Quick user guide

Maps

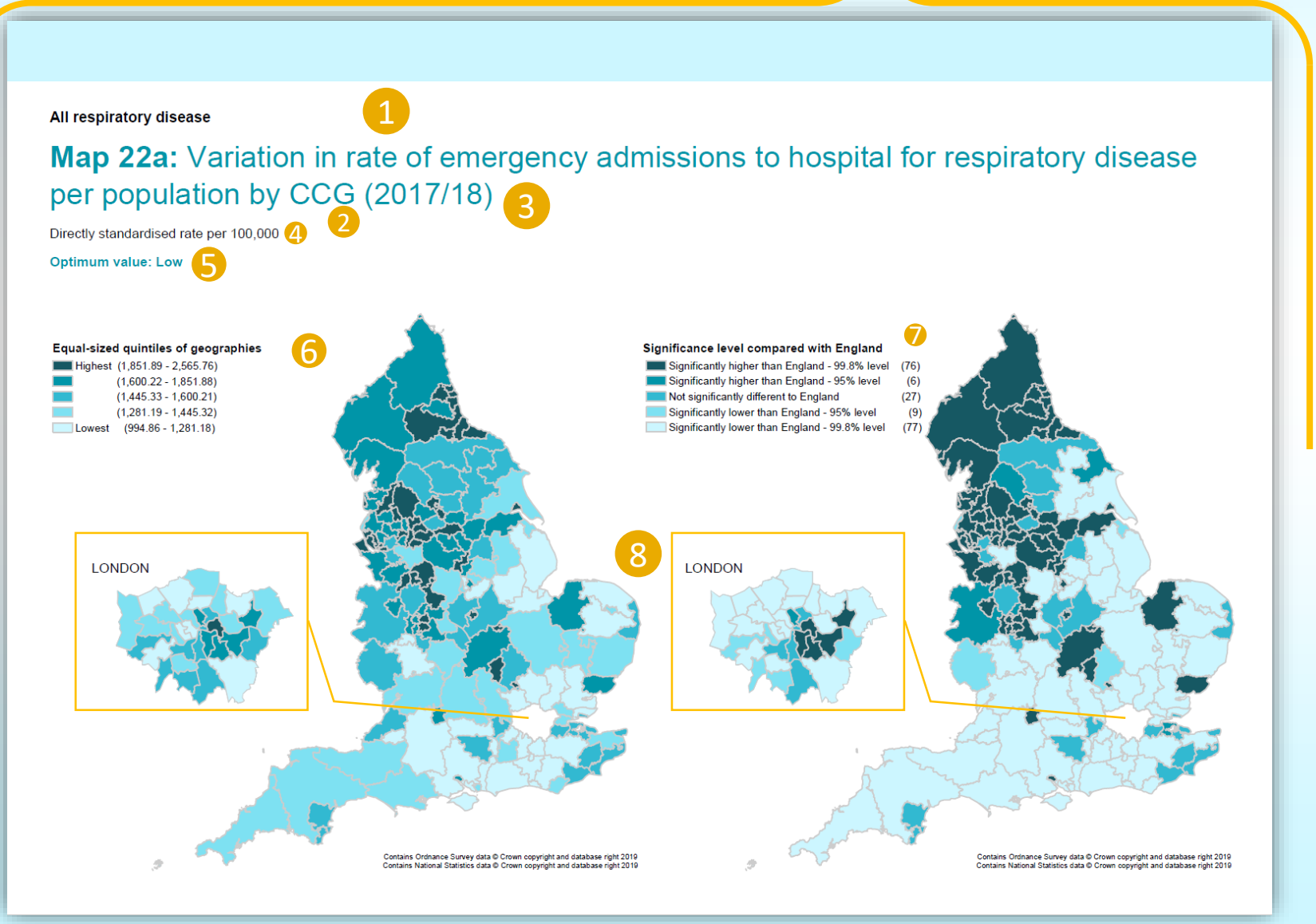
1 **Type of statistic** (e.g. rate, proportion)

2 **Geographic boundaries**

3 **Year of data presented**

4 **Rate calculated per x number of people**

5 **Optimum values** Low indicates lower values are preferential (high indicates higher values are preferential). Local interpretation maybe required for some indicators.



6 **Equal sized quintiles** The number of areas presented on the map are divided equally between the 5 categories with those with the highest values forming the 'Highest' group etc.

For example, in 2018 there were 195 CCGs, so 39 CCGs are in each category. Darker areas have the highest values.

7 **Significance level compared with England** The darkest and lightest shading on map shows CCGs whose confidence intervals do not overlap with the England value.

The second darkest and lightest colours show areas where the England value falls between the CCG's 95% and 99.8% CI.

The number in brackets indicates the number of CCGs in each category.

8 **London** is presented as a separate zoomed in map for clarity.

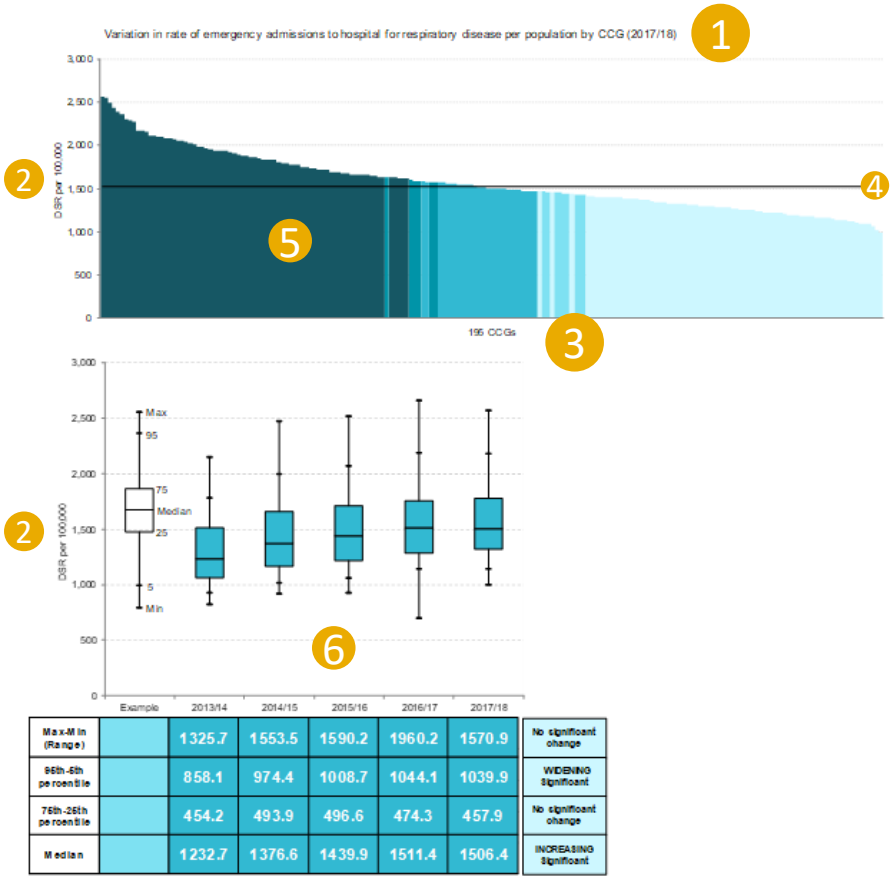
Chart, box plot and table

1. Title shows indicator details including: value type, geography and year .

2. The y-axis plots the value and gives details of the value type e.g. rate / proportion and the unit e.g. per 100,000 population.

3. The x-axis shows the geography and the number of areas on chart.

4. The line shows the England average.



5. Each bar represents an area (e.g. a CCG). The height of the bar is relative to the value for that area. Collectively, the bars show the spread of values across England.

   The colour of the bar represents how significant the area's value is in relation to England based on the area's confidence interval. Areas utilise the same colours and categories as the maps.

   Areas that are significantly higher than England at a 99.8% or 95% level are shown as darker bars whereas those with lower significance to England, at a 99.8% or 95% level, are lighter. The colour in the middle represents areas that are not significantly different from England.

   Where the significance bar chart shows little variation across the CCGs, the equal interval map colours have been used.

6. For each indicator, data is presented visually in a time series of box and whisker plots. The box plots show the distribution of data.

   The line inside each box shows the median (the mid-point, so if the 195 CCGs were sorted in order of value, the value halfway between the CCGs in the 97th and 98th position would give the median). The bottom and top of the teal box represents the values which 25% and 75% of the areas fall below. 50% of the areas have a value within this range.

   The whiskers mark the values at which 5% and 95% of areas fall below. The median and maximum values are also shown.

   The time series allows us to see how the median has changed over time, but also whether the gap between the extreme values has changed.

   The table accompanying the box and whisker plots shows whether there has been any statistically significant change in the median, or in the degree of variation over time.

7. **Sections in the chapter**

   Context – provides an overview of why the indicator is of public health interest

   Magnitude of variation – provides commentary in relation to the chart, box plot and table

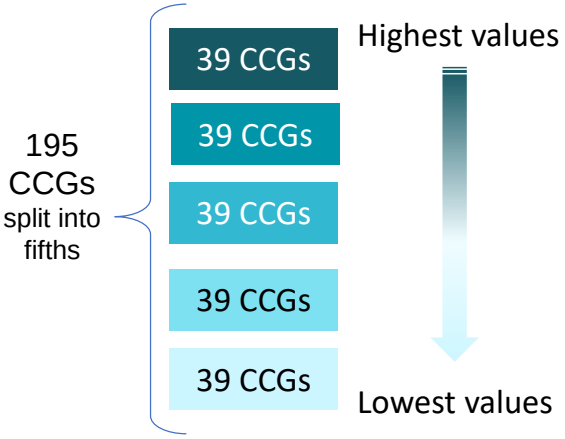
   Option for action – gives suggestions for best practice

   Resources – gives links to useful documents

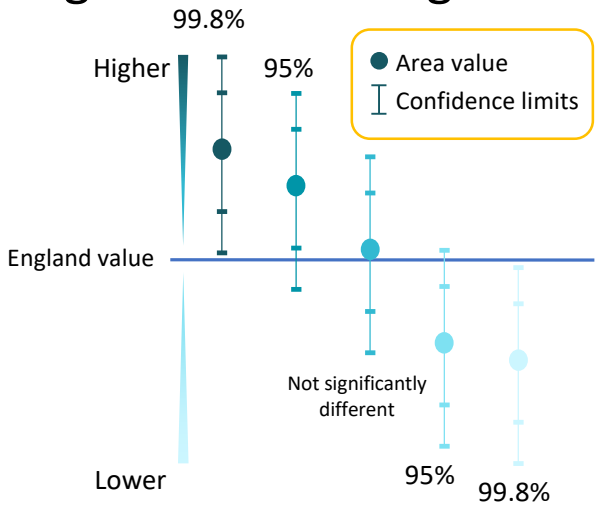
Quick user guide

How were the categories calculated?

Equal-sized quintiles



Significance to England



Confidence intervals give an estimated range in which the true CCG value lies.

Where the CCG's confidence interval does not overlap with the England value, the CCG is classed as being *significantly higher or lower than England at a 99.8% level*.

If the England value lies between the 99.8% and 95% CI, this value is classed as being *significantly higher or lower than England at a 95% level*.

Where the England value is between the upper and lower 95% CI, the CCG is classed as *not being significantly different from England*.

Box & whisker plot

Whiskers
Show the extreme values in the dataset.

Box
50% of the data values lie between the 25th and 75th percentile. The distance between these is known as the inter-quartile range (IQR).

