ECHO

EUROPEAN COLLABORATION FOR HEALTHCARE OPTIMIZATION

Potentially Avoidable Hospitalisations in Slovenia

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

I. EXECUTIVE SUMMARY

- 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).
- In Slovenia, 2% of all hospitalisations produced in 2009 were flagged as a Potentially Avoidable Hospitalisation (PAH). That represents an admission per 217 adult inhabitants.
- The most prevalent PAH condition was CHF with one admission per 270 individuals aged 40 or older. In turn, short-term complications in diabetes was the least frequent one with 1 admission per 8,333 individuals aged 40 or older.
- Slovenia had the highest rate of CHF admissions among the ECHO countries. On the contrary, COPD and urgent angina admission rates were among the lowest.
- Differences across the 12 statistical regions in the country were patent. Residents in statistical regions with the highest standardised rates experienced twice as many PAH than those with the lowest; as for specific conditions, the proportion ranged from a 12.6-fold difference in the case of urgent angina to a 1.69-fold in COPD.
- Moreover, a significant proportion of that variation was systematic -not amenable to chance- and often increasing over time. The highest systematic variation across statistical regions was detected for admissions due to short-term complications in diabetes (74%), whereas the lowest variation corresponded to asthma admissions (9%).
- Living in a particular Region –i.e. different regional policies- explained up to 24% of the observed variation. Residents in Vzhodna Slovenija endured more risk of avoidable hospitalisations than expected.

- From 2005 to 2009, PAH rates remained almost stable, increasing slightly by 5% –from 1 admission per 222 to 1 admission per 212 adult inhabitants. Systematic variation stayed in moderate levels despite rising from 4% to 9% above that expected by chance.
- No statistical differences were found on PAH rates across socioeconomic levels, over the period 2005-2009. This finding might be due to the actual welfare homogeneity across statistical regions.
- In the context of the 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. The study of PAH provides insight on whether a 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 Slovenian Healthcare System, the detected rates of PAH might indicate high reliance on hospital care and some lack of coordination between specialised and primary health care. This poses some questions as to whether there is room for resources reallocation, from hospital to community and primary care services.

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 Slovenia, 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)

Slovenia exhibits an average rate of potentially avoidable hospitalisations among ECHO countries –1 admission per 217 adult inhabitants in 2009. That means almost doubling the number of admissions in Portugal, the country with the lowest rates, but a 25% less admissions than Denmark, the country with the highest PAH rate (see appendix 1 table 1).

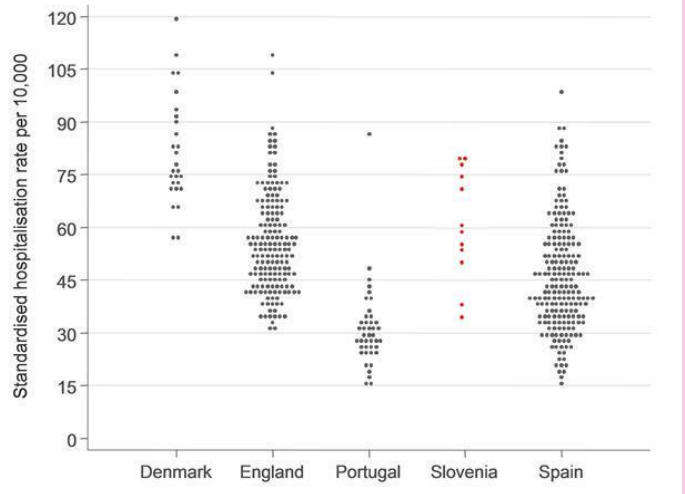


Figure 1.a. Age-sex standardised overall PAH rates per 10,000 inhabitants (natural scale to compare actual rates). Year 2009

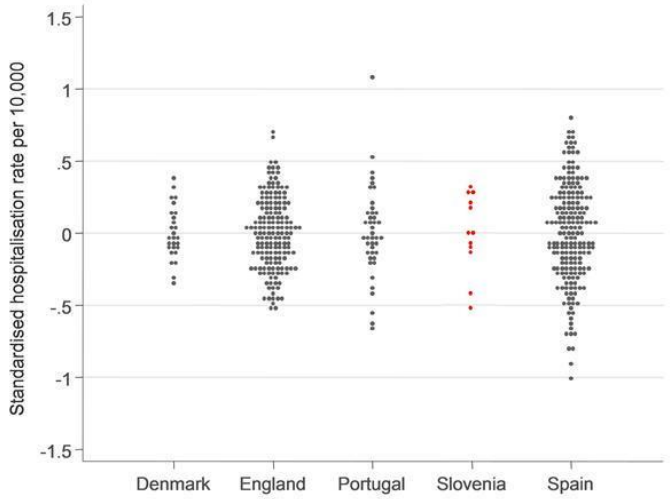


Figure 1.b. Age-sex standardised overall PAH rates per 10,000 inhabitants (normalised scale to compare degree of variation). Year 2009

Each dot represents the relevant administrative area in the country (Statistical Regions for Slovenia). 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 in Denmark, England, Portugal and Slovenia ranging from a 1.9 to a 2.6-fold 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, with Slovenia among the lowest values. Denmark is the only exception, with the highest SCV value, a 71% of variation 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 Slovenia, the most frequent condition is CHF representing 47% of all PAH, followed by COPD, asthma, angina, dehydration and diabetes (25%, 10%, 9%, 7% and 1% respectively)

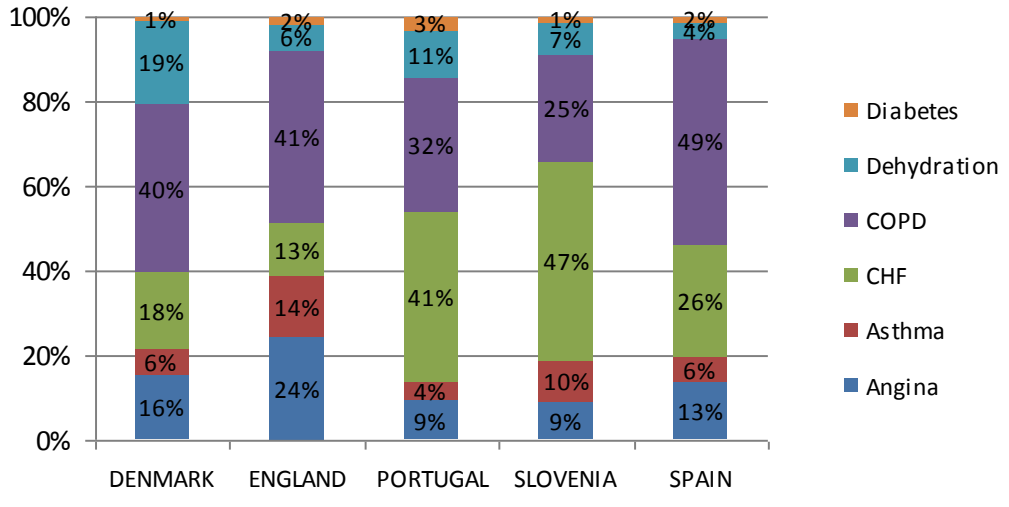


Figure 2. Share of PAH cases by country. Year 2009

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

Compared to the other countries, Slovenia has the highest rate of CHF admissions. Conversely, it exhibits low rates in COPD and angina admissions (figure 3). On the other hand, 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 but also the lowest rate in CHF hospitalisations. Otherwise, Portugal exhibits the lowest rates for urgent angina, COPD and asthma admission. Whereas, Spain has the lowest rates in dehydration and diabetes hospitalisations (see appendix 1 tables 2-7).

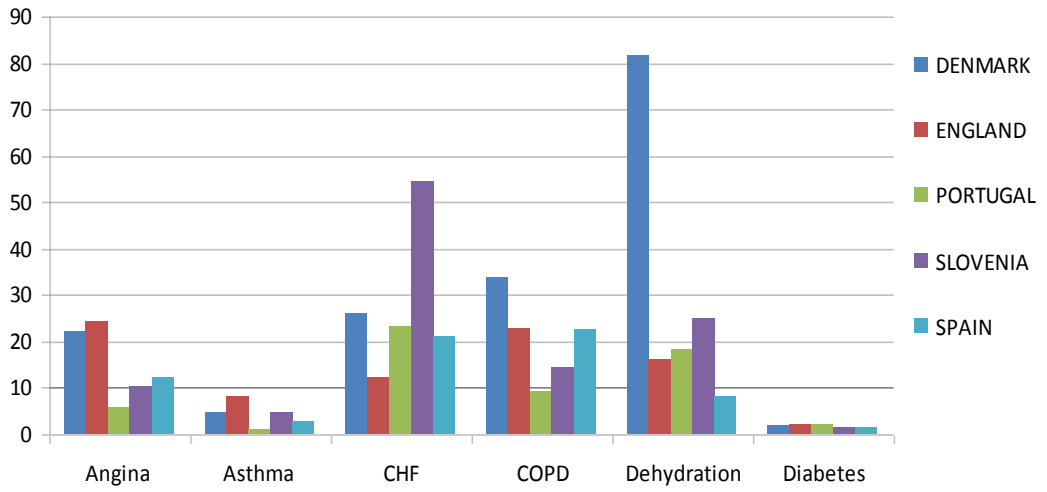


Figure 3. Magnitude of PAH per condition across countries (age-sex standardised rates per 10,000 inhabitants). Year 2009.

