Office for National Statistics

Statistical bulletin

Index of cancer survival for Clinical Commissioning Groups in England: adults diagnosed 2001 to 2016 and followed up to 2017

1-year cancer survival by Clinical Commissioning Group for all-cancers combined, three cancers combined, breast, colorectal and lung. 1-, 5- and 10-year index of cancer survival estimates are also available by Sustainability and Transformation Partnerships and Cancer Alliances.

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Next release:
To be announced

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1 . Main points

- The 1-year all-cancer survival index for England has increased from 62.0% in 2001 to 72.8% in 2016.

- The difference in the all-cancer index between the Clinical Commissioning Groups (CCGs) with the lowest net survival estimate and the highest net survival estimate narrowed from 16.0 percentage points in 2001 to 9.7 percentage points in 2016, indicating less geographic inequality across CCGs.

- Geographic inequality across CCGs for 1-year net survival in breast and colorectal cancer reduced in 2016 compared with 2001, whereas the inequality in lung cancer net survival increased.

- This is the first time that 1-, 5- and 10-year net survival has been included for the 19 Cancer Alliance areas; 5-year survival by Cancer Alliance showed a narrowing in the range of net survival estimates from 8.1 percentage points in 2001 to 4.0 percentage points in 2012.

2 . Collaboration

The cancer registration and net survival data in this bulletin have been collected and calculated by the National Cancer Registration and Analysis Service (NCRAS) within Public Health England (PHE). The Office for National Statistics (ONS) collects and provides the mortality data that PHE include in the survival analysis, as well as the life tables used to construct the survival outputs. The ONS works with PHE to quality assure the outputs. The ONS independently produces the bulletin based on the survival analysis produced by PHE, including determining the focus, content, commentary, illustration and interpretation of the survival analysis presented.

To ensure timely and accurate data delivery, the ONS and PHE have agreed on what data we expect and require from PHE, outlining quality, timing, definitions and format of data supply, and explaining how and why the data will be used.

3 . Things you need to know about this release

This bulletin focuses on trends in the 1-year survival index for all cancers combined (excluding non-melanoma skin cancer and prostate cancer) for each of the 195 Clinical Commissioning Groups (CCGs), the 42 Sustainability and Transformation Partnerships (STPs), 19 Cancer Alliances (CAs) and for England as a whole. CCGs are the smallest geography included in this release and combine to make up the larger STPs and CAs.

Separate 1-year survival estimates for breast (women only), colorectal (bowel) and lung cancer are also presented in this bulletin at CCG level. These estimates are age-standardised (breast cancer) or age-sex-standardised (colorectal and lung cancers). For STPs, CAs and England, the bulletin and datasets also provide 5- and 10-year all-cancer survival indices, and breast, colorectal and lung cancer survival estimates.

Net survival is estimated for adults (aged 15 to 99 years) who were diagnosed with cancer between 2001 and 2016 and followed up to 31 December 2017. Net survival is the survival of cancer patients compared with estimated mortality rates without the cancer. Survival is estimated using flexible parametric models. More information on methodology can be found in the Quality and Methodology Information report.

The cancer survival index provides a convenient, single number that summarises the overall pattern of cancer survival. A more detailed definition is provided in Section 8. Differences reported within this bulletin have been calculated based on rounded numbers.

These cancer survival estimates are designated as National Statistics. National Statistics are a subset of official statistics, which have been certified by the UK Statistics Authority as compliant with its Code of Practice for Statistics.

The Office for National Statistics in partnership with Public Health England produce a number of official and National Statistics cancer survival publications. In Table 2 (Section 8) we have summarised the purpose of each publication and the similarities and differences between them. If you wish to give us any feedback regarding how you use the cancer publications we have a survey open until 1 May 2019.

4 . Between 2001 and 2016, geographic inequality in cancer survival across CCGs narrowed

The range in 1-year net survival estimates (the gap between the highest and lowest Clinical Commissioning Groups (CCGs)) has narrowed from 16.0 percentage points in 2001 to 9.7 percentage points in 2016, which means there is now less geographic inequality in cancer survival by CCG in England. Figure 1 shows the variation of CCGs' net survival across time. The charts show that net survival has increased throughout the period while the difference in survival between CCGs has decreased.