Maximum The value of the area with the highest value.

95th percentile 95% of areas have values below this.

75th percentile 75% of areas have values below this.

Median (50th percentile) The median is the middle value of an ordered dataset. Half of the observations are below it and half above.

25th percentile 25% of areas have values below this.

5th percentile 5% of areas have a value below this.

Minimum The value of the area with the lowest value.

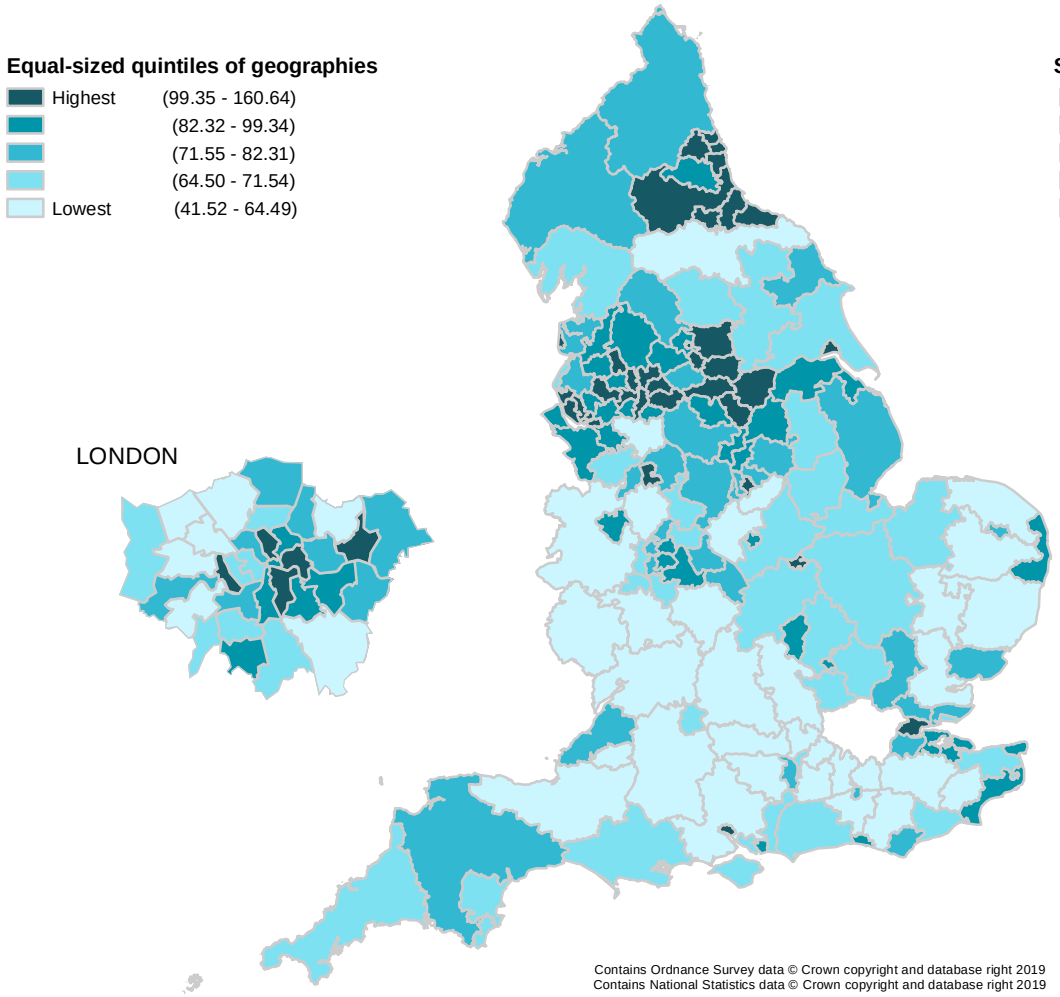
Box plot percentile	CCG rank position (195 CCGs in 2018)
Max	195
95%	Mid value between values of CCGs in ranks 185 and 186
75%	Mid value between values of CCGs in ranks 146 and 147
50% - Median	Mid value between values of CCGs in ranks 97 and 98
25%	Mid value between values of CCGs in ranks 48 and 49
5%	Mid value between values of CCGs in ranks 9 and 10
Min	1

Lung cancer - Incidence, mortality and survival

Map 29a: Variation in incidence rate of lung cancer per population by CCG (2015-2017)

Directly standardised rate per 100,000

Optimum value: Low



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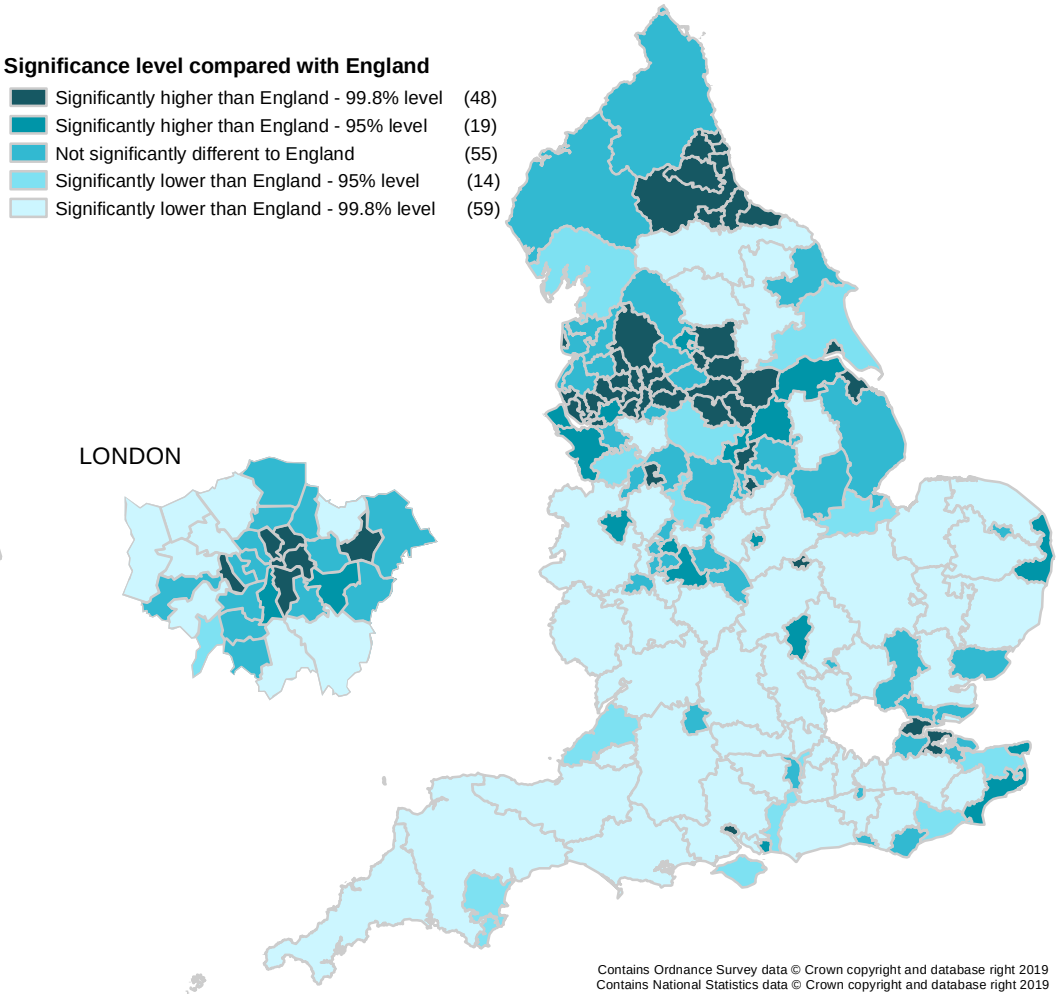

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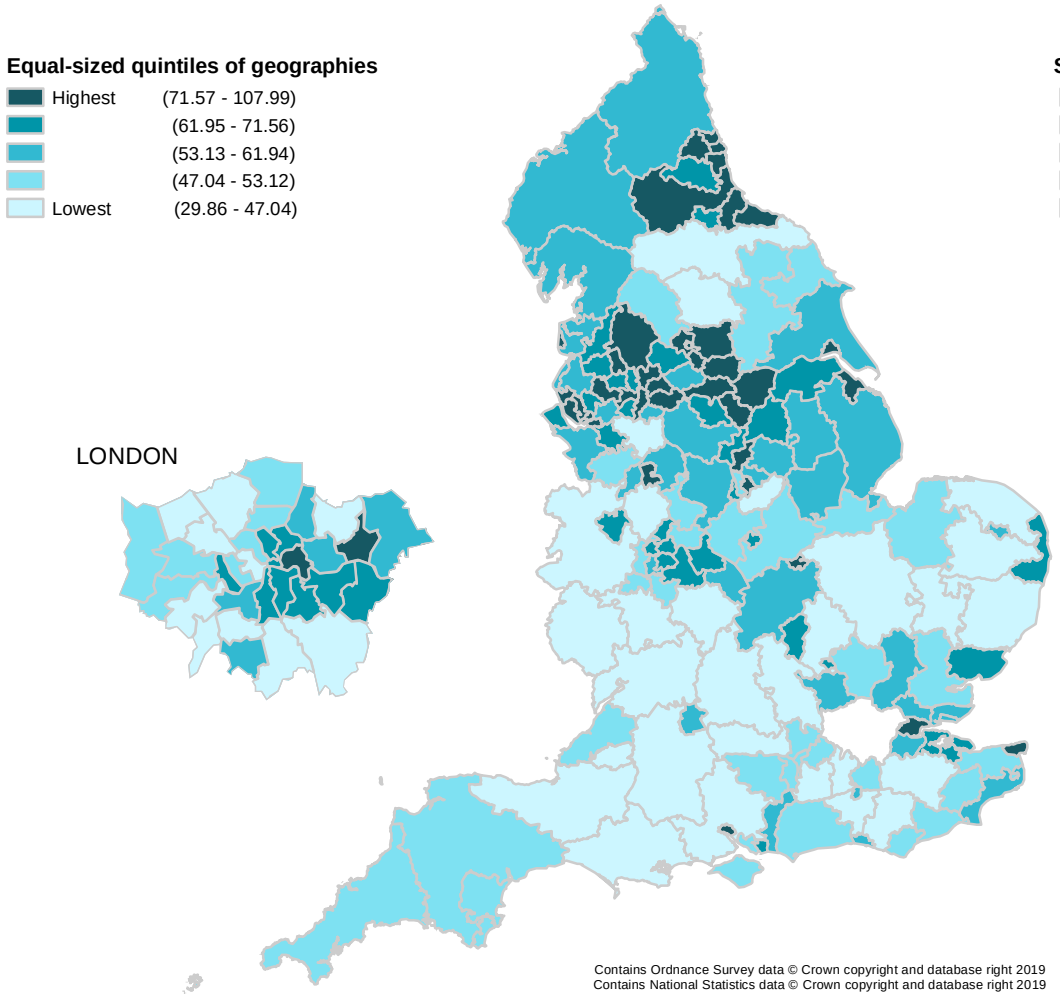
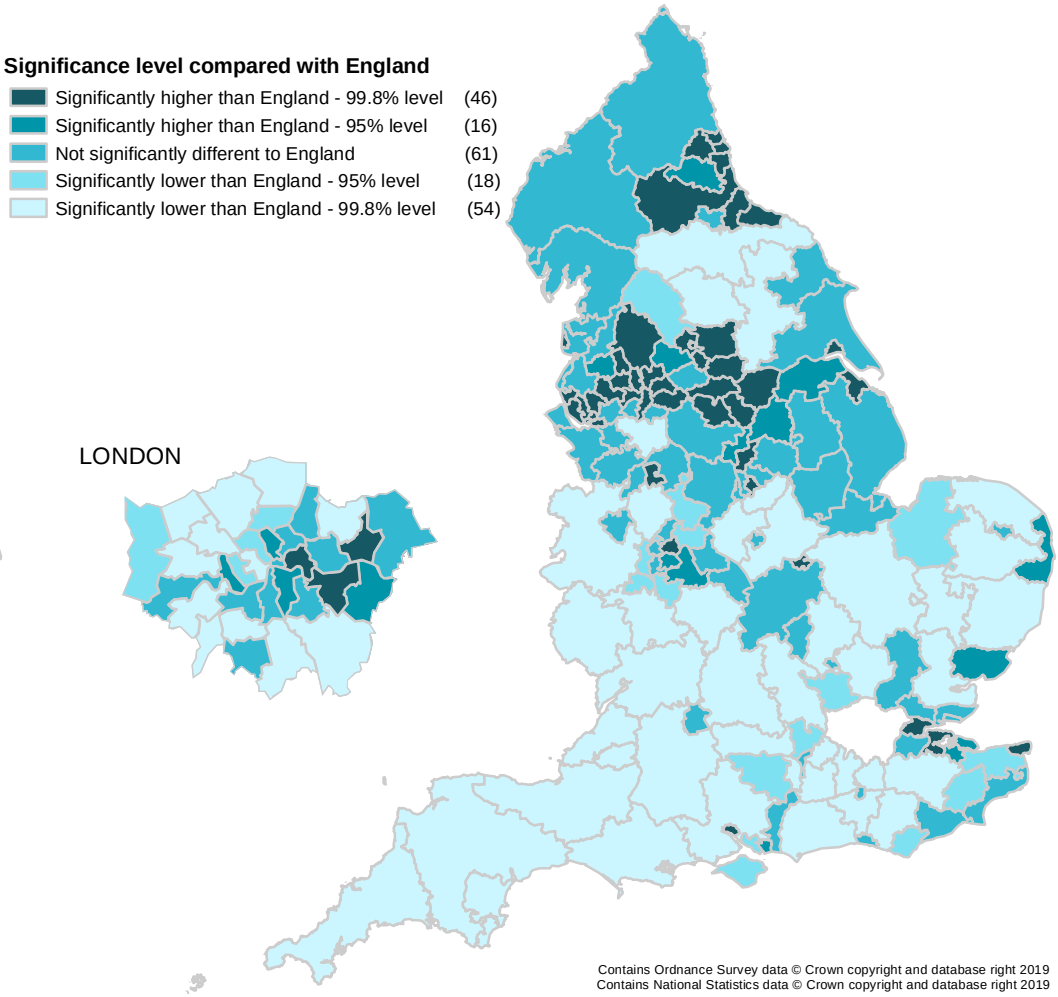
Lung cancer - Incidence, mortality and survival