III. IN COUNTRY VARIATION

Potentially avoidable hospitalizations in Slovenia are frequently observed across the country, being CHF admissions the most frequent, both in cases number and in rate value.

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 statistical regions in COPD and the widest in short-term diabetes complications (see appendix 1 tables 8-9).

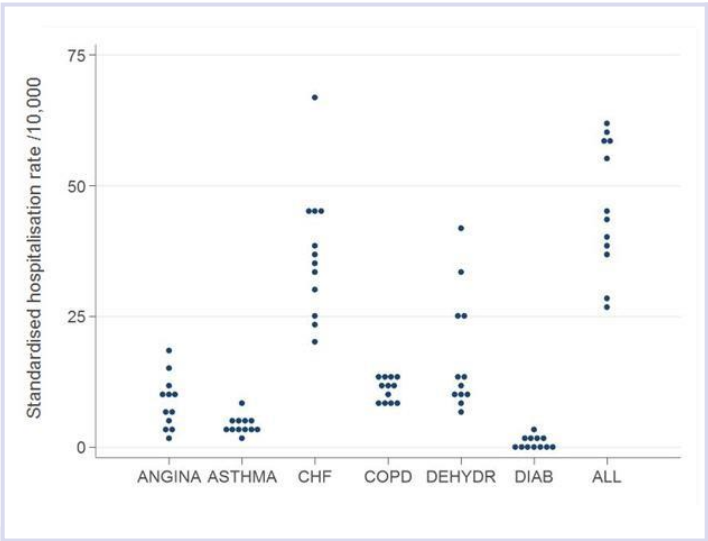


Figure 4. a. Age-sex standardised hospitalisation rates per 10,000 inhabitants (natural scale to compare actual rates). Year 2009

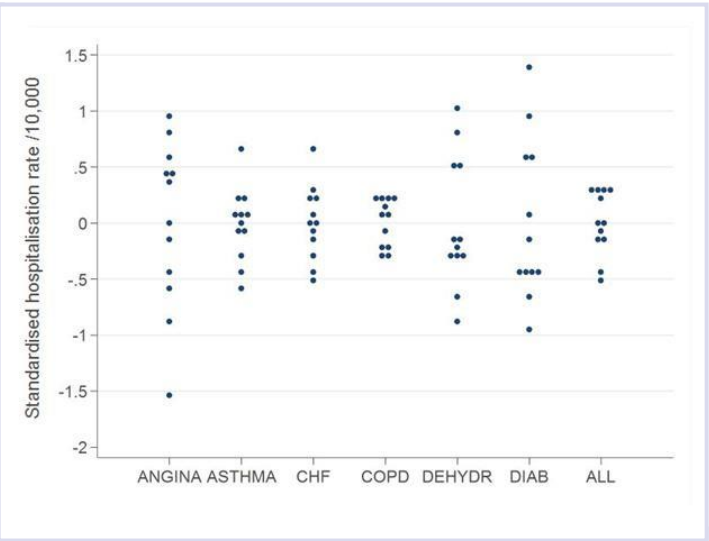


Figure 4.b. Age-sex standardised hospitalisation rates per 10,000 inhabitants (normalised scale to compare degree of variation). Year 2009

Each dot represents the relevant administrative area in the country (Statistical regions for Slovenia). The y-axis charts the statistical region 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, 7,303 admissions with one of the chronic conditions considered in this report were flagged as potentially avoidable. This figure represents around 2% of all the admissions in 2009 -1 admission out of 217 adult inhabitants.

Variation across statistical regions with extreme rates reached 2-fold difference, with a moderate systematic variation – 9% above that randomly expected. Region effect in overall PAH variation reached 24%, which may point out certain critical role of regional policy in the management of these conditions (see appendix 1 table 8, Intra-class Correlation Coefficient).

The majority of statistical regions in the eastern part of the country showed comparatively higher rates of PAH (figure 5), which translates into at least 20% more risk of avoidable admissions for their residents (figure 6).

Correlating to this pattern at regional level, residents in Vzhodna Slovenija endured 20% more risk of undergoing any potentially avoidable admissions than national average (figure 8).

Variation in each PAH condition is represented using two geographic units: statistical regions and regions. The first set is composed of 12 units and the second comprises 2 regions. While statistical regions would represent local provision of chronic care, regions are used as a surrogate for regional policies affecting all statistical regions within each one.

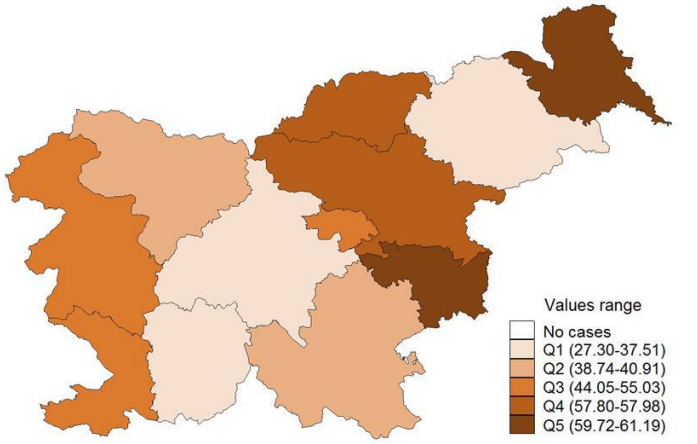


Figure 5. Age-sex standardised all PAH hospitalisation rate per 10,000 inhabitants. 12 Statistical Regions. Year 2009

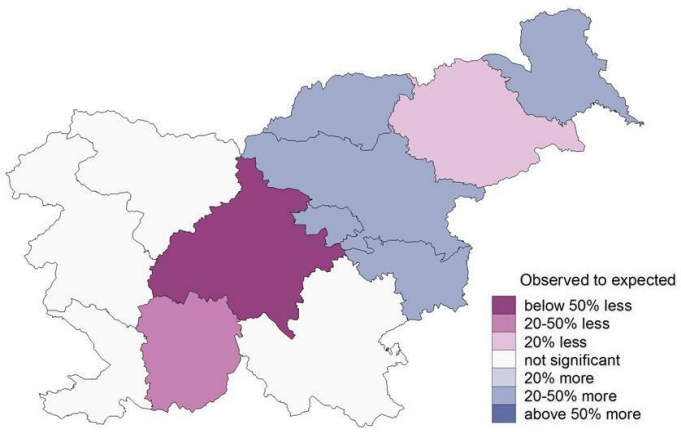


Figure 6. Ratio observed/expected all PAH admissions. 12 Statistical Regions. Year 2009

Figure 7 Age-sex standardised all PAH hospitalisation rate per 10,000 inhabitants. 2 regions. Year 2009

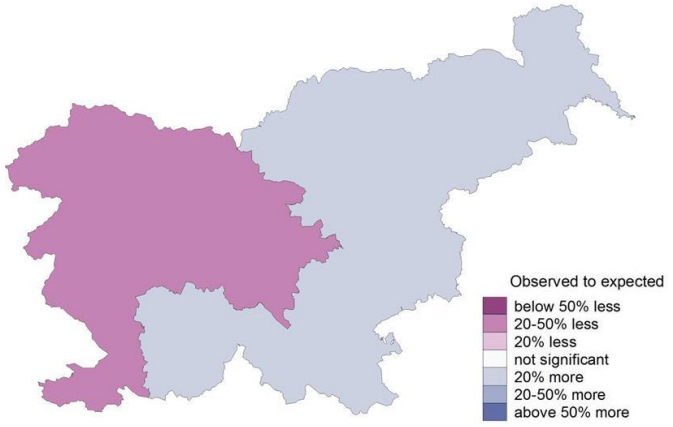


Figure 8. Ratio observed/expected all PAH admissions. 2 regions. Year 2009

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 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

703 discharges with a primary diagnosis of asthma were flagged as potentially avoidable in 2009 – 1 admission per 2,463 adult inhabitants aged 18 or older.

A 3.7-fold difference in hospitalisations was found between the extreme statistical regions. Systematic variation was moderate (9% above that expected by chance) and region effect explained barely a 7% (see appendix 1 table 8, Intra-class Correlation Coefficient).

Statistical regions with high asthma admissions rates were found in the eastern part of the country but only in one of them their residents bore more risk of asthma admissions that expected, up to a 50% (figure 10).

Likewise the map of regions showed that population living in Vzhodna Slovenija had up to 20% more risk of asthma admissions than national average (figure 12).