Figure 1: Number of Clinical Commissioning Groups by 2% bands of 1-year all cancer net survival in England, 2001 to 2016

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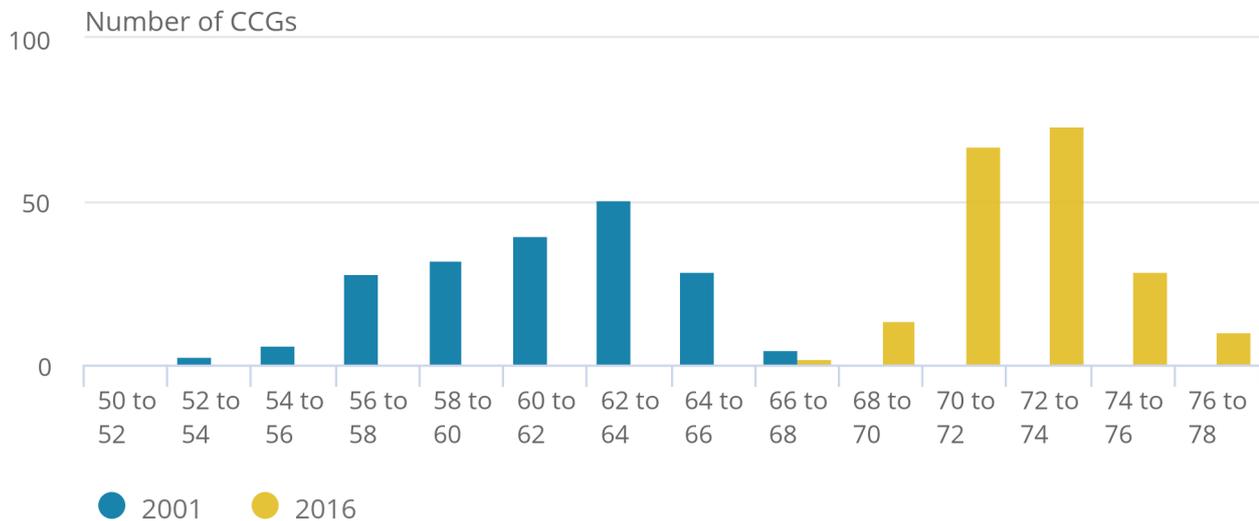
Source: Public Health England – National Cancer Registration and Analysis Service, Office for National Statistics

Notes:

1. The category labelled 50% to 52% represents those CCGs with survival between 50.0% to 51.9%. This applies to each label and there were no CCGs with survival below 50.0% or above 77.9%.

Although the index of all-cancer survival has increased in England and for all Cancer Alliances, Sustainability and Transformation Partnerships (STPs) and CCGs, the rate of improvement has varied across individual CCGs. Table 1 shows the four most and four least improved CCGs, with the largest or smallest percentage point increases in the index of all-cancer net survival between 2001 and 2016. Those CCGs where survival has improved most had relatively low survival in 2001, whereas those CCGs where survival improved the least already had relatively high survival in 2001.

Even though a CCG may be in the most or least improved categories it does not follow that these CCGs have the highest or lowest survival in 2016. The index has been designed to compare levels of survival over time for individual CCGs; direct comparisons of survival between CCGs may not be completely reliable.

Table 1: Most and least improved Clinical Commissioning Groups for index of all cancer net survival in England, 2001 to 2016

Area name	Net survival (%)		
	2001	2016	Improvement
England	62.0	72.8	10.8
Most improved CCGs			
NHS South Cheshire CCG	53.8	74.6	20.8
NHS Waltham Forest CCG	51.5	71.3	19.8
NHS Vale Royal CCG	54.5	74.3	19.8
NHS Hounslow CCG	57.0	76.1	19.1
Least improved CCGs			
NHS Wyre Forest CCG	64.5	71.0	6.5
NHS Berkshire West CCG	65.1	71.6	6.5
NHS Lincolnshire West CCG	65.5	70.4	4.9
NHS Vale of York CCG	67.5	71.6	4.1

Source: Public Health England – National Cancer Registration and Analysis Service, Office for National Statistics

Figure 2 shows a map of 1-year net survival by CCG from 2001 to 2016 in England.

In 2001, the north of England had the largest proportion of CCGs with statistically significantly lower survival than England, 57% (35 out of 61).

By 2016, 40% (16 out of 40) of CCGs in the Midlands had statistically significantly lower survival than England compared with 39% (24 out of 61) of CCGs in the north of England.

The proportion of CCGs in the south of England with statistically significantly lower survival than England has decreased from 39% (37 out of 94) in 2001 to 20% (19 out of 94) in 2016. However, the index of all-cancer net survival varies for individual CCGs within these broad regional trends.

