

Statistical bulletin

Geographic patterns of cancer survival in England: Adults diagnosed 2003 to 2010 and followed up to 2015

Cancer survival estimates for England by NHS Region, Cancer Alliance, Sustainability and Transformation Plan.

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1 . Main points

Survival at 1 year and 5 years after diagnosis improved for the 8 cancers examined in this report among adults diagnosed in England between 2003 and 2010.

This is the first time survival estimates by Cancer Alliances and Sustainability and Transformation Plans in England have been reported.

Differences in net survival between the 4 NHS Regions are generally small, of the order 1% to 3%. Survival improved slightly but consistently in all 4 regions for 7 of the 8 cancers.

For 5-year survival, the largest annual increase among Cancer Alliances for men was for colon cancer in South Yorkshire, Bassetlaw, North Derbyshire and Hardwick (2.4% per year) and for women, for cervical cancer in National Cancer Vanguard: North Central and North East London (2.6% per year).

There are wide geographic disparities in survival among the 44 Sustainability and Transformation Plans that cover the whole of England. The geographic range in 1-year survival was greater than 15% for cancers of the oesophagus and stomach (both men and women), and for women with cancer of the bladder and cervix. For 5-year survival, the range was wider than 15% for cancers of the bladder in both men and women, for colon cancer in men and for cancers of the stomach and cervix in women.

2 . Things you need to know about this release

Cancer survival has been examined for adults (15 to 99 years) diagnosed with 1 of 8 common cancers in England between 2003 and 2010. All the patients were followed up for their vital status for at least 5 years up to 31 December 2015. The cancers are those of the oesophagus, stomach, colon, lung, breast (women), cervix, prostate and bladder (Background notes 1 and 2). These cancers represent around 60% of new cancers diagnosed in England in 2014¹. These 8 cancers were included in this analysis as they have a wide range of pathways for diagnosis and treatment, and different levels of survival. Estimates of 1-year and 5-year net survival (Background note 2) are presented for each sex, and for both sexes combined.

Following advice from key stakeholders, sub-national survival estimates are presented for new geographical areas of the NHS. Results are presented for England as a whole, and for three levels of organisation of the NHS in England – 4 NHS Regions, 19 Cancer Alliances (average population about 2.9 million) and 44 Sustainability and Transformation Plan (STP) areas (average population about 1.2 million) (Background note 6).

Age-standardised survival estimates are presented for adults who were diagnosed during 2008 to 2010 and followed up to 31 December 2015. Estimates are age-standardised to adjust for changes in the age profile of cancer patients over time and differences between geographical areas (Background note 3). To show the wide disparity in cancer survival between STPs, we present in Tables 1 and 2 the range of age-standardised survival estimates (difference between the minimum and maximum) between all the STPs.

To show trends over time, unstandardised survival estimates for each year during the period 2003 to 2010 are also presented, together with the average annual change in net survival over this 8-year period (Background note 5).

3 . Collaboration

The cancer registration data in this publication were collected by the National Cancer Registration and Analysis Service in Public Health England. This publication is produced in partnership with the Cancer Survival Group at the London School of Hygiene & Tropical Medicine.



4 . Geographic patterns of cancer survival

England

In England as a whole, 1-year survival was above 70% and 5-year survival above 55% for cancers of the colon, breast (women), cervix and prostate, and for bladder cancer in men (Figure 1).

For bladder cancer in women, 1-year survival was just below 70% (68%) and just above 45% (47.7%) at 5 years. Changes in the coding and classification of bladder cancer since 2000 have contributed to a reduction in the survival estimates in England, and to some of the observed regional variation (Background note 7).

For cancers of the oesophagus, stomach and lung, survival remains very low, with 1-year survival below 45% and 5-year survival below 20%.

