ECHO

EUROPEAN COLLABORATION FOR HEALTHCARE OPTIMIZATION

Lower Value Care in Denmark

I. EXECUTIVE SUMMARY

Health Systems bear substantial opportunity-cost in using interventions deemed lower-value.

Quantifying the utilisation of this type of care and its systematic variation across policy-relevant geographical units offers at a glance insights about the local potential for enhancing efficiency (i.e. value-based provision of care).

In addition, geographical differences in residents' exposure to lower-value care might signal inequities in access to quality and safe care that should be tackled

- This report analyses the magnitude and the geographical variation of utilisation of five procedures deemed lower-value care in international literature: Adenotonsillectomy, c-section in low risks deliveries, hysterectomy in non-oncologic conditions, non-conservative surgery in breast cancer and prostatectomy in benign prostatic hyperplasia.

  These procedures are highly sensitive to clinical practice style (signature phenomenon, learning cascades) and supply factors (organizational and financial incentives)

- With the exception of adenotonsillectomy, utilisation rates of lower-value care in Denmark are relatively high compared to other ECHO countries. In terms of volume, C-section in low risk deliveries and hysterectomies in non oncologic conditions seem to be the most relevant.

- Variation is significant for all LVC procedures examined in 2009, but the systematic component of it is particularly large for certain ones, such as c-section in low risk deliveries, while for others -hysterectomy or non-conservative breast surgery-, the behaviour across kommuners seems to be quite homogeneous.

- Although LVC utilisation rates have tended to decrease from 2002 to 2009 (with the exception of c-section and c-section for low risk births), the systematic variation across kommuners has generally increased, signalling how differences in local practice across the country have become more pronounced

- The distribution of lower-value care utilisation seems to be quite homogeneous across different quintiles of kommuner wealth. The only exception regards women's exposure to c-section (both total and in low risk cases), which seems to increase when they live in wealthier areas. However, utilisation rates have converged over the period of analysis: while c-section rates have moved slightly downwards in wealthier areas, they have substantially risen in those most deprived till both, actually, end up at the same utilisation level by 2008.

- In principle, utilisation of LVC is more often explained by local medical practices; however, regions may still play some role in other factors such as

services availability and organisation of care paths, or incentives framework which may affect decisions locally made. Interestingly enough, the percentage of variation explained by the region is close to 0 for adenotonsillectomy and prostatectomy; it goes up to 11% for c-section in low risk deliveries, but ranges between 20 and 30% for hysterectomy and non-conservative breast surgery.

- The analysis conducted, suggests that there is plenty of room for enhancing value for money in the Danish system. Although utilisation rates remain generally larger as compared with the other ECHO countries, LVC use have tended to decrease over the period of analysis, with the exception of c-section; the main driver resides at local level. Focusing on local practices, particularly learning cascades and established medical practice styles, together with patient information and empowerment in decision making, will potentially have a major impact.

- Further analysis on institutional factors underpinning overuse of LVC at kommuner level, as well as social, organisational and budgetary local contexts and regional framing, will serve as basis for recommendations to guide relevant decision makers in tackling this allocative inefficiency. SAVINGS ARE NOT WARRANTED, the aim is fostering "value for money" i.e. avoid non-efficient public expenditure

Procedures eligible as "lower value"

- Those superseded by more cost-effective alternatives (non-conservative breast cancer surgery, Hysterectomy in non-oncologic conditions);
- There are defined types of patients for whom evidence of value is unclear (prostatectomy in BPH, c-section);
- Relatively ineffective procedures prone to over-use (adenotonsillectomy, c-section in low-risk births).

Atlas Rationale: The report analyses the actual utilisation rate per 10,000 inhabitants in each geographical area and compares it to 2 scenarios of "minimisation of Lower-value Care use":

I. All the areas in the country behave as those below percentile 10 of LVC utilisation (10% areas in the lower end of use)
II. All the areas in the country behave as those in the first quartile of LVC utilisation (25% areas in the lower end of use)

The potential for realignment is assessed as the difference between the number of procedures observed and those expected if LVC utilisation were minimised

II. INTERNATIONAL COMPARISON

The magnitude and variation of lower-value care utilisation in ECHO health systems provides a wider perspective in assessing the relative need for specific activities focused in enhancing the value of health care provided, compared to other relevant countries

This section lays out the utilisation of selected lower-value care (LVC) procedures in Denmark compared to the other countries in the ECHO project.

Two dimensions are explored: the magnitude of the phenomenon, and the variation across the policy-relevant administrative areas in each country.

Adenoidectomy and/or tonsillectomy

Despite their indication being exceedingly restricted, these are still frequent paediatric surgical procedures. Geographical variability in utilisation of these interventions unexplained by appropriate medical indication has been registered since 1938 till nowadays

Denmark shows the lowest age-standardised rates of adenotonsillectomy across ECHO countries (*Fig 1a*); overall around 1 in 300 children below 14 years old underwent the procedure in 2009 i.e. about 2 and a half times lower than the country with the highest rate – 1 in 120 Slovenian children were intervened in 2009 *(table 1 in Appendix 1)*

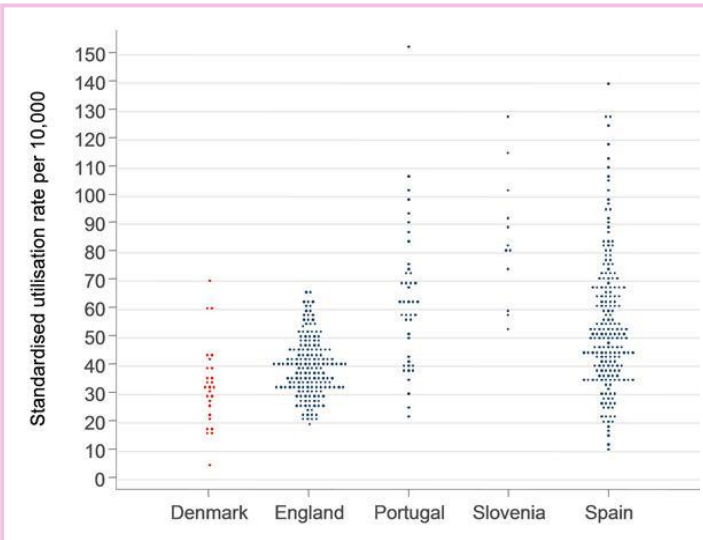


Figure 1a. Standardised rates of adenoidectomy and/or tonsillectomy per 10,000 children (natural scale). Year 2009

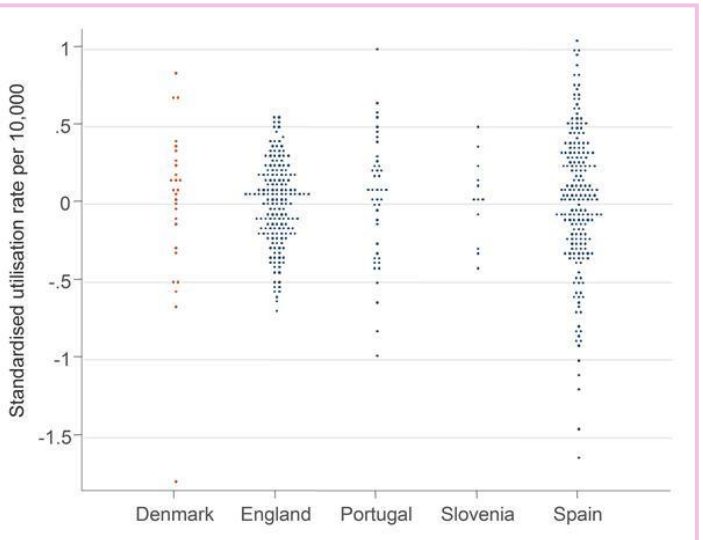


Figure 1b. Standardised rates of adenoidectomy and/or tonsillectomy per 10,000 children (normalized scale). Year 2009

** Each dot represents the relevant administrative area in the country (kommuners for Denmark). The y-axe charts the rate per 10,000 inhabitants (up to 14 years old) The figure is built on the total number of interventions in 2009 in those countries. In Figure 1b utilisation rates have been normalised to ease comparison of the degree of variation across countries.*

The ratio between the highest and lowest rates in Denmark is among the largest, though: 4-folded chance of getting the procedure for children living in high rate kommuners; only Spain shows a larger one, close to 5-fold. *(Fig 1b. See also table 1 in Appendix 1).* Likewise Denmark, England shows a relatively small rate of adenotonsillectomy, however the range of variation across local authorities is narrower, with 2.5 ratio between highest and lowest rates.

The systematic component of this variation has proven relevant in all countries examined, ranging from 9 to 66 % beyond that randomly expected.

Caesarean section in low risk pregnancies and deliveries

C-section is considered a highly effective procedure in avoiding maternal and child mortality at birth as well as complications derived from foetal distress. However, in the last decade, literature is abounding in evidence of overuse, and, particularly, misuse in lower-value indications such as low risk and normal births.

Denmark shows the highest C-section rate in low risk births across ECHO countries; it doubles English and Slovenian figures, while 5 and 10-folding Spanish and Portuguese *(Fig 2a and table 1 in Appendix 1)*. Interestingly enough, regardless the size of the rate, variation for this procedure across the territory seems to be remarkable in all countries. In Denmark it is comparatively low: 2-folded probability for women living in those areas with highest rates; Spanish healthcare areas, on the other hand, range between null cases and figures rising close to Danish kommuners *(Fig 2b and table 1 in Appendix 1)*.

The systematic component of this variation is also large across the countries examined, exceeding that expected by chance in a range from 50% to more than 6 times *(Fig 2. b and table 1 in Appendix)*.

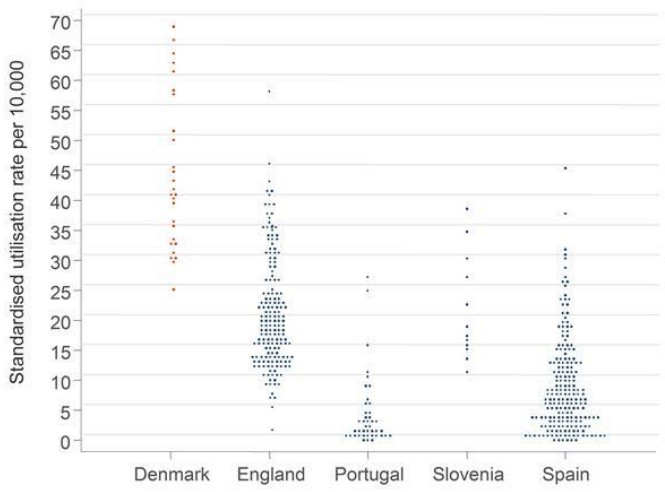


Figure 2a. Standardised Rates of C-Section in low-risk cases per 10,000 women in reproductive age (natural scale) . Year 2009

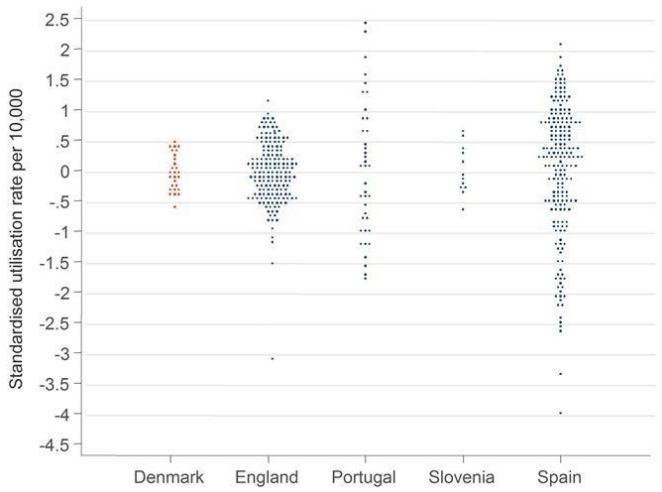


Figure 2b. Standardised Rates of C-Section in low-risk cases per 10,000 women in reproductive age (normalised scale) . Year 2009

** Each dot represents the relevant administrative area in the country (kommuners for Denmark). The y-axe charts the kommuner rate per 10,000 inhabitants (women in fertile age 15-55.) The figure is built on the total number of interventions in 2009 in those countries. In Figure 2b utilisation rates have been normalised to ease comparison of the degree of variation across countries*

Hysterectomy in non-oncologic conditions

Hysterectomy is one of the safest and most appropriate procedures in dealing with uterus cancer. However, its indication for other gynaecological conditions such as bleeding or uterine myoma is controversial and not the first line approach. In those cases hysterectomy can be considered lower-value care.

Denmark shows the highest rate of hysterectomy in non-oncologic conditions (one in 458 adult women in a year); the figure is very similar in Portugal, far from those observed in the country with lowest rates -Spain, one in 677 women *(figure 3.a and table 1 in Appendix 1)*.

Compared to other cases of LVC presented in this report, the variation in utilisation across countries seems less marked, ranging from 14.77 to 21.84 hysterectomies per 10,000 adult women; likewise, within country variation is smaller than for other LVC procedures, though still significant, particularly in Spain *(see Fig 3.b and table 1 Appendix).* However, the systematic component of this variation (beyond random variation) is low to moderate across them.

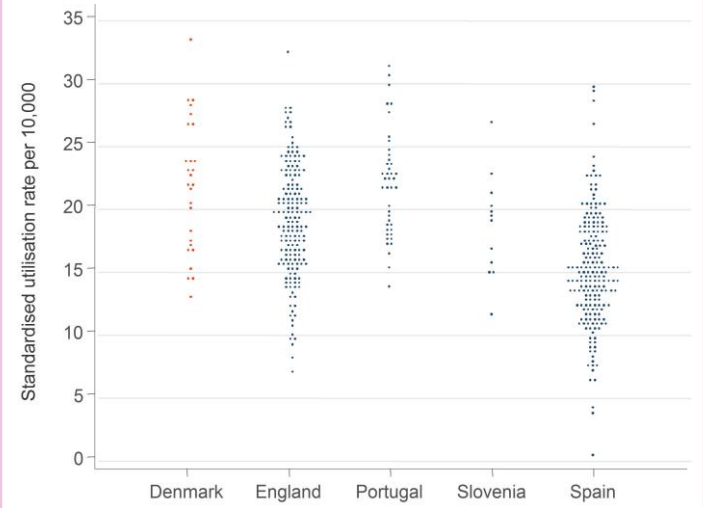


Figure 3a. Standardised Rates of Hysterectomy in non-oncologic conditions per 10,000 women. (natural scale) . Year 2009

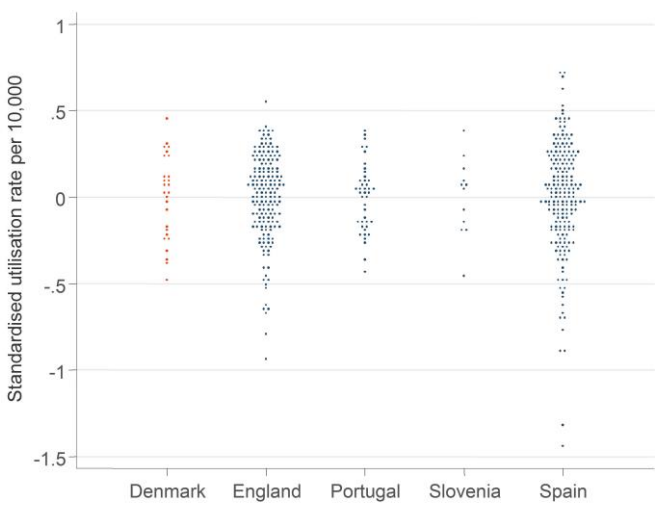


Figure 3b. Standardised Rates of Hysterectomy in non-oncologic conditions per 10,000 women. (normalised scale) . Year 2009

** Each dot represents the relevant administrative area in the country (kommuners for Denmark). The y-axe charts the kommuner rate per 10,000 inhabitants (women 18 years old and older.) The figure is built on the total number of interventions in 2009 in those countries. In Figure 3b utilisation rates have been normalised to ease comparison of the degree of variation across countries*

Non conservative surgery in breast cancer

The current therapeutic approach for breast cancer includes surgery, often followed by hormonal therapy and radiotherapy. Surgical treatment can be conservative (CS), which preserves part of breast glandular tissue, or non-conservative treatment (NCS) which entails total removal of breast glandular tissue, maintaining or not the skin tissue. CS is recommended, at any stage of breast cancer on the basis of less complications and better quality of life, confining the use of NCS to those situations where the tumour's size relative to total breast mass prevents conservative resection.

The rate of non-conservative breast surgery in Denmark is 2-times that in Spain (8.14 vs 4.31 per 10,000 women) *(Figure 4a and table 1 Appendix 1)*. In addition, women living in those kommuners with the highest rates have almost twice the probability of getting non-conservative surgery than those living at the bottom of the range; the same is true for women in England and Portugal (slightly above 2 times difference depending on their area of residence), though utilisation rates are considerably lower; this ratio increases to almost 4 times for Spanish and Slovenian women *(Figure 4b and table 1 Appendix 1)*.

However, the systematic component of this variation is uniformly below 10% in all countries but Denmark, where almost 60% of the observed variation compared to ECHO areas cannot be deemed random *(Table 1 Appendix 1)*.