Map 29b: Variation in mortality rate from lung cancer per population by CCG (2015-2017)

Directly standardised rate per 100,000

Optimum value: Low

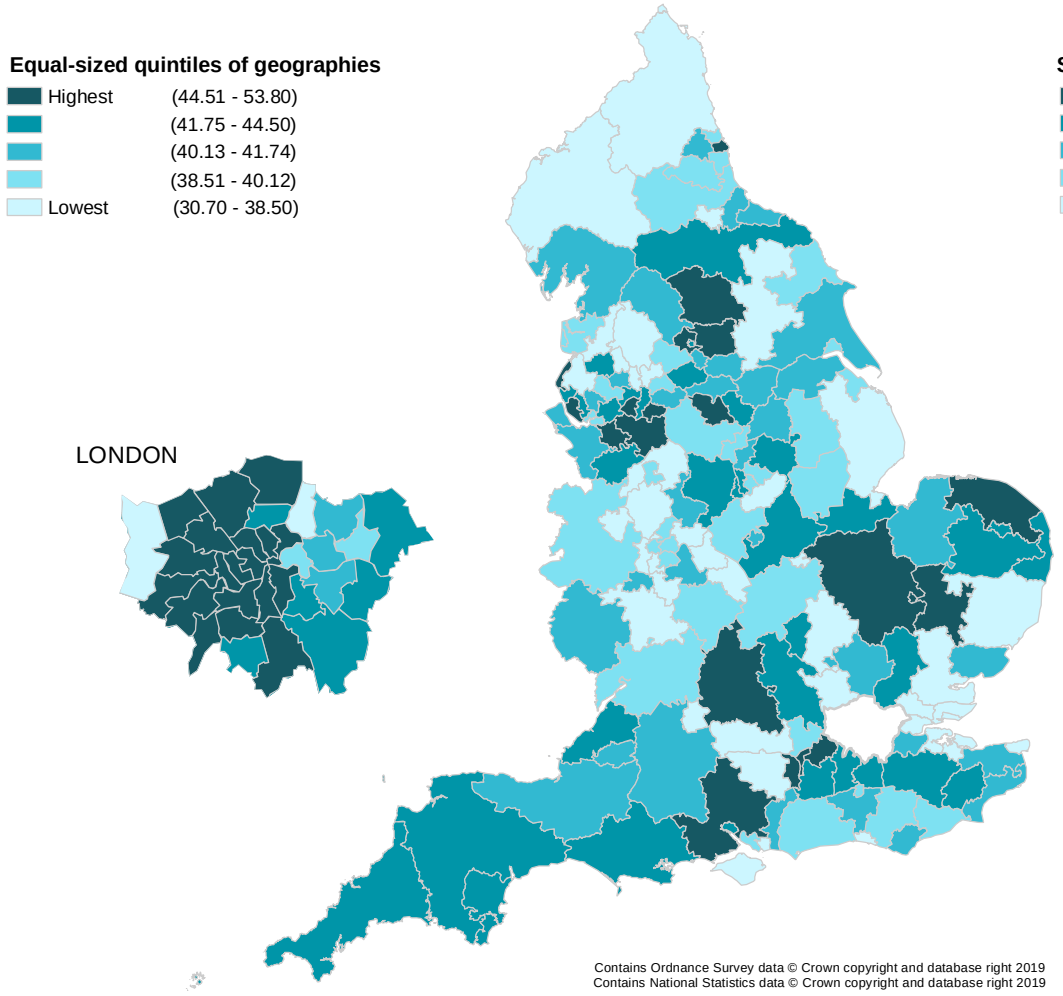


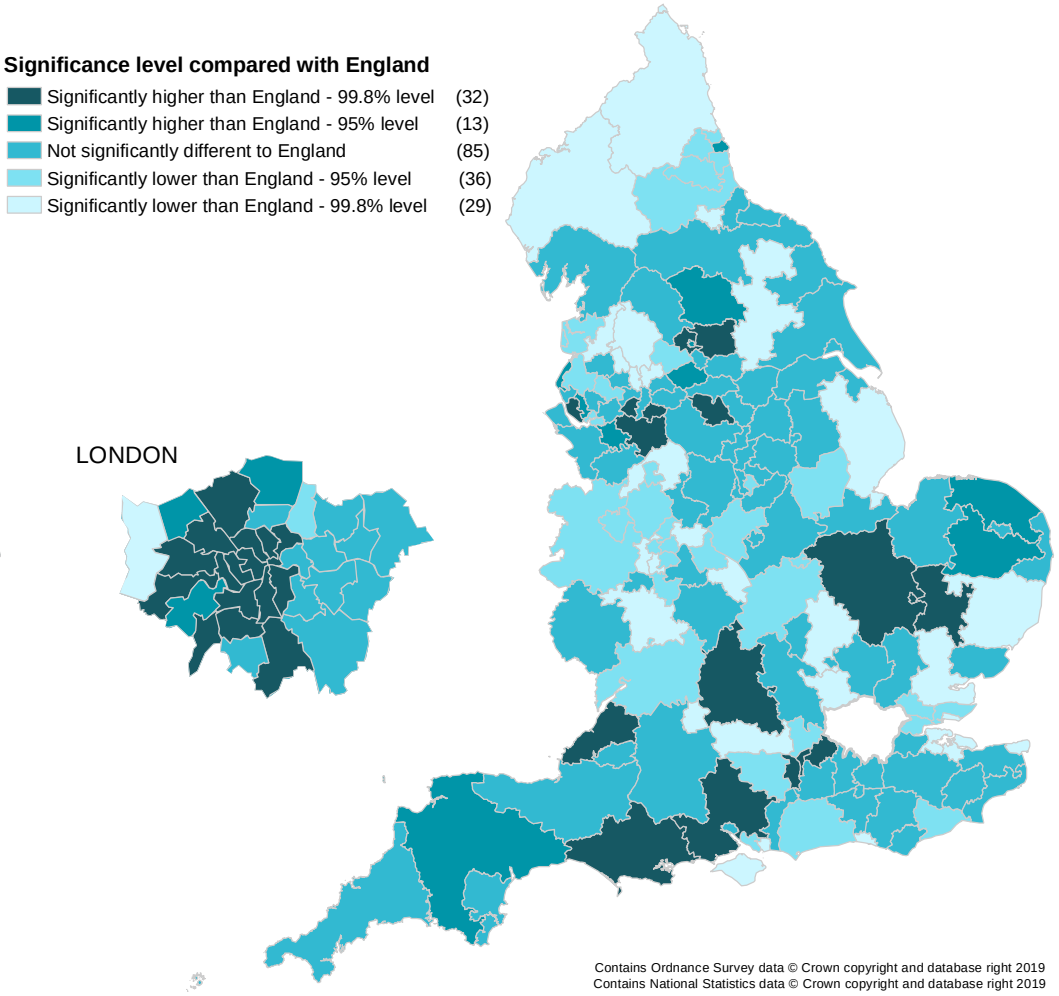


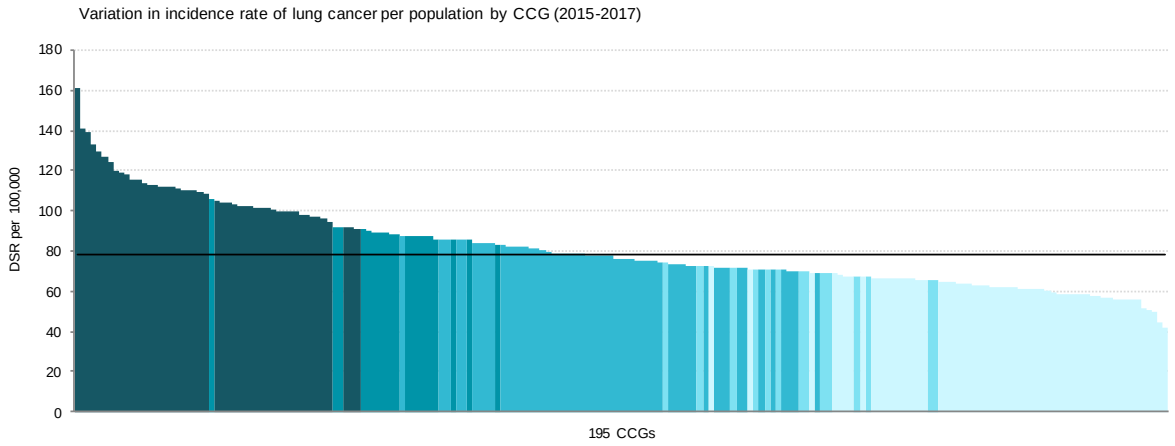
Lung cancer - Incidence, mortality and survival

