure 5. Age-sex standardised all PAH hospitalisation rate per 10,000 inhabitants. 278 concelhos. Year 2009

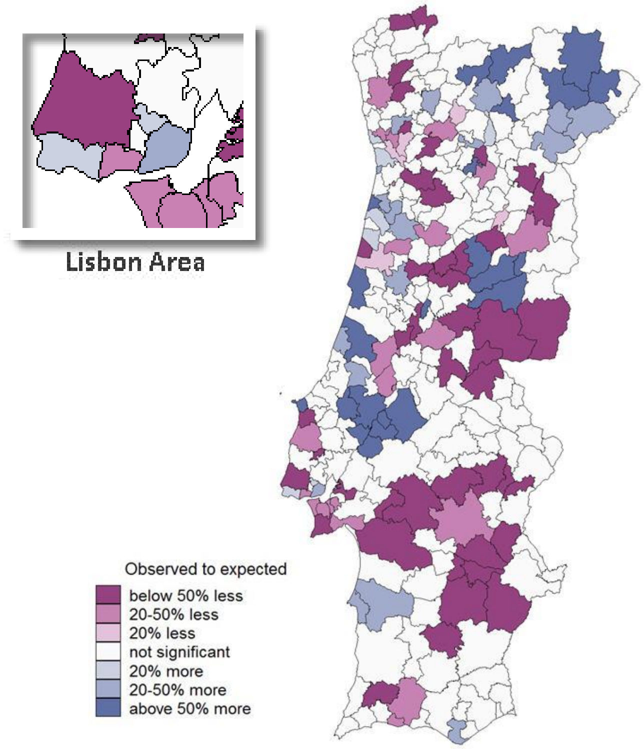


Figure 6. Ratio observed/expected all PAH admissions. 278 concelhos. Year 2009

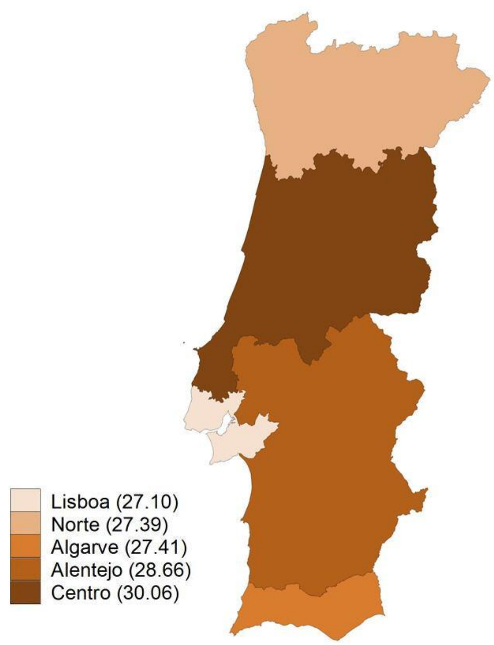


Figure 7 Age-sex standardised all PAH hospitalisation rate per 10,000 inhabitants. 5 regions. Year 2009

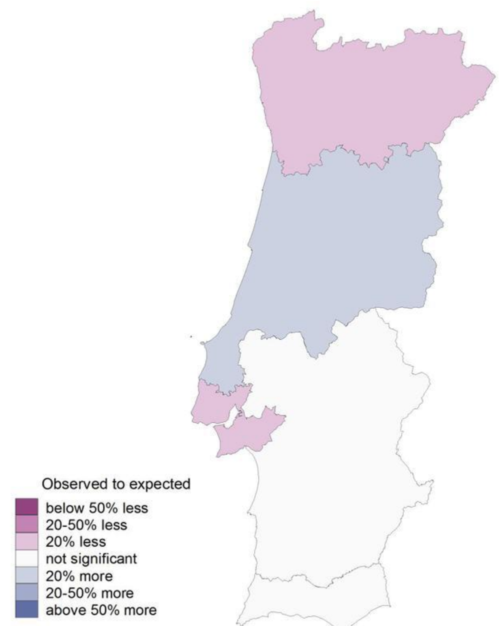


Figure 8. Ratio observed/expected all PAH admissions. 5 regions. Year 2009

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 admissions, always 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 are representing 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

932 discharges with a primary diagnosis of asthma were flagged as potentially avoidable in 2009 – 1 admission per 6,250 inhabitants aged 18 or older.

A huge difference in hospitalisations, up to 16-fold, was found between concelhos with extreme rates. Systematic variation, was one of the highest observed among all the conditions, around 1.06 times higher than that expected by chance. But only 1% of the variation in these hospitalisations could be attributed to the region of residence.

Figures 9 and 10 showed this heterogeneous behaviour. There were some scattered concelhos with high rates of admissions whose residents had up to 50% more risk of undergoing asthma hospitalisations than national average. But in general asthma admission rates were low, and population living in around 41% of the concelhos had less than 50% risk of being hospitalised by asthma.

Analysis at regional level showed that residents in Central Region endured up to 50% increased risk of asthma admissions (figure 12).

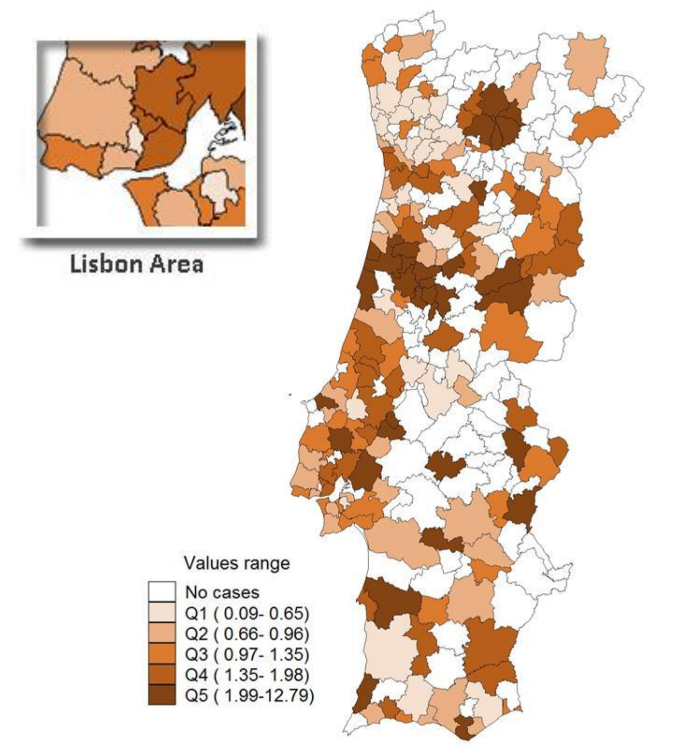


Figure 9. Age-sex standardised Asthma hospitalisation rate per 10,000 inhabitants. 278 concelhos. Year 2009

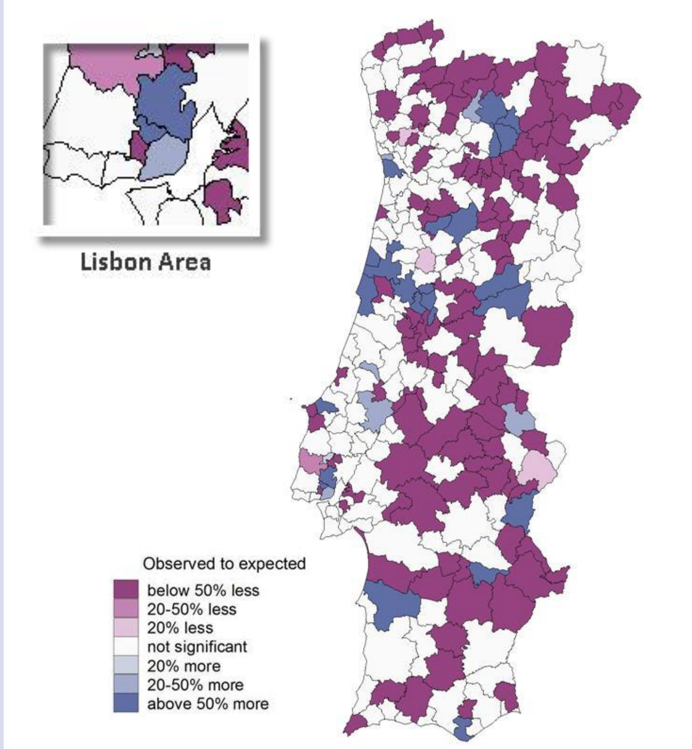


Figure 10. Ratio observed/expected asthma admissions. 278 concelhos. Year 2009

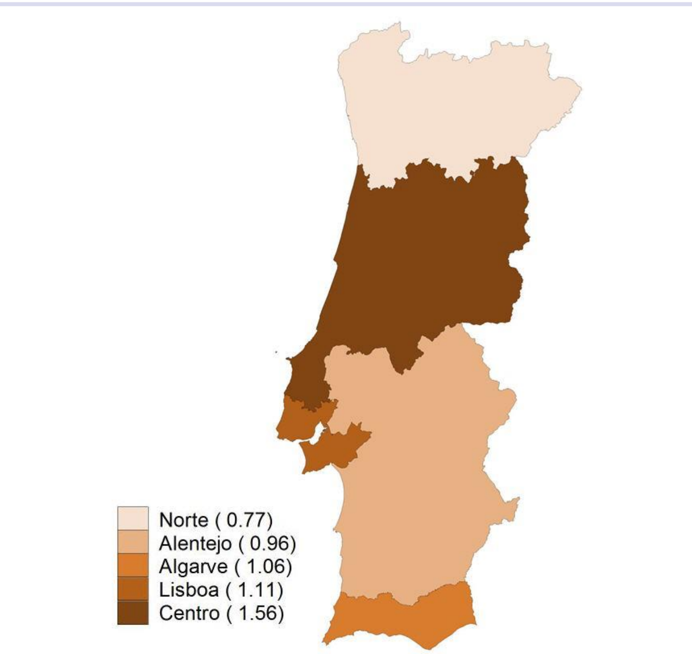


Figure 11 Age-sex standardised Asthma hospitalisation rate per 10,000 inhabitants. 5 regions. Year 2009

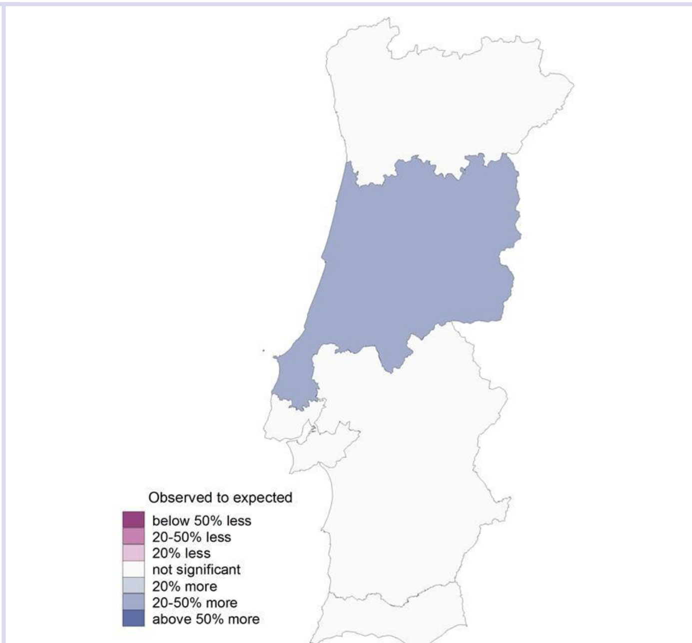


Figure 12. Ratio observed/expected asthma admissions. 5 regions. Year 2009

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 admissions, always 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 are representing 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)

Congestive heart failure (CHF) was the most prevalent condition among all PAH, being 41% of all the admissions considered as such. In 2009, 9,862 discharges were signalled as potentially avoidable -1 unplanned admission per 527 inhabitants aged 40 or older.