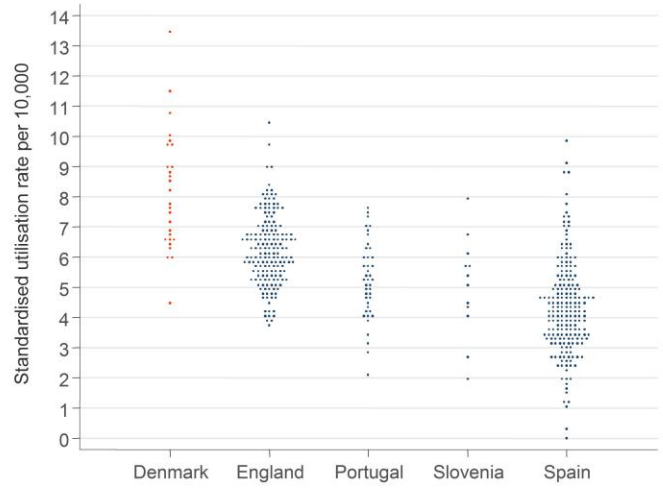


Figure 4a. Standardised Rates of non conservative surgery in breast cancer per 10,000 women (natural scale) . Year 2009

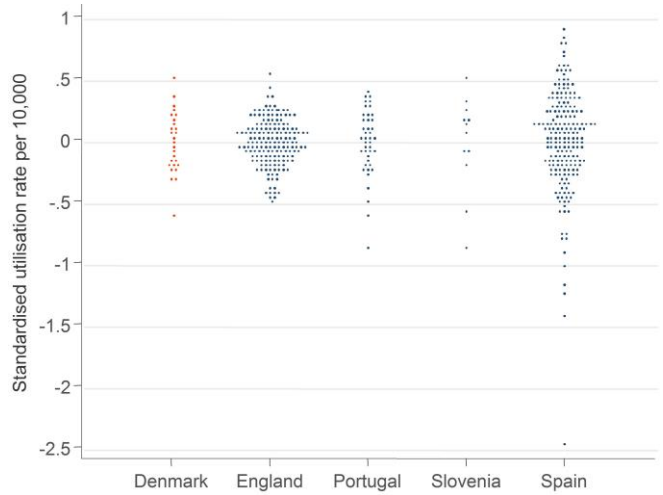


Figure 4b. Standardised Rates of non conservative surgery in breast cancer per 10,000 women (normalised scale) . Year 2009

** Each dot represents the relevant administrative area in the country (kommuners for Denmark). The y-axe charts the kommuner rate per 10,000 inhabitants (women) The figure is built on the total number of interventions in 2009 in those countries. In Figure 4b utilisation rates have been normalised to ease comparison of the degree of variation across countries*

Prostatectomy in benign prostatic hyperplasia

Open prostatectomy is the oldest surgical method to treat heavily symptomatic benign prostatic hyperplasia (BPH). This method is still preferred if the prostate is very large but, in general terms, it has been superseded by less invasive interventions, such as transurethral resection of the prostate (TURP) and should be considered lower-value care. However, there is growing evidence on overuse of surgical options (specially those less invasive) in dealing with BPH and, in particular, misuse in asymptomatic or minor cases.

Denmark shows, comparatively high rates of prostatectomy in BPH -1 intervention in 453 adult men each year, far from the numbers observed in the countries with the lowest rates, Portugal and Slovenia, around 1 in 800 adult men *(Figure 5a and table 1 Appendix 1)*. Regarding the ratio between extreme areas, Slovenia shows the highest (6-folded) followed by Denmark and Spain with adult men living in the highest rate areas bearing 4 times more chances of getting a prostatectomy *(Figure 5b and table 1 Appendix)*. The systematic component of this variation was relevant across all countries examined, ranging from 10 to almost 50% not amenable to randomness.

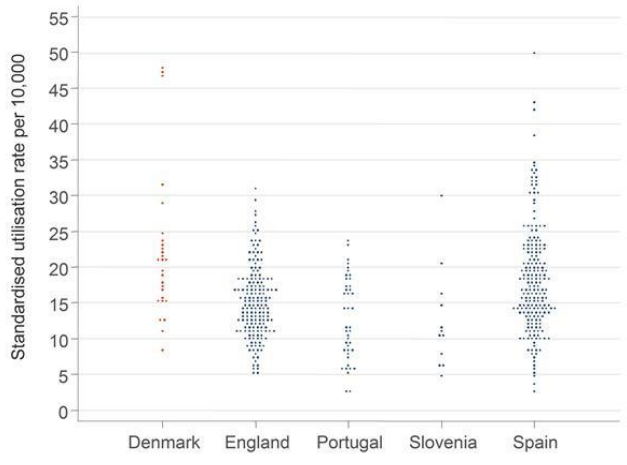


Figure 5a. Standardised Rates of prostatectomy in BPH per 10,000 men (natural scale) . Year 2009

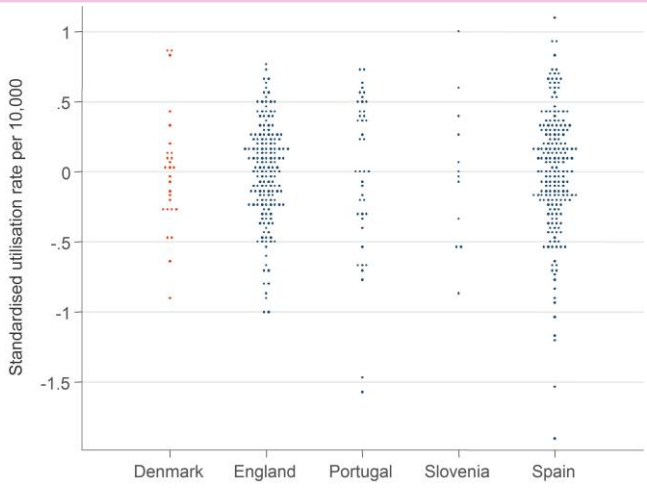


Figure 5b. Standardised Rates of prostatectomy in BPH per 10,000 men (normalised scale) . Year 2009

** Each dot represents the relevant administrative area in the country (kommuners for Denmark). The y-axe charts the kommuner rate per 10,000 inhabitants (men 40 year old and older) The figure is built on the total number of interventions in 2009 in those countries. In Figure 4b utilisation rates have been normalised to ease comparison of the degree of variation across countries*

III. IN COUNTRY VARIATION

The higher the rate of utilisation of low value care, the higher the room for enhancing efficiency.

The higher the systematic variation across areas the larger the chances of inequitable exposure to lower-value care linked to the place of residence.

With the exception of adenotonsillectomy, utilisation rates of lower-value care in Denmark are relatively high compared to other ECHO countries. In terms of volume, C-section in low risk deliveries and hysterectomies in non oncologic conditions seem to be the most relevant *(table 2 in appendix 2)*.

Though variation is significant for all LVC procedures examined, the systematic component of it is particularly large for certain ones, such as c-section in low risk deliveries, while for others -hysterectomy or non-conservative breast surgery-, the behaviour across kommuners seems to be quite homogeneous, with a bare 7% of the observed difference deemed beyond those randomly expected.

Along the following pages, the geographical pattern of utilisation for each procedure will be presented, mapping out the two relevant tiers in the health system organisation: kommuners and regions.

Whenever possible, proxies of "burden of disease" or utilisation of related or alternative procedures have been included in the analysis to better characterise the observed phenomena.

The potential for minimisation of LVC utilisation is also mapped out; each geographical area is identified by their distance in excess-cases to the desirable benchmark; to this end, two scenarios have been adopted: the first takes as reference the behaviour of the 10 kommuners with the lowest rates (10% at the bottom of the range of use); the other scenario, more conservatively, benchmarks against the 25 lowest rates in the country (percentile 25th of utilisation and below).

Although, in principle, utilisation of LVC is more often explained by local medical practices, regions may still play some role in other factors such as services availability and organisation of care paths which may affect decisions locally made. Interestingly enough, the percentage of variation explained by the region is close to 0 for adenotonsillectomy and prostatectomy; it goes up to 11% in the case of c-section in low-risk deliveries but ranges between 20 and 30% for hysterectomy and non-conservative breast surgery.

Variation in utilisation of each LVC procedure is represented using two geographical units: kommuners and regions. The first mapping is composed of 98 units and the second comprises 5 regions. Analysis by kommuners would be more linked to local medical practices, whilst regions could be considered a surrogate for regional policies affecting all the kommuners within.

Adenoidectomy and/or tonsillectomy

These are still very frequent paediatric surgeries, despite their indication being restricted to a relative small fraction of the children: those with significant obstructive apnoea (adenotonsillectomy), recurrent otitis media and ventilation-tube placement, or with chronic/recurrent sinusitis and failure of appropriate antibiotic therapy (adenoidectomy) and children with severe acute recurrent tonsillitis (tonsillectomy). Geographical variability unjustified by appropriate medical indication has been recorded for these procedures since 1938 to nowadays.

The highest quintile of age-standardised utilisation rates in Denmark includes kommuners ranging between 44 and 119 interventions per 10,000 children while the lowest goes from 6 to 19. The geographic pattern seems to point out a certain concentration of high rates in the west; the central east part of the Jutland peninsula, north Odense and west and north of Zealand Islands seem to cluster the lowest rates in the country (pale areas in figure 6). Only the islands of Laeso and Fano registered no cases of adenotonsillectomy in 2009

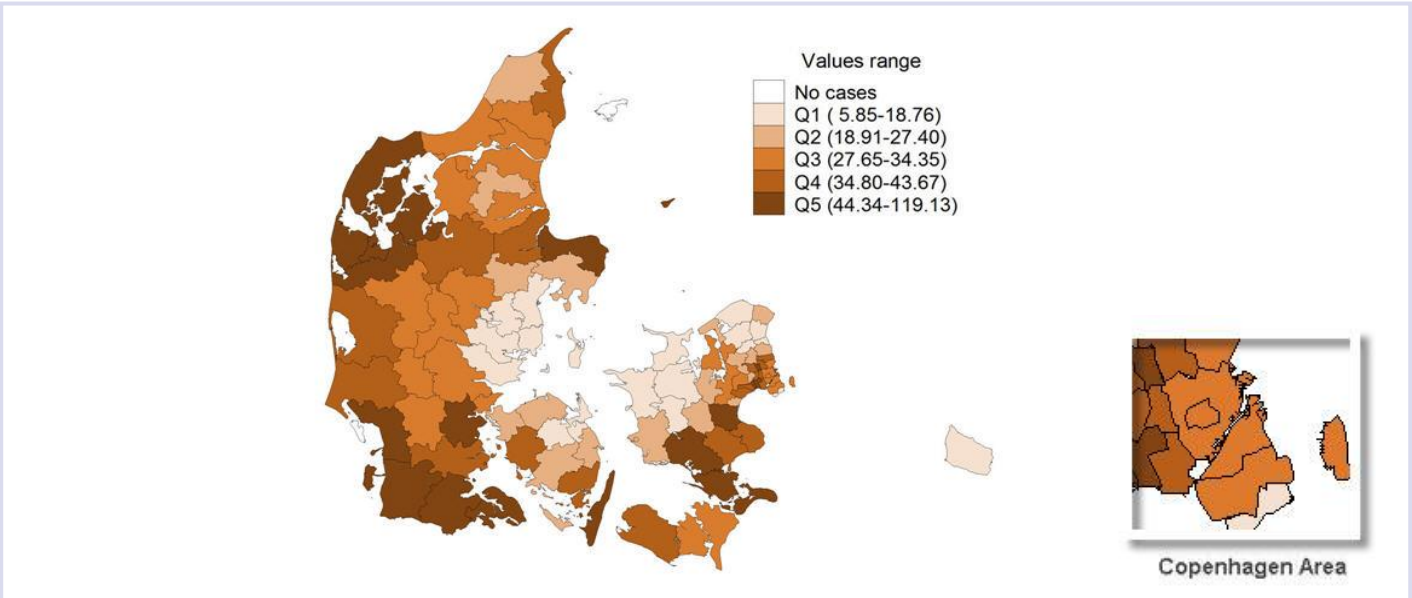


Figure 6. Age-sex standardised adenoidectomy and/or tonsillectomy utilisation rate per 10,000 children up to 14 years old. 98 kommuners. Year 2009

** The darker the brown, the higher the exposition to adenotonsillectomy of children living there. Kommuners are clustered into 5 quintiles according to their rate value (Q1 to Q5). –legend provides the range of standardised rates within each quintile.*

When the analysis is conducted by region, Syddanmark and Nordjylland stand out, though differences are, logically, much more attenuated in figure 7 than they were in 6 where the full range of variation within a region was displayed rather than smoothed out. The regional level does only explain less than 1% of the observed variation, suggesting that the main driver is medical practice at kommuner level *(table 2 in Appendix 2)*

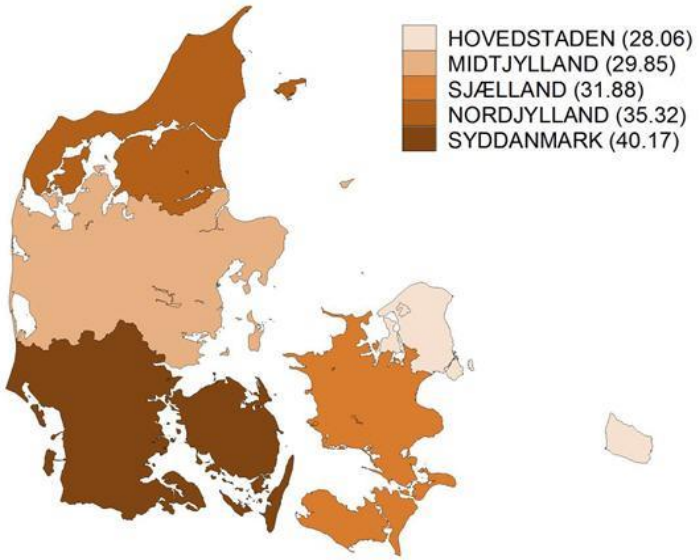


Figure 7. Age-sex standardised adeno and/or tonsillectomy utilisation rate per 10,000 children up to 14 years old. 5 regions. Year 2009

Therefore, the larger opportunities for minimising the use of adenotonsillectomy are to be found in the west part of the country *(figures 8 and 9)*. Those areas more in need of intervention to decrease use would be performing up to 112 adenotonsillectomy in excess per year in the most conservative scenario (150 when using the more demanding benchmark in scenario II). The overall number of excess interventions in the country in 2009 can be conservatively estimated around 1707 *(table 3 in Appendix 1)*

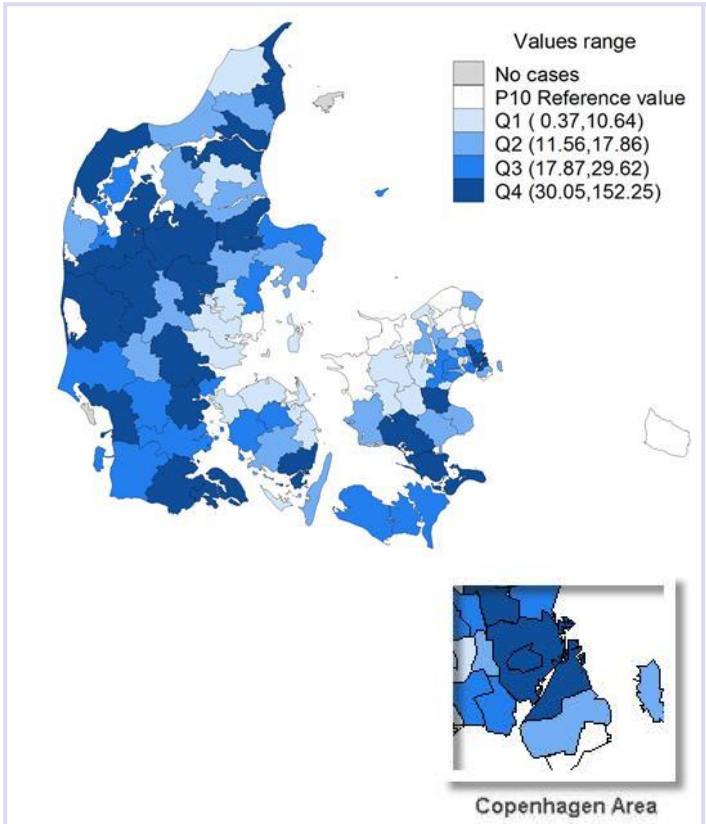


Figure 8.a. Excess cases adenotonsillectomy per kommuner. Scenario I minimisation to p10. 98 kommuners. Year 2009

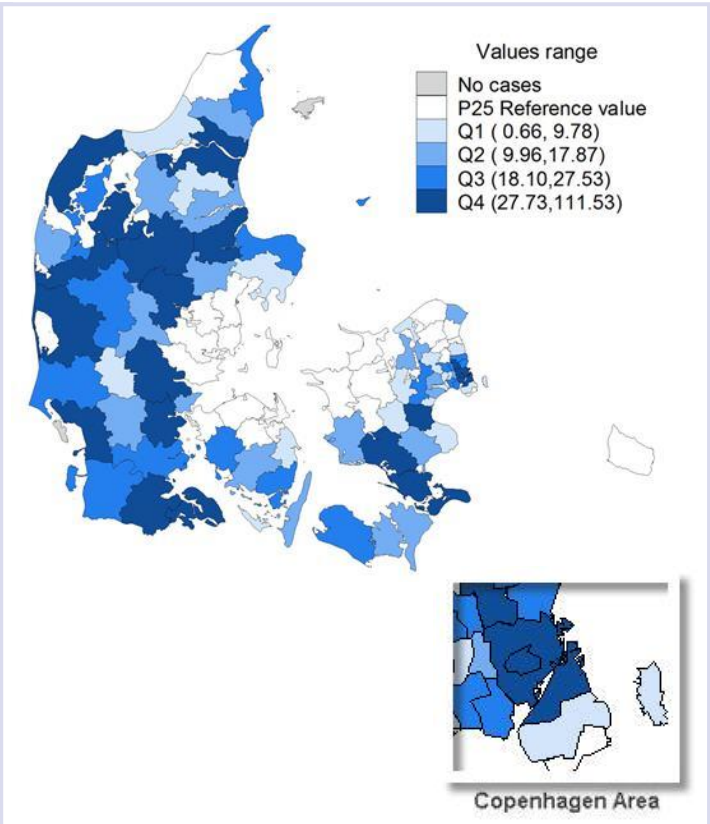


Figure 8.b. Excess cases adenotonsillectomy per kommuner. Scenario II minimisation to p25. 98 kommuners. Year 2009

** The darker the blue the larger the difference between the observed number of cases and the benchmark (expected number of cases if they behaved as those kommuners with the lowest utilisation rates –p10 and p25). Kommuners are clustered into 5 quintiles according to their level of excess cases (Q1 to Q5). –legend provides the range within each quintile.*

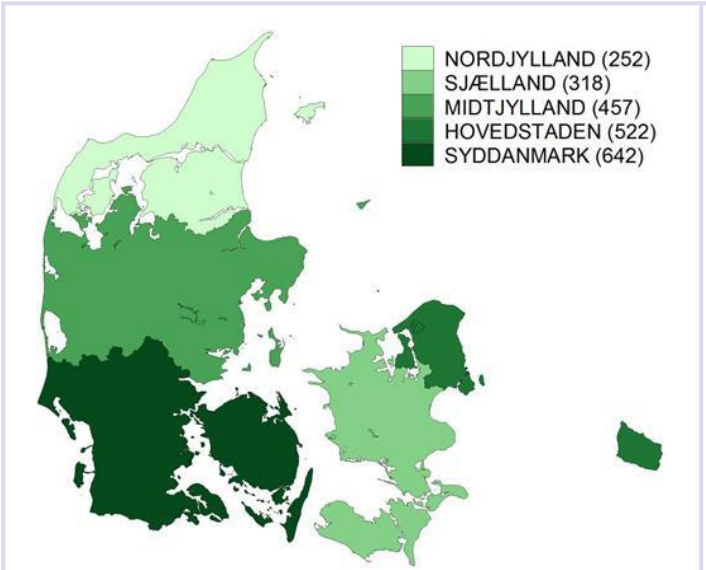


Figure 9.a. Excess cases adenotonsillectomy. Scenario I minimisation to p10. 5 regions. Year 2009

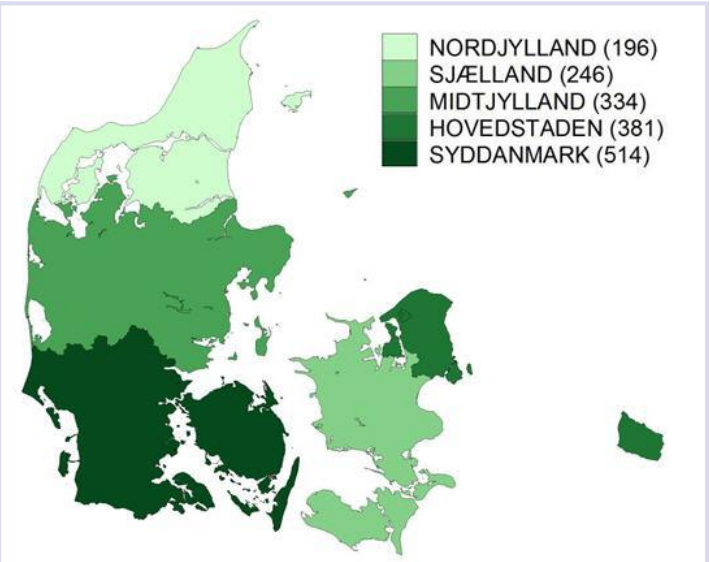


Figure 9.b. Excess cases adenotonsillectomy. Scenario II minimisation to p25. 5 regions. Year 2009

** The darker the green the larger the number of excess cases estimated at region level, if all the kommuners behaved as the benchmark of minimal utilisation –p10 and p25 -, legend provides values for each region.*

Cesarean section in low risk births

C-section is considered a highly effective procedure in avoiding maternal and child mortality at birth as well as complications derived from fetal distress. However, in the last decade, literature is abounding in evidence of overuse, particularly misuse in lower-value indications such as low risk and normal births.

