Office for
National Statistics

Statistical bulletin

Geographic Patterns of Cancer Survival in England: Adults diagnosed 2005 to 2009 and followed up to 2014

Cancer survival estimates for England by NHS Region, Clinical Senate and Area Team.

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1 . Main findings

Survival at 1 year and 5 years after diagnosis improved for 7 of the 8 cancers examined in this report among adults diagnosed in England between 2005 and 2009. There has been little change in survival for bladder cancer.

The wide geographic disparities in survival are persistent. Among the 25 geographic areas of the NHS (Area Teams) that cover the whole of England, the range in age-standardised 1-year survival was greater than 10% for cancers of the oesophagus and stomach (both men and women) and for women with cancer of the colon, cervix and bladder. For 5-year survival, the geographic range was wider than 10% for cancers of the colon and bladder (both men and women), for prostate cancer and for cancers of the stomach and cervix in women.

For men, 1-year survival for stomach cancer increased in 21 of the 25 Area Teams (ATs), with the average annual increase ranging from 0.1% to 4.0% per year. The average increase in 1-year survival was also 0.1% per year or more for cancers of the colon (20 ATs), lung (19 ATs) and oesophagus (16 ATs). 5-year survival from cancers of the colon and lung also increased at 0.1% per year or more in 22 ATs.

For women, 1-year survival for colon cancer rose in 21 of the 25 ATs, with the average annual increase ranging from 0.1% to 3.3% per year. 1-year survival also increased for cancers of the breast and lung in 20 ATs. 5-year survival also increased at 0.1% per year or more for cancers of the lung (22 ATs), breast (20 ATs) and cervix (20 ATs).

2 . Summary

Cancer survival has been examined for adults (15 to 99 years) diagnosed with 1 of 8 common cancers in England between 2005 and 2009. All the patients were followed up for their vital status for at least 5 years, to 31 December 2014. The cancers are those of the oesophagus, stomach, colon, lung, breast (women), cervix, prostate and bladder (Background notes 1 and 2). These cancers represent 61% of new cancers diagnosed in England in 2013,1 with 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.

Results are presented for England as a whole, and for 3 geographic levels of organisation of the NHS in England: 4 NHS Regions, 12 Clinical Senates (average population about 4.5 million) and 25 Area Teams (average population about 2.2 million) (Background note 5).

Age-standardised survival estimates are presented for adults who were diagnosed during 2007 to 2009 and followed up to 31 December 2014. Estimates are age-standardised to adjust for changes in the age profile of cancer patients over time and between geographical areas (Background note 3). To show trends over time, unstandardised survival estimates for each year of the period 2005 to 2009 are also presented, together with the average annual change (Background note 4).

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 Research UK Cancer Survival Group at the London School of Hygiene and Tropical Medicine.
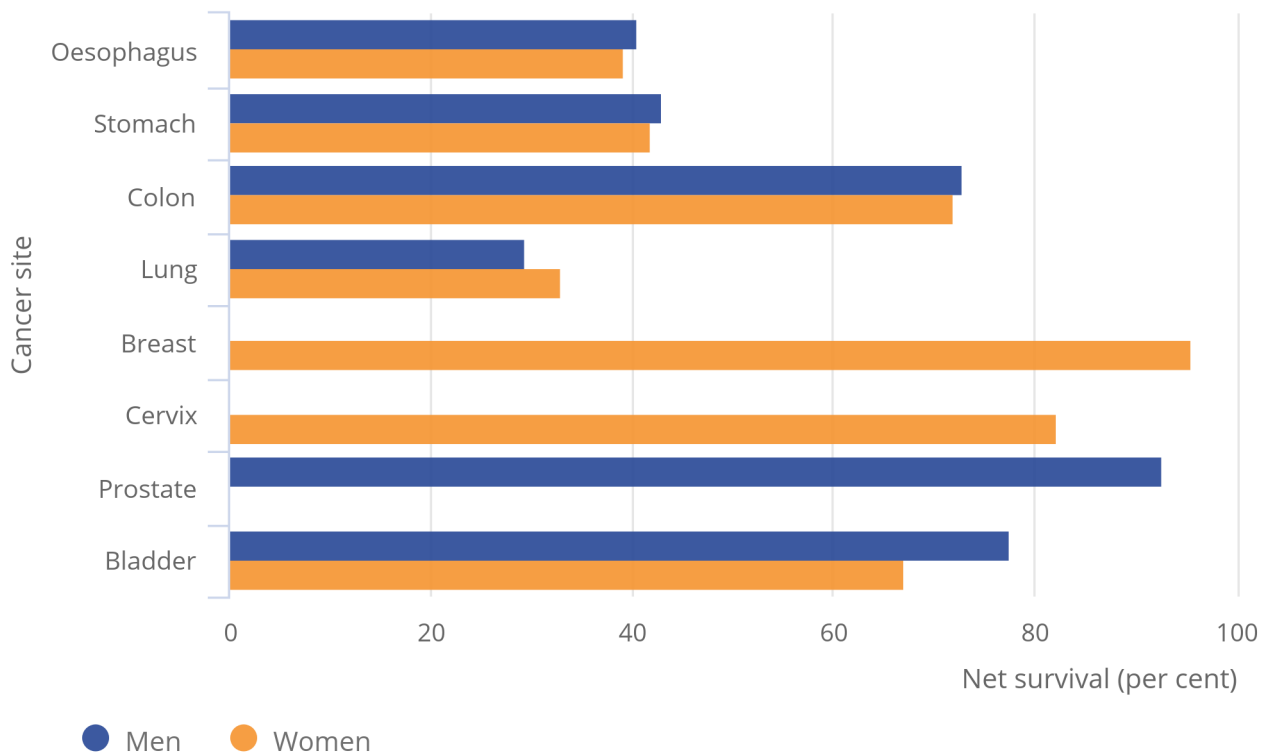
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3 . Results