A 5-fold difference was found between concelhos with extreme high and low rates, and the systematic variation was some high, 21% above that expected by chance. The effect of the region of residence in the observed variation of CHF admissions was negligible (see appendix 1 table 8, Intra-class Correlation Coefficient).

Concelhos with high rates in CHF admissions were found in north-eastern and west-central parts of the country.

Population, living in 11% of the concelhos, bear 50% more risk of CHF admissions than expected. In turn, residents in 15% of the concelhos had 20% less risk of admission (figure 14).

Surprisingly, although some concelhos that make up North Region have high CHF admission rates, the whole region exhibited lower risk than national average. In turn, residents in Algarve and Central Region faced 20% more risk than average of being hospitalised with CHF.

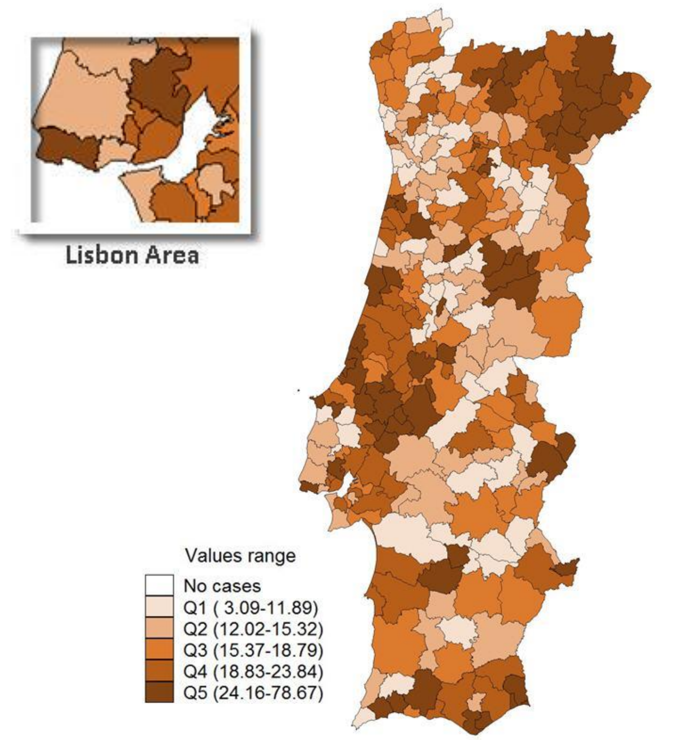


Figure 13. Age-sex standardised CHF hospitalisation rate per 10,000 inhabitants. 278 concelhos. Year 2009

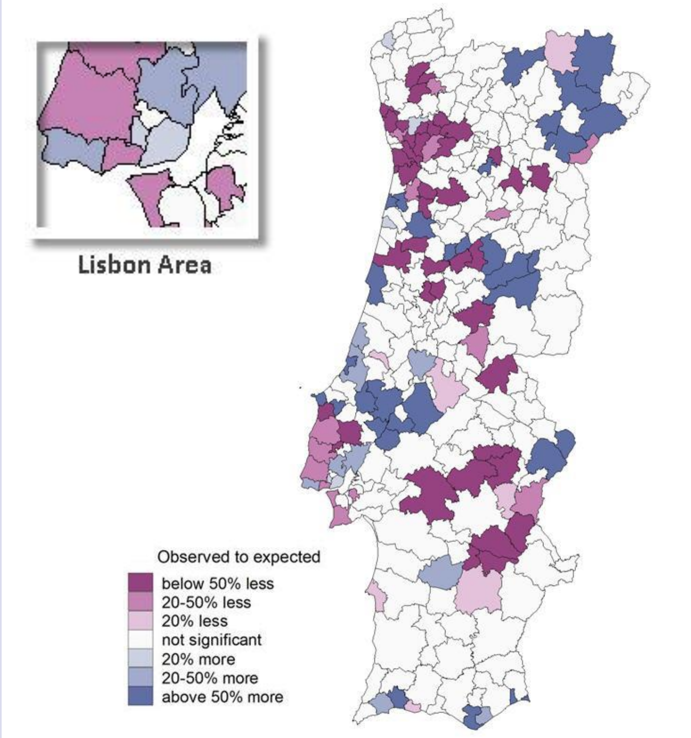


Figure 14. Ratio observed/expected CHF admissions. 278 concelhos. Year 2009

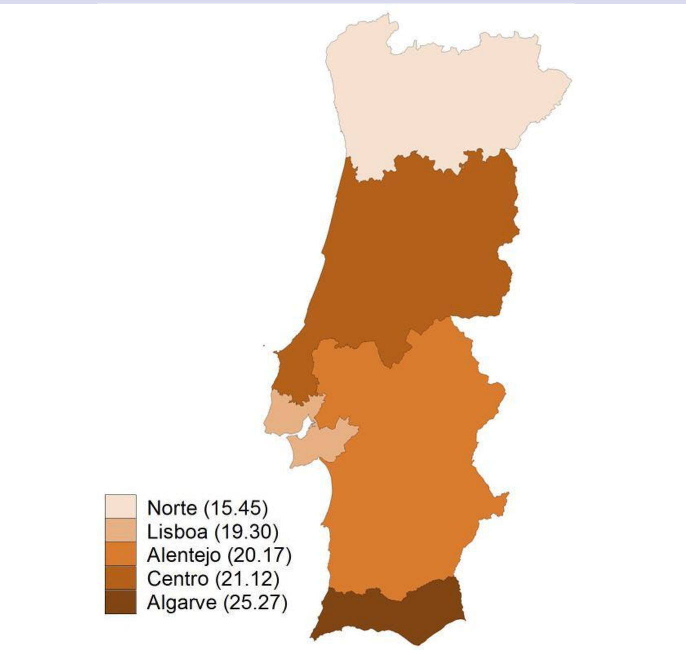


Figure 15 Age-sex standardised CHF hospitalisation rate per 10,000 inhabitants. 5 regions. Year 2009

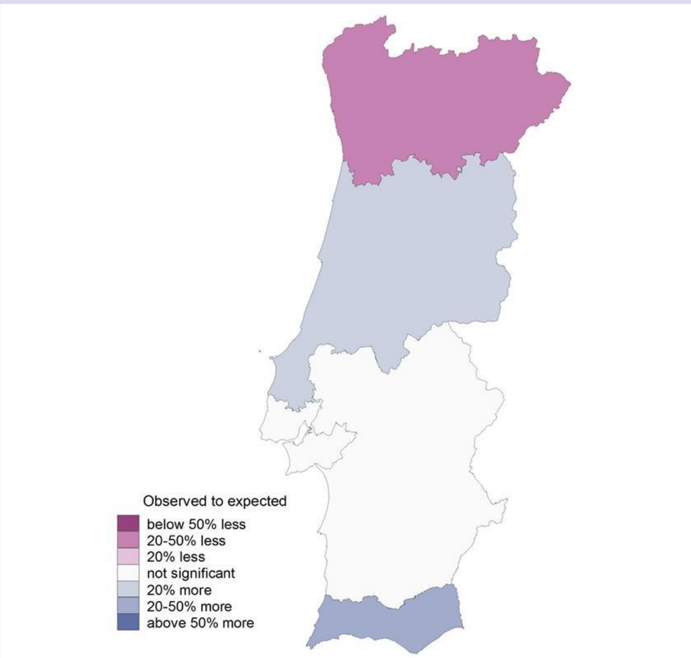


Figure 16. Ratio observed/expected CHF admissions. 5 regions. Year 2009

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 admissions, always 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 are representing 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)

In 2009, 7,709 COPD admissions were flagged as potentially avoidable – 32% of all the admissions considered as such. That means 1 admission per 1,222 inhabitants aged 18 or older.

The difference between concelhos with extreme high and low rates reached a 9.1-fold factor and the systematic variation not deemed random was 18% above that expected by chance. Despite being a moderate-high value, this systematic variation was the lowest observed among the PAH conditions analysed.

Besides, COPD admission variation was highly explained by region effect. Up to a 31% of the variation across concelhos would be explained by some contextual phenomenon (e.g. health policy) homogeneously affecting the whole region (see appendix 1 table 8, Intra-class Correlation Coefficient).

Some territorial pattern can be detected in COPD admissions, finding the highest COPD admissions rates in the northern half of the country. Nevertheless, not all the concelhos with high rates exhibited significant risk of COPD admission above the average (figure 18).

At regional level, residents in North region see their risk of admission for this condition increased more than 20% compared to the average, while Alentejo and Algarve population exhibit a decrease in their risk below 50% (figure 20).