First, a glance at c-section use in any condition in Denmark and how it relates to burden of disease -measured as rate of births with complications per 10,000 women *(see definitions in Appendix 4)*. Figures 9 and 10 illustrate how burden of disease maps out across kommuners, both in absolute terms (standardised rates) and expressed in relative risk of complications (ratio observed to expected). Excess burden of this condition seems to concentrate in a few kommuners *(blue shades in figure 10)*

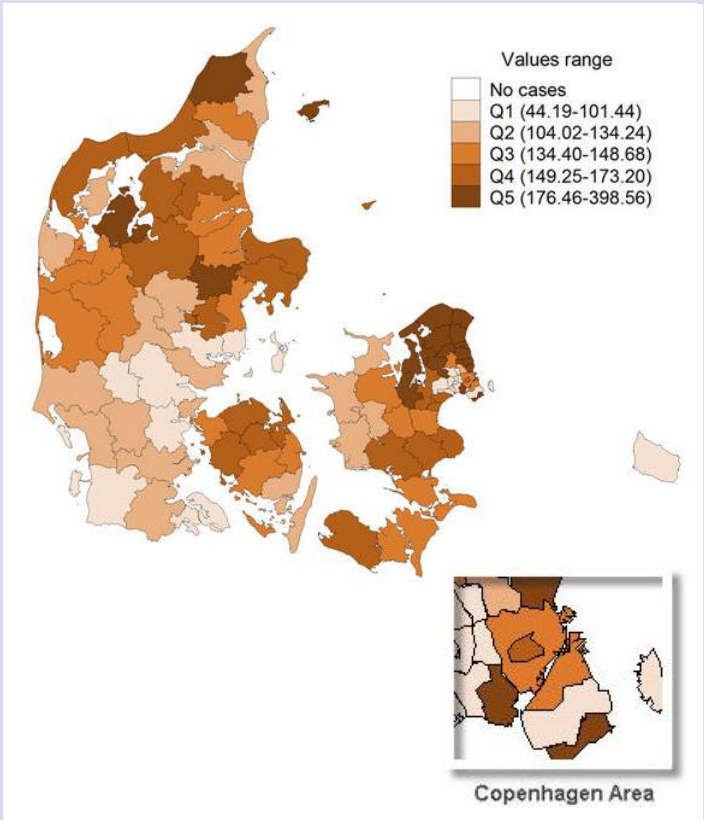


Figure 9. Age standardised Births with complications rate per 10,000 women. 98 kommuners. Year 2009

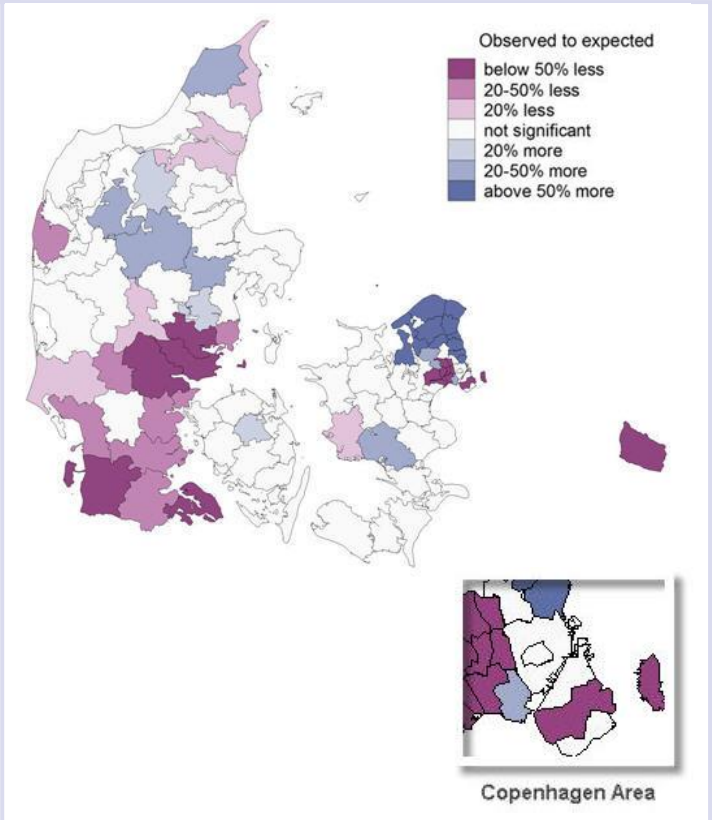


Figure 10. Admissions Ratio Observed/expected Births with complication. 98 kommuners. Year 2009

** Map on the right: The darker the brown, the higher the risk of complications among women living there. Kommuners are clustered into 5 quintiles according to their rate value (Q1 to Q5). –legend provides the range of standardised rates within each quintile. Map on the left: relative risk for women living in the kommuner compared to the expected average burden. Blue shades flag areas with excess risk (overexposure); pink shades denote risk below the expectation, thus relative protection or under-exposure compared to the rest of the country. White areas correspond to average relative risk (observed/expected=1)*

A certain overlapping, even if imperfect, between the mapping of higher relative risk of births with complications and more intensity in utilisation of c-sections can be reasonably expected. However, the pattern revealed in figure 11 shows a great deal of incongruence when compared with those arising in figure 9 and 10. The conclusion that can be drawn is that the intensity of c-section performance in several kommuners in the country seems to be driven by factors other than need.

Exploring the degree of correspondence between c-section utilisation patterns and c-section in low risk deliveries (lower value care) yields a much more congruent picture *(figures 11 and 12)*. This suggests that, in most of those kommuners with high c-section rates, women might be bearing a higher exposure to lower-value care. However, it is also worth noting that there are also areas with low-medium intensity of c-section use that seem to suffer high levels of exposure to lower-value interventions.

The ratio across areas in the extremes of the utilisation range goes up to 3-fold probability of undergoing a c-section during a low risk delivery, depending on the place of residence (table 2 appendix 2); 16% of this variation cannot be deemed random

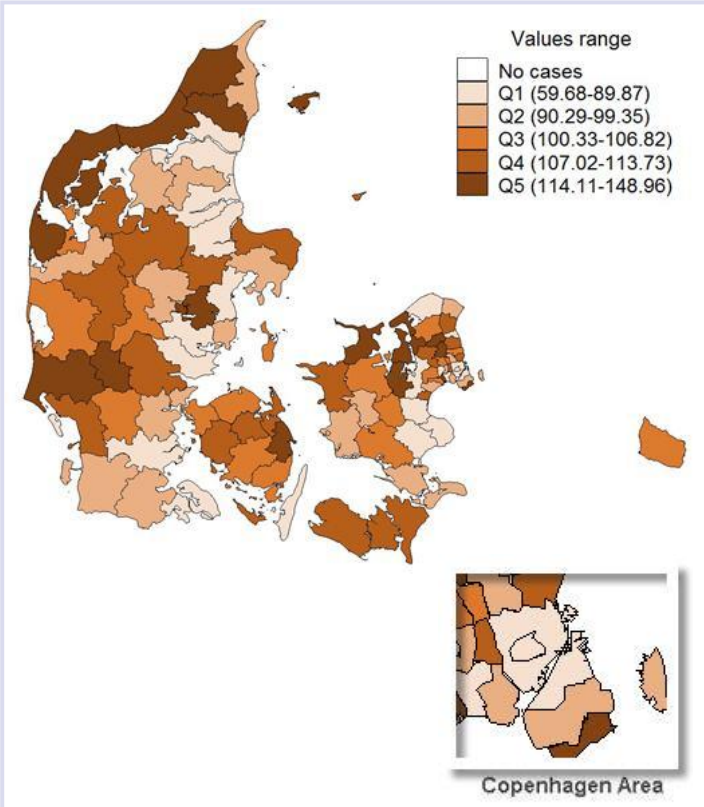


Figure 11. Age standardised c-section rate per 10,000 women aged 15-55. 98 kommuners. Year 2009

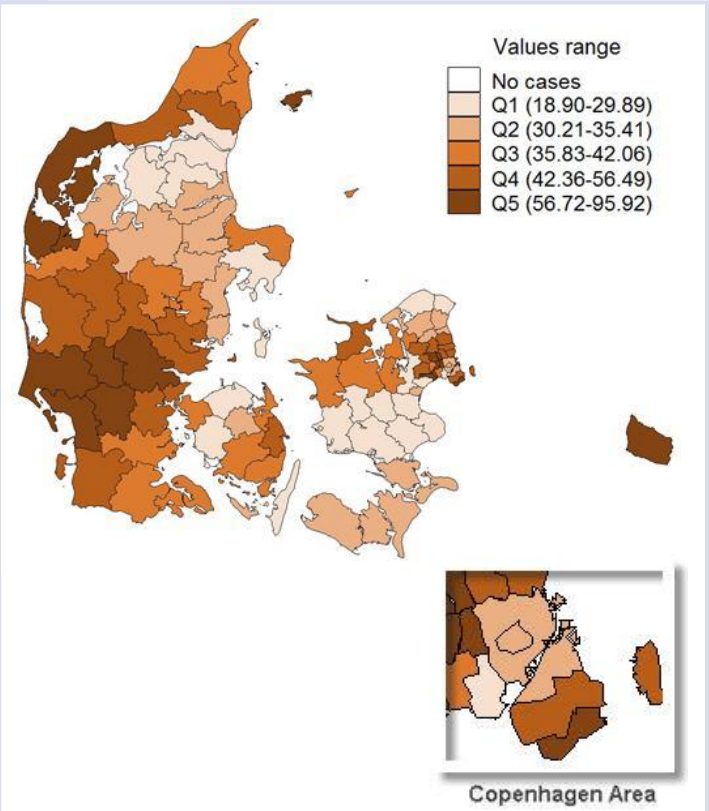


Figure 12. Age standardised c-section rate in low risk deliveries per 10,000 women aged 15-55. 98 kommuners. Year 2009

** The darker the brown, the higher the probability of getting the procedure among women in reproductive age living there. Kommuners are clustered into 5 quintiles according to their rate value (Q1 to Q5). –legend provides the range of standardised rates within each quintile.*

The regional level seems to explain 11 % of the detected variation across kommuners (table 2 in appendix 2).

When the analysis is conducted at regional level, the mismatching between burden of births with complications and intensity in use of c-section becomes more severe (figures 13 to 15); particularly in Syddanmark with the lowest rates of complicated births and among the highest of c-section; conversely women living in Hovedstaden bear the highest burden of complications and the lowest intensity in C-section.

The regional pattern of lower value c-sections seem to somehow follow the overall intensity *(figures 15 and 16),* the exception being Sjaelland where relative high rates of c-section correspond to the lowest regional level of lower-value procedures.

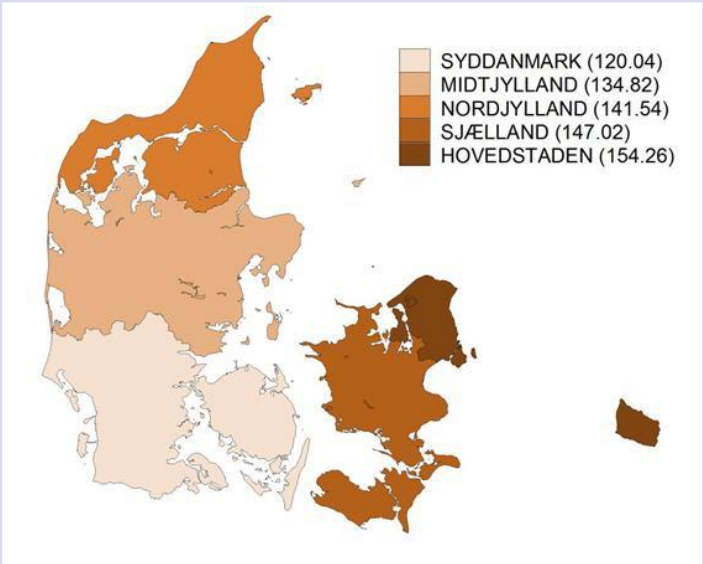


Figure 13. Age standardised Births with complications rate per 10,000 women. 5 regions. Year 2009

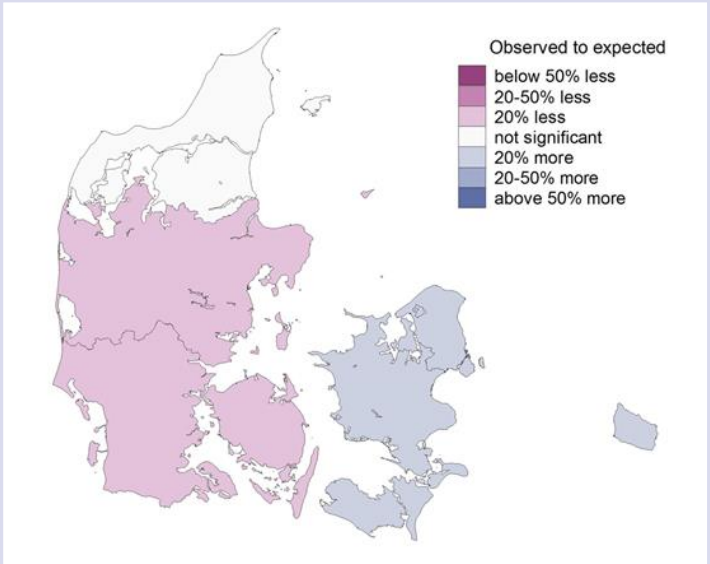


Figure 14. Admissions Ratio Observed/expected Births with complication. 5 regions. Year 2009

** Map on the left: The darker the brown, the higher the exposition to complications among women in reproductive age living in that region –legend provides the actual values of the standardised rate. Map on the right: relative risk for women living in the region compared to the expected average exposure. Blue shades flag areas with excess risk (overexposure); pink shades denote risk below the expectation, thus relative protection or under-exposure compared to the rest of the country. White areas correspond to average relative risk (observed/expected=1)*

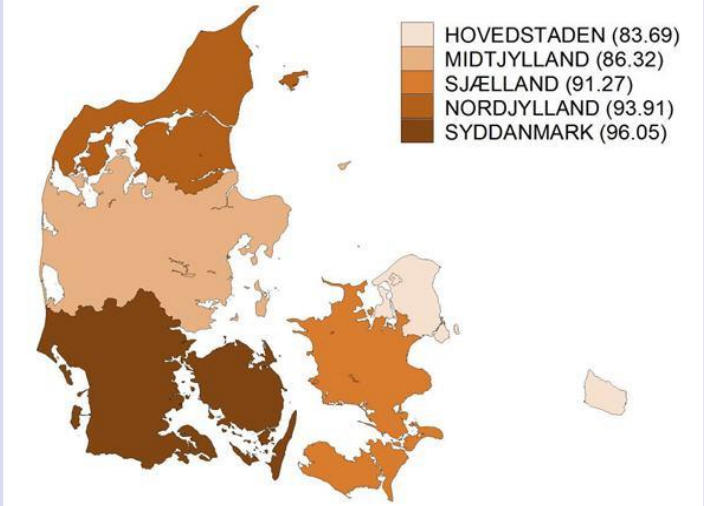


Figure 15. Age standardised c-section rate per 10,000 women aged 15-55. 5 regions. Year 2009

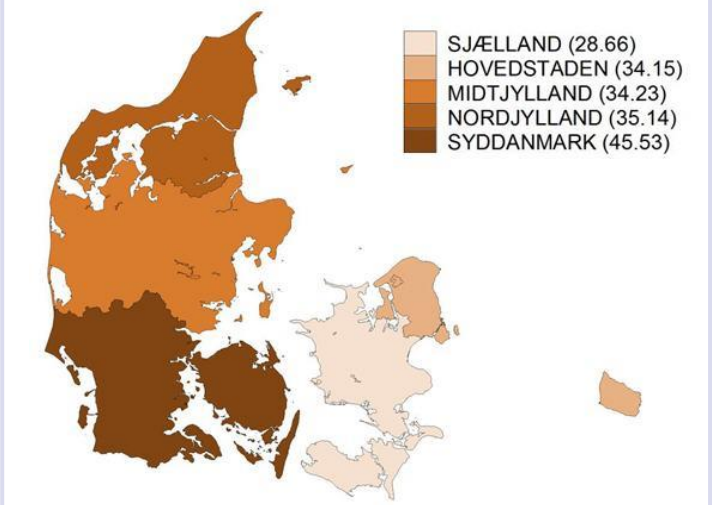


Figure 16. Age standardised c-section rate in low risk deliveries per 10,000 women aged 15-55. 5 regions. Year 2009

The distance between the observed exposure to lower value c-sections and the optimisation benchmarks is represented in figures 17 and 18 for the two tiers of health administration, kommuners and regions.