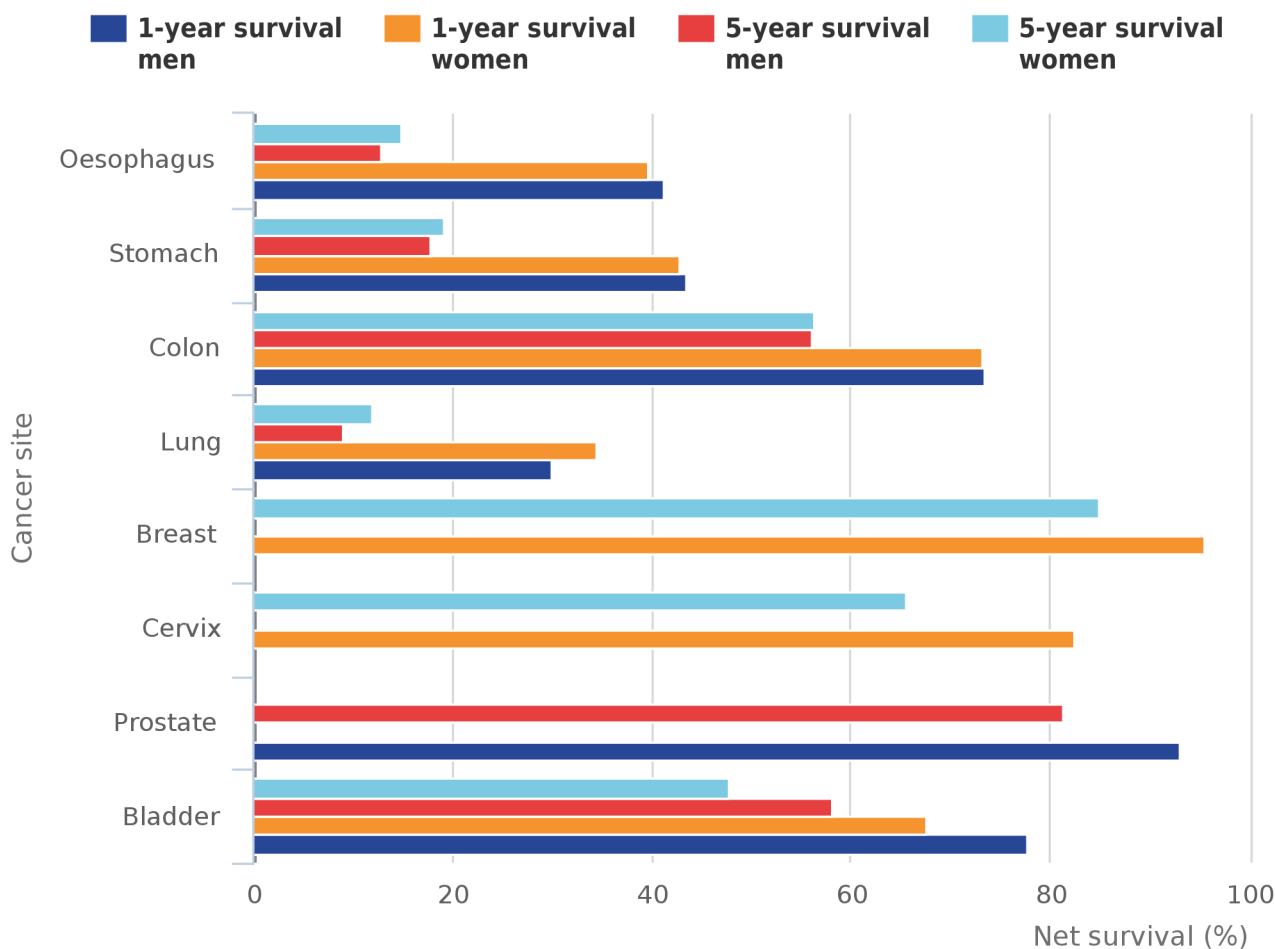
One-year survival is generally higher in men, except for lung cancer which is around 5% lower in men. While 5-year survival is generally higher in women, except for bladder cancer which is around 10% lower in women. For bladder cancer, both 1-year and 5-year survival are about 10% higher in men than in women.

Trends in cancer survival are shown in the reference tables as the annual change in net survival over the 8-year period, 2003 to 2010. This is presented as the average difference from one year to the next (Background note 5). In England as a whole and for both sexes combined, 1-year and 5-year survival improved by up to 1.2% a year between 2003 and 2010 for seven of the eight cancers examined in this report. There was almost no change in bladder cancer survival.