Figure 2: Time series map of the 1-year net survival index for all cancers combined for Clinical Commissioning Groups (CCG) in England, 2001 to 2016

5 . Differences in geographic inequality in breast, colorectal and lung cancer

Estimates of 1-year age-standardised net survival for breast cancer (women) and age-sex-standardised net survival for colorectal and lung cancer in each Clinical Commissioning Group (CCG) are presented in this section. For more detail, funnel plots of all CCG estimates for 2001 and 2016 are presented in the datasets.

Figure 3: 1-year net survival (%) for breast, colorectal and lung cancer, for Clinical Commissioning Groups in England, 2001 and 2016

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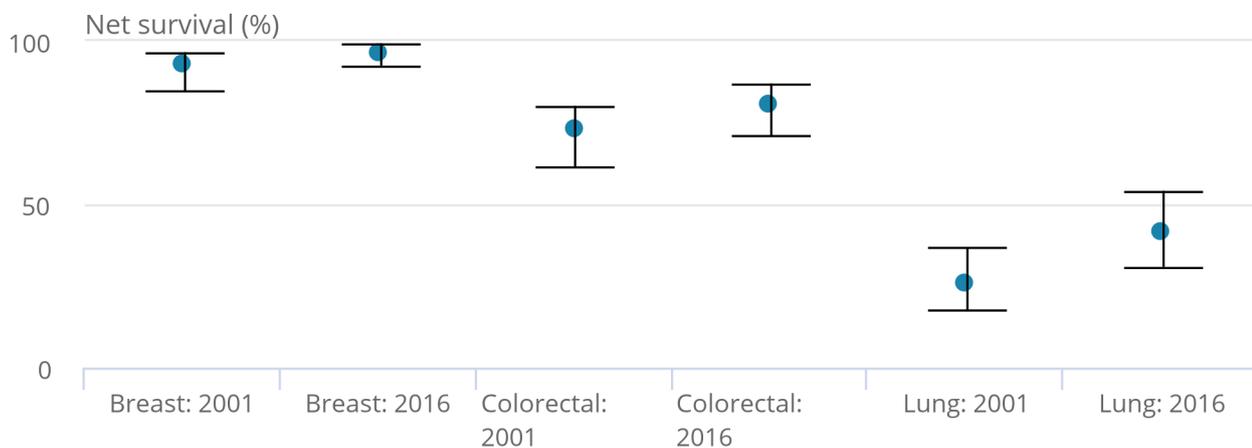
Source: Public Health England – National Cancer Registration and Analysis Service, Office for National Statistics

Figure 3 displays the minimum and maximum CCG net survival estimates rates for 2001 and 2016, including the overall survival estimate for England. For both breast and colorectal cancer, the CCG range of net survival estimates has narrowed, indicating cancer survival is now more similar amongst CCGs in England than in 2001. In contrast, the range of net lung cancer survival estimates has widened across CCGs for the same time period.

In 2016, the range between the CCGs with the lowest and highest 1-year net survival estimates for breast cancer was 6.5 percentage points (92.3% for NHS South Tyneside CCG compared with 98.8% for NHS West London CCG).

For colorectal cancer the 2016 range between the lowest and highest 1-year net survival estimates was 15.8 percentage points (71.0% for NHS Leicester City CCG compared with 86.8% for NHS Barnet CCG).

For lung cancer the 2016 range was 23.1 percentage points (30.7% for NHS Medway CCG compared with 53.8% for NHS Central London (Westminster)).

For 2016, there was less between-CCG variation in breast cancer net survival estimates than in colorectal or lung cancer net survival estimates. Of the 195 CCGs, 1-year breast cancer net survival was higher for 11 CCGs, based on survival for England and the precision (see the Quality and Methodology Information for details) of the CCGs estimate, and no CCGs were significantly less. In comparison, for colorectal cancer 1-year net survival was higher than England for 22 CCGs and lower than England for 21 CCGs. For 1-year survival in lung cancer, estimates were higher than England for 32 CCGs and lower than England for 29 CCGs. For more detail, funnel plots of all CCG estimates for 2001 and 2016 are presented in the datasets.

Generally, net survival for breast cancer is high, regardless of stage of diagnosis. Stage at diagnosis is a measure of how far the primary tumour has grown when the patient first presents in hospital (for more information on staging please refer to the Concepts and definitions section of our Quality and Methodology Information). As outlined in our Cancer Survival in England bulletin, breast cancer patients diagnosed between 2012 and 2016 at stage 1 had 1-year net survival of 100%, which fell to 66% if diagnosed at stage 4. For breast cancer, 75.4% of patients were diagnosed at stage 1 or 2, which could account for the closely distributed data amongst CCGs in Figure 3.