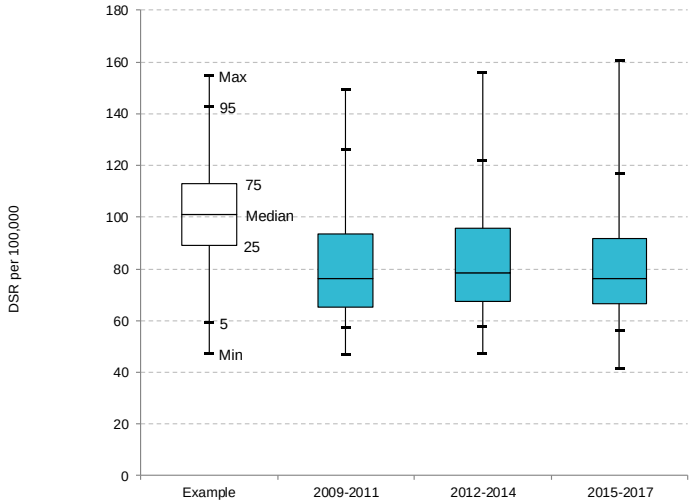
Map 29c: Variation in percentage of one-year survival estimates for lung cancer patients, all adults aged 15 to 99 years, by year of diagnosis and CCG (2016)

Optimum value: High









Max-Min (Range)		102.5	108.8	119.1	No significant change
95th-5th percentile		68.3	64.2	60.2	NARROWING Significant
75th-25th percentile		28.6	28.3	25.3	No significant change
Median		76.4	78.7	76.2	No significant change

Context

Lung cancer is the 3rd most common cancer in England with an annual average of over 38,760 people diagnosed from 2015 to 2017. Incidence rates have continued to fall since the mid-1990s, reducing by around 8%. However, this includes a decrease in male incidence rates of around 30% (from 127.9 per 100,000 population in 1995 to 86.9 in 2017) but an increase in female incidence of around 30% (51.4 in 1995 to 67.0 in 2017) (Figure 29.1).[1]

The incidence rates have fallen for males between 1995 and 2017. In contrast, the number of new diagnoses in males fell between 1995 and 2003 before increasing again.

The incidence rates and number of diagnoses in females both increased together consistently between 1995 and 2017.

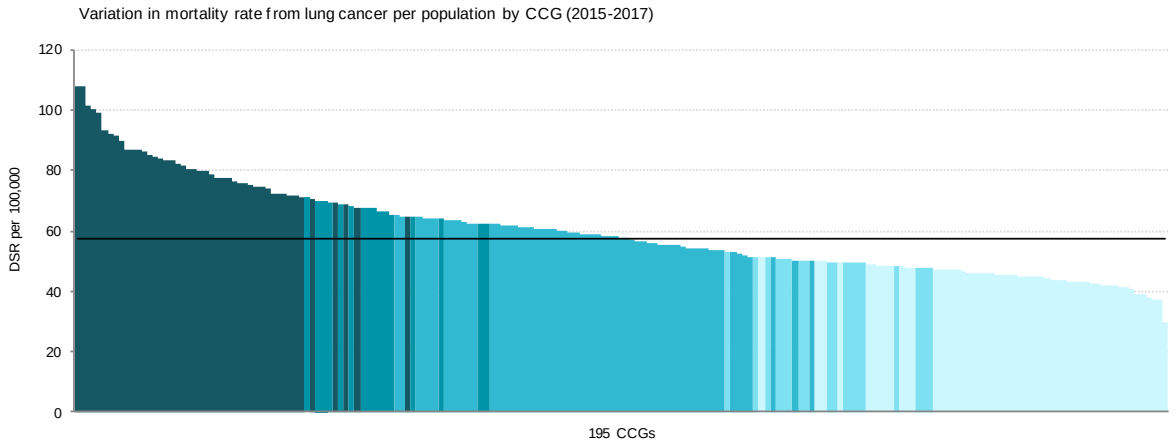
Overall the total number of people diagnosed went up from 32,751 in 1995 to 38,906 in 2017.

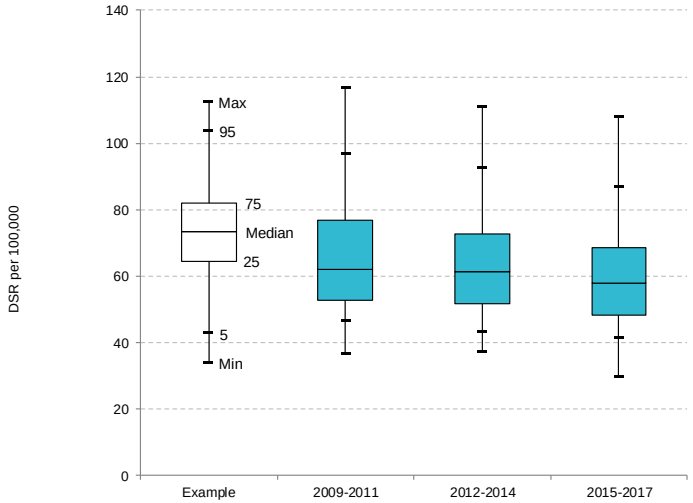
Over three-quarters of lung cancer cases are considered preventable[2] with most of these due to smoking. Other main causes of lung cancer are work place exposures and air pollution.

Lung cancer is the most common cause of cancer mortality in England with an annual average of over 28,440 deaths from 2015 to 2017.

Lung cancer survival is lower than for many other cancers in England[3] and lung cancer survival is lower in England than for many other comparator countries across Europe.[4,5]

Lung cancer survival in England has improved over the last 10 years in association with the introduction of the National





Max-Min (Range)		79.9	73.4	78.1	No significant change
95th-5th percentile		50.0	49.4	45.2	No significant change
75th-25th percentile		24.1	21.3	20.1	No significant change
Median		62.0	61.3	57.9	No significant change

Lung Cancer Audit (NLCA)[6] to focus the lung cancer community on improving their local outcomes and this is correlated with improvements in surgical resection rates.[6,7,8,9] However there remains significant variation across the country with regard to use of active treatments for all stages of disease.[10]

Major reasons for poor lung cancer outcomes nationally include, presentation with late stage (metastatic) disease that cannot be offered curative intent treatment and variation in delivery of curative intent treatment across the country to those people presenting with non-metastatic disease.[6]

Magnitude of variation

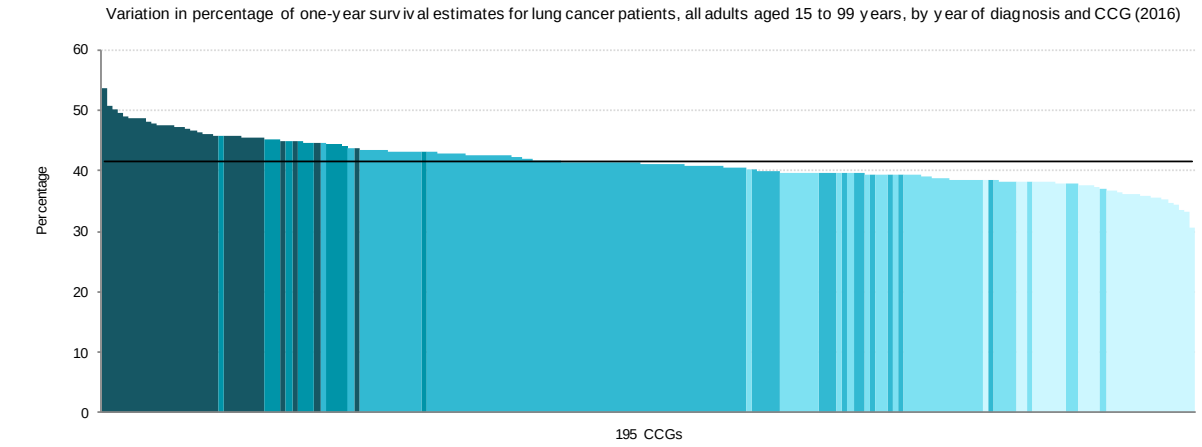
Map 29a: Variation in incidence rate of lung cancer per population by CCG (2015-2017)

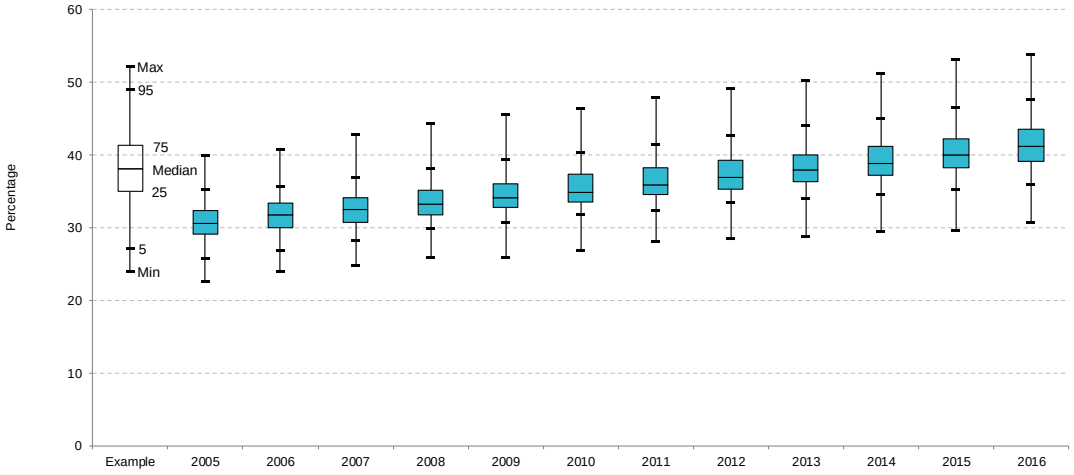
The maps and column chart display the latest period (2015 to 2017), during which CCG values ranged from 41.5 to 160.6 per 100,000 population, which is a 3.9-fold difference between CCGs. The England value for 2015 to 2017 was 78.3 per 100,000 population.

The box plot shows the distribution of CCG values for the period 2009-2011 to 2015-2017. The 95th to 5th percentile gap narrowed significantly.

Map 29b: Variation in mortality rate from lung cancer per population by CCG (2015-2017)

The maps and column chart display the latest period (2015 to 2017), during which CCG values ranged from 29.9 to 108 per 100,000 population, which is a 3.6-fold difference between CCGs. The England value for 2015 to 2017 was 57.7 per 100,000 population.





		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	
Max-Min (Range)		17.5	16.8	18.2	18.4	19.6	19.5	19.7	20.9	21.5	21.8	23.5	23.1	WIDENING Significant
95th-5th percentile		9.3	8.8	8.5	8.2	8.7	8.5	9.0	9.3	10.0	10.4	11.5	11.6	WIDENING Significant
75th-25th percentile		3.3	3.4	3.4	3.3	3.4	3.8	3.7	4.0	3.8	4.1	4.0	4.3	WIDENING Significant
Median		30.6	31.7	32.5	33.3	34.1	34.9	35.9	36.9	37.9	38.9	40.0	41.2	INCREASING Significant

The box plot shows the distribution of CCG values for the period 2009-2011 to 2015-2017. There was no significant change in any of the 3 variation measures between 2009-2011 to 2015-2017.