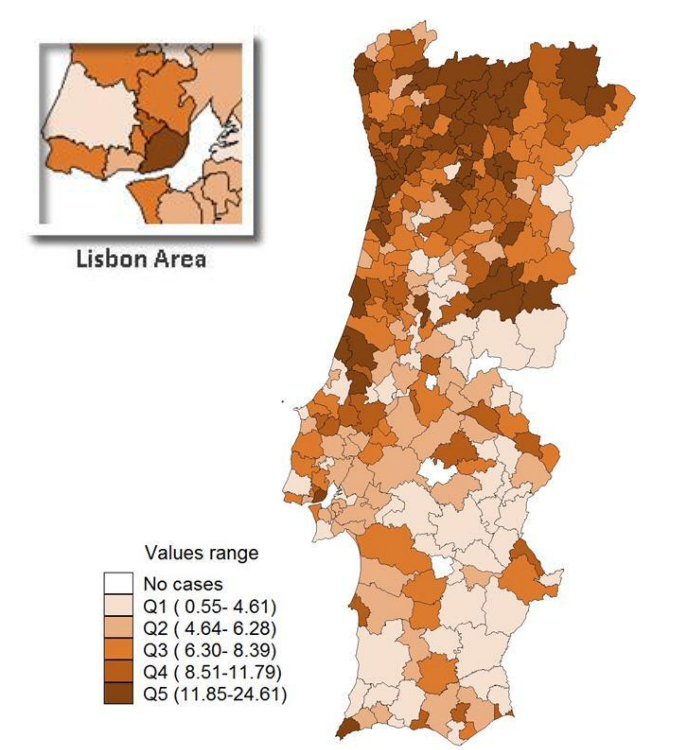


Figure 17. Age-sex standardised COPD hospitalisation rate per 10,000 inhabitants. 278 concelhos. Year 2009

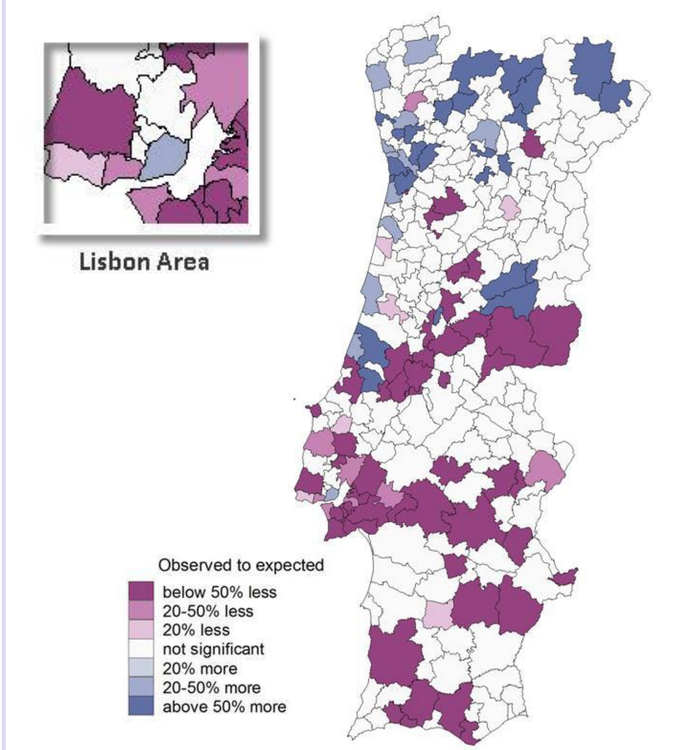


Figure 18. Ratio observed/expected COPD admissions. 278 concelhos. Year 2009

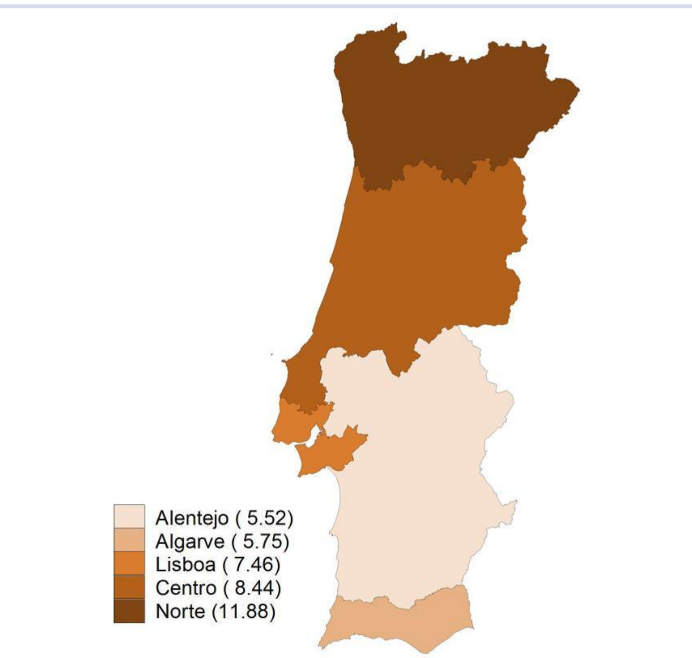


Figure 19. Age-sex standardised COPD hospitalisation rate per 10,000 inhabitants. 5 regions. Year 2009

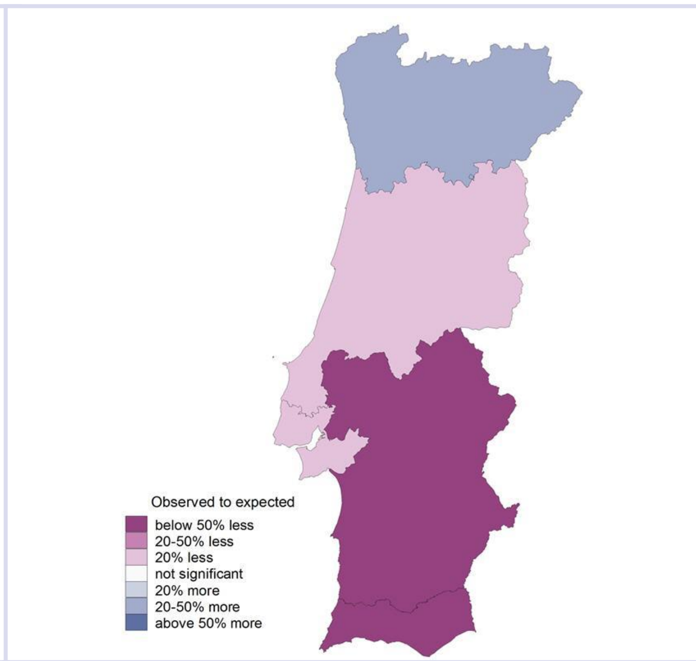


Figure 20. Ratio observed/expected COPD admissions. 5 regions. Year 2009

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 admissions, always 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 are representing 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

2,674 dehydration admissions were flagged as potentially avoidable in 2009 – 1 admission in 655 inhabitants aged 65 and older.

Variation between concelhos with extreme high and low rates was the largest among PAH conditions, up to 17 times. Besides, systematic variation was 1.01 times bigger than that expected by chance, that means 5.6 times larger than the variation observed in COPD – the condition with the lowest systematic variation. Nevertheless, only 11% of this big variation could be attributed to the region of residence (see appendix 1 table 8, Intra-class Correlation Coefficient), suggesting that medical practice at concelho level acted as main driver of the observed variation.

High dehydration rates were detected in the south-eastern part of the country and also in some north-western concelhos (figure 21). The risk of admission for population living in the majority of these areas was significantly higher than expected (bluish areas in figure 22).

At regional level, residents in Alentejo and Lisbon endure 20% and 50% more risk of being hospitalised due to dehydration, respectively. In turn, inhabitants in North region and Algarve faced up to 50% less risk of undergoing these kind of admissions (figure 24).

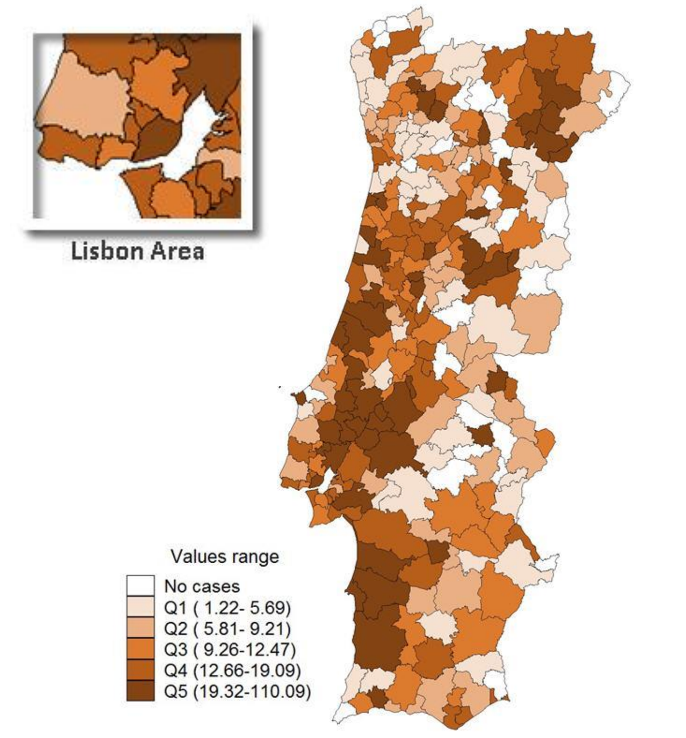


Figure 21. Age-sex standardised Dehydration hospitalisation rate per 10,000 inhabitants. 278 concelhos. Year 2009

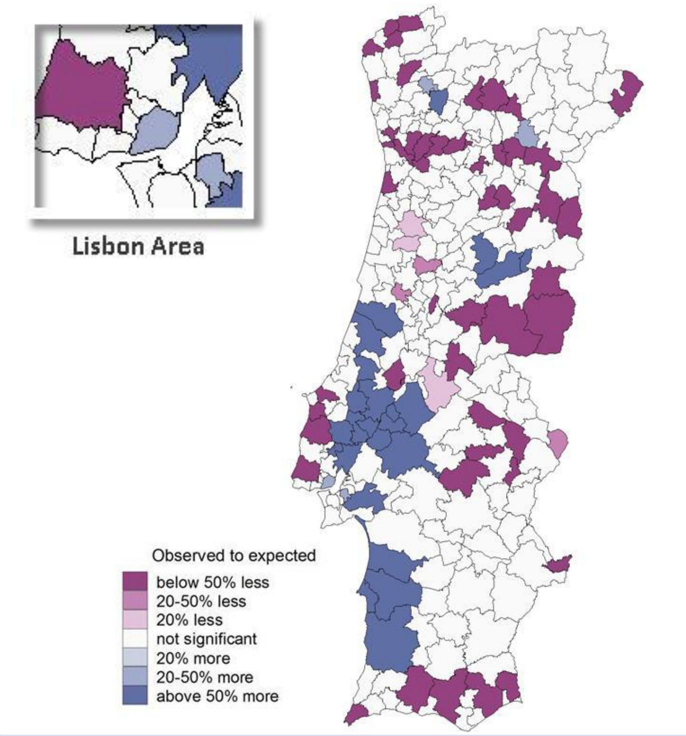


Figure 22. Ratio observed/expected dehydration admissions. 278 concelhos. Year 2009