Figure 1: 1-year age-standardised net survival [1] (per cent) for adults [2] diagnosed during 2007 to 2009 and followed up to 2014: England, 8 common cancers, by sex

Figure 1: 1-year age-standardised net survival^1^ (per cent) for adults^2^ diagnosed during 2007 to 2009 and followed up to 2014: England, 8 common cancers, by sex
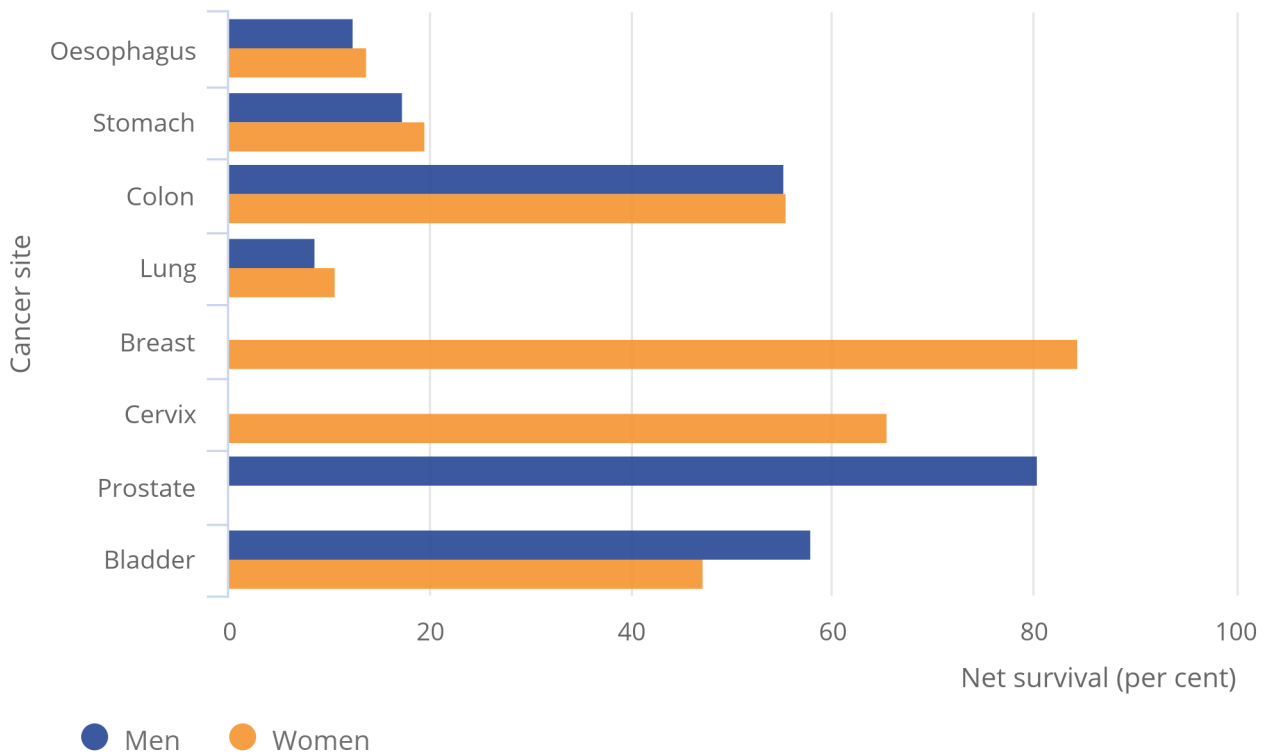