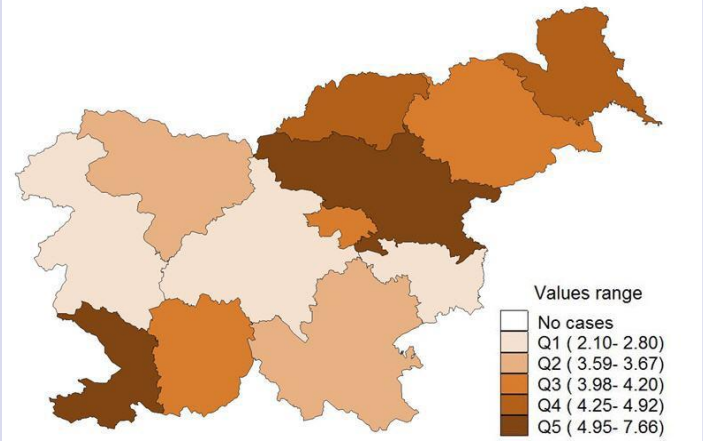


Figure 9. Age-sex standardised Asthma hospitalisation rate per 10,000 inhabitants. 12 Statistical Regions. Year 2009

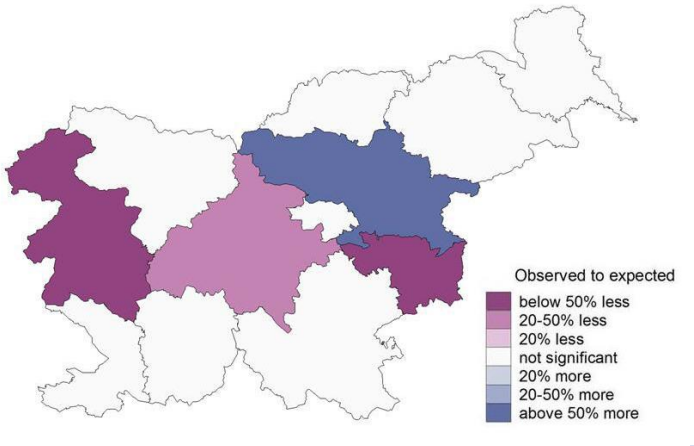


Figure 10. Ratio observed/expected asthma admissions. 12 Statistical Regions. Year 2009

Figure 11 Age-sex standardised Asthma hospitalisation rate per 10,000 inhabitants. 2 regions. Year 2009

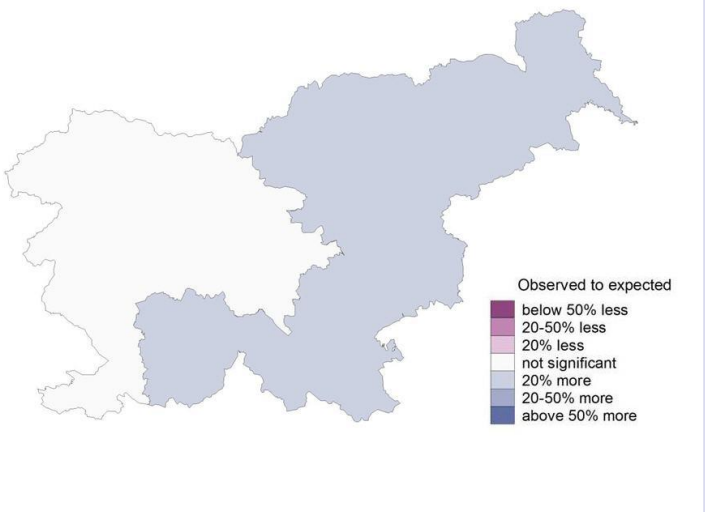


Figure 12. Ratio observed/expected asthma admissions. 2 regions. Year 2009

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 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)

By far, CHF is the most prevalent PAH condition in number of cases. In 2009, 3,442 CHF admissions were flagged as potentially avoidable –47% of all the admissions considered as such.

A 3.3-fold difference was found between statistical regions with extreme rates. The systematic part of variation was moderate (17% above that expected by chance) and the region effect was negligible (see appendix 1 table 8, Intra-class Correlation Coefficient).

The highest CHF admission rates were detected in statistical regions located both, in the eastern and western parts of the country. Residents in five out of twelve areas had at least 20% more risk of suffering a CHF hospitalisation, than expected (figure 14).

Zooming out to the region level, inhabitants in Vzhodna Slovenija endured up to 20% more risk of CHF admissions than national average. In turn residents in Zahodna Slovenija exhibited 20% less risk than average (figure 16).

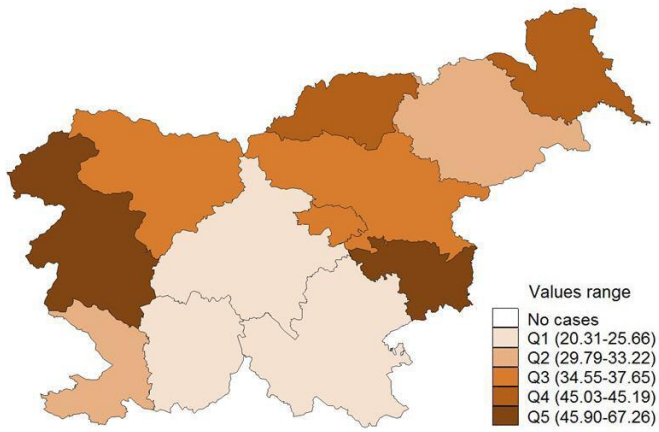


Figure 13. Age-sex standardised CHF hospitalisation rate per 10,000 inhabitants. 12 Statistical Regions. Year 2009

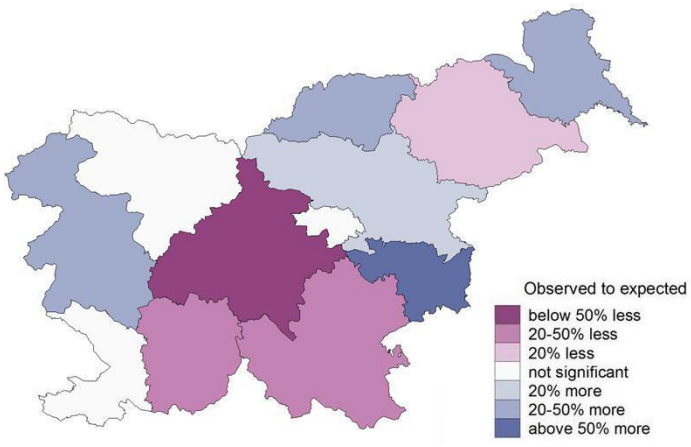


Figure 14. . Ratio observed/expected CHF admissions. 12 Statistical Regions. Year 2009

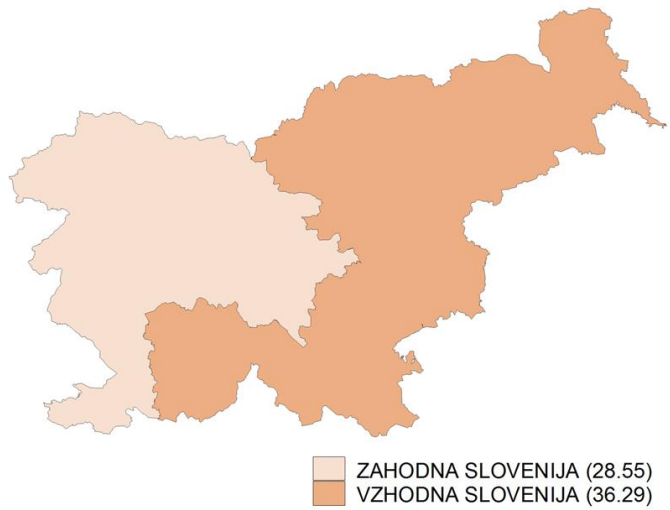


Figure 15 Age-sex standardised CHF hospitalisation rate per 10,000 inhabitants. 2 regions. Year 2009

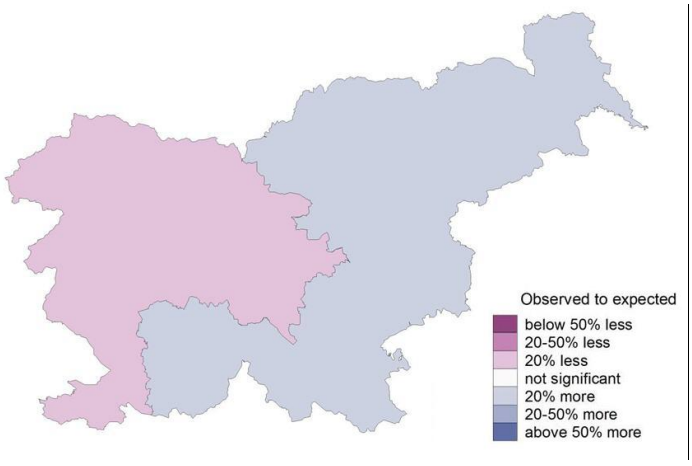


Figure 16. . Ratio observed/expected CHF admissions. 2 regions. Year 2009

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 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)

In 2009, 1,853 COPD admissions were flagged as potentially avoidable – 1 admission per 932 adult inhabitants.