Map 29c: Variation in percentage of one-year survival estimates for lung cancer patients, all adults aged 15 to 99 years, by year of diagnosis and CCG (2016)

The maps and column chart display the latest period (2016), during which CCG values ranged from 30.7% to 53.8%, which is a 1.8-fold difference between CCGs. The England value for 2016 was 41.6%.

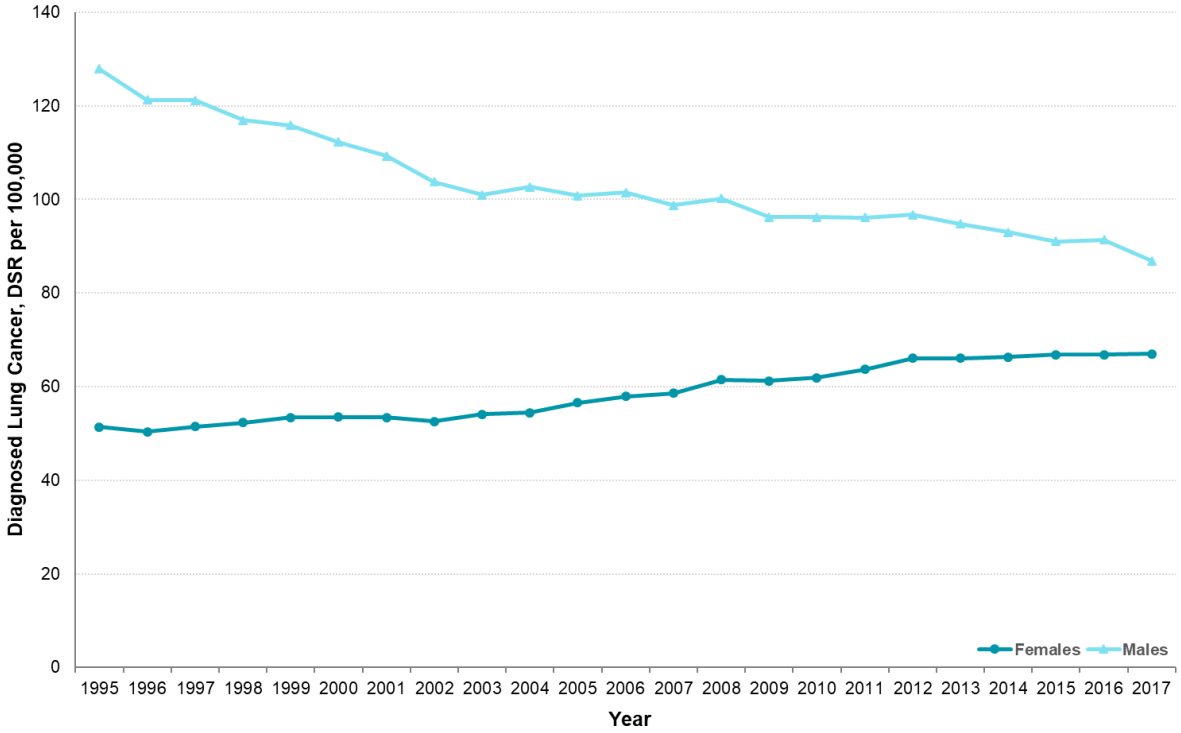
The box plot shows the distribution of CCG values for the period 2005 to 2016.There has been significant widening of all 3 measures of variation. The median increased significantly from 30.6% in 2005 to 41.2% in 2016.

Potential reasons for this degree of variation in incidence and mortality and survival include:

- smoking, current and historic smoking prevalence, social deprivation, air quality in larger towns and cities, co-morbidity
- capacity and resource availability to deliver curative intent treatments (surgery and radical radiotherapy including stereotactic ablative radiotherapy (SABR))

Whilst some variation is inevitable, much is unwarranted and all patients should receive the same care as those in best-performing CCGs. Medical teams need to have the facility to offer optimum treatments and to reduce unwarranted variation.

Figure 29.1: Newly Diagnosed cases of Lung Cancer by sex, DSR per 100,000[11]



Options for action

Continuing to improve lung cancer outcomes remains a major challenge for the NHS. The UK Lung Cancer Coalition (UKLCC) ten-year strategy document[12] highlights important principles to improve this.

Smoking cessation programmes and lung cancer prevention measures are vital for maintaining the global reduction in lung cancer incidence, especially within CCGs where incidence remains significantly higher than the national value. In light of the increasing incidence in women more emphasis should be directed to reducing smoking prevalence in women. The incidence of lung cancer can also be reduced by monitoring and control of radon in homes, schools, and workplaces. Responsibility for this lies across the health and social care system.

Options for action include:

- performance targets for smoking cessation services
- equitable access to evidence-based interventions for adults who smoke
- promoting assessment of radon risk in workplaces and homes
- targeted campaigns in areas of higher radon risk

Options for reducing mortality rates and continuing the improvement in one year survival relate to increasing proportion of lung cancers diagnosed at early stage and treated with curative intent treatments along the whole lung cancer pathway.

Earlier and more rapid diagnosis may be facilitated by:

- improving public awareness of signs and symptoms of lung cancer (Be Clear on Cancer campaigns)
- optimising the lung cancer diagnostic and treatment pathways within CCGs, based on national guidelines (NOLCP)
- equitable access to diagnostic imaging, including direct-to-test referrals from GPs and computerized tomography (CT)
- ensure adequate organisational service resources are available for timely diagnosis and treatment

Actions to improve treatment include:

- offering treatment with curative intent to more patients
- improving standards of care in all CCGs to the level of the best[13]
- using data from the National Lung Cancer Audit (NLCA) to self-assess institutional performance

- using findings from the Getting It Right First Time (GIRFT) programmes for cardiothoracic surgery (reported in 2018) and lung cancer (due in 2020) to remove unwarranted variation in patient care with consultants self-assessing their performance in the National Clinical Improvement Programme portal

Resources

Public Health England Be Clear on Cancer PHE Campaign Resource Centre [Accessed 27 March 2019]

Cancer Research UK, Lung Clinical Expert Group (2017) National Optimal Lung Cancer Pathway [Accessed 14 June 2019]

Cancer Research UK, Lung Clinical Expert Group (2017) NOLCP Implementation Guide [Accessed 14 June 2019]

NHS England (2018) Implementing a timed lung cancer diagnostic pathway. A handbook for local health and care systems [Accessed 27 March 2019]

National Institute of Health and Care Excellence (2019) Lung cancer overview (Nice pathway) [Accessed 27 March 2019]

National Institute of Health and Care Excellence (2018) Suspected cancer recognition and referral overview (NICE pathway) [Accessed 27 March 2019]

National Institute of Health and Care Excellence (2019) Lung cancer: diagnosis and management (NICE clinical guidance [NG122]) [Accessed 16 September 2019]

National Institute of Health and Care Excellence (2015) Suspected cancer: recognition and referral (NICE guidance [NG12]) [Accessed 27 March 2019]

National Institute of Health and Care Excellence (2012) Lung cancer in adults (NICE quality standard [QS17]) [Accessed 27 March 2019]

National Institute of Health and Care Excellence (2016) Suspected cancer (NICE quality standard [QS124]) [Accessed 27 March 2019]

Royal College of Physicians National Lung Cancer Audit [Accessed 8 August 2019]

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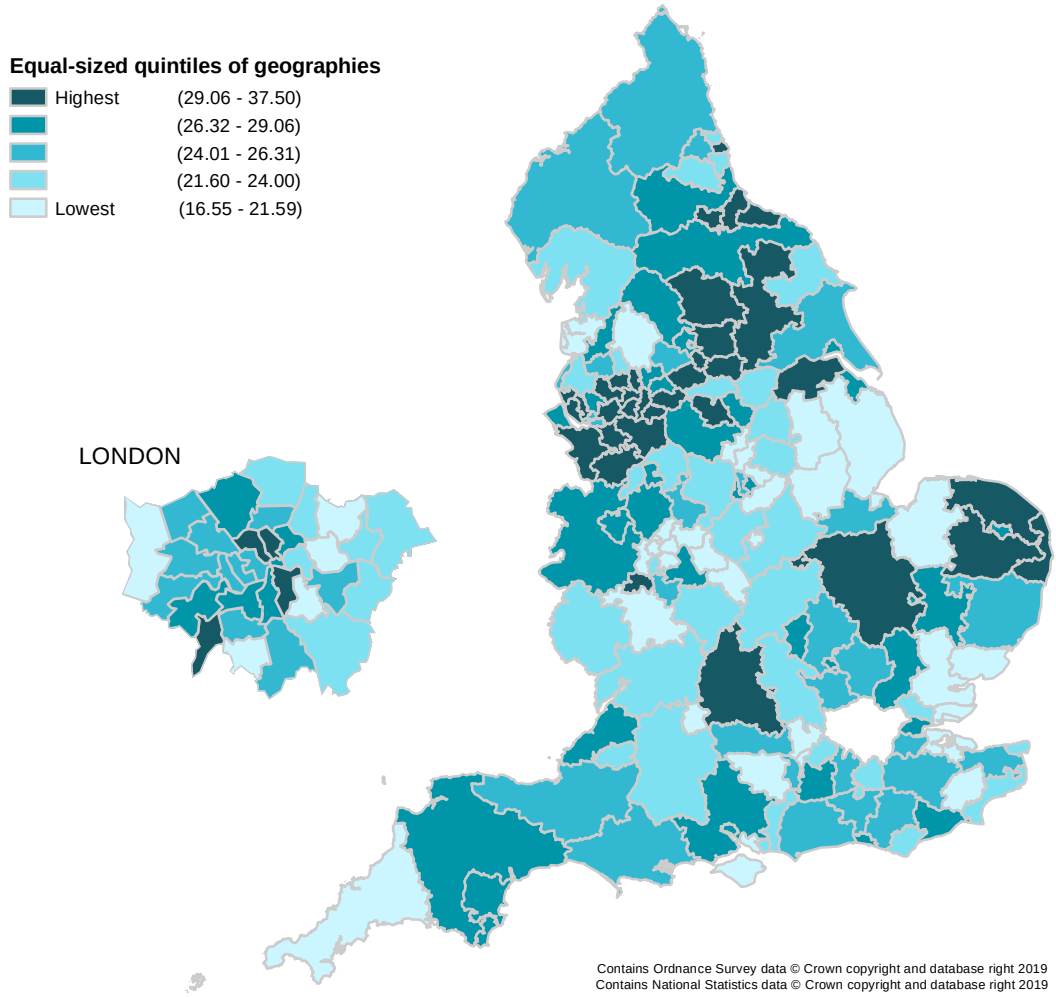
[1] Office for National Statistics, National Cancer Registration and Analysis Service within Public Health England Cancer registration statistics, England: 2017 [Accessed 28 August 2019]
[2] Brown K, Rumgay H, Dunlop C and others (2018) The fraction of cancer attributable to modifiable risk factors in England, Wales, Scotland, Northern Ireland, and the United Kingdom in 2015 Br J Cancer 118(8):1130-1141
[3] Office for National Statistics, National Cancer Registration and Analysis Service within Public Health England Cancer survival in England: adults [Accessed 28 August 2019]
[4] Allemani C, Coleman M and others (2018) Global surveillance of trends in cancer survival 2000-14 (CONCORD-3) The Lancet, Vol. 391, Issue 19125 p1023-1075
[5] Arnold M, Rutherford MJ, Bardot A, et al (2019) Progress in cancer survival, mortality, and incidence in seven high-income countries 1995–2014 (ICBP SURVMARK-2): a population-based study The Lancet Oncology 19(09) [Accessed 18 September 2019]
[6] Royal College of Physicians National Lung Cancer Audit [Accessed 29 August 2019]
[7] Office for National Statistics, National Cancer Registration and Analysis Service within Public Health England Index of cancer survival for Clinical Commissioning Groups in England: adults [Accessed 28 August 2019]
[8] Riaz SP, Linklater KM, Page R, et al (2015) Recent trends in resection rates among non-small cell lung cancer patients in England Thorax 2012;67:811-814 [Accessed 28 August 2019]
[9] Walters S, Benitez-Majano S, Muller P, et al Is England closing the international gap in cancer survival? British Journal of Cancer 15(113) [Accessed 18 September 2019]
[10] Møller H, Coupland V, Tataru D and others (2018) Geographical variations in the use of cancer treatments are associated with survival of lung cancer patients Thorax 273:530–537 [Accessed 8 August 2019]
[11] Office for National Statistics, National Cancer Registration and Analysis Service within Public Health England Cancer registration statistics, England: 2017 [Accessed 28 August 2019]
[12] United Kingdom Lung Cancer Coalition (2016) 25 by 25: a ten year strategy for improving lung cancer survival rates [Accessed 8 August 2019]
[13] Hiom S, Kumar H, Swanton C and others (2018) Lung cancer in the UK: addressing geographical inequality and late diagnosis The Lancet Oncology 19(8)1015–1017 [Accessed 8 August 2019]