Source: Office for National Statistics, London School of Hygiene and Tropical Medicine

Notes:

1. Survival estimates were age-standardised using a standard population of cancer patients (see Background note 3 of statistical bulletin).

2. Adults ages 15 to 99 years.

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.

Figure 2: 5-year age-standardised net survival [1] (per cent) for adults [2] diagnosed during 2007 to 2009 and followed up to 2014: England, 8 common cancers, by sex

Figure 2: 5-year age-standardised net survival^1^ (per cent) for adults^2^ diagnosed during 2007 to 2009 and followed up to 2014: England, 8 common cancers, by sex

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

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In England as a whole, 1-year survival was above 70% and 5-year survival above 45% for cancers of the colon, breast (women), cervix and prostate, and for bladder cancer in men (Figures 1 and 2).

For bladder cancer in women, 1-year survival was just below 70% (67%) and just above 45% (47.3%) 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 6).

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

Survival is generally higher in men at 1 year, except for lung cancer, while 5-year survival is generally higher in women, except for bladder cancer. 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 5-year period 2005 to 2009. This is presented as the average difference from one year to the next (Background note 4). In England as a whole and for both sexes combined, 1-year and 5-year survival improved between 2005 and 2009 for 7 of the 8 cancers examined in this report, while survival of bladder cancer was stable.

The largest annual improvement in 1-year survival in England in men was for cancer of the stomach (average increase 1.0% per year) and in women, for cancer of the oesophagus (1.2%). The largest annual improvements in 5-year survival were for colon cancer (average increase 1.5% per year for men and 1.2% for women) and for cervix cancer (also 1.2% per year). For all other cancers at national level, 1-year and 5-year survival continued to increase, slowly, between 2005 and 2009 (average increase less than 1% per year). Bladder cancer in women was an exception: survival fell slightly between 2005 and 2009 (-0.2% per year for 1-year survival and -1.1% per year for 5-year survival).

Among the 12 Clinical Senates, the largest annual improvement in 1-year survival was for oesophageal cancer, both for men (Yorkshire and The Humber, average increase 2.8% per year) and for women (Thames Valley, 4.0% per year). For 5-year survival, the largest annual increase from 2005 to 2009 for men was for colon cancer in East Midlands (2.8% per year) and for women, for cervical cancer in East of England (2.9% per year).

Area Teams are smaller than Clinical Senates and more variation can be expected. Nevertheless, wide and persistent differences in survival between the 25 Area Teams in England were seen for each of the 8 cancers examined here that were diagnosed during the 3-year period 2007 to 2009 (see Tables 1 and 2). For women, the range in 1-year survival estimates between Area Teams was more than 10% for cancers of the oesophagus, stomach, colon, cervix or bladder and wide differences persisted at 5 years. Five-year survival from bladder cancer, in women, differed even more widely between Area Teams (range about 27% – but see Background note 6).

For men, the range in survival between Area Teams was more than 12% for 1-year survival from cancers of the oesophagus and stomach, and for 5-year survival from cancers of the prostate and bladder. It should be noted that some of the geographic variation in bladder cancer survival can 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 6).