Differences in cancer survival between CCGs may be partially related to differences in the proportion of patients diagnosed at a relatively early stage. For breast cancer, the majority of patients are diagnosed early compared with lung cancer where the majority of patients are diagnosed at later stages (for more information please refer to our Cancer Survival in England bulletin). This may affect the variability between CCGs.

Of the three cancers considered here, there is most geographic inequality in lung cancer, with a wider range between the lowest and highest CCG survival estimate. In contrast to breast cancer, lung cancer shows a wider range in net survival estimates depending upon stage of diagnosis.

6 . 1-, 5-, and 10-year survival increased for all Cancer Alliances whilst geographic inequality narrowed

Figure 4: Minimum, maximum, and median 1 and 5-year net survival by Cancer Alliance for all cancers in England, 2001 to 2016

Figure 4: Minimum, maximum, and median 1 and 5-year net survival by Cancer Alliance for all cancers in England, 2001 to 2016

Net survival (%)

| | Maximum 1-year | Median 1-year | Minimum 1-year | Maximum 5-year |
| Median 5-year | Minimum 5-year | | |
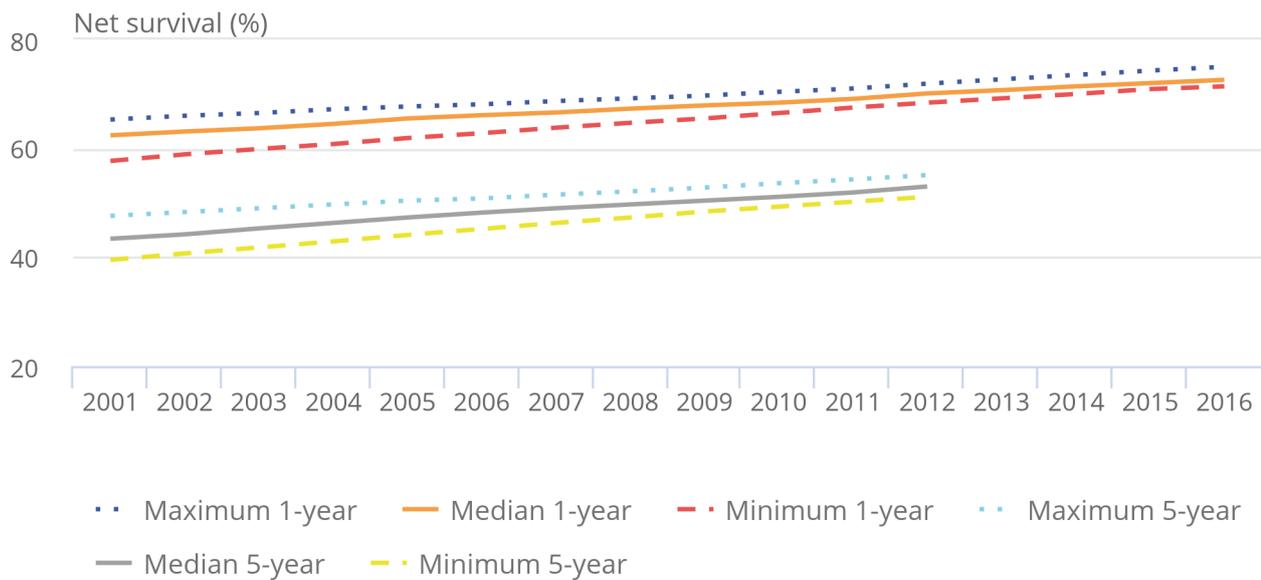
Source: Public Health England – National Cancer Registration and Analysis Service, Office for National Statistics

Notes:

1. 5-year survival estimates are not available from 2013 to 2016 due to the lack of 5-years of complete follow-up.

Since 2001, both the 1- and 5-year all-cancer survival index increased across all Cancer Alliances (CA), with both the lowest and highest survival estimates increasing over time. Figure 4 shows that the minimum CA estimates for 1-year survival in 2016 and 5-year survival in 2012 are now higher than the corresponding maximum survival estimates in 2001.

Both 1- and 5-year survival also showed a narrowing in the range of CA estimates over time. Between 2001 and 2016, 1-year survival showed a narrowing in range from 7.6 percentage points to 3.6 percentage points, whilst between 2001 and 2012, 5-year survival showed a narrowing in range from 8.1 percentage points to 4.0 percentage points.