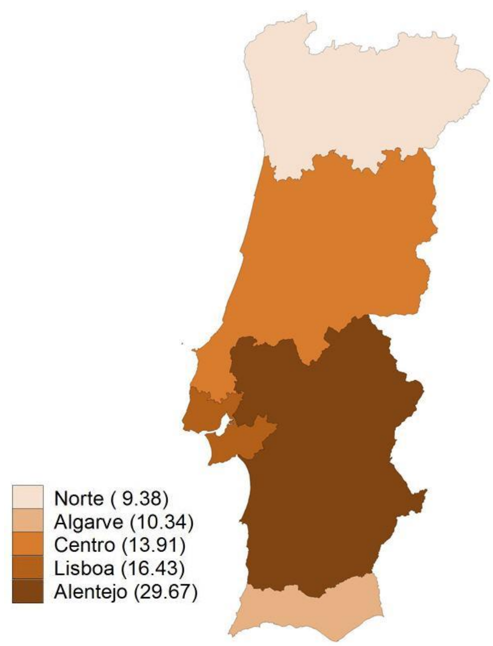


Figure 23. Age-sex standardised Dehydration hospitalisation rate per 10,000 inhabitants. 5 regions. Year 2009

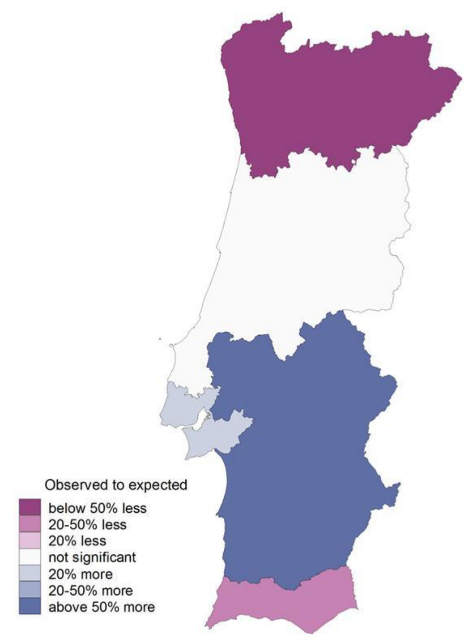


Figure 24. Ratio observed/expected dehydration admissions. 5 regions. Year 2009

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 admissions, always 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 are representing 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 due to diabetes short-term complications were the least frequent PAH condition in Portugal. In 2009, 772 admissions with a short-term complication of diabetes were signalled as potentially avoidable – around 1 per 4,525 inhabitants aged 40 or older.

Variation between concelhos with extreme high and low rates was up to 16-fold difference and systematic variation not deemed random, was the highest observed among all the conditions- around 1.07 times higher than expected by chance. In this case, just a 14% of the variation observed in diabetes admissions could be attributed to regional policies (see appendix 1 table 8, Intra-class Correlation Coefficient).

Figure 25 shows this heterogeneous behaviour across the country. High admission rates were found in north-western concelhos that correlated with risk of admission above 50% that expected (figure 26).

The observed pattern was highly correlated with the region of residence. Thus, residents in North region endured 50% more risk of diabetes admission than average. In turn, population living in Alentejo, Lisbon and central region experience 50% less risk than expected (figure 28).

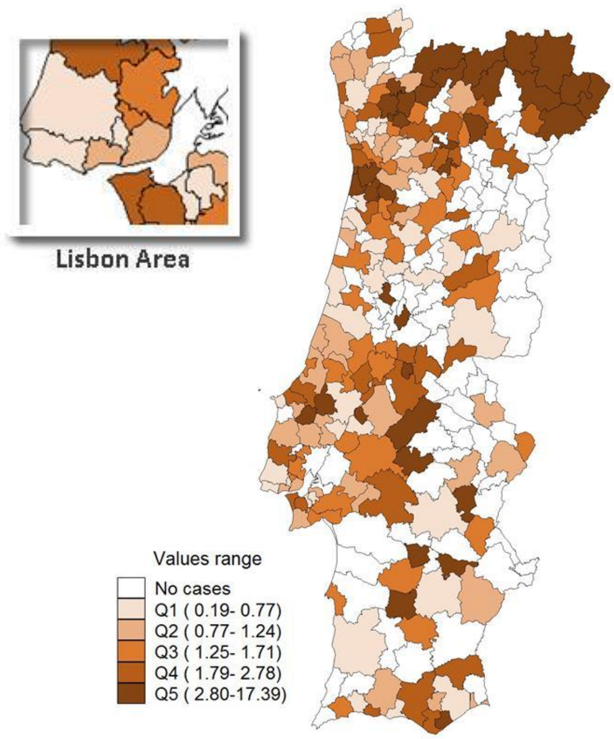


Figure 25. Age-sex standardised Diabetes hospitalisation rate per 10,000 inhabitants. 278 concelhos. Year 2009

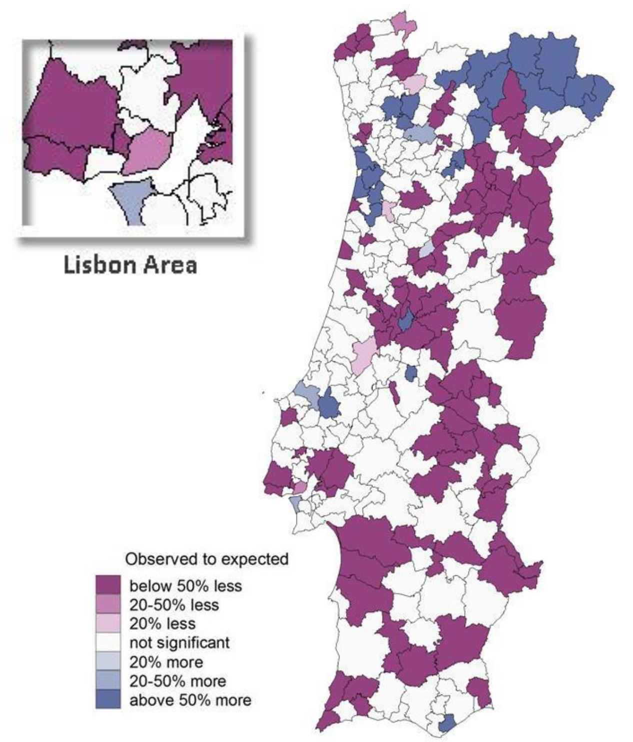


Figure 26. Ratio observed/expected diabetes admissions. 278 concelhos. Year 2009

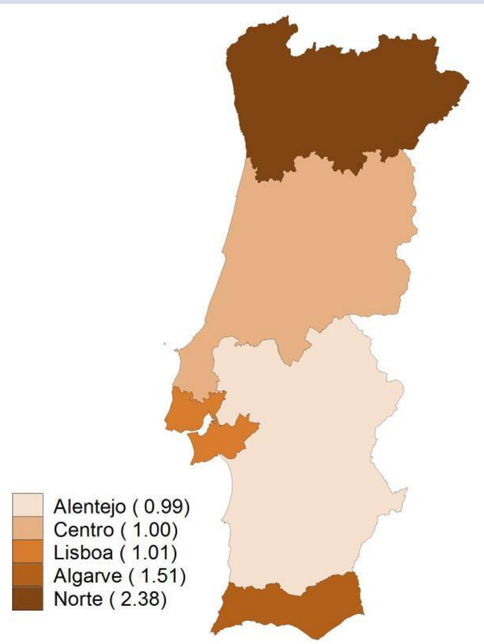


Figure 27. Age-sex standardised Diabetes hospitalisation rate per 10,000 inhabitants. 5 regions. Year 2009

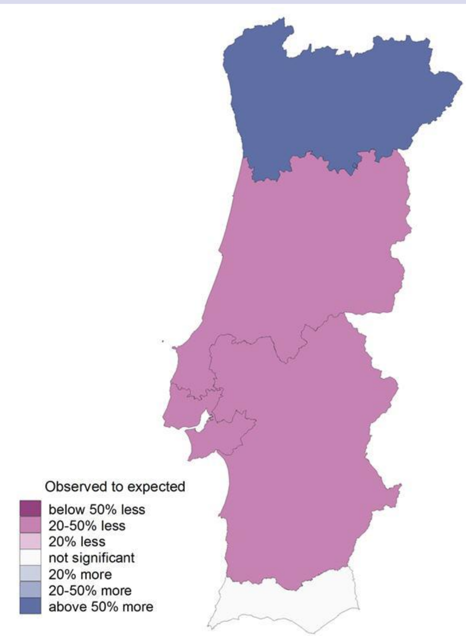


Figure 28. Ratio observed/expected diabetes admissions. 5 regions. Year 2009

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 admissions, always 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 are representing 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 admissions - with no concurrent procedure

2,303 emergency angina admissions were flagged as potentially avoidable in 2009, 1 admission per 1,822 inhabitants aged 40 and older.

An extreme 11-fold difference was found across concelhos with extreme rates. Systematic variation was high, being 66% over that expected by chance. In this case, regions barely accounted for 1.6% of the variation (see appendix 1 table 8, Intra-class Correlation Coefficient).

There was quite a strong geographic pattern in the north/central-eastern part of the country (figure 29). In most of these concelhos, the high rates translated into increased risk of angina admission for their residents (bluish areas in figure 30).

Population living in Central Region faced up to 20% more risk of undergoing angina admissions. On the contrary, in Algarve and North region residents had at least 20% less risk than national average (figure 32).