The difference between statistical regions with extreme rates reached a small 1.7-fold factor, besides the systematic variation was the lowest observed among PAH conditions, just a 3% above that randomly expected. This pointed out to a quite an even behaviour across statistical regions. On the other hand, regions barely explained 3% of that observed variation (see appendix 1 table 8, Intra-class Correlation Coefficient).

Nevertheless, some territorial pattern could be detected in the eastern half of the country, where statistical regions with the highest COPD rates were located and their residents had significant higher risk of COPD admissions (figures 17 and 18).

This observed pattern was highly correlated with the region of residence, resulting in risk of admission 20% above the expected for population living in Vzhodna Region (figure 20).

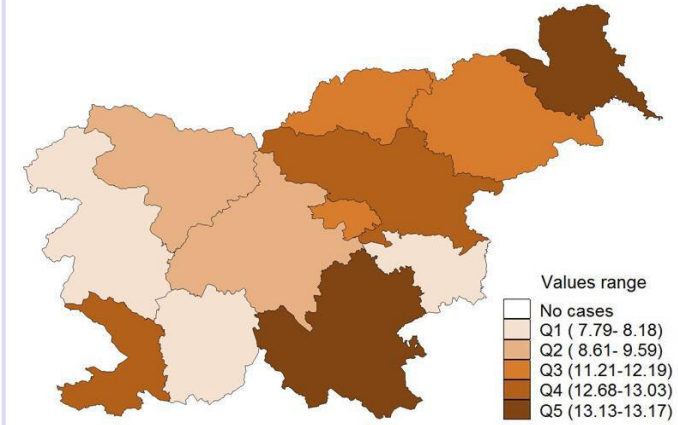


Figure 17. Age-sex standardised COPD hospitalisation rate per 10,000 inhabitants. 12 Statistical Regions. Year 2009

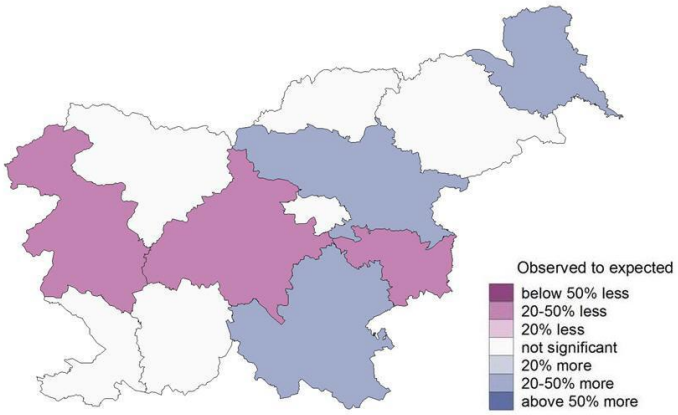


Figure 18. Ratio observed/expected COPD admissions. 12 Statistical Regions. Year 2009

Figure 19 Age-sex standardised COPD hospitalisation rate per 10,000 inhabitants COPD. 2 regions. Year 2009

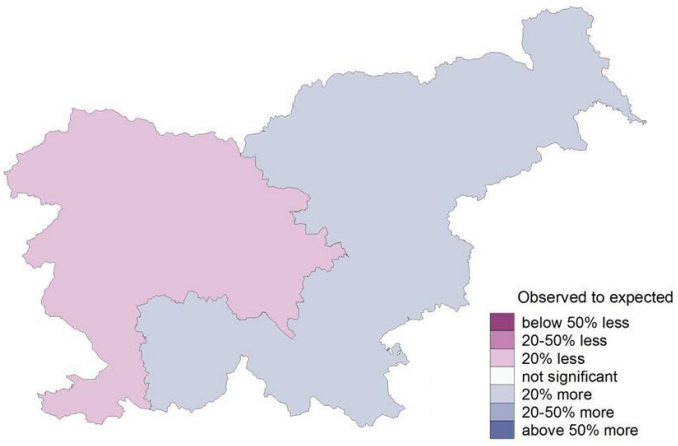


Figure 20. Ratio observed/expected COPD admissions. 2 regions. Year 2009

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 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

548 dehydration admissions were flagged as potentially avoidable in 2009 –1 admission per 571 inhabitants aged 65 or older.

A 6.7-fold difference was found between statistical regions with extreme rates. Variation not deemed random was high (up to 42% over that expected by chance) and a 12% of variation could be attributed to the region of residence (see appendix 1 table 8, Intra-class Correlation Coefficient).

As observed in figure 21 and 22, areas with high admission rates had also higher risks of dehydration admissions for their residents- up to 50% more risk than expected. In turn, population living in the western half bore at least 20% less risk than national average of undergoing dehydration hospitalisations.

At regional level, residents in Vzhodna Slovenija endured between 20-50% more risk of dehydration admissions than average (figure 24).

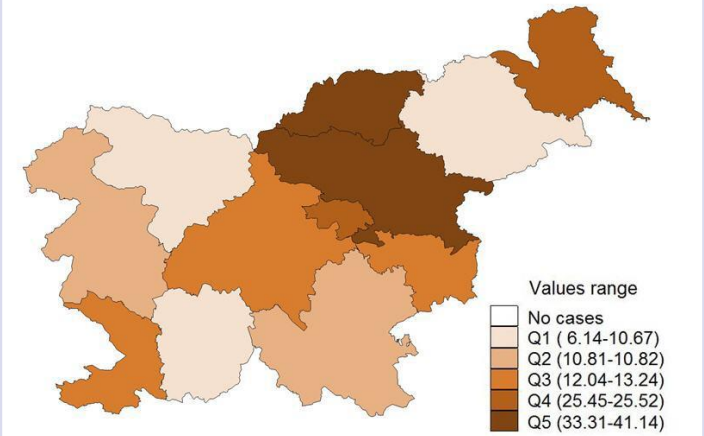


Figure 21. Age-sex standardised Dehydration hospitalisation rate per 10,000 inhabitants. 12 Statistical Regions. Year 2009

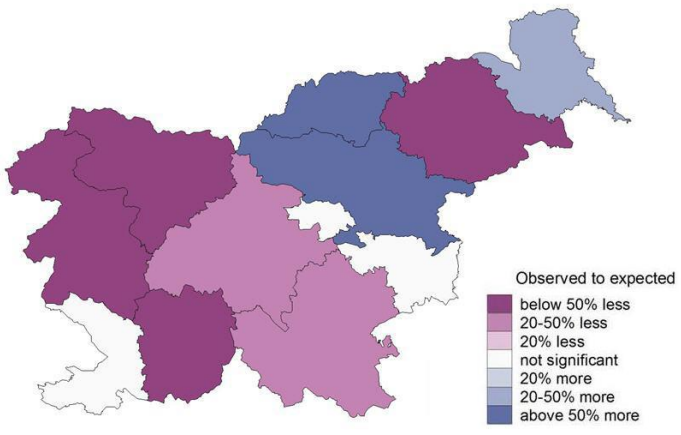


Figure 22. Ratio observed/expected dehydration admissions. 12 Statistical Regions. Year 2009

Figure 23. Age-sex standardised Dehydration hospitalisation rate per 10,000 inhabitants. 2 regions

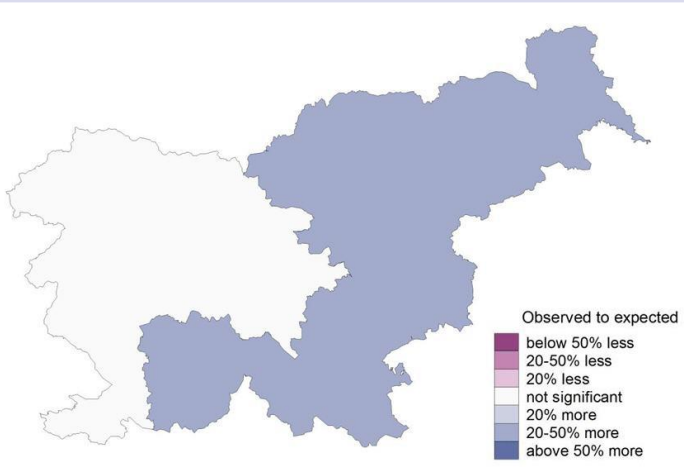


Figure 24. Ratio observed/expected dehydration admissions. 2 regions. Year 2009

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 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

Short-term complications of diabetes were the less frequent PAH condition. Along 2009, only 100 admissions due to short-term complication of diabetes were signaled as potentially avoidable – around 1 per 8,333 adult inhabitants aged 40 or older.

An extreme 10-fold difference was found across statistical regions. Besides, systematic variation was the highest among the PAH conditions -90% over that randomly expected. In turn, a 14% of the observed variation could be attributed to regional policies (see appendix 1 table 8, Intra-class Correlation Coefficient), suggesting a critical role of medical practice at statistical region level in this condition.

This led to a heterogeneous pattern of diabetes rates across the country (figure 25). In three statistical regions, inhabitants had risk of admission 50% greater than expected.

Zooming out to the regional level, residents in Vzhodna Slovenija endured 20% more risk of diabetes admissions than average. Conversely, population in Zahodna Slovenija had 50% less risk (Figure 28).