The most conservative scenario of minimisation (figures 17.b and 18. b) quantifies the excess lower value c-sections in Denmark in a year in almost 1600 interventions (table 3 appendix 2). The distribution of those cases is, obviously, uneven across kommuners and regions; figures 17.a and b map out in darker shades those municipalities that may be a priority target for measures to reduce the utilisation of c-sections in low risk births (the maximum local potential for reduction estimated in between 30 and 132 interventions per year –Q4 in figures 17.a and b).

The same quantification for potential reduction in use of lower value c-sections was conducted at regional level (figures 18.a and b). The most conservative scenario *(Fig 18.b)* estimates regional impact in lower-value interventions in between 50 and 560, while in the more demanding it ranges from 100 to 650 per year depending on the region.

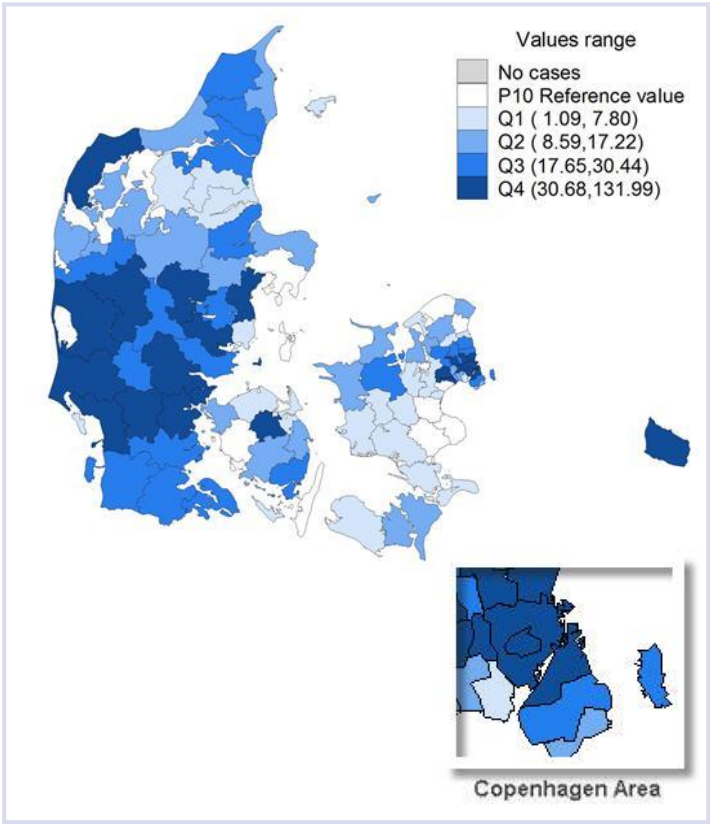


Figure 17.a. Excess cases c-section in low risk deliveries per kommuner. Scenario I minimisation to p10.
98 kommuners. Year 2009

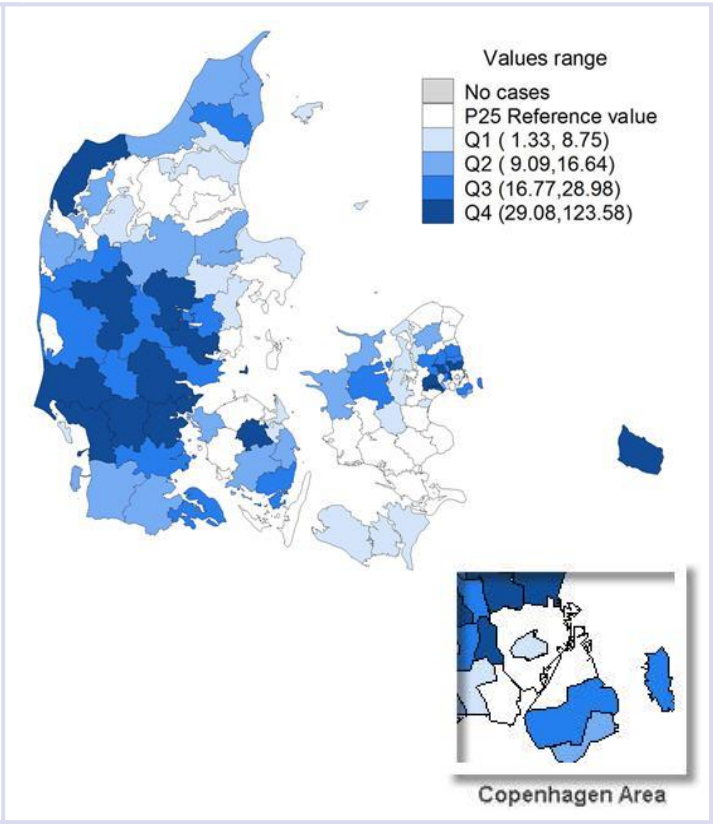


Figure 17.b. Excess cases c-section in low risk deliveries per kommuner. Scenario II minimisation to p25.
98 kommuners. Year 2009

** The darker the blue the larger the difference between the observed number of cases and the benchmark (expected number of cases if they behaved as those kommuners with the lowest utilisation rates –p10 and p25). Kommuners are clustered into 5 quintiles according to their level of excess cases (Q1 to Q5). –legend provides the range within each quintile.*

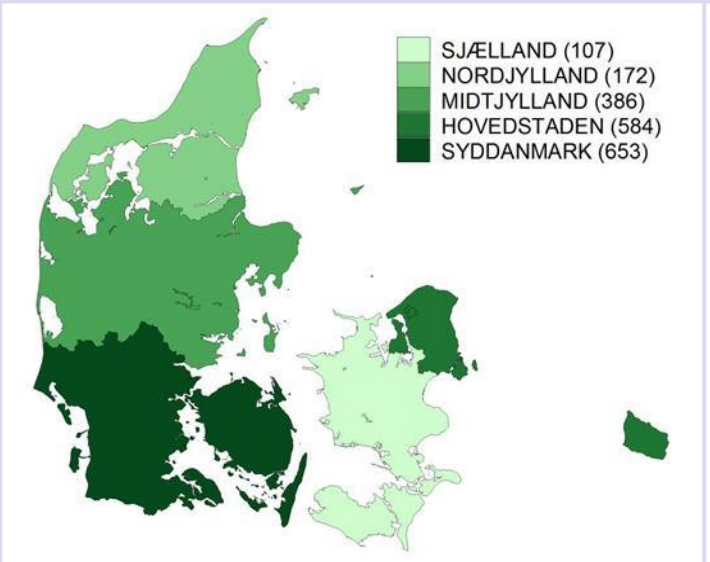


Figure 18.a. Excess cases c-section in low risk deliveries
Scenario I minimisation to p10. 5 regions. Year 2009

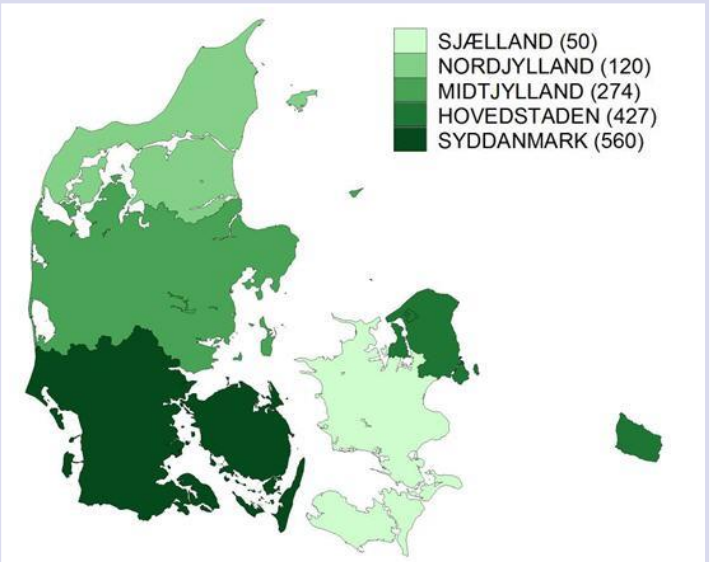


Figure 18.b. Excess cases c-section in low risk deliveries.
Scenario II minimisation to p25. 5 regions. Year 2009

** The darker the green the larger the number of excess cases estimated at region level, if all the kommuners behaved as the benchmark of minimal utilisation – p10 and p25 -legend provides values for each region.*

Hysterectomy in non-oncologic conditions

Hysterectomy is one of the safest and most appropriate procedures in dealing with uterus cancer. However, its indication for other gynaecological conditions such as bleeding or uterine myoma is controversial and not the first line approach. In those cases hysterectomy can be considered lower-value care.

Figures 19 and 20 allow for a comparison of the distribution of the two types of hysterectomy indication across kommuners in Denmark

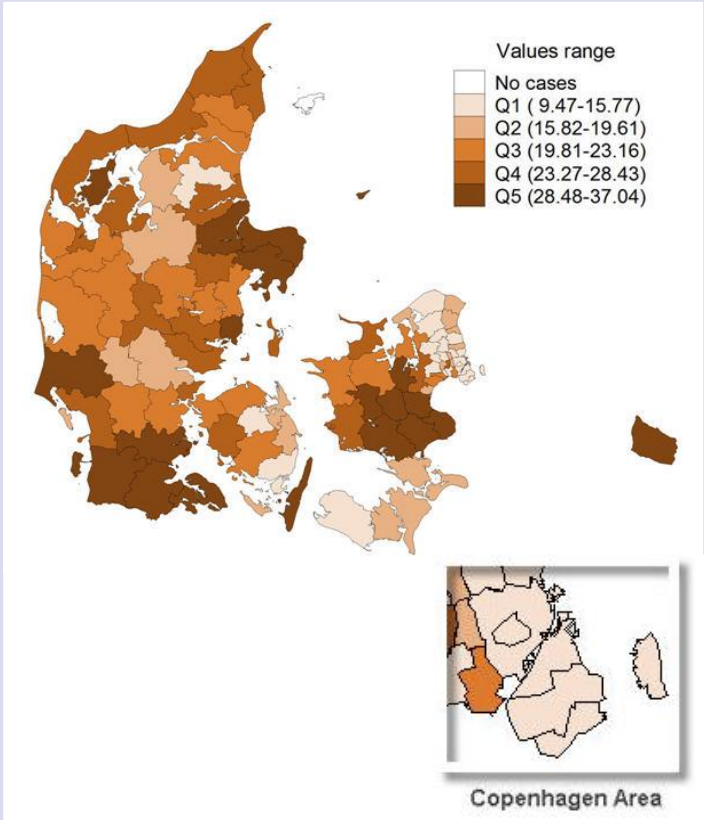


Figure 19. Age-standardised Hysterectomy non-oncologic diagnosis utilisation rate per 10,000 women aged 18 years or older. 98 kommuners. Year 2009

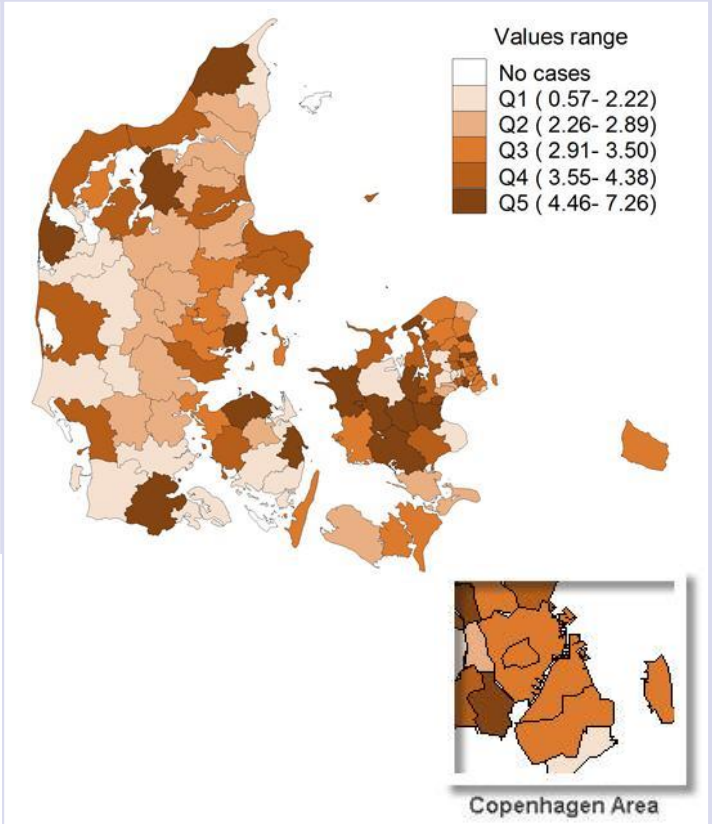


Figure 20. Age-standardised Hysterectomy in uterus cancer utilisation rate per 10,000 women.98 kommuners. Year 2009

** The darker the brown, the higher the exposition to hysterectomy of women living there. Kommuners are clustered into 5 quintiles according to their utilisation rate value (Q1 to Q5). –legend provides the range of standardised rates within each quintile.*

It is worth noting that utilisation rates for the lower-value indication are significantly higher overall than for the adequate one (kommuners with highest hysterectomy utilisation rates in the cancer indication range between 5 and 7 procedures per 10,000 adult women, escalating to 29 to 37 interventions for the lower-value indication).

Furthermore, excluding the cancer indication, the differences in women's probability to get a hysterectomy could be as large as more than 2 and a half times, depending on their kommuner of residence (table 2, appendix 2).

Although only 7 % of this variation can be deemed not random (systematic), the region where the kommuner belongs seems to explain almost 30% of it; this suggests a relevant role of regional policy and/or services organisation in modulating local clinical practice.

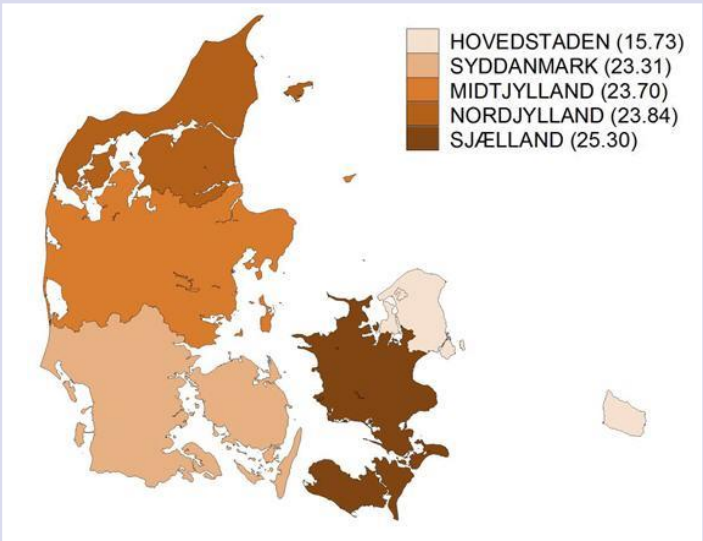


Figure 21. Age-standardised Hysterectomy non-oncologic diagnosis utilisation rate per 10,000 women aged 18 years or older.
5 regions. Year 2009

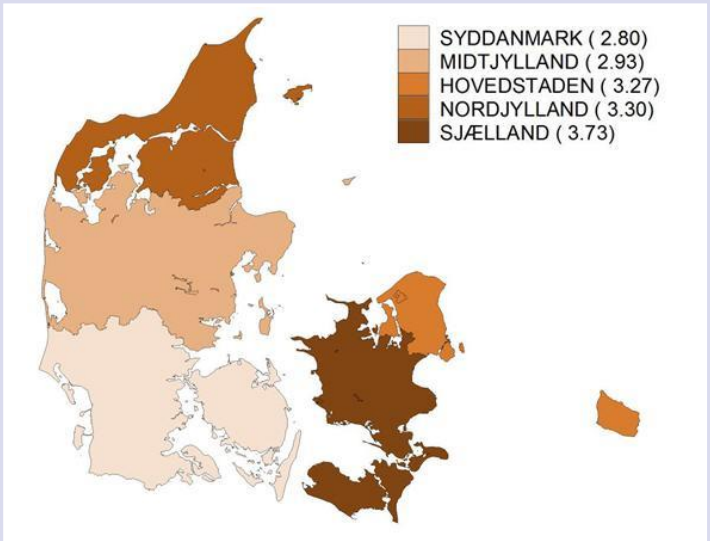


Figure 22 Age-standardised Hysterectomy in uterus cancer utilisation rate per 10,000 women.
5 regions. Year 2009

Using regions as the unit of analysis (figures 21 and 22), the highest rates of both cancer and lower-value hysterectomy indications coexist in Sjaelland and Nordjylland; Syddanmark and Midtjylland behave similarly for both types of indication; only Hovedstaden outstands showing the lowest rates of lower-value hysterectomy and a median rate for the cancer indication. As expected, the range of variation across regions is higher for the lower-value hysterectomy.

The potential for minimisation of lower-value hysterectomy use at kommuner-level is summarised in figures 22 and 23, for the two usual scenarios: The most

conservative one, using as benchmark the kommuners in the lowest quartile of use, yields a range of excess cases per municipality from 1 to 85 per year.