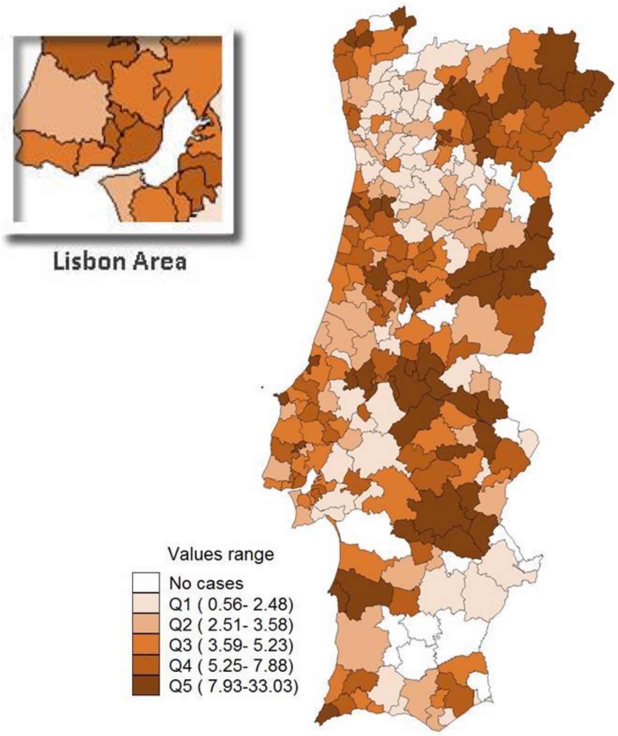


Figure 29. Age-sex standardised Angina hospitalisation rate per 10,000 inhabitants. 278 concelhos. Year 2009

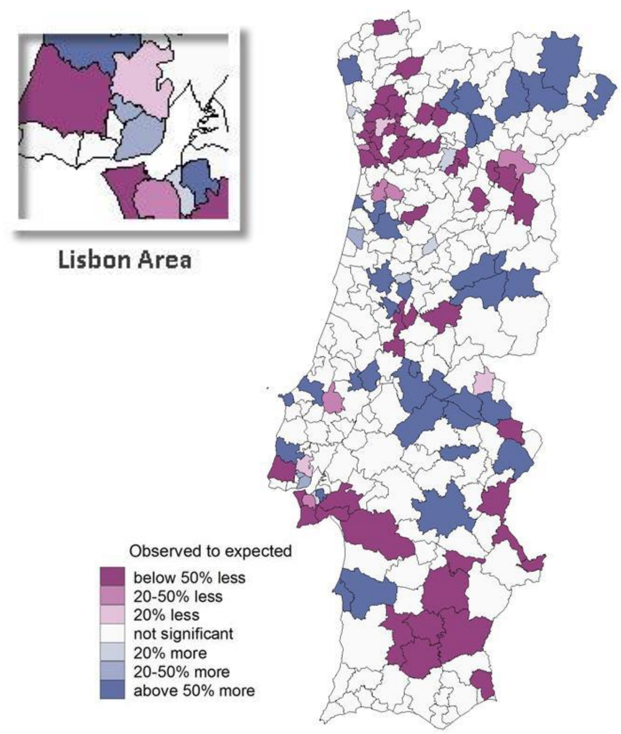


Figure 30. Ratio Observed/expected angina admissions. 278 concelhos. Year 2009

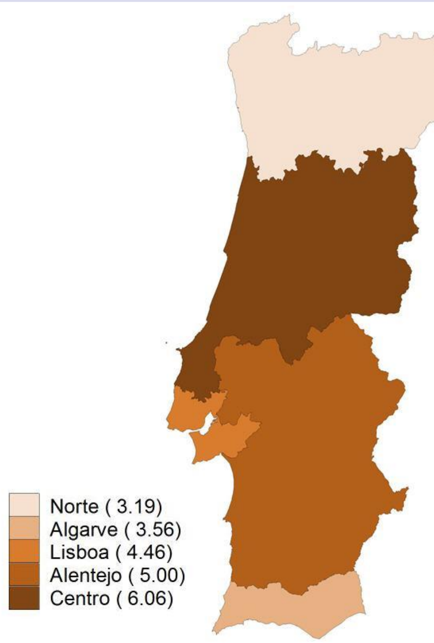


Figure 31. Age-sex standardised COPD hospitalisation rate per 10,000 inhabitants. 5 regions. Year 2009

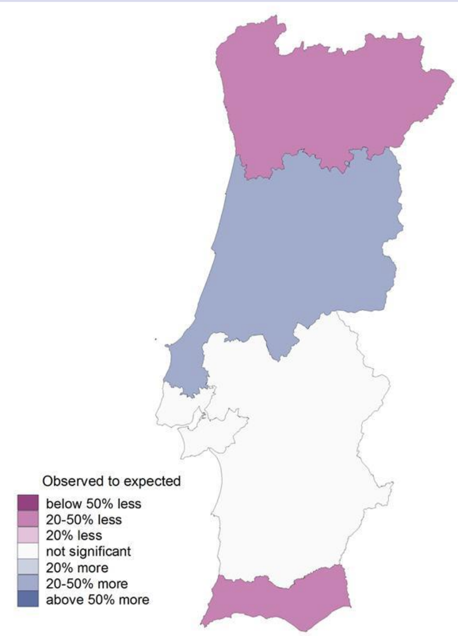


Figure 32. Ratio Observed/expected angina admissions. 5 regions. Year 2009

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 admissions, always 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 are representing 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).

In the period 2002 to 2009, avoidable hospitalisation rates have slightly increased and moderate systematic variation has remained stable.

IV. EVOLUTION OVER TIME

Between 2002 and 2009, rates of potentially avoidable hospitalisations increased slightly by 5%, from 1 admission per 387 to 1 admission per 368 adult inhabitants. Besides, systematic variation not deemed random stayed in moderate values, ranging from 0.13 to 0.15, over this period (see appendix 1 table 10).

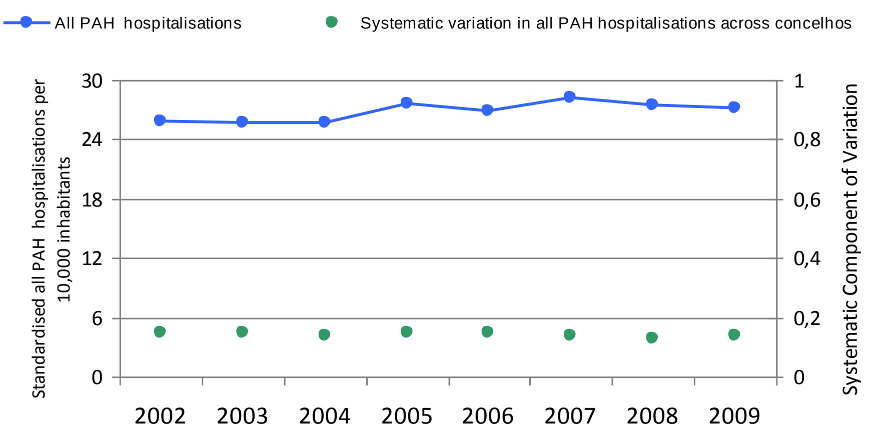


Figure 33. Evolution of standardised rates (blue lines) and systematic variation (green dots) over time

> 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 a larger variation should drive us to further analysis on the drivers in those specific areas departing from the general trend.

The number of asthma, COPD and CHF admissions stayed very stable over the analysed period. The slight increase in COPD and CHF by 6% was very far from the 53% increase found in dehydration rates. Besides dehydration systematic variation in 2009 was 2.4 times bigger than that detected in 2002. On the contrary angina and diabetes short-term complications decreased their rates by 20% and 24%, respectively (see appendix 1 tables 11-16).

With regard to systematic variation, COPD and CHF experienced a decrease of 27% and 26% of relative reduction in its moderate values. Both, dehydration and asthma doubled its systematic variation, pointing out an increasingly uneven population exposure to this kind of hospitalisations. We should also notice that in asthma, dehydration and diabetes, SCV values varied erratically along the analysed period.

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

Trends in those areas within the lowest and highest quintile of avoidable hospitalisations rates in 2002

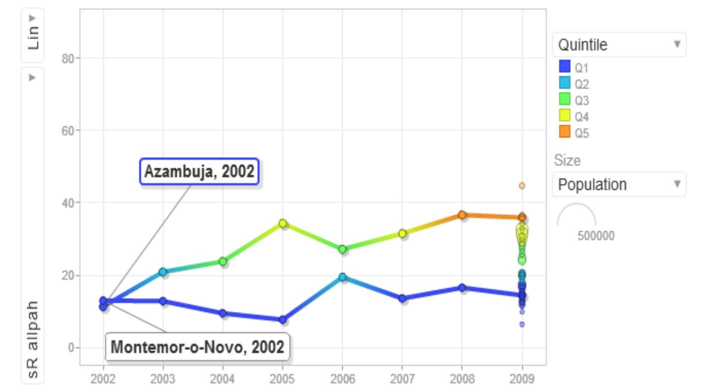


Figure 35. Trends in all PAH rates in areas with lowest levels (Q1) in 2002

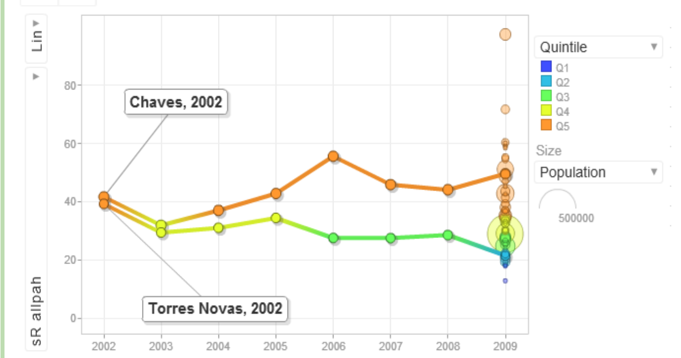


Figure 36. Trends in all PAH rates in areas with highest levels (Q5) in 2002

Bubbles represent the health care areas: 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 (the health care areas) 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 Montemor-o-Novo and Azambuja, both areas showed a good performance (among the lowest levels of PAH) in 2002. The evolution of these two areas was extremely uneven. While Montemor-o-Novo has maintained its low rates of PAH, Azambuja has experienced a steady increase reaching the highest levels in the country, by the end of the period (figure 35).

It can be observed that areas with highest levels of PAH in 2002 (Q5 in orange) also experienced an uneven evolution over the period. Thus, while Chaves remained in the same quintile over time, the PAH rate in Torres Novas (with similar size) decreased over time until the lowest quintile of exposure (figure 38).