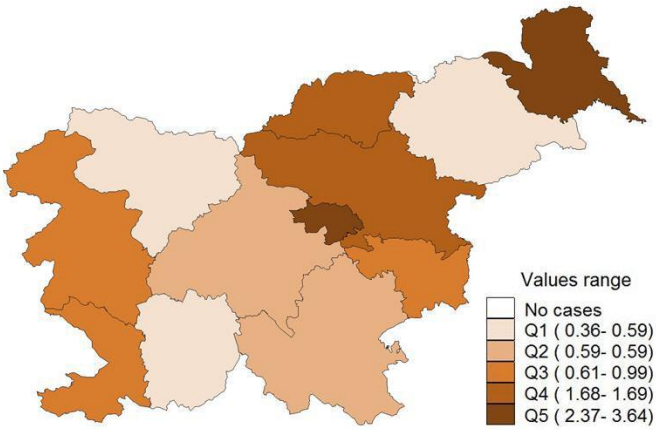


Figure 25. Age-sex standardised Diabetes hospitalisation rate per 10,000 inhabitants. 12 Statistical Regions. Year 2009

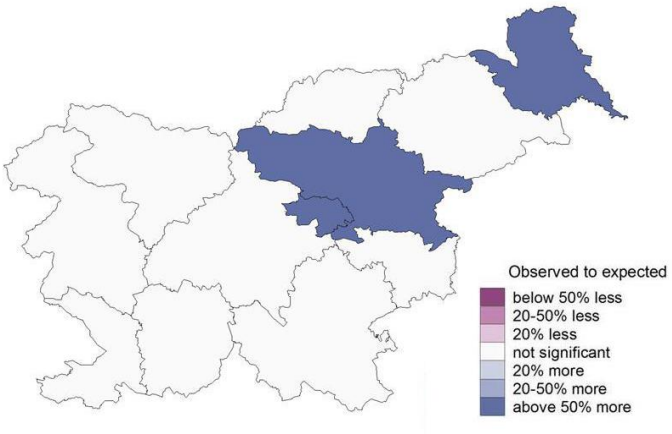


Figure 26. Ratio observed/expected diabetes admissions. 12 Statistical Regions. Year 2009

Figure 27. Age-sex standardised Diabetes hospitalisation rate per 10,000 inhabitants. 2 regions. Year 2009

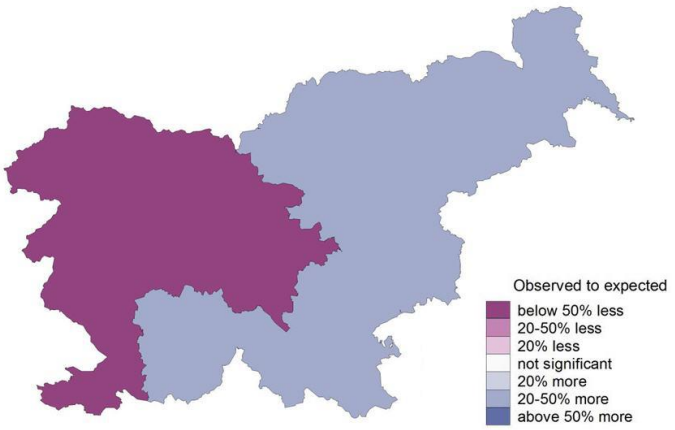


Figure 28. Ratio observed/expected diabetes admissions. 2 regions. Year 2009

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 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 admission -with no concurrent procedure

In 2009, 661 emergency angina admissions were flagged as potentially avoidable –1 admission per 217 inhabitants aged 40 or older.

Variation between statistical regions with extreme rates was the largest among the PAH conditions reaching a 12.6-fold difference. Systematic variation was also very high, 74% above that expected by chance. Moreover, there is a strong regional effect in the observed variation with up to 41% of variation potentially attributed to regional policies (see appendix 1 table 8, Intra-class Correlation Coefficient).

Figure 29 shows quite strong geographic pattern in the eastern part of the country, with up to six statistical regions having 50% more risk of angina admissions than national average (bluish areas in figure 30).

Population living in Vzhodna Slovenija faced up to 20% more risk of angina admissions than expected. In turn, residents in Zahodna Slovenija had 50% less risk than expected (Figure 32).

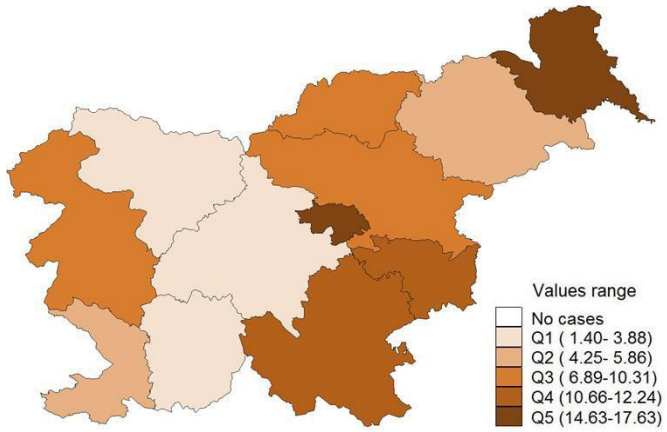


Figure 29. Age-sex standardised Angina hospitalisation rate per 10,000 inhabitants. 12 Statistical Regions. Year 2009

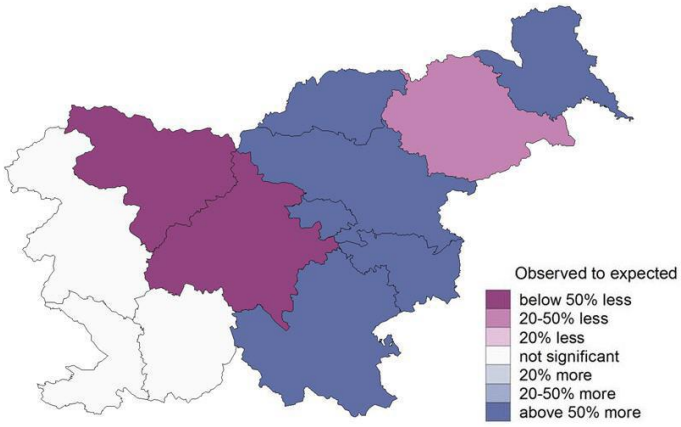


Figure 30. Ratio observed/expected angina admissions. 12 Statistical Regions. Year 2009

Figure 31. Age-sex standardised Angina hospitalisation rate per 10,000 inhabitants. 2 regions. Year 2009

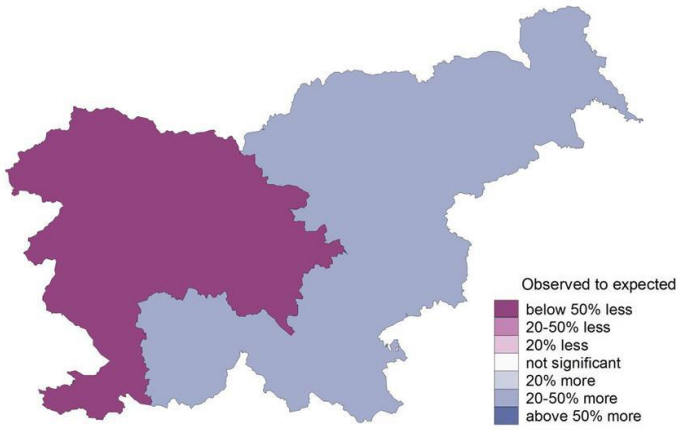


Figure 32. Ratio observed/expected angina admissions. 2 regions. Year 2009

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 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).

IV. EVOLUTION OVER TIME

Along the period 2005-2009, avoidable hospitalisation rates remained stable and systematic variation stayed moderate.

From 2005 to 2009, rates of potentially avoidable hospitalisations remained almost stable, increasing slightly by 5%, from 45 to 47 admissions per 10,000 inhabitants – from 1 admission per 222 to 1 admission per 212 adult inhabitants. Systematic variation stayed at moderate levels increasing from 4% to 9% beyond that expected by chance (see appendix I table 10).