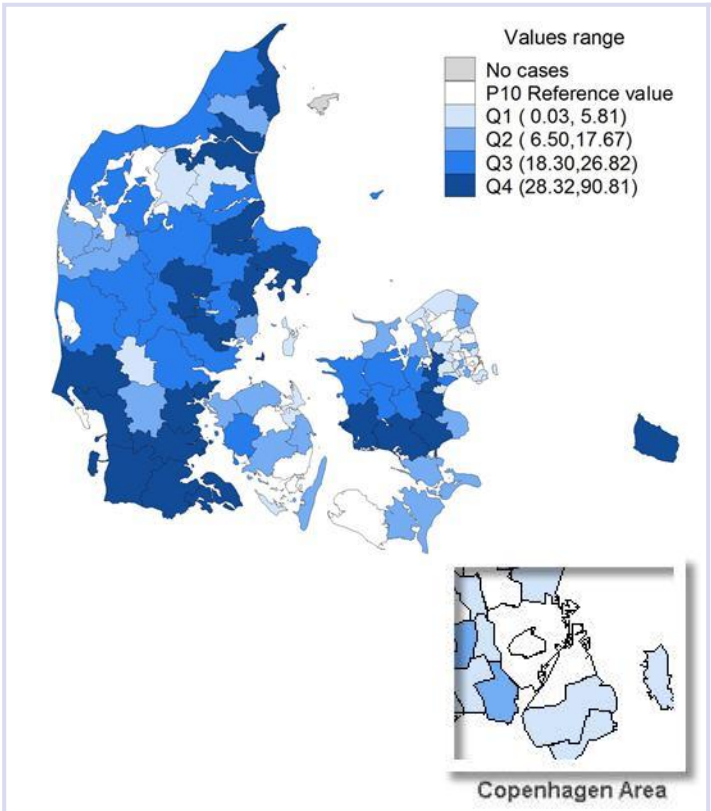


Figure 22. Excess cases Hysterectomy without uterus cancer diagnosis per kommuner. Scenario I minimisation to p10. 98 kommuners. Year 2009

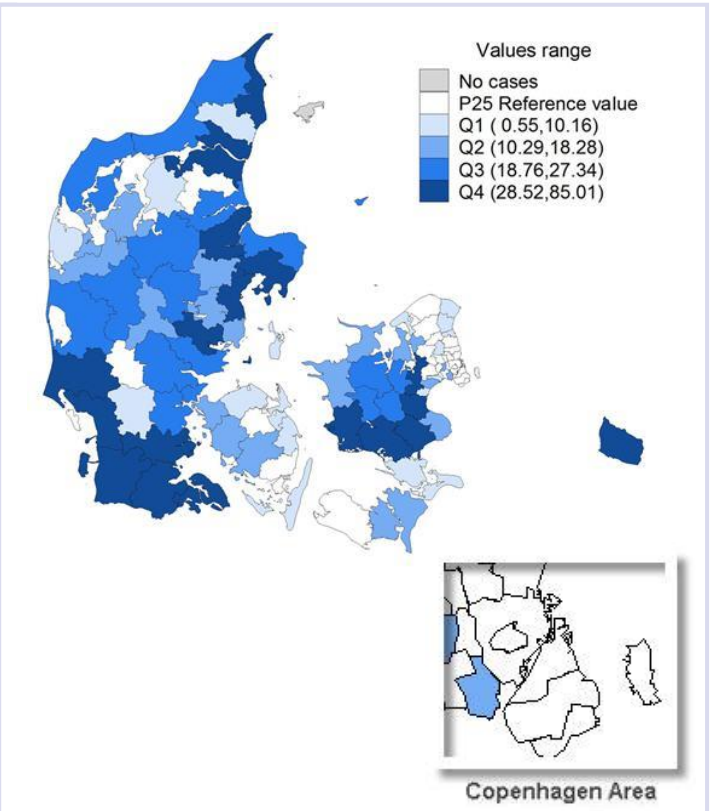


Figure 23. Excess cases Hysterectomy without uterus cancer diagnosis per kommuner. Scenario II minimisation to p25. 98 kommuners. Year 2009

** The darker the blue the larger the difference between the observed number of cases and the benchmark (expected number of cases if they behaved as those kommuners with the lowest utilisation rates –p10 and p25). Kommuners are clustered into 5 quintiles according to their level of excess cases (Q1 to Q5). –legend provides the range within each quintile.*

Aggregated at Regional level, Midtjylland shows the larger potential for avoiding excess-cases, in the range of 500 interventions per year, far from Hovedstaden that remains in the area of 100 excess lower-value hysterectomies per year (figures 24 and 25)

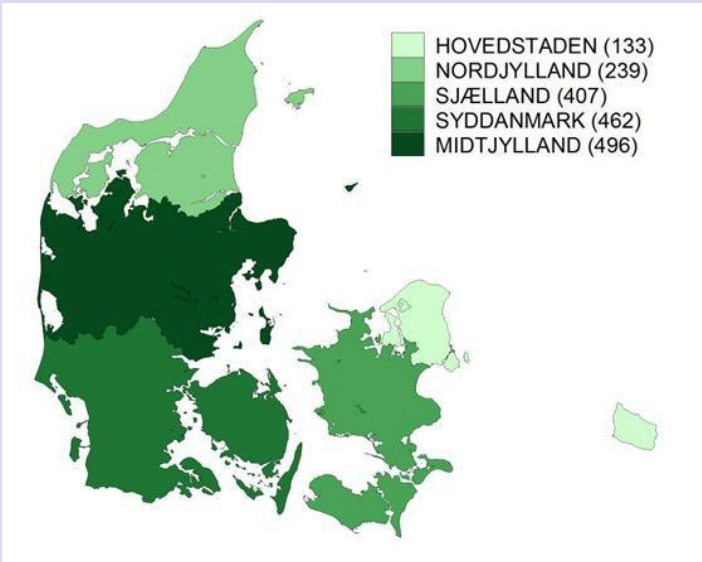


Figure 24. Excess cases Hysterectomy without uterus cancer diagnosis. Scenario I minimisation to p10. 5 regions. Year 2009

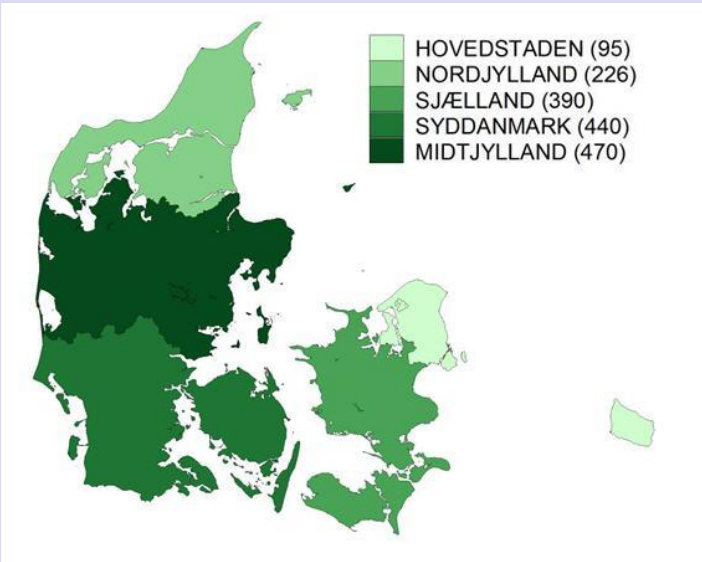


Figure 25. Excess cases Hysterectomy without uterus cancer diagnosis. Scenario II minimisation to p25. 5 regions. Year 2009

** The darker the green the larger the number of excess-cases estimated at region level, if all the kommuners behaved as the benchmark of minimal utilisation –p10 and p25 -, legend provides values for each region.*

Non conservative surgery in breast cancer

The current therapeutic approach for breast cancer includes surgery, often followed by hormonal therapy and radiotherapy. Surgical treatment can be conservative (CS), which preserves part of breast glandular tissue, or non-conservative treatment (NCS) which entails total removal of breast glandular tissue, maintaining or not the skin tissue. Different studies show equal effectiveness for both surgical strategies in terms of long-term survival. However CS is recommended, at any stage of breast cancer on the basis of less complications and better quality of life, confining the use of NCS to those situations where the tumour's size relative to total breast mass prevents conservative resection. In specialised breast cancer centres, approximately 75 percent of women with early stage breast cancer are candidates for breast conserving therapy and 50 to 75% of them would prefer the conservative approach. Thus, in most situations, NCS is considered lower-value care as it has been superseded by the conservative alternative.

The previous section on international comparison highlighted how Denmark shows the highest NCS utilisation rate across ECHO countries, figure 26 shows how the national rate translates onto individual kommuners.

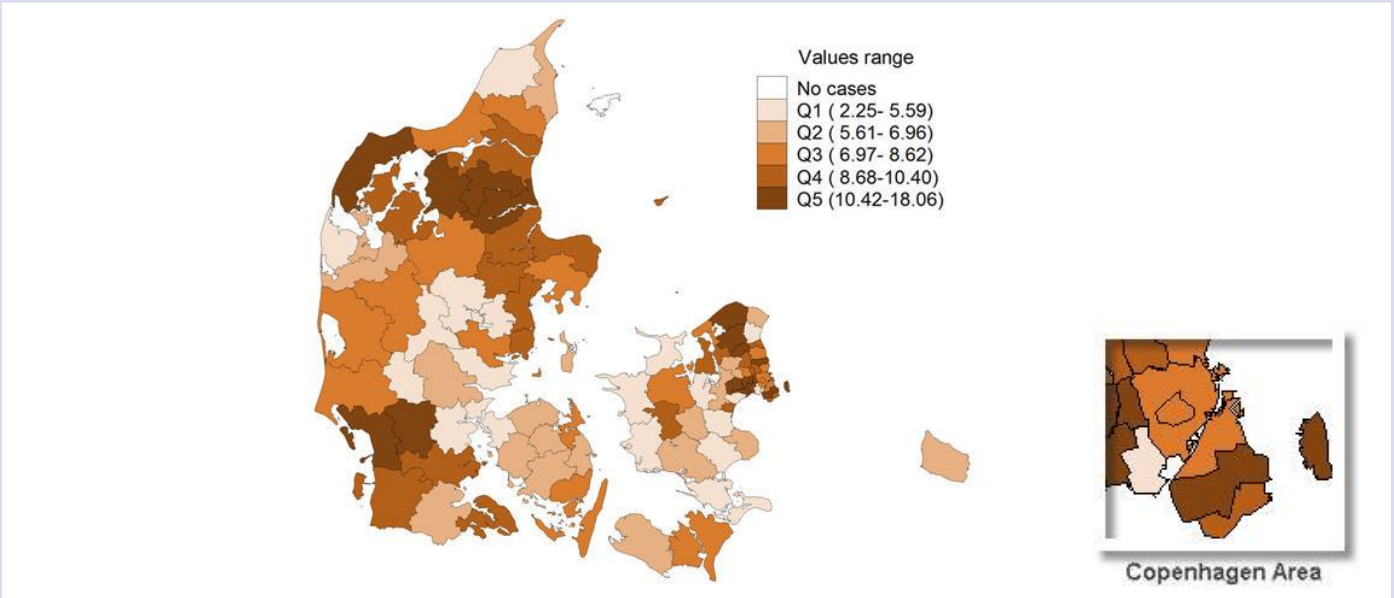


Figure 26. Age-standardised Non conservative surgery in breast cancer utilisation rate per 10,000 women.
98 kommuners. Year 2009

** The darker the brown shade, the higher the exposure to non conservative surgery of women living there. Kommuners are clustered into 5 quintiles according to their rate value (Q1 to Q5). –legend provides the range of standardised rates within each quintile.*

The range of age-standardised rates across the country is wide: depending on their kommuner of residence women face up to a 3-fold difference in the probability of undergoing lower-value breast surgery (table 2 appendix 2). Although only 7% of this variation exceeds what could be randomly expected, the region where the kommuner belongs explains more than 20% of it.

The analysis at regional level points out Nordjylland, with the higher NCS utilisation rate, barely above Hovedstaden, but about four points larger than the smaller rate, found in Sjaelland: roughly 1 in 1000 adult women vs 1 in 1667

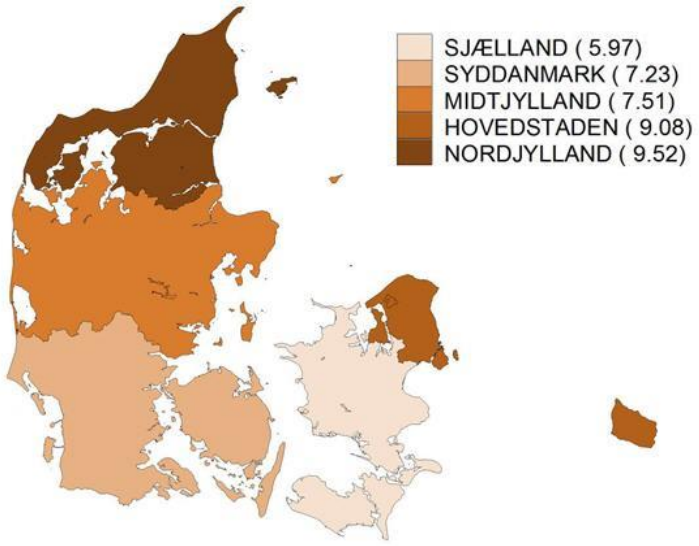


Figure 27. Age-standardised Non conservative surgery in breast cancer utilisation rate per 10,000 women.
5 regions. Year 2009

An estimation of the local potential for minimising the utilisation of NCS shows that, conditional on how strict the benchmark set *(figures 28.a and b)*, women are bearing an excess of this lower-value care in between 1 and 74 excess interventions in a year, depending on their kommuner of residence. The same analysis performed at regional level *(figures 29.a and b)* yields an excess of NCS in Hovenstaden in the area of 200 to 400, while Sjaelland moves between 20 and 70 excess lower-value interventions per year.

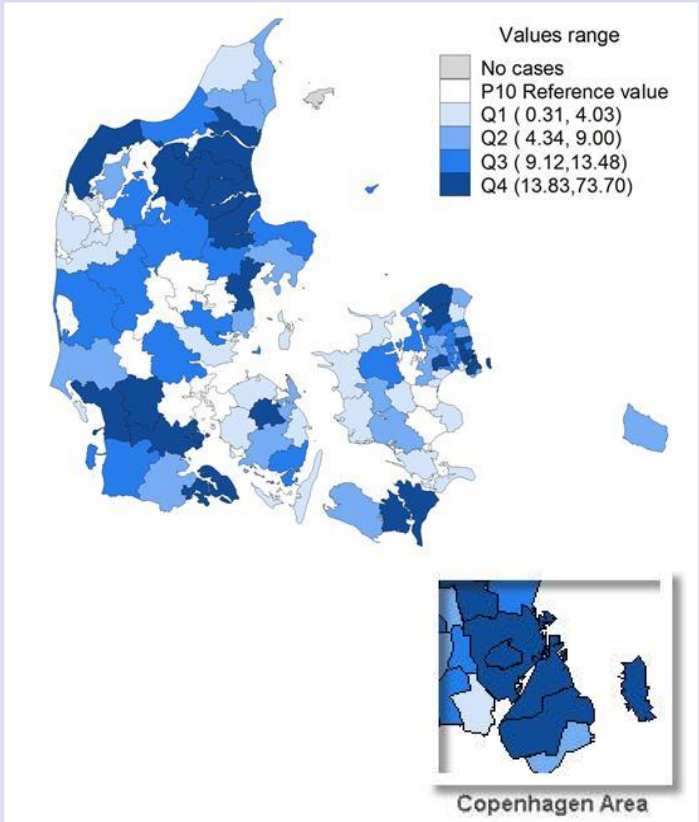


Figure 28.a. Excess cases Non conservative surgery in breast cancer. Scenario I minimisation to p10. 98 kommuners. Year 2009

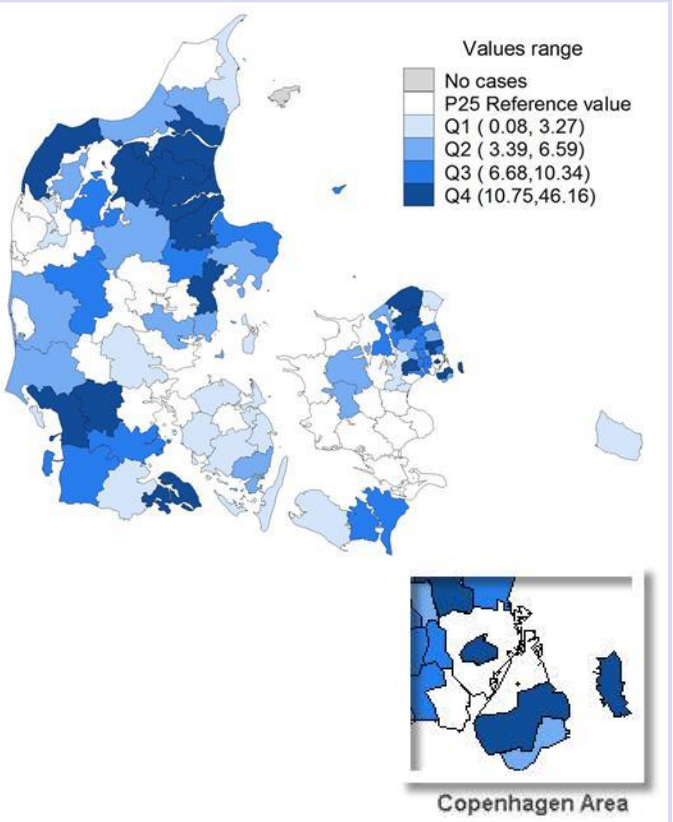


Figure 28.b. Excess cases Non conservative surgery in breast cancer. Scenario II minimisation to p25. 98 kommuners. Year 2009

** The darker the blue the larger the difference between the observed number of cases and the benchmark (expected number of cases if they behaved as those kommuners with the lowest utilisation rates –p10 and p25). Kommuners are clustered into 5 quintiles according to their level of excess cases (Q1 to Q5). –legend provides the range within each quintile.*

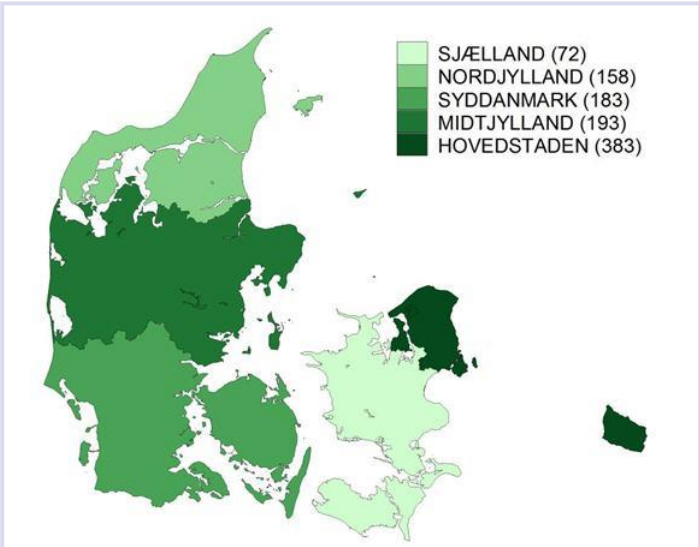


Figure 29.a. Excess cases Non conservative surgery in breast cancer. Scenario I minimisation to p10. 5 regions. Year 2009

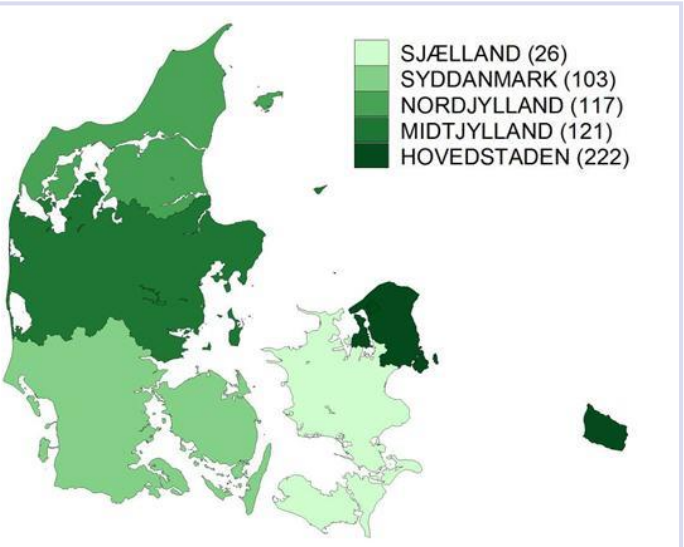


Figure 29.b. Excess cases Non conservative surgery in breast cancer. Scenario II minimisation to p25. 5 regions. Year 2009

** The darker the green the larger the number of excess-cases estimated at region level, if all the kommuners behaved as the benchmark of minimal utilisation –p10 and p25 -, legend provides values for each region.*

Prostatectomy in benign prostatic hyperplasia

Open prostatectomy is the oldest surgical method to treat heavily symptomatic benign prostatic hyperplasia (BPH). This method is still preferred if the prostate is very large but, in general terms, it has been superseded by less invasive interventions, such as transurethral resection of the prostate (TURP) and should be considered lower-value care. However, there is growing evidence on overuse of surgical options (specially those less invasive) in dealing with BPH and, in particular, misuse in asymptomatic or minor cases.