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 concelhos at: http://www.echo-health.eu/handbook/quintiles_pah_por.html

> Over time evolution areas in blue (lowest rates of PAH) are expected to be blue, along over time evolution however areas in orange (highest rates of PAH) are expected to turn into a different colour (ideally bluish) representing a reduction in PAH rates.

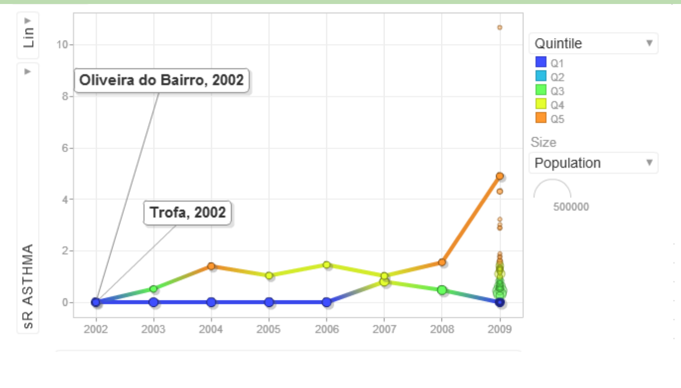


Figure 37. Trends in asthma rates in areas with lowest levels (Q1) in 2002.

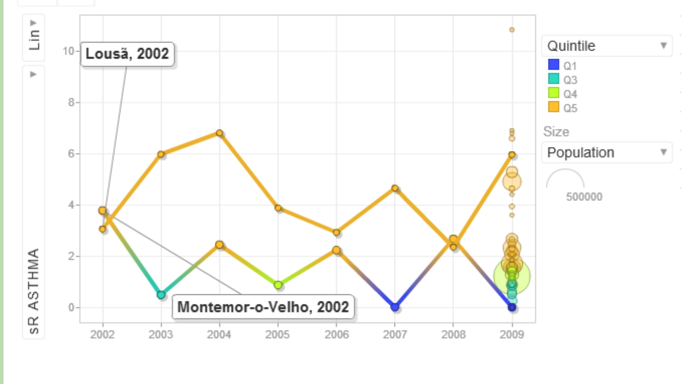


Figure 38 Trends in asthma rates in areas with highest levels (Q5) in 2002.

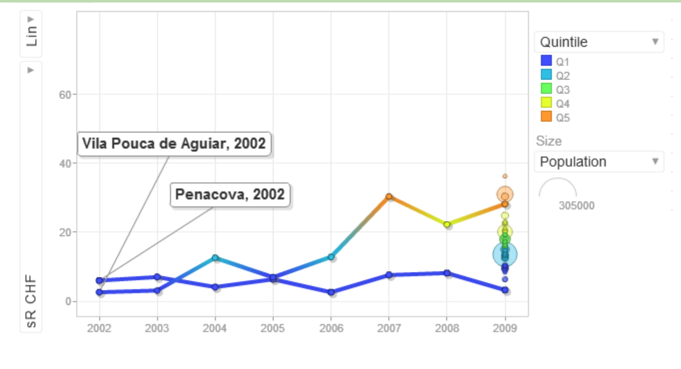


Figure 39. Trends in CHF rates in areas with lowest levels (Q1) in 2002

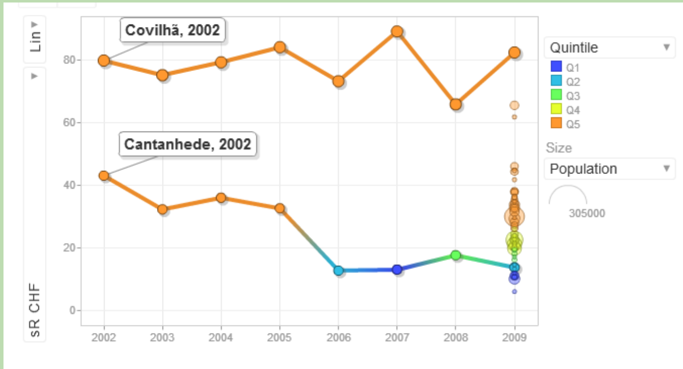


Figure 40. Trends in CHF rates in areas with highest levels (Q5) in 2002.

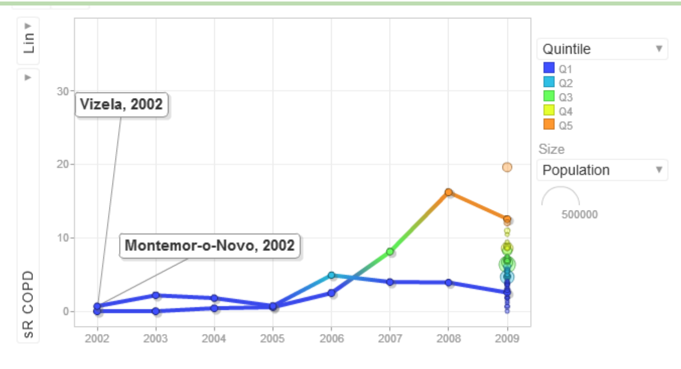


Figure 41. Trends in COPD rates in areas with lowest levels (Q1) in 2002.

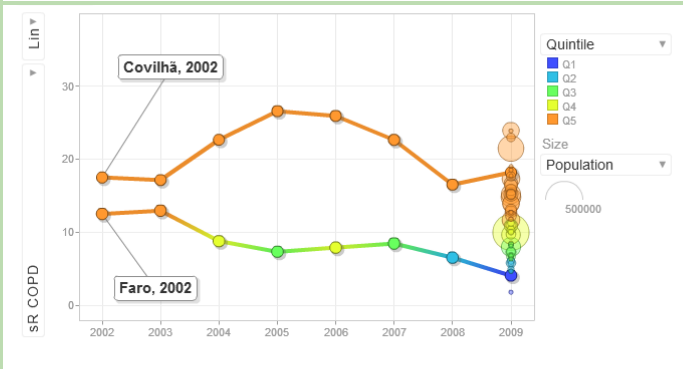
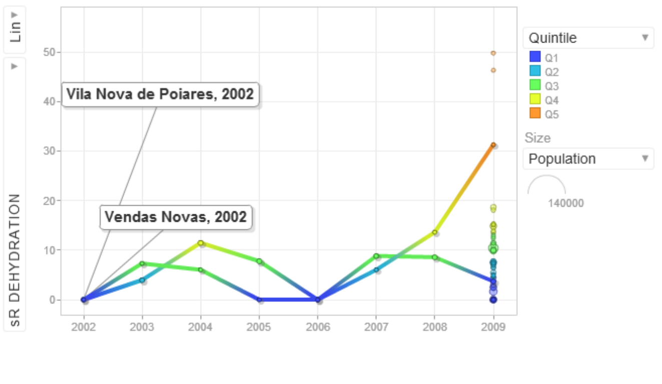


Figure 42. Trends in COPD rates in areas with highest levels (Q5) in 2002

Bubbles represent the health care areas: 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 (the health care areas) 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.



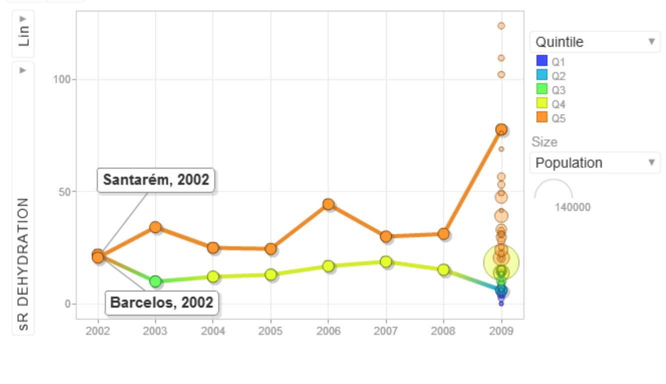
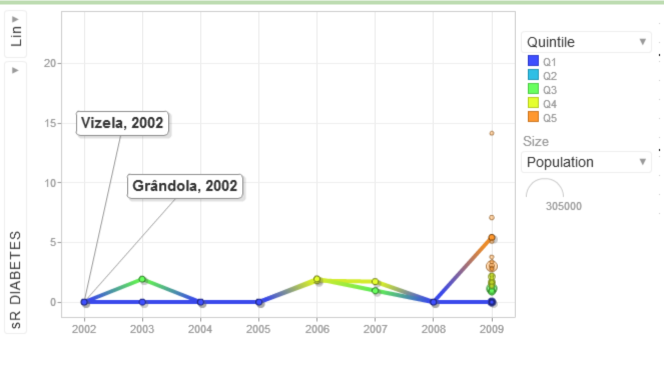


Figure 43. Trends in dehydration rates in areas with lowest levels (Q1) in 2002.

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



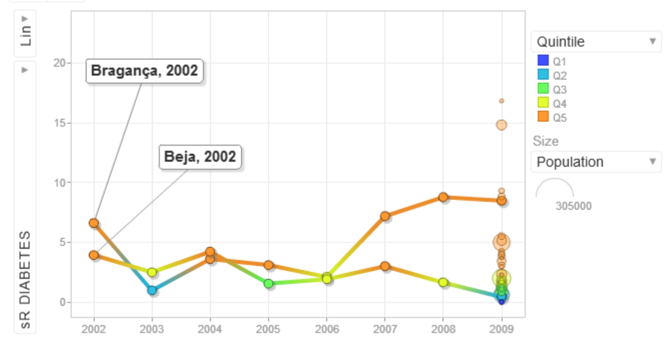
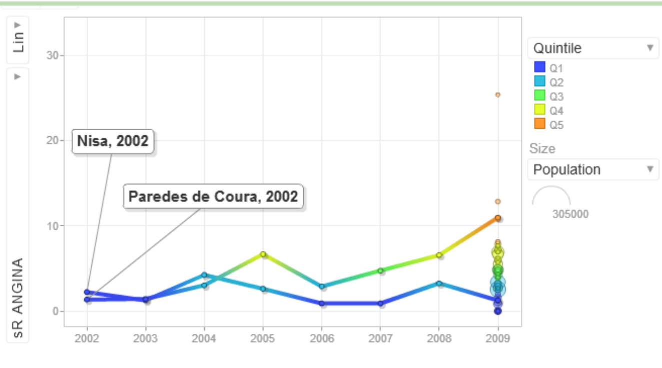


Figure 45. Trends in diabetes rates in areas with lowest levels (Q1) in 2002

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



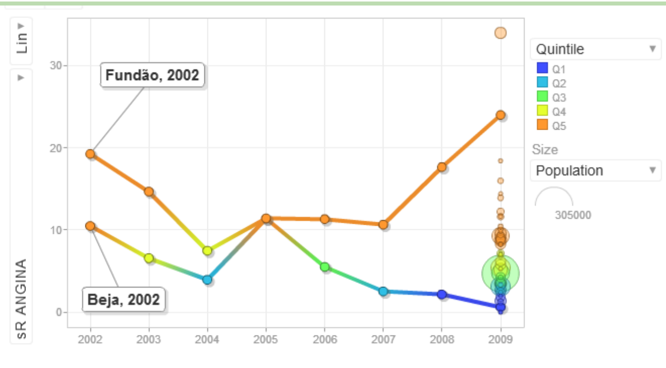


Figure 47. Trends in angina rates in areas with lowest levels (Q1) in 2002.