The largest annual improvements in 1-year survival in England in men were for cancers of the oesophagus and stomach (average increase 1.0% per year), and in women, for cancer of the colon (1.0%).

The largest annual improvements in 5-year survival were for colon cancer in men and for cervical cancer in women (1.2% per year). For all other cancers at national level, 1-year and 5-year survival continued to increase, albeit slowly, between 2003 and 2010 (average increase less than or equal than 1% per year).

Figure 1: 1- and 5-year age-standardised net survival (%) for adults diagnosed during the period 2008 to 2010 and followed up to 2015: England, 8 common cancers, by sex



Source: Office for National Statistics, London School of Hygiene & Tropical Medicine

Notes:

1. Adults aged 15 to 99 years.
2. International Classification of Diseases, tenth edition.
3. The symbol (:) means not available. Breast cancer in males is rare, and survival estimates are not available.
4. The symbol (z) means not applicable.

NHS Regions

The largest annual improvements in 1-year survival for men amongst the 4 NHS regions were for oesophageal cancer in the North of England and stomach cancer in the South of England (average increases of 1.5% per year). For women, the largest improvement in 1-year survival was the average annual increase of 1.7% for stomach cancer, in London.

For 5-year survival, the largest increase over this 8-year period for men was for colon cancer in the South of England and London (1.4% per year). For women, the largest increase was for cervical cancer, also in London (1.4% per year).

Cancer Alliances

For men, 1-year survival for cancers of the stomach and colon increased in all 19 Cancer Alliances (CAs), with the average annual increase ranging from 0.4% to 2.5% per year for stomach and from 0.2% to 2.2% per year for colon.

1-year survival also increased for cancers of the oesophagus (17 CAs), lung (18 CAs), and prostate (16 CAs). 5-year survival increased for 15 out of 19 CAs for 7 of the 8 cancers, except for bladder cancer, for which 10 CAs showed an increase in 5-year survival.

For women, 1-year survival for colon cancer rose in all 19 CAs, with the average annual increase ranging from 0.1% to 1.7% per year. 1-year survival also increased for cancer of the lung in 18 CAs and in 17 CAs for cancer of the cervix. 5-year survival increased in all 19 CAs for cancers of the colon, lung and breast, and in 17 CAs for cervical cancer.

Sustainability and Transformation Plans

Sustainability and Transformation Plans (STP) are smaller areas than Cancer Alliances, and more variation can be expected due to smaller populations. Wide differences in age-standardised survival between the 44 STPs in England were seen for patients diagnosed during the 3-year period 2008 to 2010 for each of the 8 cancers examined (see Tables 1 and 2).

For women, the range in 1-year survival estimates between STPs was more than 15% for cancers of the oesophagus, stomach, cervix and bladder, and wide differences persisted in 5-year survival for stomach, cervix and bladder.

For men, the range in survival between STPs was more than 15% for 1-year survival from cancers of the oesophagus and stomach, and for 5-year survival from cancers of the colon and bladder. It should be noted that some of the geographic variation in bladder cancer survival may be attributed to differences between the regions of England in the speed of adoption of changes in pathological coding and classification during this period (Background note 7).

Table 1: Range in 1-year net survival (%) across the 44 Sustainability and Transformation Plans in England: adults diagnosed during 2008 to 2010 and followed up to 2015, 8 common cancers, by sex

		Age-standardised net survival (%)								
ICD-10 code ²	Site description	Men			Women			Persons		
		Min	Max	Range	Min	Max	Range	Min	Max	Range
C15	Oesophagus	33.0	56.3	23.3	31.7	47.4	15.7	33.4	48.1	14.7
C16	Stomach	31.5	51.5	20.0	30.2	56.0	25.7	31.0	53.2	22.2
C18	Colon	67.3	77.2	9.8	68.6	78.7	10.1	68.4	77.0	8.6
C33-34	Lung	26.2	33.9	7.6	27.5	40.1	12.5	27.8	36.4	8.6
C50	Breast	:	:	:	94.5	96.8	2.4	:	:	:
C53	Cervix	z	z	z	69.7	92.1	22.4	z	z	z
C61	Prostate	89.2	95.9	6.7	z	z	z	z	z	z
C67	Bladder	70.0	84.8	14.8	57.2	75.8	18.6	68.6	81.5	12.8

Source: Office for National Statistics and London School of Hygiene & Tropical Medicine

1. Adults aged 15 to 99 years.
2. International Classification of Diseases, tenth edition.
3. The symbol (:) means not available. Breast cancer in males is rare, and survival estimates are not available.
4. The symbol (z) means not applicable.
5. The range is the geographical variation.