Lung cancer – Diagnosis and presentation

Map 30a: Variation in percentage of lung cancer patients diagnosed at an early stage (stage 1 and 2) by CCG (2015-2017)

Optimum value: High



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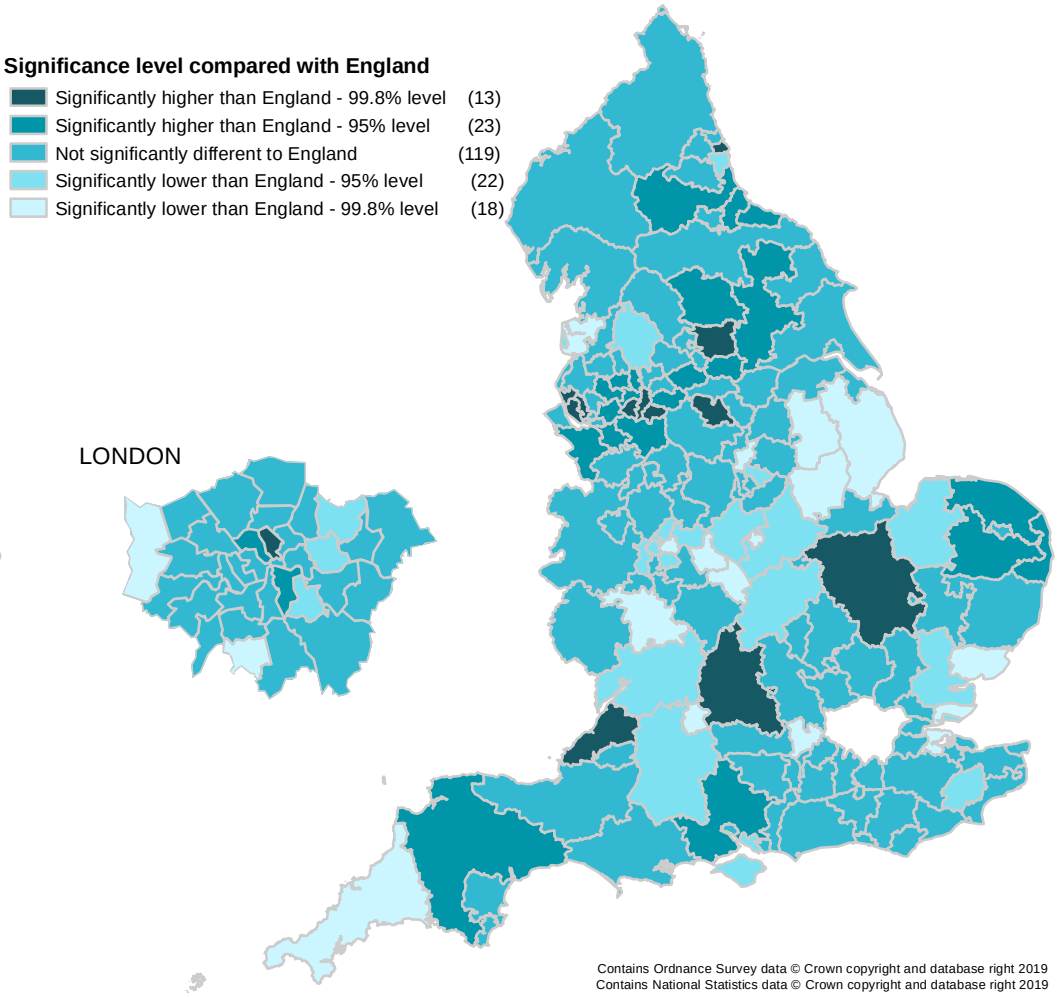

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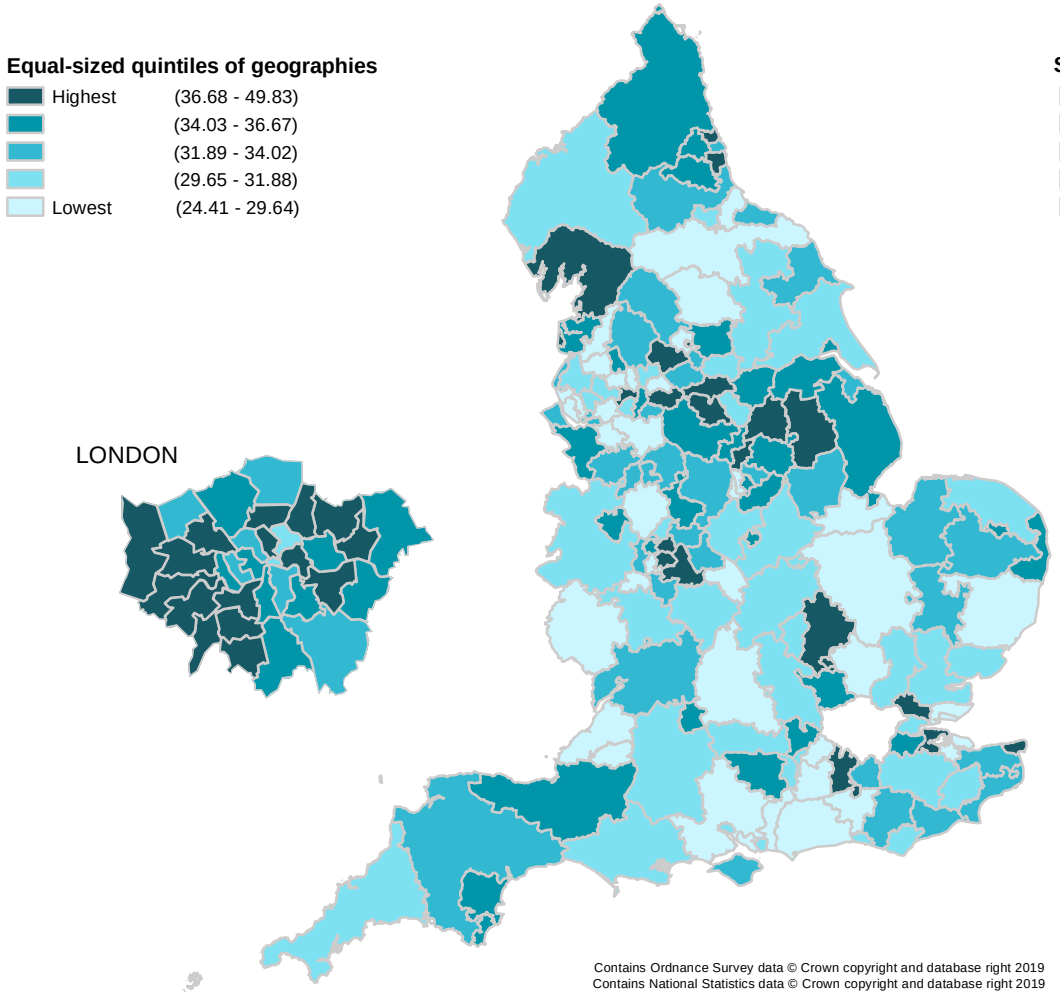
Lung cancer – Diagnosis and presentation

Map 30b: Variation in percentage of lung cancer patients presenting as an emergency by CCG (2014-2016)

Optimum Value: Low



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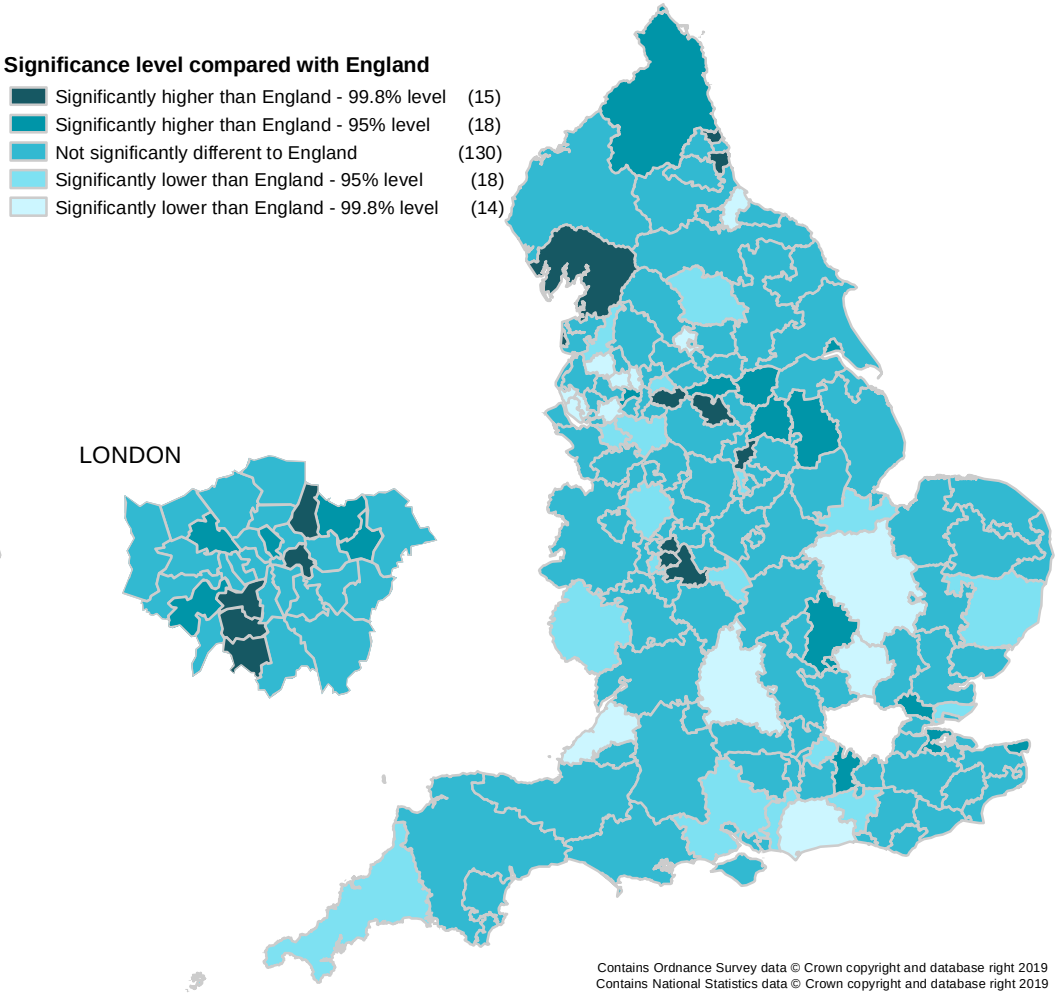