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

Bubbles represent the health care areas: 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 (the health care areas) 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 Portugal, wealthier concelhos have significant more potentially avoidable hospitalisations than more deprived ones.

When examining the overall rates of potentially avoidable hospitalisations, wealthier concelhos showed significant higher rates when compared to most deprive ones (figure 49). Thus, differences across concelhos detected in previous sections could stem from their uneven level of wealth. These differences seem to become narrower over time, mainly due to an increase in PAH admissions in less affluent concelhos (see table 10 in appendix 1).

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 healthcare areas. 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

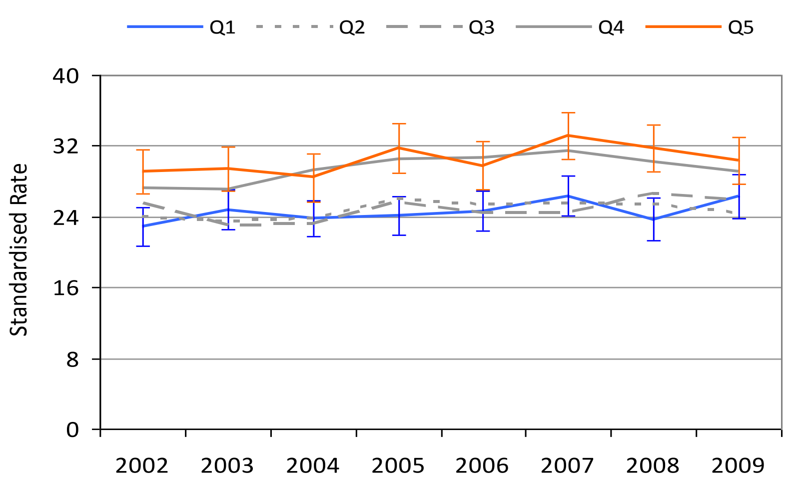


Figure 49. Trend in PAH standardised rates by average income quintile

Areas are divided in 5 categories of wealth (average annual family income available per individual): 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.

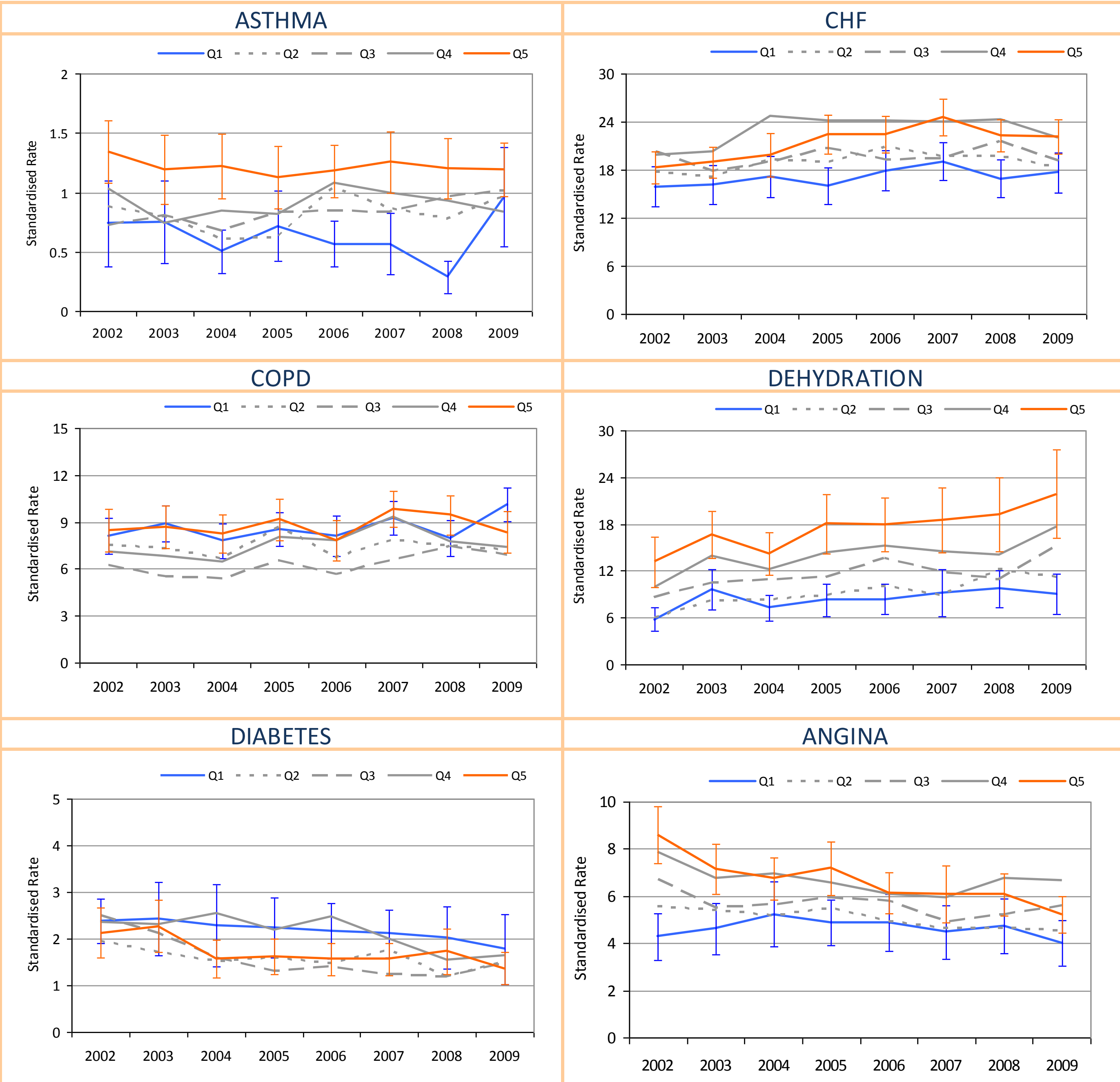


Figure 50. Trend in PAH standardised rates by income quintile and clinical condition

Dehydration admissions were also significantly more frequent in areas with high average income, and this gap became wider over time. Asthma, CHF and unplanned angina admissions rates were also higher in better-off areas, but differences were not significant all years. In turn, there were no significant differences in COPD and diabetes admissions across wealth levels. We have to notice, that in diabetes, although differences are not significant, worse-off concelhos showed higher admission rates than better-off ones (figure 50).

VI. POLICY IMPLICATIONS

Portugal exhibits the lowest rates in PAH compared to other ECHO countries despite having increased a small 5% along the period 2002-2009. In turn, variation not amenable to random phenomena was high pointing out uneven population exposure to PAH across the country, proven associated to welfare levels.

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 specialized care.
- Distance to a hospital and/or different supply of hospital care. High concentration of hospital care very often ends up in hospital utilisation (i.e. more patients derivation 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.

Interestingly high-income concelhos showed higher PAH admissions rates than less affluent ones. It could be argued that, as it happens in other countries, the highest concentration of hospitals in better-off areas entails more accessibility to hospital care. In the case of Portugal, this hypothesis could be even more plausible given the actual propensity of hospital use concurrent with a relative small use of outpatient care, in comparison with other European countries[1]. Conversely, from the perspective of the worse-off areas it could be reasoned that the observed lower PAH rates is related to a lesser propensity of hospitalization or a limited access to hospitals, translating in both appropriate and avoidable admissions. A last argument would support the idea of an uneven effective primary care across welfare areas, favouring the more deprived ones. Since Portugal is very much a hospital-oriented healthcare system, arguments on the differential hospital access across welfare areas would prevail. Whether primary care plays a role would remain uncertain.

Portugal initiated a nationwide primary care reform in 2005. A milestone in this process was the creation of functional units within health centre groups (ACES) aimed at guaranteeing primary health care provision to the population of a given geographical area, with a focus on individuals, family and community. Under this reform, primary care would involve: prevention activities, diagnosis and disease treatment, and activities to cope with health vulnerability (e.g. chronic patients). In the particular area of chronic conditions, in February 2013, the Government issued a strategy for a better integration of diabetic care where ACES are to provide specialized diabetes appointments and mechanisms to connect the population with the long-term care network. The study of PAH in upcoming years will likely shed light on the effects of this reform.

Potentially avoidable hospitalisations rates have slightly increased in Portugal along the period 2002-2009. Despite this trend, Portugal still shows the lowest PAH rates compared to other ECHO countries.

High-income concelhos face more PAH admissions than most deprived ones. This observation may be pointing out to both easier accessibility to hospital beds in those better-off areas, or limited access to hospital care in those deprived, translated into fewer admissions both preventable and necessary.

Recent measures aimed to guarantee an effective primary health care provision to the population, as well as efforts to connect the population with long-term care network, may have a positive impact. The type of analysis described in this report would be helpful in assessing the results of these reforms.