Table 2: Range in 5-year net survival (%) across the 44 Sustainability and Transformation Plans in England: adults diagnosed during 2008 to 2010 and followed up to 2015, 8 common cancers, by sex

ICD-10 code ²	Site description	Age-standardised net survival (%)								
		Men			Women			Persons		
		Min	Max	Range	Min	Max	Range	Min	Max	Range
C15	Oesophagus	5.5	17.0	11.5	8.2	18.2	10.0	7.8	18.3	10.5
C16	Stomach	11.3	24.7	13.5	8.8	30.1	21.3	10.2	25.0	14.8
C18	Colon	50.6	68.2	17.6	51.0	63.9	12.8	52.3	64.1	11.8
C33-34	Lung	5.9	12.4	6.5	7.0	16.5	9.5	7.0	14.3	7.3
C50	Breast	:	:	:	81.2	87.1	5.9	:	:	:
C53	Cervix	z	z	z	55.1	80.8	25.7	z	z	z
C61	Prostate	74.5	87.6	13.0	z	z	z	z	z	z
C67	Bladder	46.3	71.5	25.2	35.4	56.4	21.0	44.5	63.8	19.3

Source: Office for National Statistics and London School of Hygiene & Tropical Medicine

1. Adults aged 15 to 99 years.
2. International Classification of Diseases, tenth edition.
3. The symbol (:) means not available. Breast cancer in males is rare, and survival estimates are not available.
4. The symbol (z) means not applicable.
5. The range is the geographical variation.

5 . Additional Information

Further information about our cancer survival estimates can be found in the [Cancer Survival Quality and Methodology Information report](#). These are overview notes containing important qualitative information on the quality of statistics and a summary of the methods used to compile the output.

Statistics on cancer are produced:

- in Scotland by the [Scottish Cancer Registry](#)
- in Wales by the [Welsh Cancer Intelligence and Surveillance Unit](#)
- in Northern Ireland by the [Northern Ireland Cancer Registry](#)

6 . Policy context

Health policy-makers use population-based cancer survival statistics to plan services aimed at cancer prevention and treatment. Cancer survival estimates feed in to national cancer plans, such as: '[Achieving world-class cancer outcomes: A Strategy for England 2015 to 2020](#)'. The report recommends 6 strategic priorities to help improve cancer survival in England by 2020.

Cancer survival estimates also feed into outcomes strategies that set out how the NHS, public health and social care services will contribute to the progress agreed with the Secretary of State, in each of the high-level outcomes frameworks. The indicators set for the [National Health Service \(NHS\) Outcomes Framework](#) include 1- and 5-year survival from colorectal, breast and lung cancers.

7 . Authors

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8 . Acknowledgements

The National Cancer Registry at the Office for National Statistics and the London School of Hygiene and Tropical Medicine wish to acknowledge the work of the [National Cancer Registration and Analysis Service](#) in Public Health England, which provides the raw data for these analyses.