Table 1: Range in age-standardised 1-year net survival (per cent) among Area Teams in England: adults diagnosed during 2007 to 2009 and followed up to 2014, 8 common cancers, by sex

ICD-10 code[2]	Site description	Men			Women			Persons		
		Min	Max	Range	Min	Max	Range	Min	Max	Range
C15	Oesophagus	34.5	46.7	12.2	32.9	46.9	14.0	34.5	45.2	10.8
C16	Stomach	34.0	48.7	14.7	34.9	48.8	13.8	35.3	48.4	13.1
C18	Colon	69.0	75.7	6.7	63.9	75.5	11.6	68.2	75.0	6.7
C33-34	Lung	24.8	32.7	7.9	28.8	36.2	7.4	26.6	33.5	6.9
C50	Breast	:	:	:	94.5	96.6	2.1	:	:	:
C53	Cervix	z	z	z	75.9	86.3	10.4	z	z	z
C61	Prostate	89.4	95.3	5.9	z	z	z	z	z	z
C67	Bladder	73.0	81.5	8.5	57.8	77.3	19.4	69.1	80.2	11.2

Source: Office for National Statistics

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.

Table 2: Range in age-standardised 5-year net survival (per cent among Area Teams in England: adults diagnosed during 2007 to 2009 and followed up to 2014, 8 common cancers, by sex

ICD-10 code[2]	Site description	Men			Women			Persons		
		Min	Max	Range	Min	Max	Range	Min	Max	Range
C15	Oesophagus	8.8	17.8	9.0	9.2	17.2	8.1	9.5	17.7	8.2
C16	Stomach	12.0	21.5	9.5	12.8	25.3	12.5	13.5	22.9	9.4
C18	Colon	51.1	61.8	10.8	46.1	60.8	14.7	49.9	58.4	8.6
C33-34	Lung	6.4	10.9	4.5	8.1	12.3	4.2	8.0	11.4	3.3
C50	Breast	:	:	:	82.4	86.6	4.3	:	:	:
C53	Cervix	z	z	z	59.8	72.5	12.7	z	z	z
C61	Prostate	73.4	86.2	12.8	z	z	z	z	z	z
C67	Bladder	49.8	65.2	15.3	35.4	62.0	26.6	46.2	61.5	15.3

Source: Office for National Statistics

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.

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]()

4 . 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.

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6 . 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.

7. 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 at 1 of the 8 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 one day. Details of the inclusion and exclusion criteria have been published[3].

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 2005 to 2014, for each of 5 categories of socio-economic status (deprivation) and for each English Region (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 estimator [4], as implemented in Stata within the stns command[5]. 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 0–100%.

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 Wales[7]. 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.

4. Net survival was estimated for each year from 2005 to 2009 (these results are not age-standardised). 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 5 consecutive years. Due to the year-on-year variability of the survival estimates in smaller areas (for example, Area Teams), the average annual trend may be increasing over 5 years, even though a drop in survival may be observed between 2 consecutive years. 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. The annual trend in survival is only reported if at least 3 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 observations represent a real change and did not just occur by chance.

5. In editions of this bulletin published before 2014 (available on our archived website), results were presented by Government Office Region, Strategic Health Authority (SHA) and Cancer Network. SHAs and Cancer Networks are NHS geographies that were abolished in March 2013. Clinical Senates were established across England in April 2013 to provide strategic clinical advice and leadership to Clinical Commissioning Groups (CCGs) and the NHS Commissioning Board. There are 12 Clinical Senates: assigned to fixed geographies, Clinical Senates comprise a range of professionals and take an overview of health and healthcare for local populations by providing advice and leadership on how services should be designed to provide the best overall care and outcomes for patients.

6. 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.

7. 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.

8. Previous editions of this bulletin are available on our archived website.

9. These National Statistics are produced to high professional standards and released according to arrangements approved by the UK Statistics Authority.

10. A list of the names of those given pre-publication access to the statistics and written commentary is available. The rules and principles that govern pre-release access are featured within the Pre-release Access to Official Statistics Order 2008.

11. Details of the policy governing the release of new data are available by visiting the UK Statistics Authority website or from the Media Relations Office email: media.relations@ons.gsi.gov.uk.

The United Kingdom Statistics Authority has designated these statistics as National Statistics, in accordance with the Statistics and Registration Service Act 2007 and signifying compliance with the Code of Practice for Official Statistics.

Designation can be broadly interpreted to mean that the statistics:

- meet identified user needs

- are well explained and readily accessible

- are produced according to sound methods

- are managed impartially and objectively in the public interest

Once statistics have been designated as National Statistics it is a statutory requirement that the Code of Practice shall continue to be observed.

8. References

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