Denmark shows the highest prostatectomy rate in BPH across ECHO countries (see section II) but variation within the country is relevant too, covering an array from about 1 in 3 thousand men to 1 in 200, depending on the kommuner of residence (Fig. 30). This means that men living in a top utilisation kommuner are bearing 5 times more probabilities to get their prostate removed than those residents in a bottom rate place. Such differences are hardly amenable to differences in need. Almost 20% of this variation exceeds what could be randomly expected; also, it seems to be entirely amenable to factors operating within the kommuner, with the regional level playing null role in explaining such variation.

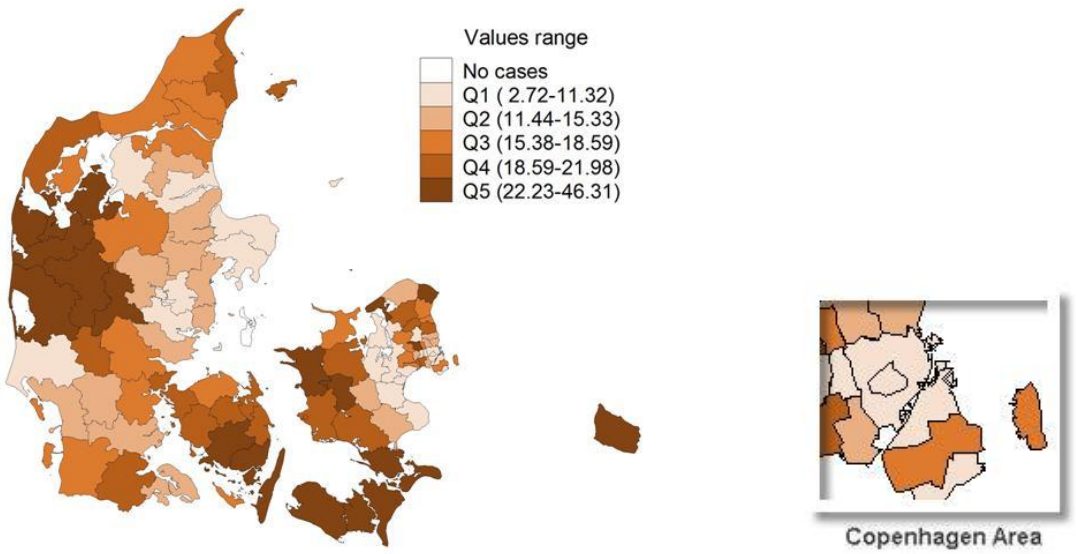


Figure 30. Age-standardised Prostatectomy in benign prostatic hyperplasia utilisation rate per 10,000 male aged 40 or older. 98 kommuners. Year 2009

** The darker the brown shade, the higher the exposition to prostatectomy of men living there. Kommuners are clustered into 5 quintiles according to their rate value (Q1 to Q5). –legend provides the range of standardised rates within each quintile.*

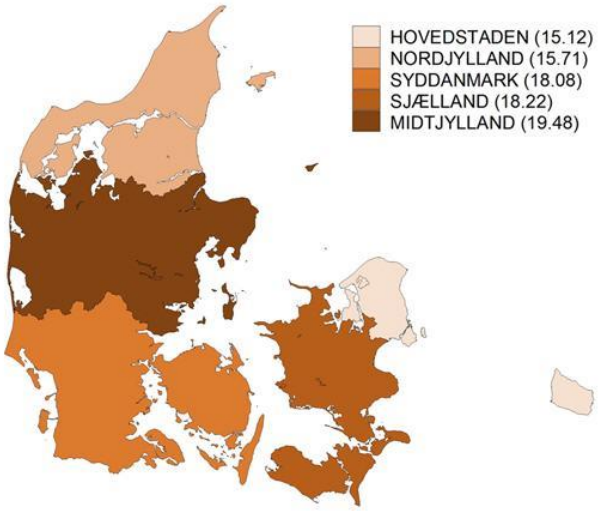


Figure 31. Age-standardised Prostatectomy in benign prostatic hyperplasia utilisation rate per 10,000 male aged 40 or older. 5 regions. Year 2009

The estimation of excess cases in a year per kommuner (figures 32.a and b) shows how if all areas were to converge to the lowest utilisation rate in the country (either the behaviour across the lowest 25% or 10%) the number of interventions that could be avoided in a year would range from 1 to 6, for the kommuners already in lower utilisation intensity, to 20 to 78 for those more prone to use it.

The estimations at regional level for both scenarios yield a minimum 100 excess interventions in Nordjylland up to more than 300 in Midtjylland. Overall, some 1105 to 1360 excess-interventions in a year at country level (appendix 2, Tables 3 and 4).

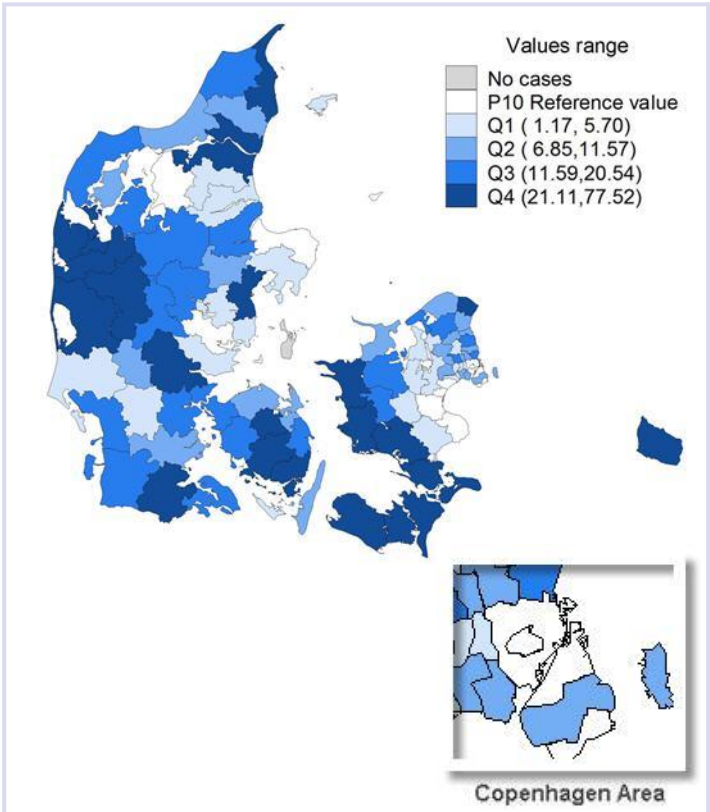


Figure 32.a. Excess cases Prostatectomy in benign prostatic hyperplasia per kommuner. Scenario I minimisation to p10. 98 kommuners. Year 2009

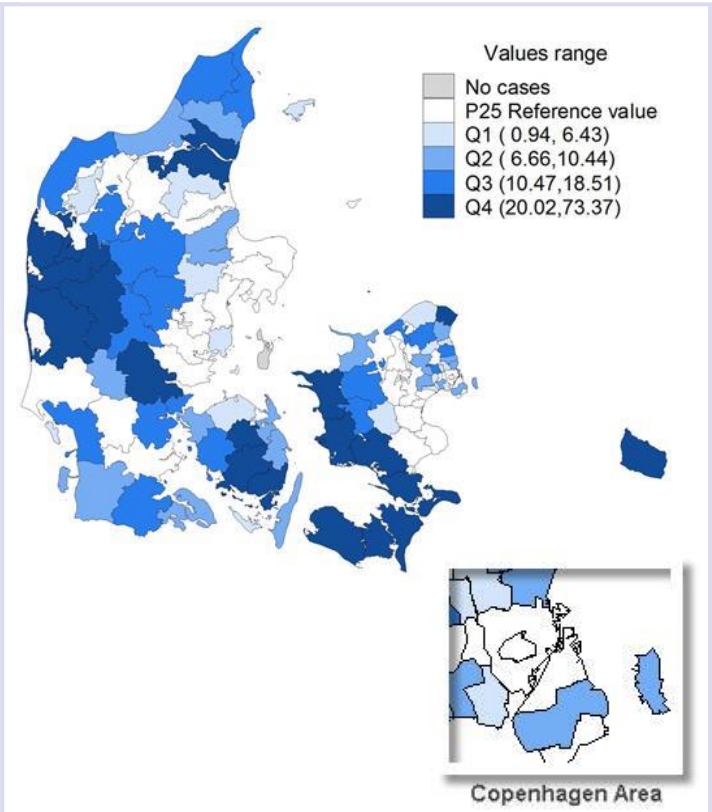


Figure 32.b. Excess cases Prostatectomy in benign prostatic hyperplasia per kommuner. Scenario II minimisation to p25. 98 kommuners. Year 2009

** The darker the blue the larger the difference between the observed number of interventions and the benchmark (expected number of interventions if they behaved as those kommuners with the lowest utilisation rates –p10 and p25). Kommuners are clustered into 5 quintiles according to their level of excess cases (Q1 to Q5). –legend provides the range within each quintile.*

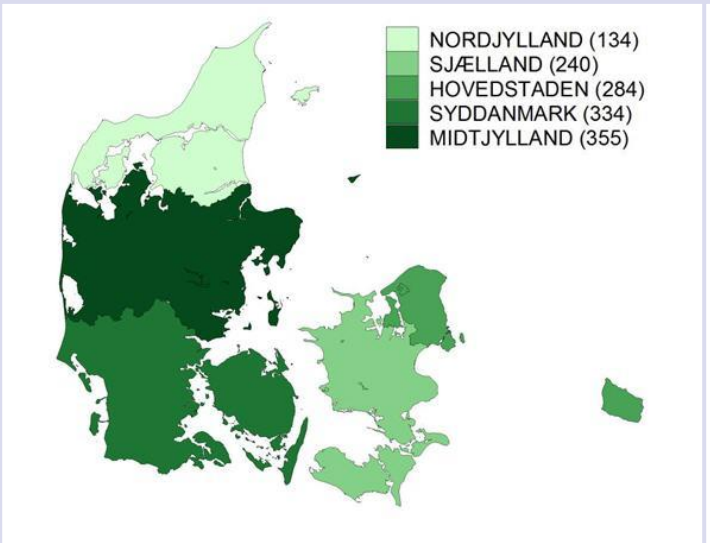


Figure 37.a. Excess cases Prostatectomy in benign prostatic hyperplasia. Scenario I minimisation to p10. 5 regions. Year 2009

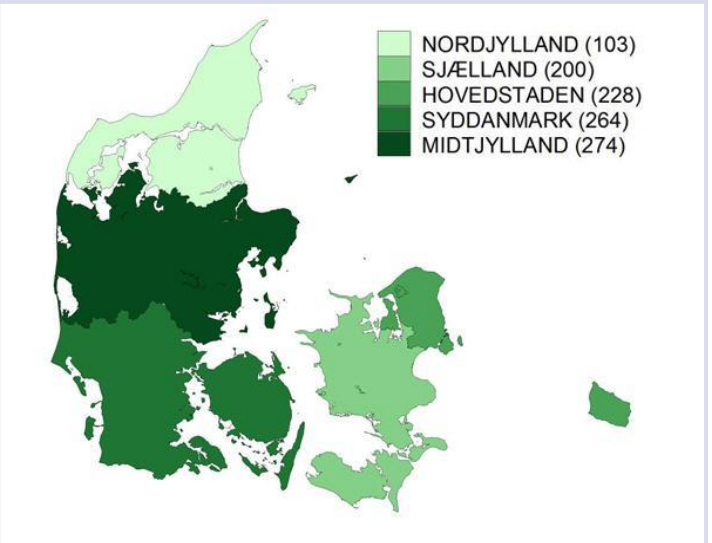


Figure 37.b. Excess Prostatectomy in benign prostatic hyperplasia. Scenario II minimisation to p25. 5 regions. Year 2009

** The darker the green the larger the number of excess-cases estimated at region level, if all the kommuners behaved as the benchmark of minimal utilisation –p10 and p25 - legend provides values for each region.*

IV. EVOLUTION OVER TIME

Although LVC utilisation rates have tended to decline since 2002, the systematic variation across kommuners has generally increased, signalling how differences in local practice across the country have become more pronounced

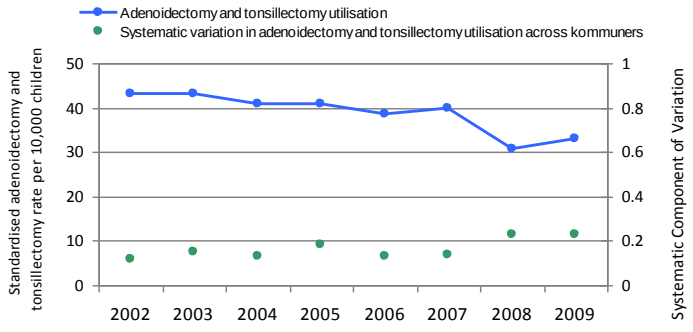
Between 2002 and 2009, utilisation rates of lower-value care show different trends depending on the procedure, but the general feature seems to be relative steadiness over the period (fig 38 and 39): some slightly upwards trend (c-section in low risk deliveries increased by 9%), but in most cases it has shown a modest decline (8% in NC cancer breast surgery, 10% non-oncologic hysterectomy) or a more substantive 24% decrease in Adeno and/or tonsillectomy; the more outstanding change regards prostatectomy, for which the utilisation rate has almost halved over the period of analysis (still the highest across ECHO countries, though) (see tables 5 to 9 in appendix 2).

Systematic variation, on the other hand, has only declined for Hysterectomy; otherwise, it has risen for all lower-value procedures examined, particularly as from 2006. The most dramatic change corresponds, again, to prostatectomy: at the beginning of the period, 11% of the observed variation across kommuners exceeded that randomly expected; by 2009 this systematic variation has gone up to 36%. This suggest that the systematic divergence in kommuners' behaviour is more exacerbated than it was in 2002

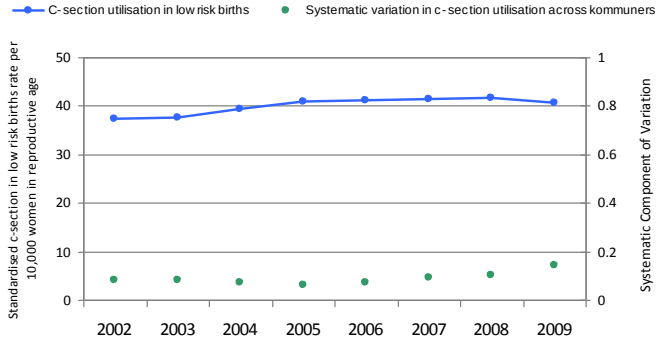
Graphs in this section provide information on two issues: the evolution of the utilisation rate (blue lines representing the standardised rate) and the evolution of the non-random variation (green dots representing the systematic component of variation), over time.

We should look first at the utilisation trend –upwards would mean bad evolution, regardless how variation had changed. The desirable change would be a simultaneous decline in utilisation and variation. A decrease in utilisation concurrent with larger variation entails more divergence in local behaviours, i.e. certain populations systematically more exposed to lower-value care, which, in turn, warrants the identification and specific targeting of those kommuners more deviant from the desirable minimal utilisation.

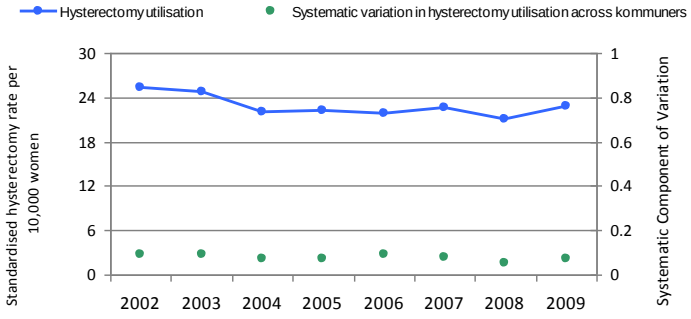
Adenotonsillectomy



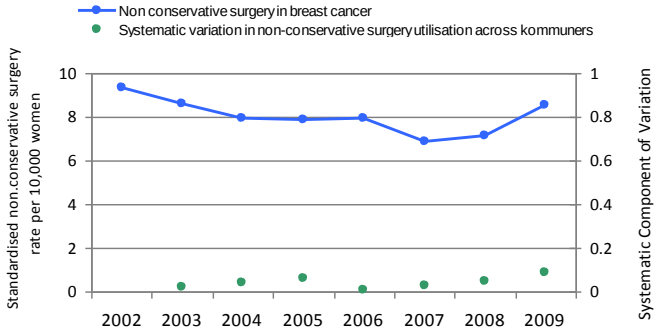
Cesarean section in low risk deliveries



Hysterectomy



Non conservative surgery in breast cancer



Prostatectomy in benign prostatic hyperplasia

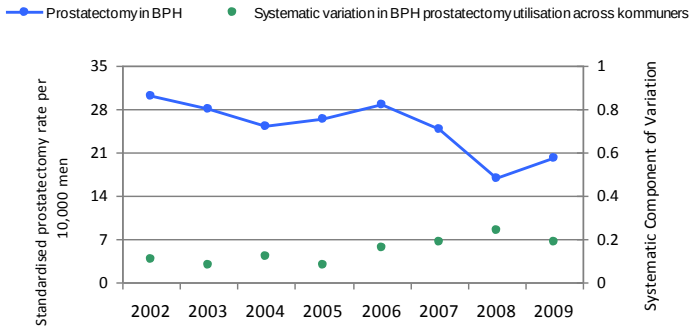


Figure 39 . Evolution of standardised rates (blue lines) and systematic variation (green dots) over time

Individual trends for kommuners at both extremes of lower-value care utilisation (2002 –2009)

The insights drawn from overall trends in utilisation rate and systematic variation can be complete by looking at the individual behaviour of kommuners over the period of analysis.