9. Background notes

1. The cancer registration data in this publication were collected by the National Cancer Registration and Analysis Service, Public Health England. Cancer records were included in the analyses if the patient was diagnosed between the ages of 15 and 99 years with a primary, invasive, malignant neoplasm in one of the eight specified organs, as defined in the 10th edition of the International Classification of Diseases: oesophagus (C15); stomach (C16); colon (C18); lung (C33-34); breast (C50); cervix (C53); prostate (C61) and bladder (C67)². Cancer records were excluded from analysis if the patient's cancer was registered only from a death certificate, or the cancer was not a primary, invasive malignancy (benign, 'in situ', or uncertain whether benign or malignant). Patients who were known to have died on the same day as they were diagnosed were included in the analyses with a survival time of 1 day. Details of the inclusion and exclusion criteria have been published³.
2. Net survival is the survival that we would observe if cancer were the only cause of death. It is estimated by assuming the all-cause mortality to be the sum of the expected (background) mortality and the excess mortality due to cancer. Expected mortality is derived from life tables of all-cause mortality in the general population for each sex and at each year of age. We used life tables for each calendar year 2003 to 2015, for each of 5 categories of socio-economic status (deprivation) and for each Government Office Region (GOR; North East, North West, Yorkshire and The Humber, East Midlands, West Midlands, East of England, London, South East, South West). Net survival was estimated with the non-parametric Pohar-Perme estimator⁴, implemented in Stata within the `stns` command⁵. This method adjusts for the bias that can arise when, for example, the death of elderly patients from their cancer is less likely to be recorded because of a higher competing risk of death from other causes ('informative censoring')⁶. For convenience, net survival is expressed as a percentage in the range 0 to 100%.
3. Net survival varies with age at diagnosis. The age profile of cancer patients can vary with time and between geographical areas. To enable comparison of survival for all ages combined over long periods of time and between geographical areas, age-standardised estimates are calculated as a weighted sum of the age-specific survival estimates, using a standard age distribution. Here, we used the weights from the age distribution of cancer patients diagnosed during 1986 to 1990 in England and Wales⁷. This enables direct comparison with survival figures published for England over the last 20 years. Age-standardisation requires an estimate of survival to be available for each age group. Age-specific estimates may not be obtained if there are too few events (deaths) in a given age group. That can happen because survival is very high (there are very few deaths) or because it is very low (most of the patients die early in the 5-year period of follow-up). Where it was not possible to age-standardise, the unstandardised estimate has been presented instead, and this is clearly marked in the tables(:). In a very few instances, it was not even

possible to present an unstandardised estimate, again because of too few observed events (deaths). Again, this is clearly marked in the tables(--).

4. Unstandardised net survival was estimated for each year from 2003 to 2010. In some cases, it was not possible to calculate the unstandardised estimate for adults diagnosed with a particular cancer in a particular geography in a particular year, because there were too few patients to enable a reliable estimate to be produced. This has been clearly marked in the tables (:).
5. The annual trend in survival is the slope estimated by variance-weighted least-squares regression of the annual survival estimates. This represents the average annual change in net survival over 8 consecutive years. Due to the year-on-year variability of the survival estimates in smaller areas (for example, Sustainability and Transformation Plans), the average annual trend may be increasing over eight years, even though a drop in survival may be observed between 2 consecutive years. The annual trend in survival is only reported if at least three annual survival estimates were available and the absolute difference in survival between 2 consecutive years did not exceed 20%. The p-value indicates whether or not the average annual change in survival is statistically significant. A p-value lower than 0.05 indicates that we can be more than 95% confident that the trend represents a real change and did not just occur by chance.
6. [Previous editions](#) of this bulletin have presented cancer survival estimates for Clinical Senates, Area Teams, Government Office Regions, Strategic Health Authorities (SHA) and Cancer Networks. Following stakeholder feedback, results are now available for new geographies: [Cancer Alliances](#) and [Sustainability and Transformation Plans](#). Cancer Alliances were established in addition to the three National Cancer Vanguard sites to lead local implementation of the 2015 cancer strategy. Sustainability and Transformation Plans (STPs) are local plans produced collaboratively by NHS organizations and councils which aim to improve health and care by setting out practical ways to improve NHS services and health outcomes.
7. Transitional-cell papillomas of the bladder diagnosed from 2000 onwards were reclassified from malignant to non-malignant. Non-malignant tumours are excluded from survival analyses. Survival from transitional-cell papillomas is high. Excluding them from the analyses reduces the overall estimate of survival from bladder cancer. Geographic variation in the speed with which these changes in pathological classification were applied still affects geographic patterns of survival.
8. The introduction of the Prostate-Specific Antigen (PSA) test during the 1990s increased the diagnosis of asymptomatic prostate cancers. Men with these tumours have higher survival.

10. References

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