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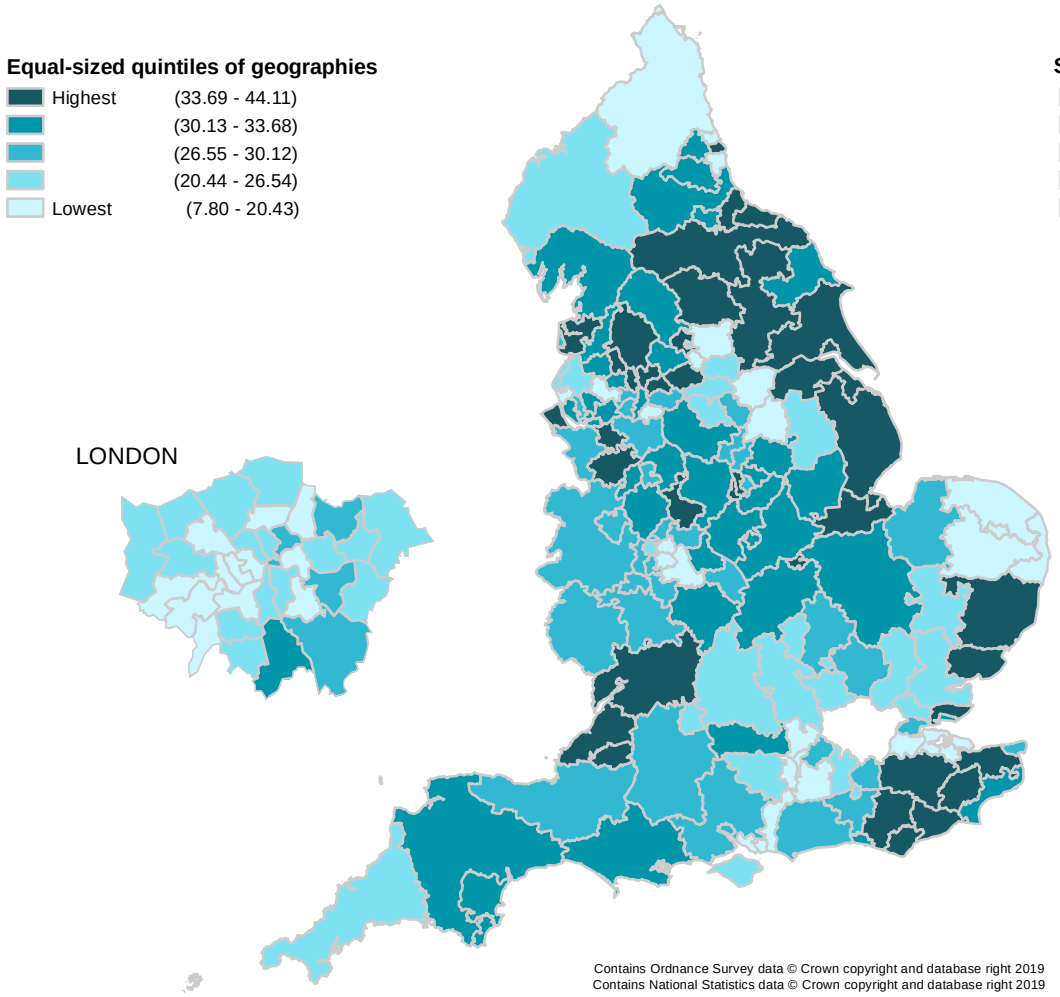
Lung cancer – Diagnosis and presentation

Map 30c: Variation in percentage of lung cancer patients presenting via the two-week wait route by CCG (2014-2016)

Optimum Value: High



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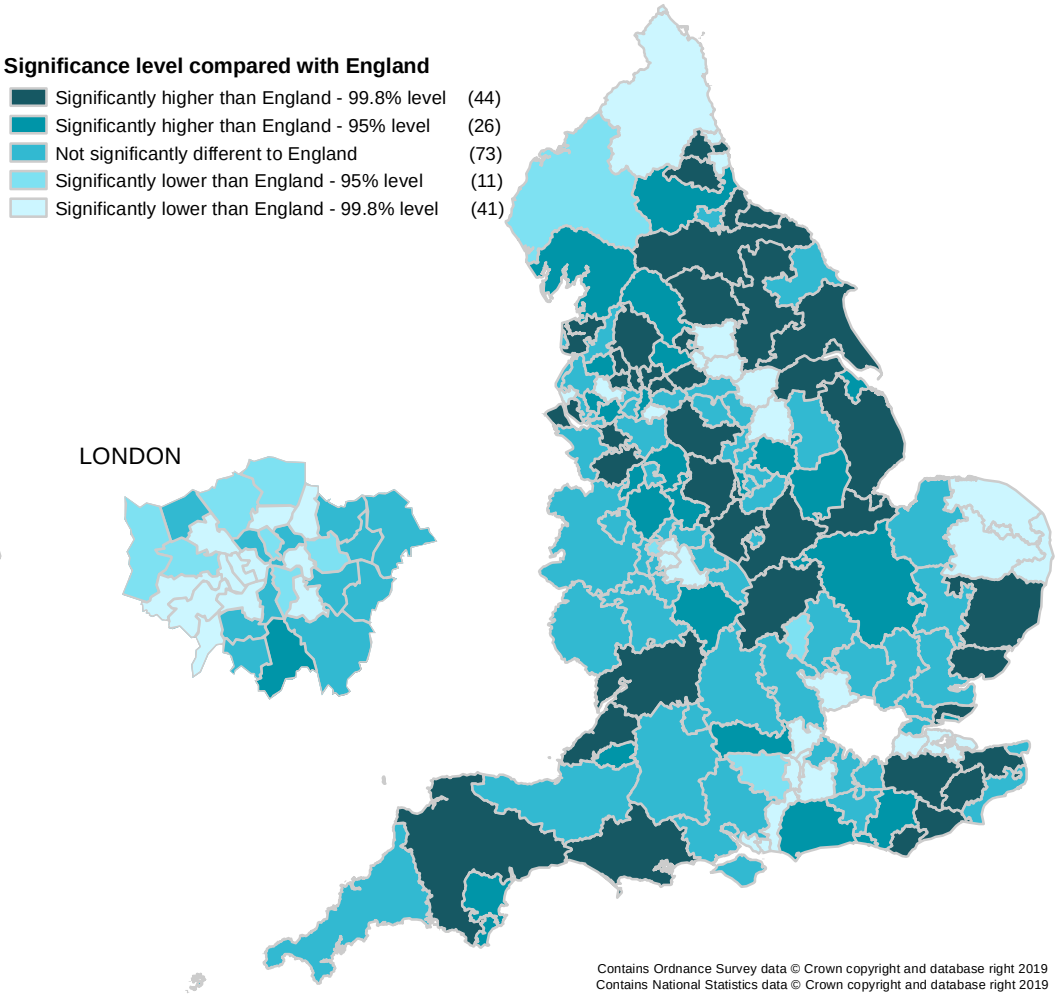

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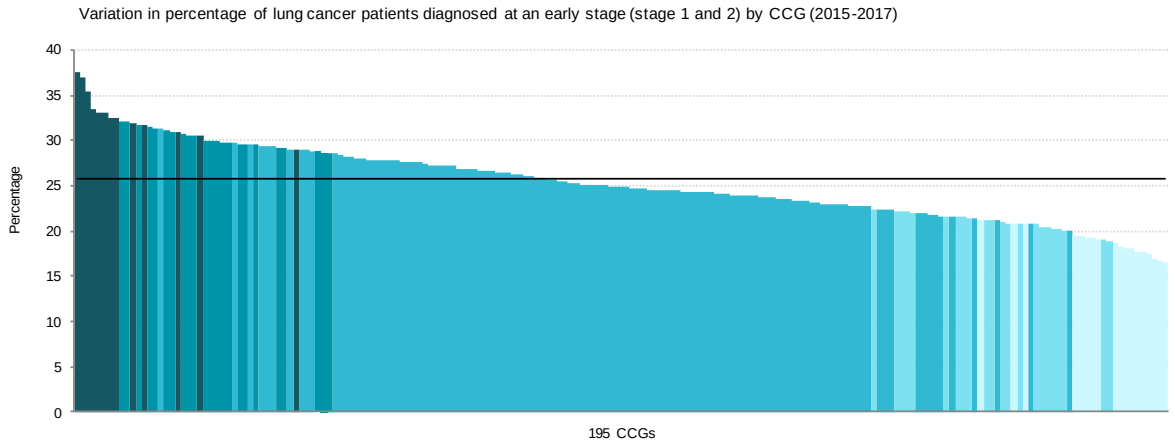
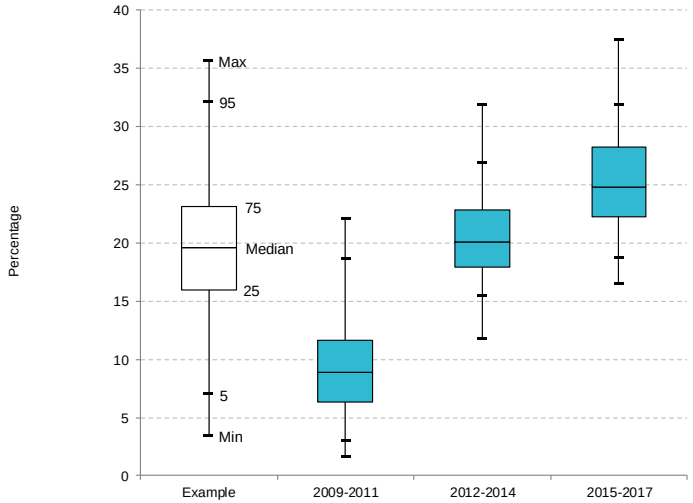




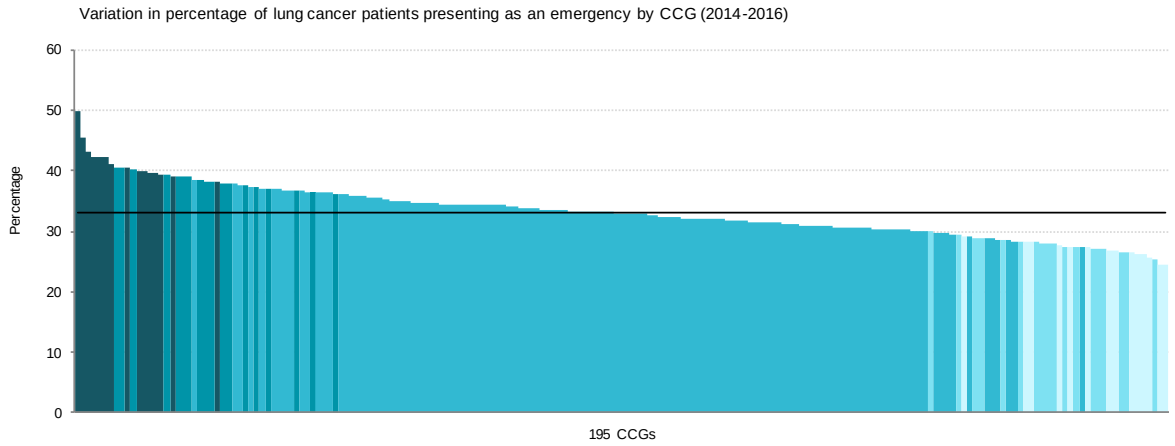
Max-Min (Range)		20.5	20.2	20.9	No significant change
95th-5th percentile		15.7	11.4	13.1	No significant change
75th-25th percentile		5.3	4.9	6.0	No significant change
Median		8.9	20.1	24.8	No significant change