> This section offers only a few selected examples, but Individual kommuners' evolution over time can be tracked in their original dynamic charts at
>
> http://www.echo-health.eu/handbook/quintiles_lvc_dnk.html
>
> Besides the specific examples of change in intensity of lower-value care use, it is also relevant to consider the spread of bubbles in 2009. Since they all started at the same utilisation quintile in 2002, the variety of colours they have taken up by the final year (one for each quintile of utilisation intensity), provides a flavour of how inveterate might be the medical practice underpinning such utilisation and how homogeneous or diversely shaped over time and across kommuners.

As mentioned above, Danish adenotonsillectomy rate has slightly declined while the systematic component of variation became larger. Figure 40.a tracks two kommuners ranking as good performers at the beginning of the period (among the 20 % lowest rates per 10,000 children in the country -quintile 1); however, their behaviour starts diverging as from 2004: children in Assens increase their probability of receiving the intervention while their colleagues in Fredensborg's even dropped it; despite having started at the same level of utilisation, they end up at opposite extremes of the range. Figure 40.b portraits the same phenomenon, but for bad performers, i.e. kommuners at the top quintile of utilisation range in 2002.

The resulting array of bubbles in 2009 shows how about half of the kommuners starting in quintile 1 have tended to escalate their utilisation level by one or two quintiles; conversely, most of those already starting in the upper utilisation level have remained at the same intensity.

For c-section in low risk births, the majority of those kommuners at the bottom level of intensity have moved up one or two levels, while those in the upper bound have more often moved downwards, stretching along the whole range of utilisation quintiles.

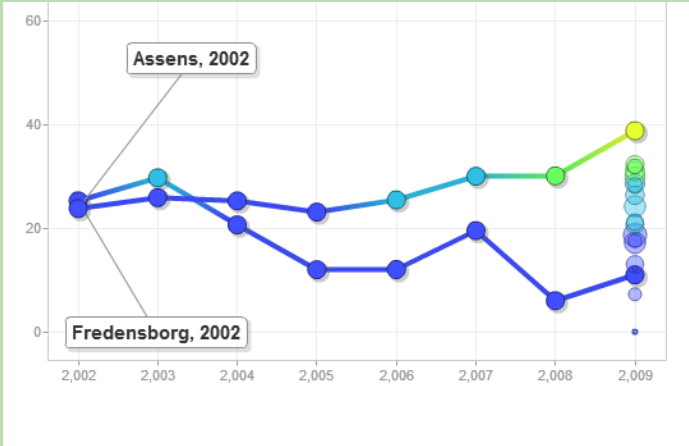


Figure 40.a. Trends in adenotonsillectomy. Q1

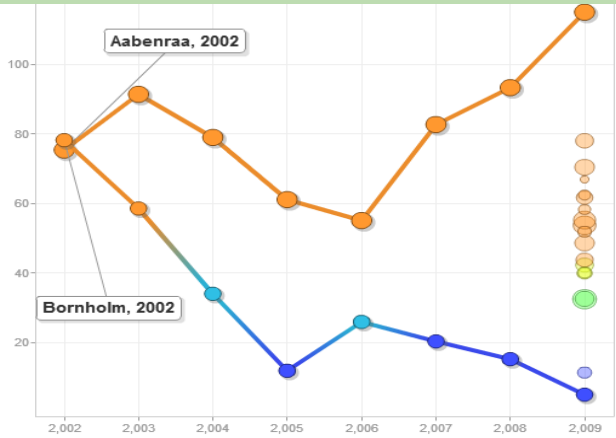


Figure 40.b. Trends in adenotonsillectomy. Q5

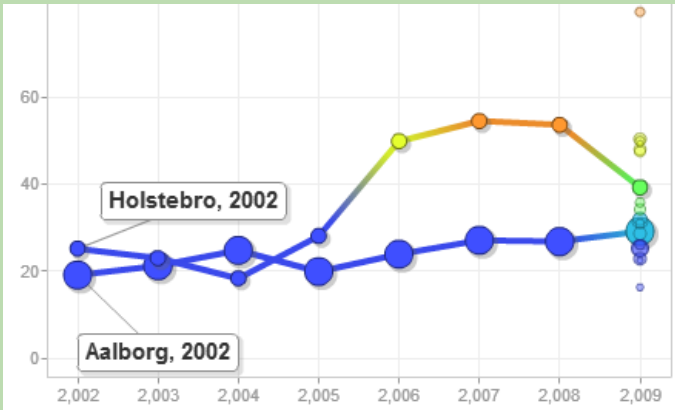


Figure 41.a. Trends in C-section in low risk deliveries. Q1

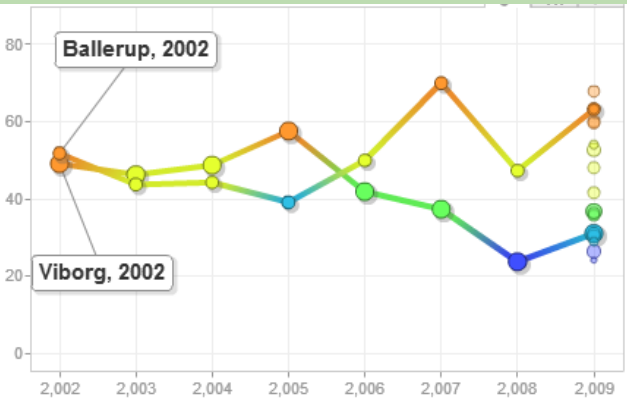


Figure 41.b. Trends in C-section in low risk deliveries. Q5

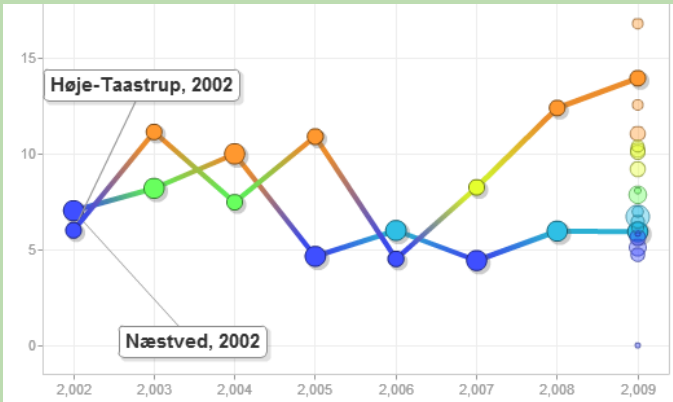


Figure 42.a. Trends in non-conservative cancer breast surgery. Q1

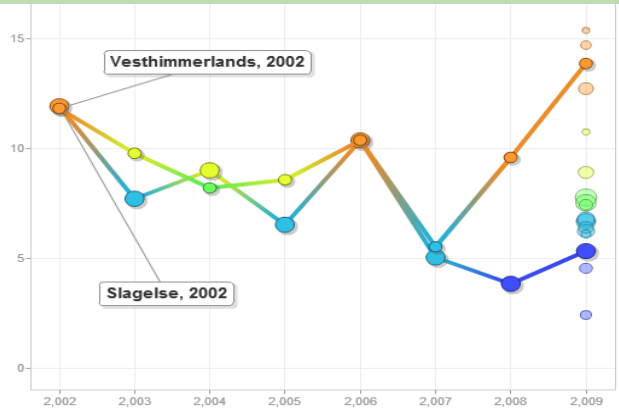


Figure 42.b. Trends in non-conservative cancer breast surgery. Q5

** All figures chart Standardised utilisation rates per 10,000 and time in years. Bubbles represent individual kommuners, the size being proportional to population. Colours reflect a ranking of utilisation: Q5 corresponds to the highest quintile of utilisation, Q1 the lowest. Bubbles change colour over time according to the changes in their relative intensity of use compared to the others (quintile of utilisation); the absolute value of the standardised rate each year is marked by the position in y-axis. The array of bubbles represented on 2009 reflects only those kommuners which in 2002 where in the same utilisation quintile as the two tracked in the figure.* Q1 Q2 Q3 Q4 Q5

The same is true for those areas at both ends of utilisation rates of NCS in breast cancer, by the end of the period they had spread through the whole array of quintiles of intensity.

Kommuners at the extremes of hysterectomy utilisation in non-oncologic conditions at the beginning of the period are remarkably prone to remain at the same level of intensity by 2009.

Overall, Prostatectomy in BPH rate has almost halved through the period, while systematic variation 3-folded. Looking at the evolution at the extremes, the group of low use kommuners (quintile 1) in 2002 has extended to cover the whole range of intensity of use by 2009; however, those starting in quintile 5 by 2002 have mainly remained there with few exceptions (Figures 44.a and b)

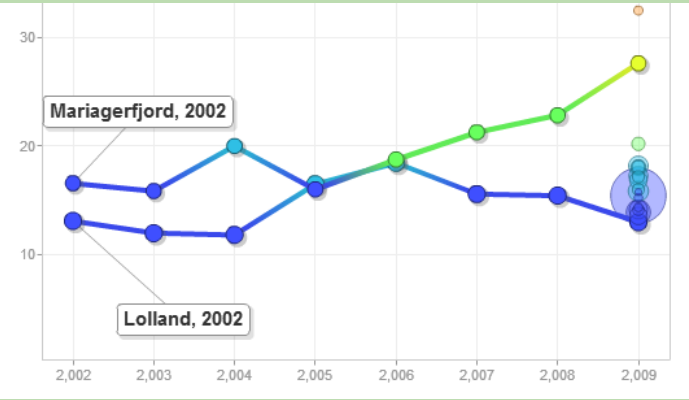


Figure 43.a. Trends in hysterectomy non-oncologic. Q1

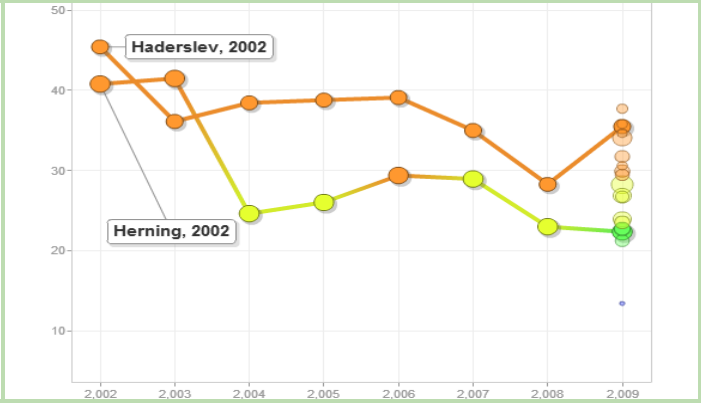


Figure 43.b. Trends hysterectomy non-oncologic. Q5

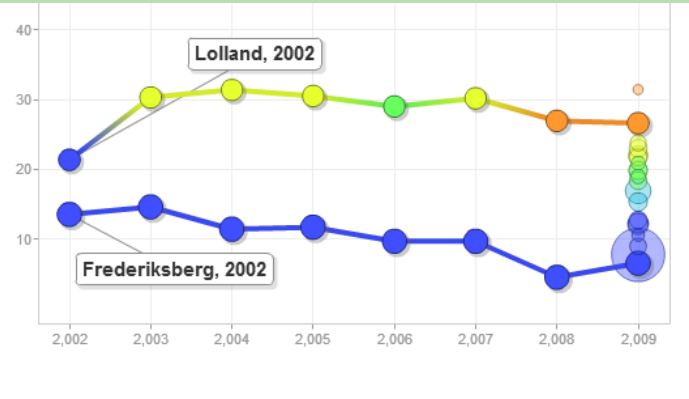


Figure 44.a. Trends in Prostatectomy in benign prostate hyperplasia. Q1

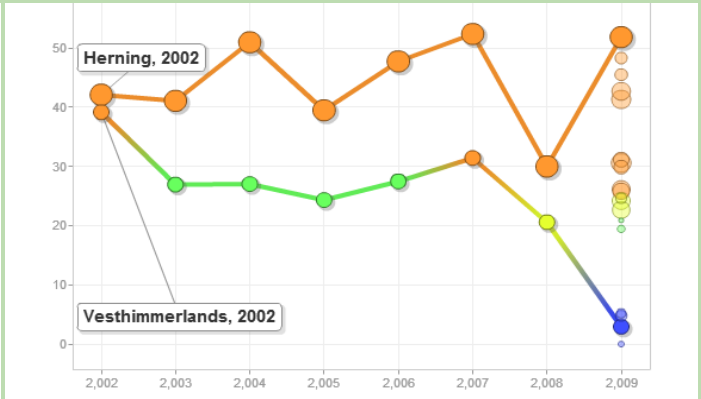


Figure 44.b. Trends in Prostatectomy in benign prostate hyperplasia. Q5

** All figures chart Standardised utilisation rates per 10,000 and time in years. Bubbles represent individual kommuners, the size being proportional to population. Colours reflect a ranking of utilisation: Q5 corresponds to the highest quintile of utilisation, Q1 the lowest. Bubbles change colour over time according to the changes in their relative intensity of use compared to the others (quintile of utilisation); the absolute value of the standardised rate each year is marked by the position in y-axis. The array of bubbles represented on 2009 reflects only those kommuners which in 2002 where in the same utilisation quintile as the two tracked in the figure.* Q1 Q2 Q3 Q4 Q5

V. SOCIAL GRADIENT

Only C-section showed statistically significant differences between better and worse-off areas, consistent over time; for most of the period the rate was significantly higher in wealthier kommuners; however, by 2008 deprived areas had already caught up

The distribution of lower-value care utilisation seems to be quite homogeneous across different quintiles of kommuner wealth. The only exception regards women's exposure to c-section (both total and in low risk cases), which seems to increase when they live in wealthier areas. However, utilisation rates seem to have converged over the period of analysis: while c-section rates have moved slightly downwards in wealthier areas, they have substantially risen in those most deprived, till both, actually, end up at the same utilisation level by 2008.

NCS in breast cancer shows a similar pattern against women living in more affluent areas, although such differences have only proven significant in 2004.

Prostatectomy in BPH shows an interesting behaviour. Differences across levels of wealth are never significant; however, the trends at both ends of income seem to switch relative positions over the period. It is worth noting, how the period of higher rates for all levels of income, 2005-2006, coincides with the peak of higher exposure for more affluent areas but, when utilisation starts to decline it does it most sharply for the wealthier, leaving the deprived to lead the utilisation rate comparison.

The gradient seems to play in the opposite direction when it comes to children's exposure to adenotonsillectomy and women's to hysterectomy in non-oncologic conditions. Though this pattern is stable over time, differences are not statistically significant at any point.

LVC utilisation rates are compared across kommuners clustered into quintiles of average income level. Each line in the graphs corresponds to one of those quintiles.

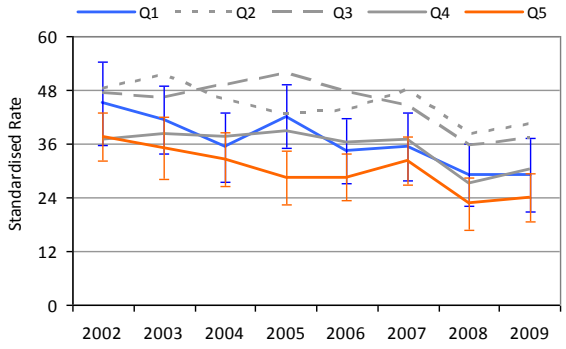
The wider the gap between most and least affluent quintile lines, the more inequitably distributed the exposure to low value care will be. Such eventual gap could be widening, narrowing or maintained over time.

Besides the relative position of the lines over time, it is relevant to keep track of the 95% confidence intervals (whiskers drawn around annual rate) for quintiles 1 and 5. Only those not overlapping represent a statistically significant difference between wealthier and deprived areas.

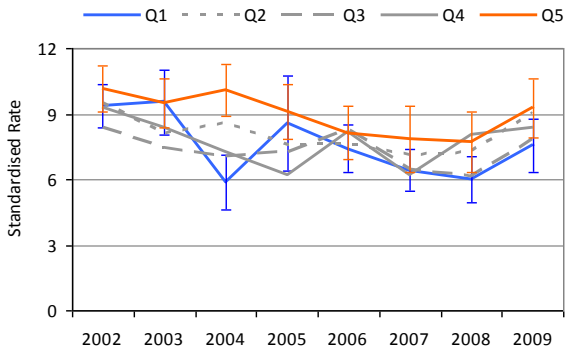
The desirable pattern will show no statistically significant differences across kommuners amenable to their wealth. If such differences were present, a positive time trend will consist in progressively narrowing the gap till, eventually, disappearing.

However, given the nature of the type of care examined, a concern about the direction of convergence is due. The suitable evolution should tend to minimise lower-value care provision for all levels of wealth. Horizontal equity at high levels of lower-value care utilisation could hardly be considered a good performance sign.