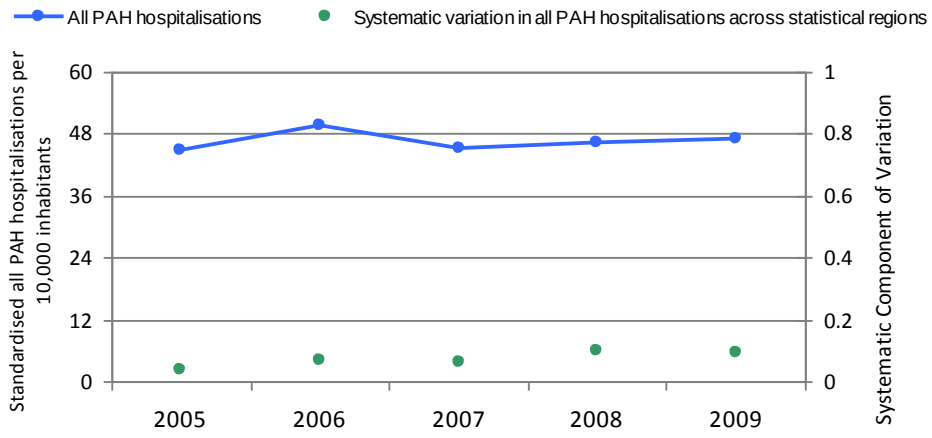


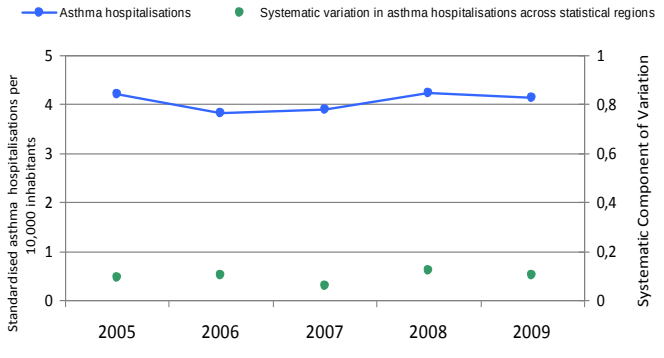
Figure 33. Evolution of standardised rates (blue lines) and systematic variation (green dots) over time

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.

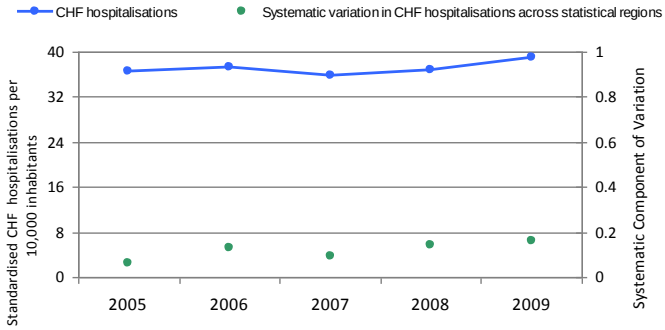
Asthma, COPD and urgent angina rates stayed almost constant along the analysed period. On the other hand, diabetes exhibited a decreasing trend (36%), just the opposite to CHF and dehydration admissions, which experience and increasing evolution, 7% and 30%, respectively (see appendix 1 tables 11-16).

With regard to systematic variation, dehydration, diabetes and urgent angina exhibited high values.

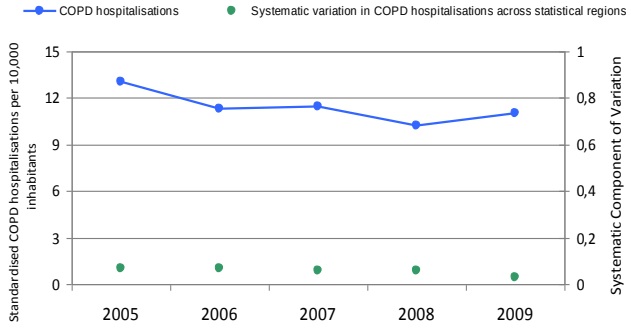
ASTHMA



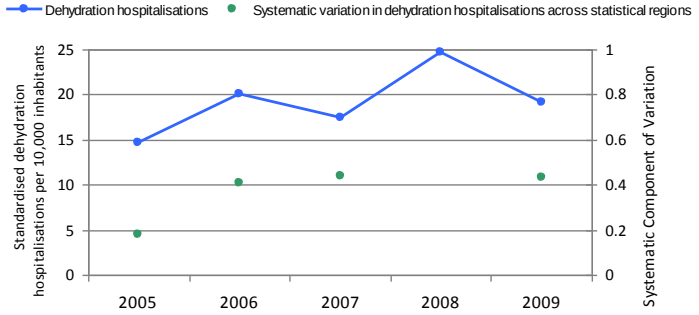
CHF



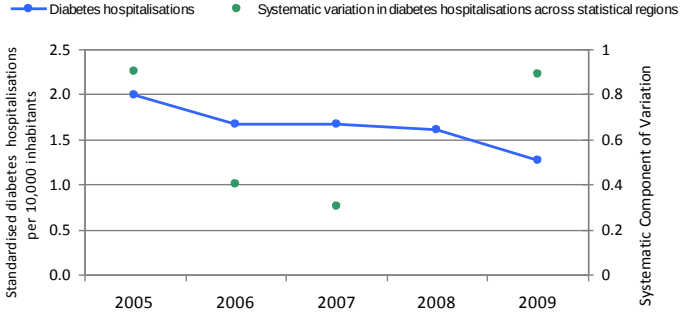
COPD



DEHYDRATION



DIABETES



ANGINA (*)

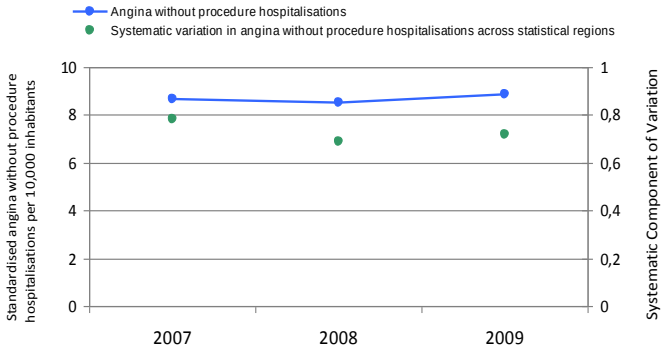


Figure 34. Evolution of standardised rates (blue lines) and systematic variation (green dots) over time

(*) *Because of lack of stability in urgent admissions coding before 2007, analysis of urgent angina* admissions only *covered from 2007 to 2009*

Trends in statistical regions within the lowest and highest quintile of potentially avoidable hospitalisations along 2005-2009

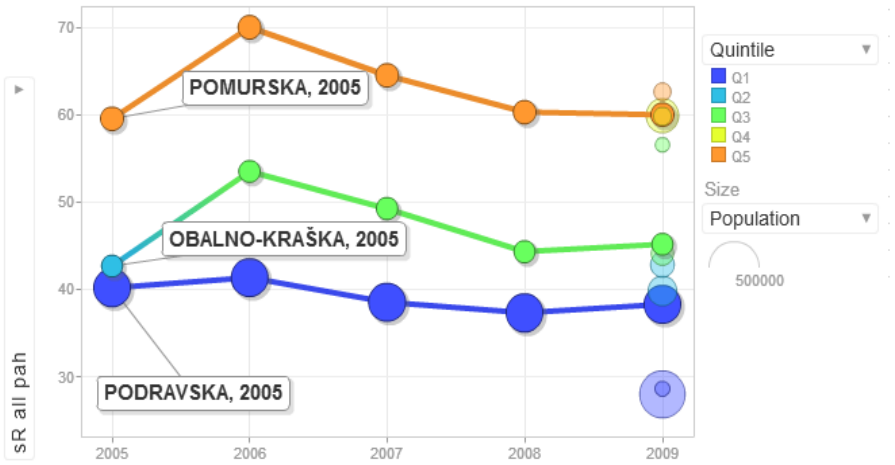


Figure 35. Trends in all PAH rates in all statistical regions in the period 2005-2009

** Bubbles represent the statistical regions: 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 (statistical regions) 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 statistical regions over the period of analysis.*

When statistical regions are divided into utilisation quintiles, a very stable behaviour of overall avoidable hospitalisations is found, meaning that, in general, statistical regions remained in the same quintile of utilisation along the analysed period.

In the following figures (figures 36-41), similar patterns can be observed in each one of the chronic conditions studied in this Atlas report.

See more: http://www.echo-health.eu/handbook/quintiles_pah_slv.html

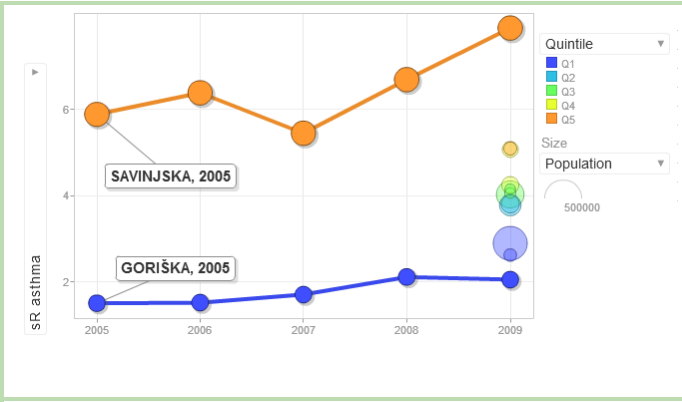


Figure 36. Trends in asthma rates in all statistical regions in the period 2005-2009