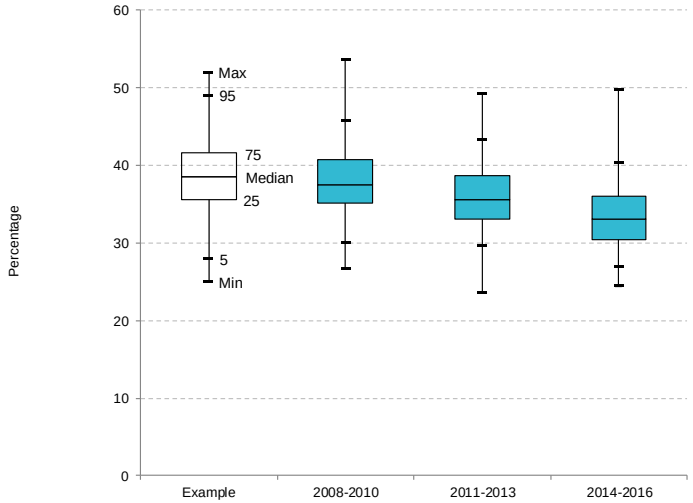
Context

There is good evidence that people diagnosed with lung cancer at an early stage do better than those presenting with more advanced disease.[1]

Patients with early stage lung cancer can be offered curative treatment with surgical resection and with radical radiotherapy, including stereotactic ablative radiotherapy (SABR). The improvements in lung cancer survival seen in England over the last 15 years correlate with increased surgical resection rates.[2] However, data from the most recent National Lung Cancer Audit (NLCA) shows that the majority of lung cancer patients are still diagnosed at later stage.[3]

Delays in starting treatment can also affect stage and fitness for treatment and therefore outcomes.[4] Currently referral via the Two Week Wait route is the most rapid and preferred pathway for diagnosis. Unfortunately, diagnosis made during an emergency presentation is still common in lung cancer,[5] with almost 35% of patients being diagnosed by this route. In the majority of cases this is emergency presentation due to symptoms from advanced lung cancer although a subset of emergency presentations are due to other causes, with asymptomatic early cancers noted as an incidental finding on computerised tomography (CT) scans. Patients diagnosed via the emergency route are less likely to receive active treatments and have a much lower one year survival rate.[5]





Max-Min (Range)		26.9	25.7	25.4	No significant change
95th-5th percentile		15.8	13.6	13.4	No significant change
75th-25th percentile		5.7	5.6	5.7	No significant change
Median		37.6	35.5	33.0	DECREASING Significant

Magnitude of variation

Map 30a: Variation in percentage of lung cancer patients diagnosed at an early stage (stage 1 and 2) by CCG (2015-2017)

The maps and column chart display the latest period (2015 to 2017), during which CCG values ranged from 16.6% to 37.5%, which is a 2.3-fold difference between CCGs. The England value for 2015 to 2017 was 25.8%.

The box plot shows the distribution of CCG values for the period 2009-2011 to 2015 -2017.

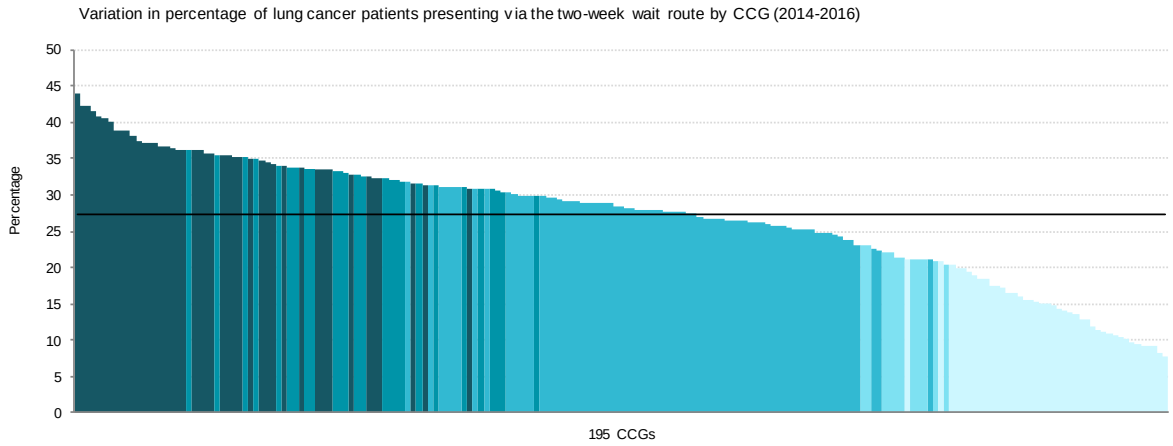
There was no significant change in any of the 3 variation measures between 2009 to 2011 and 2015 to 2017.

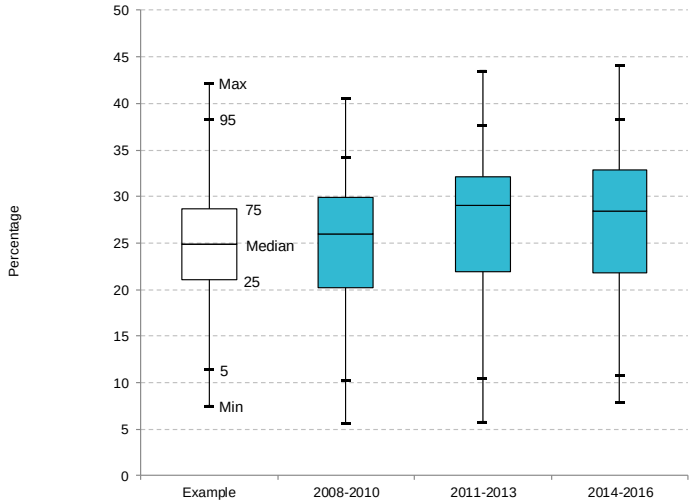
Map 30b: Variation in percentage of lung cancer patients presenting as an emergency by CCG (2014-2016)

The maps and column chart display the latest period (2014 to 2016), during which CCG values ranged from 24.4% to 49.8%, which is a 2-fold difference between CCGs. The England value for 2014 to 2016 was 33%.

The box plot shows the distribution of CCG values for the period 2008-2010 to 2014-2016. There was no significant change in any of the 3 variation measures between 2008 to 2010 and 2014 to 2016.

The median decreased significantly from 37.6% in 2008 to 2010 to 33.0% in 2014 to 2016.





Max-Min (Range)		34.9	37.7	36.3	No significant change
95th-5th percentile		24.0	27.1	27.5	No significant change
75th-25th percentile		9.7	10.1	11.1	No significant change
Median		25.9	29.1	28.4	No significant change

Map 30c: Variation in percentage of lung cancer patients presenting via the two-week wait route by CCG (2014-2016)

The maps and column chart display the latest period (2014 to 2016), during which CCG values ranged from 7.8% to 44.1%, which is a 5.7-fold difference between CCGs. The England value for 2014 to 2016 was 27.3%.

The box plot shows the distribution of CCG values for the period 2008-2010 to 2014-2016.

There was no significant change in any of the 3 variation measures between 2008 to 2010 and 2014 to 2016.

Reasons for both variation in stage at presentation and route of presentation across the country can be multiple and interdependent and include:

- equity of access to GP services
- variation across CCGs in referral pathways from primary care into hospitals and rapid access to diagnostic services such as CT imaging
- variation in service provision for lung cancer
- adherence to NICE guidelines in referral for suspected cancer (NG12)
- awareness of symptoms, and overlap of symptoms with co-morbid conditions
- individual factors which may impede interaction with health services, such as health literacy, fear of diagnosis, English as a second language, or a reluctance to ‘bother’ health professionals

Data from the NLCA organisational audit showed that service provision levels in keeping with national commissioning guidelines were associated with improved

lung cancer outcomes including survival, access to curative intent treatment and timely start of treatment.[6]

Delays in referral pathways may lead to an increase in emergency presentations. People presenting via an emergency pathway often have symptoms from more advanced disease and are less likely to receive active treatment.

Over the last 20 years, completeness of lung cancer staging across England has dramatically improved with the majority of lung cancer cases fully staged for the last 7-8 years, allowing a useful analysis on variation by CCG in early/late stage presentation for recent years.[7]

Options for action

Increasing the proportion of lung cancer patients diagnosed with early stage disease is important across the whole country, in particular for CCGs with significantly lower percentages than the national mean.

Early diagnosis campaigns such as Be Clear on Cancer[8,9,10] have led to an increased number of GP attendances and onward referrals. Repetition of such campaigns may maintain a public awareness of symptoms. Alongside such campaigns local commissioners could consider promoting NICE guidelines on cancer referral (NG12) to primary care services.

Service providers and Cancer Alliances should monitor the implementation of the National Optimal Lung Cancer Pathway (NOLCP)[11]. This pathway developed by the Lung Clinical Expert Group sets out strong recommendations for trusts and CCGs to follow with regard to optimising rapid diagnosis and start of active treatment. Where implemented this will lead to reductions in variation in the patient pathway and quicker (and hence earlier) diagnosis. A new 28-day standard for the interval between referral and diagnosis is shortly to be introduced by NHS England (NHSE).[12]

Following positive outcomes from pilots in Liverpool and Manchester, the NHS will extend lung health checks over the next two years. This will provide for an immediate low-dose CT scan to patients assessed as high risk of lung cancer. In addition, during 2019 more mobile lung CT scanners will be deployed starting in areas where cancer survival rates are at their lowest levels. Not only will this increase the number of cancers identified and reduce inequalities in cancer outcomes, but it will also identify a range of other health conditions including COPD.[6]

Resources

Public Health England Be Clear on Cancer PHE Campaign Resource Centre [Accessed 27 March 2019]

Cancer Research UK, Lung Clinical Expert Group (2017) National Optimal Lung Cancer Pathway [Accessed 14 June 2019]

Cancer Research UK, Lung Clinical Expert Group (2017) NOLCP Implementation Guide [Accessed 14 June 2019]

National Institute of Health and Care Excellence (2019) Lung cancer overview (NICE pathway) [Accessed 27 March 2019]

National Institute of Health and Care Excellence (2018) Suspected cancer recognition and referral overview (NICE pathway) [Accessed 27 March 2019]

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[2] Walters S, Benitez-Majano S, Muller P, et al Is England closing the international gap in cancer survival? British Journal of Cancer 15(113) [Accessed 18 September 2019]
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[5] National Cancer Registration and Analysis Service Routes to Diagnosis [Accessed 3 June 2019]
[6] Adizie JB, Khakwani A, Beckett P, et al Impact of organisation and specialist service delivery on lung cancer outcomes Thorax 2019;74:546-550 [Accessed 18 September 2019]
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[10] Cancer Research UK (2014) Be Clear on Cancer Evaluation Results [Accessed 10 June 2019]
[11] Cancer Research UK, Lung Clinical Expert Group (2017) National Optimal Lung Cancer Pathway - Implementation Guide [Accessed 27 March 2019]
[12] NHS England (2019) Long Term Plan Chapter 3, paragraph 3.58 [Accessed 05 June 2019]