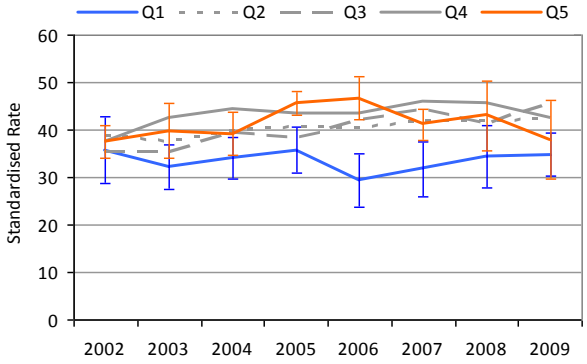
Adenotonsillectomy



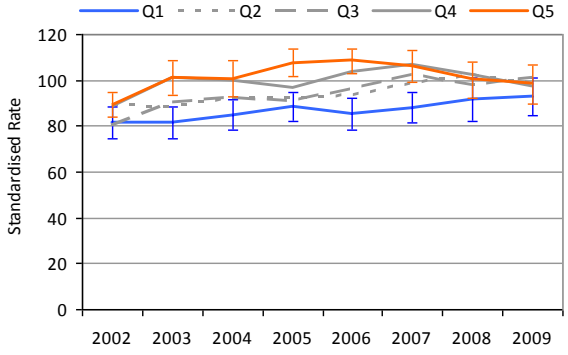
Non-conservative breast cancer surgery



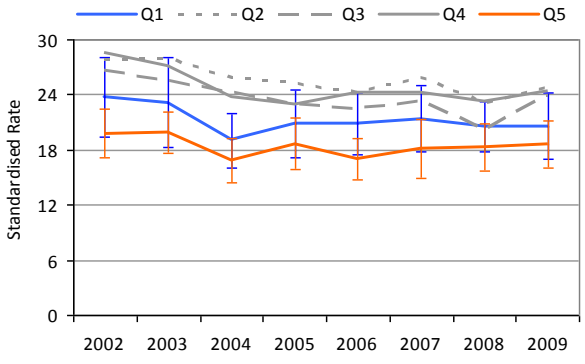
c-section low risk deliveries



Total c-section



Hysterectomy non oncologic conditions



Prostatectomy in benign prostatic hyperplasia

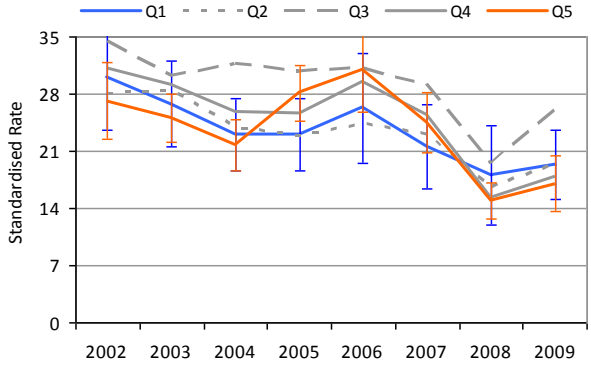


Figure 45 Over time evolution of LVC utilisation rates per quintiles of kommuner average income
(Q1 = lowest; Q5 =highest income)

VI. POLICY IMPLICATIONS

The conceptual framing of the analysis presented above is pretty simple: utilisation of lower-value care entails a loss of value-for-money in the health system (allocation of resources that leads to lower quality and safety of care i.e. inefficiency). Typically, these phenomena occur at local level, giving way to differential exposure or access to services depending on the place of residence (often coined as *"post-code lottery").*

The analysis yields two types of knowledge useful for action: on the one hand, it quantifies the magnitude of the problem, setting it in reference to other relevant European countries; on the other, it actually identifies those areas within the country with higher potential for realignment into value-based provision of care on the basis of national benchmarks (less prone to cultural and organisational biases, so relevant in this cluster of care)

The 2 scenarios of minimising use of LVC are somewhat arbitrary. They are only intended to provide some reasonable reference for the potential for improvement on the basis that, when it comes to lower-value care, *the lesser the better.* Overall, the minimisation of the use of the 5 LVC procedures examined is worth 6700 excess-interventions in a year for the conservative scenario and 8300 in the drastic one. The estimation is summarised in the following table

	Estimated excess-interventions in a year	
LVC procedures	Conservative p25	Drastic p10
Adeno and/or tonsillectomy	1707	2199
C-section in LRD	1592	1984
Hysterectomy non-oncologic	1651	1752
NC breast cancer surgery	639	993
Prostatectomy BPH	1105	1360
Total	6694	8288

Policy-wise the key will in understand the local situation to appropriately guide intervention to limit the use of lower-value care. Factors that had often been highlighted as underpinning these phenomena and maybe worth analysing in Denmark include:

- Local schools of practice that lead to well establish clinical styles that may involve lower-value care. Learning cascades and the leadership of prestige figures play a paramount role here.

- Existing clinical guidelines/protocols locally or regionally issued. They could weight in two opposite directions:

    1. Perfectly adequate guidelines may have no impact on clinical practice if they are not binding and/or the general perception is that they lack legitimacy to meddle with daily practice. This could be either because the recommended courses of action are not locally available -no contextualising effort is acknowledged- or, simply, because professionals had felt excluded from the elaboration and, thus, do not accept them as relevant

    2. Local protocols of care for certain conditions may have adapted to limited availability of cost-effective conservative alternatives, consolidating certain practice styles. Such alternatives often involve more intense follow-up and consultation and/or co-adjuvant therapies, which may be more difficult to display in certain settings, such as disperse populations entailing considerable, direct and indirect, travel costs.

- The lack of clinical guidelines has also been reported as fostering utilisation of low-value care. In October 2007, an agreement between the government and Danish Regions on the implementation of integrated cancer pathways was reached[1]. The binding integrated cancer pathways were developed as organizational and clinical standards for the diagnosis and treatment for most types of cancer. They were fully implemented by January 2009. Prostatectomy, breast surgery and hysterectomy are typical cancer-related interventions. Although the indications examined in this report are those inappropriate, the wide straightening of their adequate indications within the pathways' implementation may have had a positive spill-over, decreasing lower-value utilisation. Unfortunately, they were only fully implemented by the end of our period of analysis, in 2009. Extending the analysis to the following years will help in assessing this hypothesis

[1] All background information on Danish Health System can be consulted at European Observatory of Health Systems and policy platform: Health Systems Policy Monitor http://www.hspm.org/countries/denmark27012013/countrypage.aspx

- This report is restrained to publicly funded activity, regardless the nature of the provider. Private providers have been shown more prone to lower-value care, particularly when the structure of payments is activity-based and the profit derived from surgery exceeds that attached to more conservative options. The "extended free choice" of hospital introduced in Denmark in 2002 might have contributed to increase the share of activity conducted under those schemes (440,000 patients have been reported to have used it from its inception). How evenly distributed the option is across territory and types of procedures may partly inform some of the results presented in this report.

- Since all the procedures analysed can be considered "elective" surgery, patient's preferences could be most relevant. The choice of lower-value care might stem from insufficient, and even inadequate, information about consequences and alternative courses of action. This eventual misinformation has been often reported, particularly in relation to prostatectomy and c-section. Patients' empowerment and adequate exposure to complete information may change their views.

- Other factor argued as relevant in explaining local use of lower-value care is the characteristics of supply: Local Capacity (total beds, share of surgeons over medical staff, terciarity and teaching…) as well as propensity to surgery (total volume of surgical procedures and share over total discharges, surgical length of stay)

The analysis conducted, suggests that there is plenty of room for enhancing value for money in the Danish system.

Although utilisation rates remain generally larger as compared with the other ECHO countries, LVC use have tended to decrease over the period of analysis, with the exception of c-section; the main driver resides at local level. Focusing on local practices, particularly learning cascades and established medical practice styles, together with patient information and empowerment in decision making, will potentially have a major impact.

Further analysis on institutional factors underpinning overuse of LVC at kommuner level, as well as social, organisational and budgetary local contexts, will serve as basis for recommendations to guide relevant decision makers in tackling this allocative inefficiency. SAVINGS ARE NOT WARRANTED, the aim is fostering "value for money" i.e. avoid non-efficient public expenditure

APPENDIX 1:

Tables International Comparison 2009

Table 1. Summary Utilisation rates and statistics of variation per country 2009 per indicator

	Adenotonsillectomy children up to 14 years old				
	DENMARK	ENGLAND	PORTUGAL	SLOVENIA	SPAIN
Cases	3261	37301	9597	2354	30076
Stand. Rate	33.38	39.75	62.29	83.67	53.93
EQ5-95	3.86	2.5	3.42	2.46	4.8
SCV	0.21	0.09	0.34	0.66	0.23

	C-section in low-risk deliveries				
	DENMARK	ENGLAND	PORTUGAL	SLOVENIA	SPAIN
Cases	5356	26982	1140	1106	9287
Stand. Rate	43.41	20.3	4.32	21.81	8.95
EQ5-95	2.29	4.51		3.51	49.44
SCV	6.34	0.8	0.69	0.81	0.47

	Hysterectomy non-oncologic conditions				
	DENMARK	ENGLAND	PORTUGAL	SLOVENIA	SPAIN
Cases	4897	39948	9166	1568	24367
Stand. Rate	21.84	19.01	21.44	18.18	14.77
EQ5-95	1.98	2.27	1.83	2.34	2.95
SCV	0.14	0.07	0.09	0.04	0.09

	Non-conservative surgery breast cancer				
	DENMARK	ENGLAND	PORTUGAL	SLOVENIA	SPAIN
Cases	2187	15472	2746	490	8821
Stand. Rate	8.14	6.22	5.24	5	4.31
EQ5-95	1.93	1.9	2.32	3.96	3.77
SCV	0.56	0.1	0.04	0.06	0.07

	Prostatectomy benign prostatic hyperplasia				
	DENMARK	ENGLAND	PORTUGAL	SLOVENIA	SPAIN
Cases	2330	16197	3120	458	16422
Stand. Rate	22.09	15.04	12.73	12.53	18.2
EQ5-95	4.38	3.33	3.94	6.37	4.13
SCV	0.47	0.1	0.18	0.23	0.18

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

APPENDIX 2:

Tables Denmark 2009

Table 2. LVC procedures standardised utilisation Rates per 10,000 and statistics of variation in Denmark, year 2009

	Adenotonsillectomy	C-section Low Risk Delivery	Hysterectomy Non-oncologic condition	Non-conservative Surgery breast cancer	Prostatectomy benign prostatic hyperplasia
Cases	3261	5356	4897	2187	2330
Population	1,008,086	1,431,298	2,287,759	2,779,431	1,343,866
Crude Rate	32.46	38.4	22.72	8.51	18.26
Stand. Rate	33.61	42.81	22.25	8.13	17.79
sR Min.	5.85	18.9	9.47	2.25	2.72
sR Max.	119.13	95.92	37.04	18.06	46.31
sR. P5	10.76	22.84	13.47	4.33	7.33
sR. P25	21.82	30.94	16.63	5.79	12.09
sR. P50	30.97	38.72	21.39	7.87	17.28
sR. P75	40.95	51.59	26.97	10	20.68
sR. P95	67.23	75.72	35.31	13.5	37.74
EQ5-95	6.25	3.32	2.62	3.12	5.15
EQ25-75	1.88	1.67	1.62	1.73	1.71
SCV	0.28	0.16	0.07	0.07	0.19
ICC	0.01	0.11	0.29	0.23	0.00

sR: Age-sex Standardised Rate per 10,000 inhabitants (Reference population: national); sR Px: percentile x of sR distribution; EQ: Extremal Quotient;

APPENDIX 2:

Tables Denmark 2009

Table 3. Excess-cases (Observed-Expected) of lower-value care in Denmark, year 2009, conservative scenario (benchmark: the 25 percent of kommuners with the lowest standardised utilisation rate)

	Adenoton sillectomy	C-section Low Risk Delivery	Hysterectomy Non-oncologic condition	Non-conservative Surgery breast cancer	Prostatectomy benign prostatic hyperplasia
Total EC25	1707	1592	1651	639	1105
EC25 min	1	1	1	1	1
EC25 max	112	124	85	47	73
Q1	108	73	70	44	92
Q2	242	206	223	123	162
Q3	379	502	440	127	235
Q4	978	811	918	345	616

EC25:Excess number of cases using as benchmark percentile 25 of the distribution of standardised utilisation rate per kommuner (observed-expected); Qx: quartile of the EC25 distribution;

Table 4. Excess-cases (Observed-Expected) of lower-value care in Denmark, year 2009, drastic scenario (benchmark: the 10 percent of kommuners with the lowest standardised utilisation rate)

	Adenoton sillectomy	C-section Low Risk Delivery	Hysterectomy Non-oncologic condition	Non-conservative Surgery breast cancer	Prostatectomy benign prostatic hyperplasia
Total EC10	2199	1984	1752	993	1360
EC10 min	1	1	1	1	1
EC10 max	152	132	91	74	78
Q1	154	85	73	64	79
Q2	353	271	226	184	179
Q3	468	506	471	206	401
Q4	1224	1122	982	539	701

EC10:Excess number of cases using as benchmark percentile 10 of the distribution of standardised utilisation rate per kommuner (observed-expected); Qx: quartile of the EC10 distribution;

APPENDIX 2:

Tables Denmark Evolution over time 2002-2009

Table 5

	Adenotonsillectomy							
	2002	2003	2004	2005	2006	2007	2008	2009
Cases	4221	4217	3986	3967	3796	3973	3043	3261
Stand. Rate	43.1	43	40.93	40.82	38.47	39.86	30.88	32.88
sR Q1.	45.09	41.29	35.26	42.12	34.41	35.44	29.14	29.13
sR Q5.	37.58	34.96	32.57	28.32	28.51	32.27	22.63	23.99
SCV	0.12	0.15	0.13	0.18	0.13	0.14	0.23	0.23

** 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 6

	C-section Low Risk Delivery							
	2002	2003	2004	2005	2006	2007	2008	2009
Cases	5102	4931	5444	5287	5447	5502	5358	5356
Stand. Rate	37.3	37.45	39.31	40.74	41.05	41.38	41.64	40.57
sR Q1.	35.76	32.10	34.02	35.69	29.48	31.78	34.33	34.72
sR Q5.	37.35	39.75	39.15	45.62	46.58	41.11	43.02	37.92
SCV	0.08	0.08	0.07	0.06	0.07	0.09	0.1	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 7

	Hysterectomy Non-oncologic condition							
	2002	2003	2004	2005	2006	2007	2008	2009
Cases	5611	5401	4896	4854	4756	4891	4545	4897
Stand. Rate	25.34	24.74	21.99	22.15	21.77	22.59	21.11	22.7
sR Q1.	23.75	23.15	19.01	20.91	20.83	21.39	20.55	20.59
sR Q5.	19.79	19.87	16.85	18.65	16.94	18.09	18.32	18.67
SCV	0.09	0.09	0.07	0.07	0.09	0.08	0.05	0.07

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

APPENDIX 2:

Tables Denmark Evolution over time 2002-2009

Table 8

	Non-conservativeSurgery breast cancer							
	2002	2003	2004	2005	2006	2007	2008	2009
Cases	2563	2320	2146	2052	2083	1901	1900	2187
Stand. Rate	9.32	8.59	7.92	7.88	7.93	6.87	7.11	8.51
sR Q1.	9.33	9.54	5.87	8.56	7.42	6.42	6.01	7.55
sR Q5.	10.16	9.50	10.08	9.09	8.14	7.82	7.71	9.28
SCV	-0.02	0.02	0.04	0.06	0.01	0.03	0.05	0.09

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

Table 9

	Prostatectomy benign prostatic hyperplasia							
	2002	2003	2004	2005	2006	2007	2008	2009
Cases	3483	3275	750	607	2698	2332	1624	1900
Stand. Rate	30.14	27.81	6.94	5.55	23.39	20.21	13.96	16.28
sR Q1.	29.99	26.77	22.99	23.00	26.27	21.52	18.07	19.35
sR Q5.	27.12	25.09	21.75	28.11	30.99	24.44	14.93	16.96
SCV	0.11	0.08	0.83	0.38	0.2	0.27	0.16	0.36

** 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 3:

Technical note

Utilisation of lower-value care is measured 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 lower-value care 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 between extremes and Component of Systematic Variation. The other variable consistently mapped through out the report is the excess cases per area in two scenarios of minimised utilisation

When burden of disease or activity calibrators were available, the report has also included their standardised utilization rates and ratios

Instruments:

Being an ecologic study, each admission was allocated to the place of residence of the patient, which in turn was referred to a policy relevant geographic unit – the 98 kommuners and the 5 Regions building up the Danish National Health System.

The operational definitions for each indicator are detailed in the coding table in appendix 4. Indicators are based on those in use in the international arena. 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 Discharges Dataset (Ministeriet Sunhed Forebyggelse). 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 were obtained from the National Statistics office (Danmarks Statistik Statistikbanken) data for kommuners on average family annual income (based both in transfers and available) was obtained from the Statistikbanken.

APPENDIX 4:

Definitions of indicators

	Diagnosis codes ICD10 and Procedures codes Nomesco					
	Primary diagnosis		Secondary diagnosis2-30		Procedures	
	Inclusions	Exclusions	Inclusions	Exclusions	Inclusions	Exclusions
Non-conservative surgery in breast cancer Women	C50 D05 Z85.3				HAC15 HAC20 HAC25	
Prostatectomy in prostate cancer Male population aged 40 or older	C61 D07.5 D09.9 D40.0				KEC KED KEW	
Prostatectomy in benign prostatic hyperplasia Male population aged 40 or older	N40 D29.1				KEC KED KEW	
Births with complications (CB) Women Aged between 15 and 55	O44 O45 O46 O47 O48 O11 O14 O15 O23 O300 O301 O302 O308 O32 O34 O43 O364 O362 O420 O756 O611 O610 O753 O321 O648 O345 O640 O660 O661 O664 O665 O658 O669 O632 O690 O691 O710 O711 O713 O290 O291 O750 O751 O830 O291 O987 O641		O44 O45 O46 O47 O48 O11 O14 O15 O23 O300 O301 O302 O308 O32 O34 O43 O364 O362 O420 O756 O611 O610 O753 O321 O648 O345 O640 O660 O661 O664 O665 O658 O669 O632 O690 O691 O710 O711 O713 O290 O291 O750 O751 O830 O291 O987-O641			

	Diagnosis codes ICD10 and Procedures codes Nomesco					
	Primary diagnosis		Secondary diagnosis2-30		Procedures	
	Inclusions	Exclusions	Inclusions	Exclusions	Inclusions	Exclusions
Cesarean section rate Women Aged between 15 and 55 years old					MCA00 MCA10 MCA20 MCA30 MCA96	MAH30 LCH20 LCH96
Cesarean section rate in low risk deliveries Women Aged between 15 and 55 years old		O987 O11 O14 O15 O23 O290 O291 O291 O300 O301 O302 O308 O32 O321 O34 O345 O362 O364 O420 O43 O44 O45 O46 O47 O48 O610 O611 O632 O64.1 O640 O648 O658 O660 O661 O664 O665 O669 O690 O691 O710 O711 O713 O750 O751 O753 O756 O830		O987 O11 O14 O15 O23 O290 O291 O291 O300 O301 O302 O308 O32 O321 O34 O345 O362 O364 O420 O43 O44 O45 O46 O47 O48 O610 O611 O632 O64.1 O640 O648 O658 O660 O661 O664 O665 O669 O690 O691 O710 O711 O713 O750 O751 O753 O756 O830	MCA00 MCA10 MCA20 MCA30 MCA96	MAB MAC MAD MAE MAF MAG MAW MAH30 LCH20 LCH96
Hysterectomy in uterus cancer (CB) Women	C53 C54 C55 D06		C53 C54 C55 D06		LCC00 LCC10 LCC11 LCD00 LCD01 LCC96 LCC97 LCD04 LCD10 LCC20 LCD30 LCD31 LCD40 LCD11 LCE00* LCE10* LCE20* LCD96 LCD97 LEF13 LCC01	

	Diagnosis codes ICD10 and Procedures codes Nomesco					
	Primary diagnosis		Secondary diagnosis2-30		Procedures	
	Inclusions	Exclusions	Inclusions	Exclusions	Inclusions	Exclusions
Hysterectomy without uterus cancer diagnosis Women Aged 18 or older		Cancer in female genital organs or uterus. Abdominal trauma (Appendix 7) O00-O99		Cancer in female genital organs or uterus. Abdominal trauma (Appendix 7) O00-O99	LCC00 LCC10 LCC11 LCC20 LCC96 LCC97 LCD00 LCD01 LCD04 LCD10 LCD11 LCD30 LCD31 LCD40 LCD96 LCD97 LCE LEF13 MCA33	
Adenoidectomy and/or Tonsillectomy Population Aged 14 and younger					EMB20 EMB30 EMB99 EMB00 EMB10 EMB15 EMW99	