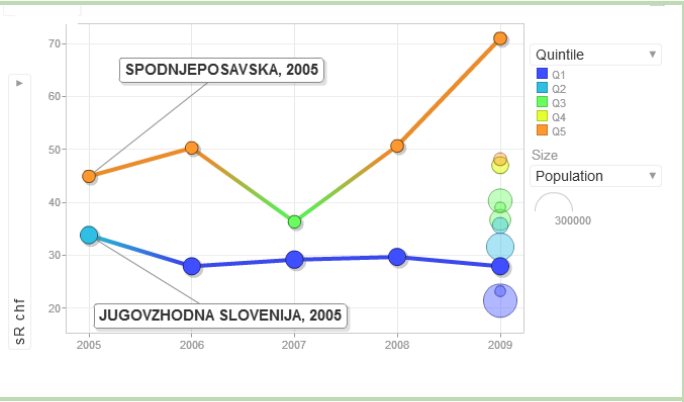


Figure 37. Trends in CHF rates in all statistical regions in the period 2005-2009

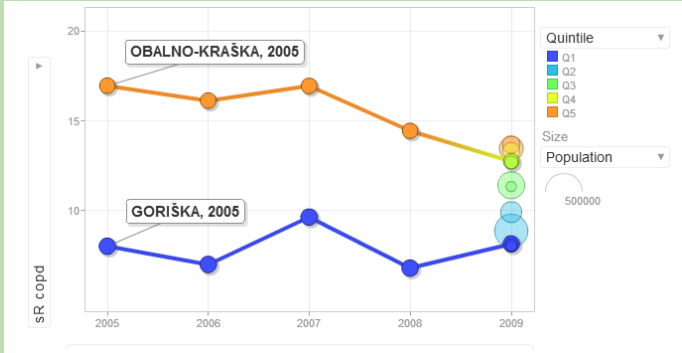


Figure 38. Trends in COPD rates in all statistical regions in the period 2005-2009.

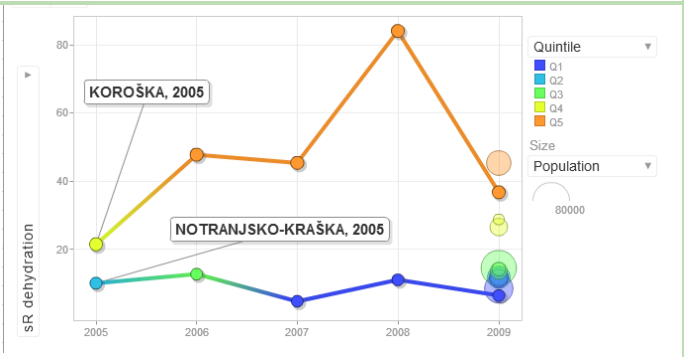


Figure 39. Trends in dehydration rates in all statistical regions in the period 2005-2009.

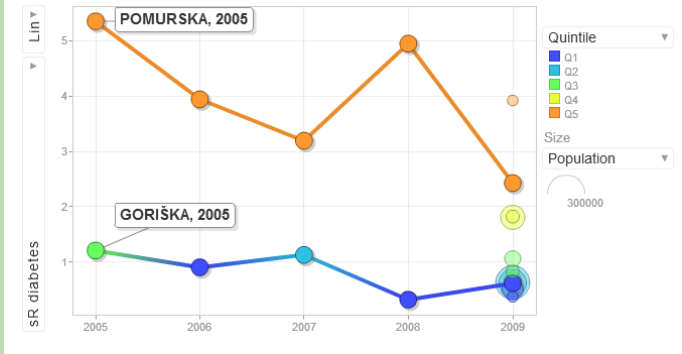


Figure 40. Trends in diabetes rates in all statistical regions in the period 2005-2009.

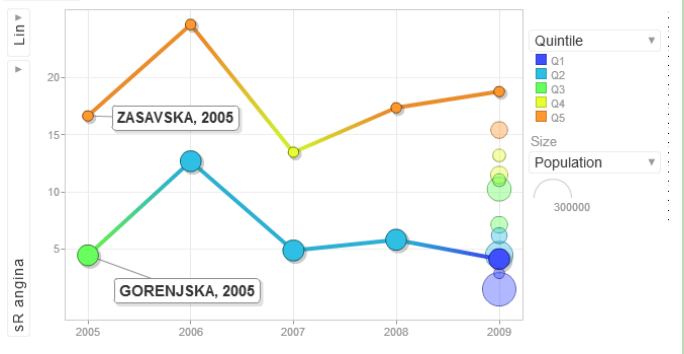


Figure 41. Trends in angina rates in all statistical regions in the period 2005-2009.

Bubbles represent the statistical regions: 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 (statistical regions) 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 statistical regions over the period of analysis.

In Slovenia, there were no significant differences in potentially avoidable hospitalisations across wealth levels

V. SOCIAL GRADIENT

In Slovenia there were only 12 units of analysis and average income resulted quite homogeneous across them. For this reason, making quintiles out of it was far too artificial resulting in a meaningless analysis showing no differences across socioeconomic levels with big overlapping confidence intervals.

Knowing this methodological limitation, although overall rates of potentially avoidable hospitalisations in deprived areas were higher than those found in better-off ones, differences were not significant (figure 42). Again when analysing each specific PAH condition, no differences were found across wealth levels (figure 43).

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 statistical region. 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

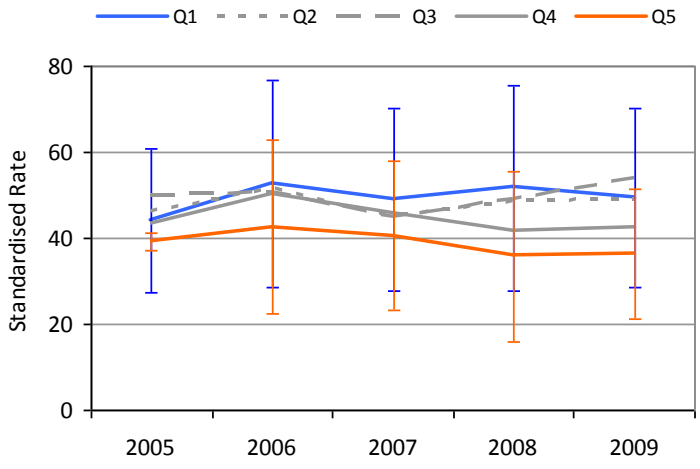


Figure 42. Trend in PAH standardised rates by average income quintile

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.

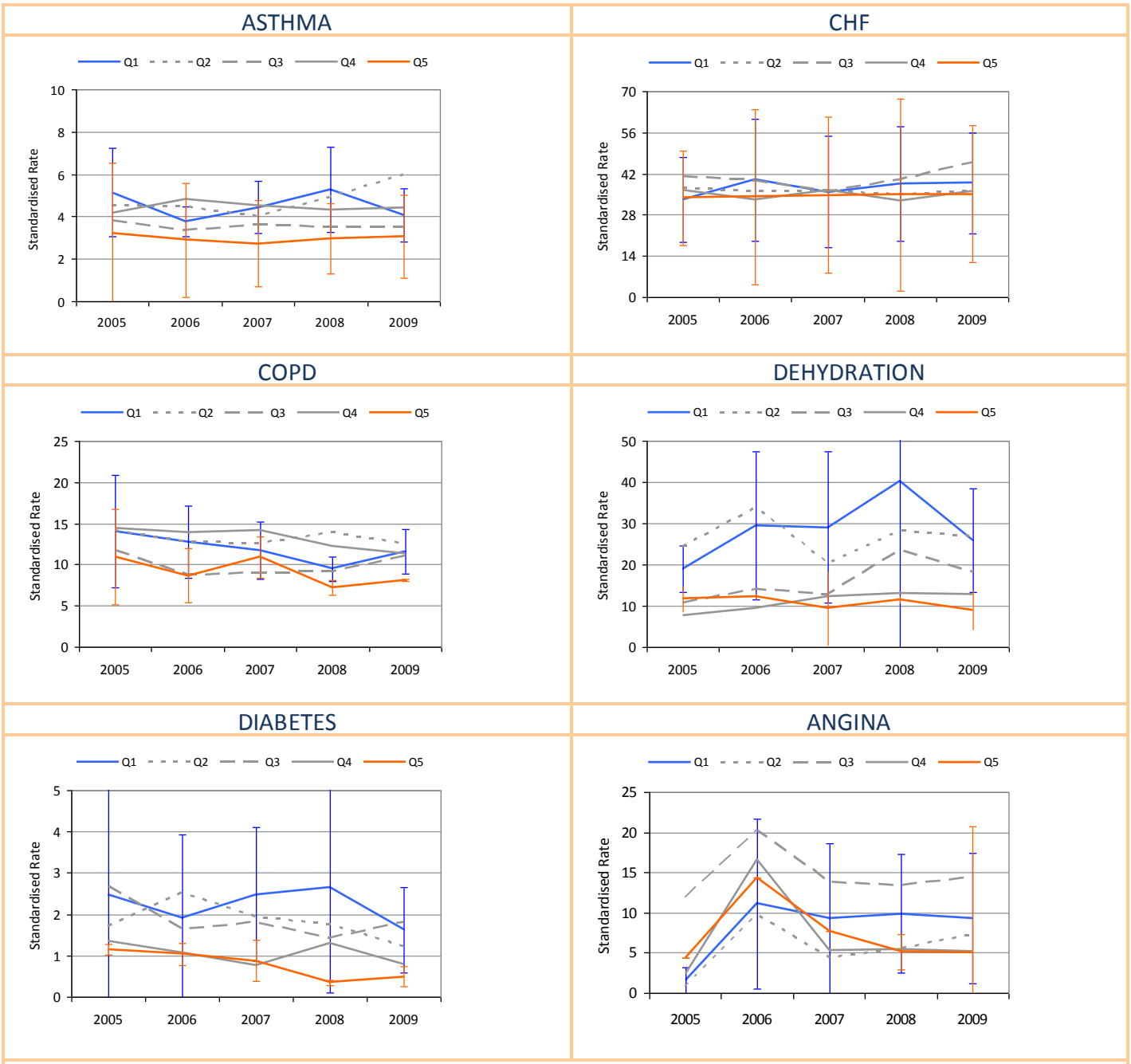


Figure 43. Trend in PAH standardised rates by income quintile and clinical condition

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.