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[1] All background information on Portuguese Health System can be consulted at European Observatory of Health Systems and policy platform: Health Systems Policy Monitor http://www.hspm.org/countries/portugal25062012/countrypage.aspx

APPENDIX 1:

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	2.35	2.65	2.25	3.22
SCV	0.71	0.15	0.21	0.15	0.11

Stand. Rate: 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

Stand. Rate: 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

Stand. Rate: 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

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

APPENDIX 1:

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

Stand. Rate: 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	4,667	772	100	2,420
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

Stand. Rate: 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

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

APPENDIX 1:

Portugal 2009

Table8

	Asthma	CHF	COPD	Dehydration	Diabetes	Angina	All PAH
Cases	932	9862	7709	2674	772	2303	24252
Population	8,616,865	5,222,232	8,616,865	1,838,327	5,222,232	5,222,232	8,616,865
Crude Rate	1.01	21.51	9.05	14.11	1.64	5.48	31.67
Stand. Rate	1.6	18.99	8.18	15.28	2.21	5.49	27.45
sR Min.	0.09	3.09	0.55	1.22	0.19	0.56	7.35
sR Max.	12.79	78.67	24.61	110.09	17.39	33.03	98.96
sR. P5	0.3	7.28	1.88	2.9	0.44	1.15	14.12
sR. P25	0.74	12.82	5.03	6.43	0.9	2.73	19.98
sR. P50	1.19	16.99	7.35	10.76	1.53	4.36	25.23
sR. P75	1.78	22.58	10.94	17.43	2.49	6.98	32.35
sR. P95	4.89	36.55	17.16	49.31	7.17	12.74	49.59
EQ5-95	16.31	5.02	9.14	17	16.36	11.04	3.51
EQ25-75	2.42	1.76	2.17	2.71	2.78	2.55	1.62
ICC	0.01	0.00	0.31	0.11	0.13	0.01	0.00

Stand. Rate and 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.	0.09	0.15	0.07	0.09	0.17	0.12	0.23
SUR Máx.	12.41	4.15	2.75	7.57	9.3	7.36	3.49
SUR P5	0.26	0.39	0.26	0.2	0.33	0.26	0.49
SUR P25	0.68	0.66	0.56	0.44	0.65	0.62	0.69
SUR P50	1.09	0.87	0.82	0.74	1	1	0.89
SUR P75	1.73	1.18	1.19	1.17	1.62	1.59	1.12
SUR P95	4.5	1.89	1.82	3.23	4.38	2.88	1.72
SCV	1.06	0.21	0.18	1.01	1.07	0.66	0.14

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

APPENDIX 1:

Portugal 2002-2009

Table 10

	ALL PAH							
	2002	2003	2004	2005	2006	2007	2008	2009
Cases	23961	23737	23632	25314	24199	25592	25091	24252
Stand. Rate	25.85	25.67	25.71	27.6	26.95	28.19	27.49	27.17
sR Q1.	22.88	24.81	23.83	24.12	24.64	26.32	23.73	26.29
sR Q5.	29.04	29.45	28.43	31.73	29.79	33.18	31.72	30.31
SCV	0.15	0.15	0.14	0.15	0.15	0.14	0.13	0.14

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	1014	948	899	933	919	962	906	932
Stand. Rate	1.62	1.45	1.32	1.4	1.52	1.52	1.42	1.61
sR Q1.	0.74	0.75	0.51	0.72	0.57	0.56	0.29	0.96
sR Q5.	1.34	1.19	1.22	1.13	1.18	1.25	1.2	1.2
SCV	0.38	0.46	0.17	0.08	0.28	0.19	0.18	0.85

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	9186	8889	9429	10077	10044	10616	10394	9862
Stand. Rate	18.7	18.17	20.13	20.61	20.92	21.43	21.04	19.8
sR Q1.	15.92	16.13	17.11	16	17.93	19.05	16.93	17.66
sR Q5.	18.32	18.96	19.83	22.41	22.4	24.54	22.34	22.11
SCV	0.27	0.23	0.28	0.23	0.24	0.2	0.18	0.2

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:

Portugal
2002-2009

Table 13

	COPD							
	2002	2003	2004	2005	2006	2007	2008	2009
Cases	7508	7643	7210	8112	7147	8383	7996	7709
Stand. Rate	7.67	7.62	7.08	8.37	7.44	8.65	8.17	8.13
sR Q1.	8.09	8.9	7.79	8.53	8.13	9.27	7.98	10.12
sR Q5.	8.47	8.71	8.27	9.16	7.82	9.82	9.46	8.34
SCV	0.26	0.29	0.28	0.26	0.27	0.18	0.19	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.

Table 14

	Dehydration							
	2002	2003	2004	2005	2006	2007	2008	2009
Cases	1754	2159	2004	2252	2441	2207	2415	2674
Stand. Rate	10.84	13.65	12.59	13.83	14.89	15.21	14.79	16.62
sR Q1.	5.75	9.61	7.28	8.28	8.37	9.13	9.7	9.04
sR Q5.	13.14	16.65	14.23	18.02	17.89	18.5	19.21	21.89
SCV	0.43	0.44	0.42	0.51	0.4	0.78	0.53	1.04

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	1061	966	895	896	831	837	754	772
Stand. Rate	3.07	2.98	2.89	2.7	2.68	2.51	2.3	2.32
sR Q1.	2.38	2.42	2.28	2.24	2.17	2.11	2.02	1.77
sR Q5.	2.13	2.27	1.58	1.62	1.57	1.57	1.73	1.36
SCV	0.77	1.02	1.19	0.67	0.93	0.51	0.57	1.01

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:

Portugal
2002-2009

Table 16

	Angina							
	2002	2003	2004	2005	2006	2007	2008	2009
Cases	3438	3132	3195	3045	2817	2588	2626	2303
Stand. Rate	7.07	6.46	6.44	6.48	6.09	5.78	5.97	5.65
sR Q1.	4.28	4.62	5.23	4.89	4.87	4.49	4.72	4.01
sR Q5.	8.6	7.14	6.75	7.18	6.14	6.11	6.06	5.2
SCV	0.31	0.19	0.19	0.23	0.24	0.28	0.33	0.49

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 ecological study, each admission was allocated to the place of residence of the patient, which in turn is referred to a meaningful geographic unit – the 278 concelhos and the 5 Regions composing Portugal.

The operational definitions for each indicator are detailed in the coding table in appendix 3. Indicators are based on those used 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 National Health Service (Ministério de Saúde). Cross- and in-country sections were built upon 2009 discharges, whereas time-trends and social gradient analyses used 2002 to 2009 data.

Social gradient data and data for concelhos on average family annual income (both based in transfers and available) were obtained from the National Statistics office (INE Portugal).

APPENDIX 3:

Definitions of indicators

	Diagnosis and procedures codes ICD 9-CM					
	Primary diagnosis		Secondary diagnoses		Procedures	
	Inclusions	Exclusions	Inclusions	Exclusions	Inclusions	Exclusions
Asthma +18 Age	493.00, 493.01, 493.02, 493.10, 493.11, 493.12, 493.81, 493.82, 493.90, 493.91, 493.92 OR 518.81 IF "diag2-30"=A		A) 493.00, 493.01, 493.02, 493.10, 493.11, 493.12, 493.81, 493.82, 493.90, 493.91, 493.92	Pregnancy, childbirth and the puerperium: 630-677 CHF: 428 402.01 402.11 402.91 404.01 404.03 404.11 404.13 404.91 404.93 398.91 Cystic fibrosis: 277.0 7472.1 748.3 748.4 748.5 748.6* 748.8 748.9 750.3 759.3 770.7 747.31* 747.32* 747.39* Mental disorders: 295.0*-295.9*, 296.0*-296.99, 297.0-297.9, 298.0-298.9, 300.0-300.9, 301.0-301.9 303.91, 304.01, 304.11, 304.21, 304.31, 304.41, 304.51, 304.61, 304.71, 304.81, 304.91, 316, Respiratory diseases: 494.0, 494.1, 515, 519.8, 519.9 COPD: 491.1, 491.20, 491.21, 491.22, 491.8, 491.9, 492.0, 492.8, 493.20, 493.21, 493.22, 4940, 4941, 496		

	Diagnosis and procedures codes ICD 9-CM					
	Primary diagnosis		Secondary diagnoses		Procedures	
	Inclusions	Exclusions	Inclusions	Exclusions	Inclusions	Exclusions
Congestive Heart Failure +40 Age	398.91 402.01 402.11 402.91 404.01 404.03 404.11 404.13 404.91 404.93 428.0 428.1 428.20 428.22 428.23 428.30 428.32 428.33 428.40 428.42 428.43 428.9			Pregnancy, childbirth and the puerperium: 630-677 COPD 491.1 491.20 491.21 491.22 491.8 491.9 492 493.20 493.21 493.32 494 496 491 492 493 494 496 466.0 490 518.81 518.84 491.21 491.22 493.21 493.32 Ischaemic disease 410, 411.1, 411.8, 413 Kidney failure 403 404.00 404.02 404.10 404.12 404.90 404.92 584.5 584.6 584.7 584.8 584.9 585 586		
Chronic obstructive pulmonary disease (COPD) +18 Age	491.1, 491.20, 491.21, 491.22, 491.8, 491.9, 492.0, 492.8, 493.20, 493.21, 493.22, 494.0, 494.1, 49.6% OR 466.0 IF DX= "A)" or 490 IF DX= "A)" 518.81 IF DX= "B)" or 518.84 IF DX= "B)"		A) 491*, 492* 493* 494* 496* B) 491.21 491.22 493.21 493.22 494.0 494.1	Pregnancy, childbirth and the puerperium: 630-677 CHF 428 402.01 402.11 402.91 404.01 404.03 404.11 404.13 404.91 404.93 398.91 Cystic fibrosis: 277.0 747.21 748.3 748.4 748.5 748.6* 748.8 748.9 750.3 759.3 770.7 747.31 7473.2* 7473.9* Mental disorders: 295.0-295.9, 296.0*-296.99, 297.0-297.9, 298.0-298.9, 300.0-300.9, 301.0-301.9 303.91, 304.01, 304.11, 304.21, 304.31, 304.41, 304.51, 304.61, 304.71, 304.81, 304.91, 316,		

	Diagnosis and procedures codes ICD 9-CM					
	Primary diagnosis		Secondary diagnoses		Procedures	
	Inclusions	Exclusions	Inclusions	Exclusions	Inclusions	Exclusions
Dehydration Admission +65 Age	276.0, 276.1, 276.5, 276.50, 276.51, 276.52					
Diabetes short-term complication +40 Age	250.10 250.11 250.20 250.21 25022 250.23 250.30 250.31 250.32 250.33			Pregnancy, childbirth and the puerperium: 630-677 Mental Disorders: 295.0*-295.9*, 296.0*-296.99 297.0-297.9, 298.0-298.9, 300.0-309, 301.0-301.9 303.91 304.01 304.11 304.21 304.31 304.41 304.51 304.61 304.71 304.81 304.91		
Angina without procedure +40 Age Urgent admissions	411.1, 411.81, 411.89, 413.0, 413.1, 413.9			Pregnancy, childbirth and the puerperium: 630-677		Cardiac Procedures (Annex 1)