VI. POLICY IMPLICATIONS

In Slovenia, potentially avoidable hospitalisations rates have slightly increase, by a 5%, from 2005 to 2009, resulting in the second highest PAH rate in 2009 among the ECHO countries. Variation not amenable to random phenomena was moderate, although in some conditions, such as diabetes or urgent angina admissions, reached high values.

These PAH rates found in Slovenia, 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 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.

Slovenia has established a gatekeeper system, which means that patients are treated by a specialist only when their primary care physicians have determined

the necessity[1]. But, chronic diseases when there is a need for long-term treatment by certain specialists are exceptions to this rule. In such cases, personal physicians can transfer some of their authority to specialists or to hospitals, but they have to report back to personal physicians about the patient's progress on a regular basis. Unfortunately, it has been reported that this cooperation between primary and secondary levels of care has left much to be desired. So, it is possible that the Slovenian health system, traditionally hospital-oriented, is relying more in hospital or specialist care to treat chronic conditions, explaining the relative high PAH rates found in the country.

Otherwise, some primary health care centres have actually collapsed and functionally ceased to exist in several parts of Slovenia. As a result of this, geographical access to primary health care provider institutions was limited for people in various parts of the country. This could be coherent with some statistical regions showing significant higher risk of admission for their residents in all or almost all the conditions analysed. Thus, we cannot exclude some flaws in primary health care contributing to increase PAH rates and their uneven distribution in Slovenia.

To solve this weakness, in recent years an increasing amount of resources have been devoted to primary health care services in order to cover the implementation of all the mandatory preventive programmes. Besides, there are also plans to develop home care in close cooperation with hospital health services and primary health care services.

Potentially avoidable hospitalisations rates have slightly increased in Slovenia along the period 2005-2009. Besides, Slovenia still shows quite high PAH rates compared to other ECHO countries as well as an uneven population exposure to PAH across the country.

The type of analysis described in this report would be helpful in assessing the extent and distribution of recent measures to improve primary health care and homecare services.

[1] All background information on Slovenian Health System can be consulted at European Observatory of Health Systems and policy platform: Health Systems Policy Monitor http://www.hspm.org/countries/slovenia25062012/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	2.34	2.64	2.25	3.22
SCV	0.71	0.15	0.21	0.15	0.11

Stand. Rate: Age-sex Standardised Rate per 10,000 habitants (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 habitants (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 habitants (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 habitants (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 habitants (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

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

APPENDIX 1:

Slovenia 2009

Table 8

	Asthma	CHF	COPD	Dehydration	Diabetes	Angina	All PAH
Cases	703	3442	1853	548	100	661	7303
Population	1,748,308	1,052,533	1,748,308	334,029	1,052,533	1,052,533	1,748,308
Crude Rate	4.08	37.46	10.88	17.41	1.19	8.4	47.07
Stand. Rate	4.06	36.97	10.73	17.5	1.2	8.34	46.11
sR Min.	2.1	20.31	7.79	6.14	0.36	1.4	27.3
sR Max.	7.66	67.26	13.17	41.14	3.64	17.63	61.19
sR. P5	2.1	20.31	7.79	6.14	0.36	1.4	27.3
sR. P25	3.2	27.72	8.39	10.74	0.59	4.07	38.13
sR. P50	4	35.45	11.24	12.62	0.7	8.22	44.27
sR. P75	4.58	45.11	12.85	25.48	1.69	11.45	57.89
sR. P95	7.66	67.26	13.17	41.14	3.64	17.63	61.19
EQ5-95	3.65	3.31	1.69	6.7	10.22	12.56	2.24
EQ25-75	1.43	1.63	1.53	2.37	2.86	2.82	1.52
ICC	0.07	0.00	0.03	0.12	0.14	0.41	0.24

sR: Age-sex Standardised Rate per 10,000 habitants (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.	0.52	0.62	0.74	0.39	0.37	0.23	0.66
SUR Máx.	1.89	2.06	1.26	2.5	3.8	2.85	1.47
SUR P5	0.52	0.62	0.74	0.39	0.37	0.23	0.66
SUR P25	0.8	0.85	0.8	0.65	0.61	0.65	0.91
SUR P50	0.98	1.08	1.06	0.77	0.73	1.31	1.07
SUR P75	1.14	1.38	1.21	1.53	1.74	1.82	1.38
SUR P95	1.89	2.06	1.26	2.5	3.8	2.85	1.47
SCV	0.09	0.17	0.03	0.42	0.9	0.74	0.09

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

APPENDIX 1:

Slovenia 2005-2009

Table 10

	ALL PAH				
	2005	2006	2007	2008	2009
Cases	7154	7816	7138	7165	7303
Stand. Rate	44.97	49.77	45.34	46.14	47.14
sR Q1.	44.21	52.62	48.98	51.68	49.26
sR Q5.	39.2	42.52	40.52	35.73	36.36
SCV	0.04	0.07	0.06	0.1	0.09

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

Table 11

	Asthma				
	2005	2006	2007	2008	2009
Cases	702	651	651	689	703
Stand. Rate	4.21	3.82	3.9	4.23	4.14
sR Q1.	5.14	3.75	4.43	5.27	4.08
sR Q5.	3.21	2.9	2.74	2.96	3.06
SCV	0.09	0.1	0.06	0.12	0.1

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

Table 12

	CHF				
	2005	2006	2007	2008	2009
Cases	3316	3343	3282	3266	3442
Stand. Rate	36.55	37.19	35.84	36.8	39.08
sR Q1.	33.2	40	35.85	38.6	38.85
sR Q5.	33.88	34.14	34.77	34.88	35.13
SCV	0.06	0.13	0.09	0.14	0.16

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

APPENDIX 1:

Slovenia 2005-2009

Table 13

	COPD				
	2005	2006	2007	2008	2009
Cases	2117	1905	1914	1811	1853
Stand. Rate	13.05	11.28	11.48	10.23	10.98
sR Q1.	14.06	12.76	11.72	9.51	11.63
sR Q5.	10.98	8.67	10.9	7.25	8.09
SCV	0.07	0.07	0.06	0.06	0.03

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

Table 14

	Dehydration				
	2005	2006	2007	2008	2009
Cases	529	633	498	637	548
Stand. Rate	14.73	20.12	17.49	24.75	19.15
sR Q1.	18.89	29.49	29.03	40.15	25.9
sR Q5.	11.68	12.24	9.39	11.53	8.95
SCV	0.18	0.41	0.44	1.12	0.43

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

Table 15

	Diabetes				
	2005	2006	2007	2008	2009
Cases	161	153	146	130	100
Stand. Rate	1.99	1.66	1.67	1.6	1.27
sR Q1.	2.47	1.91	2.48	2.66	1.63
sR Q5.	1.14	1.04	0.88	0.35	0.49
SCV	0.9	0.4	0.3	1.05	0.89

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

APPENDIX 1:

Slovenia 2005-2009

Table 16

	Angina				
	2005	2006	2007	2008	2009
Cases	329	1132	652	634	661
Stand. Rate	4.6	14.61	8.68	8.52	8.88
sR Q1.	1.54	11.16	9.25	9.9	9.32
sR Q5.	4.41	14.31	7.73	5.13	5.01
SCV	2.31	0.47	0.78	0.69	0.72

Stand. Rate & sR: Age-sex Standardised Rate per 10,000 habitants (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 12 Statistical regions and the 2 Regions composing Slovenia.

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 by the Ministry of Health (Ministrstavo za Zdravje). Cross- and in-country sections were built upon 2009 discharges, whereas time-trends and social gradient analyses used 2005 to 2009 data.

Social gradient data and data for statistical regions on average family annual income (both based in transfers and available income) were obtained from the National Statistics office (Statistični Urad Republike Slovenije).

APPENDIX 3:

Definitions of indicators

	Diagnosis codes ICD10 and Procedures codes ACHI					
	Primary diagnosis		Secondary diagnoses		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 ACHI					
	Primary diagnosis		Secondary diagnoses		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)