The median CA estimate of the 1-year all-cancer survival index shifted over time. In 2001, the median estimate was closer to the maximum than the minimum, but in 2016 the median was closer to the minimum. This indicates a quicker rate of improvement and reduction in inequality for CAs that fall below the median.

Overall for the years available, the 1-, 5- and 10-year all-cancer survival index increased for all CAs and the geographic inequality between CAs reduced. Similar to 1- and 5-year estimates, 10-year net survival increased across all CAs between 2001 and 2007, with a decrease in the range between CAs. In 2001, 10-year survival varied between 34.3% and 42.7%, a difference of 8.4 percentage points. Whilst, in 2007 survival ranged from 41.4% to 46.7%, ranging 5.3 percentage points. Throughout 2001 to 2007, the CA with the lowest 10-year all-cancer survival estimate was North Central and North East London, and the CA with the highest estimate was Wessex.

7 . Sustainability and Transformation Partnerships (STP)

For patients diagnosed in 2016, the 1-year all-cancer survival index for STPs ranged from 70.2% to 75.6%, compared with 56.3% to 66.5% in 2001. For further data, including 5- and 10-year net survival estimates for STPs please refer to our datasets.

8 . Interpretation of these statistics

The cancer survival index: what it is

The cancer survival index provides a convenient, single number that summarises the overall pattern of cancer survival in each Clinical Commissioning Group (CCG) or Sustainability and Transformation Partnership (STP) or Cancer Alliance (CA) or England, for all cancers combined, for each calendar year. It combines the net survival estimates for each sex, age group and type of cancer (breast cancer diagnosed in women, colorectal cancer and lung cancer) separately and all other cancers combined, prostate and non-melanoma skin cancer being excluded. More information on methodology can be found in the Quality and Methodology Information report.

Research on population-based cancer survival trends in England and Wales found that for most cancers, survival is either stable or rising steadily from year to year. This trend is reflected in the index. The cancer survival index is designed to reflect real progress in cancer outcomes by long-term monitoring of progress in overall cancer survival. The index provides a summary measure of cancer survival that takes account of any shifts in the pattern of cancers in a given CCG.

The survival index can be compared over time, because it is adjusted for any changes in the profile of cancer patients by age, sex or type of cancer. This adjustment is necessary because survival varies widely by all three factors meaning that, without standardisation, changes in survival could result from changes in the profile of cancer patients. For example, overall cancer survival in a given CCG could change simply because of changes in the profile of its cancer patients, even if survival at each age, for each cancer and in each sex did not change. CCGs should not be compared with each other in any one year, instead they should be compared with the region and England total estimates.

Points to consider when interpreting these estimates

For geographic areas with small populations, like most CCGs, some fluctuation in survival estimates between consecutive years can be expected, as found in the following studies: Cancer survival indicators for Clinical Commissioning Groups in England (PDF, 1.3MB) and Cancer survival indicators for primary care organisations in England (PDF, 544KB). Fluctuations in cancer survival by CCG can occur due to the small numbers of cancer diagnoses and deaths each year within the population. Therefore, a low survival figure for a single calendar year should not be over-interpreted. However, if the survival estimates in a given CCG are consistently low "outliers" for several years in a row, possible explanations should be considered.

Interpretation should therefore focus on trends, rather than the survival estimate for a particular year. A CCG, STP or CA for which the survival index is consistently lower than average should nevertheless be considering why survival in its area might be low, even if it is not identified as an outlier.

The aim of this publication is to present data that can support long-term improvements in cancer control. These estimates can indicate the potential for improvement in the management of cancer, from early detection through to referral, investigation, treatment and care. Survival estimates should not be used as the only indicator of a CCG's performance in cancer outcomes. To gain a more complete picture of the cancer burden in a particular CCG, these estimates should be used alongside other information available, such as cancer incidence and mortality data.

It is important to note that CCGs in England came into existence on 1 April 2013, replacing NHS Primary Care Trusts. STPs were established in December 2016 and Cancer Alliances were established in late 2016 (September to December). A CCG, STP or CA cannot be held responsible for trends in cancer survival that pre-date its existence. Data are provided for this 16-year period so that each CCG has a baseline against which to assess progress over time. Survival is estimated using the most up-to-date CCG boundaries – in 2018, the number of CCGs fell from 207 to 195.

CCGs are membership bodies in which local General Practitioner (GP) practices are the members. Therefore, the population of a CCG is not entirely based on the geographical population of a defined territory, but on patients who are registered with a GP practice that is a member of that CCG, but who may live in the territory of a different CCG. With this in mind, it is important to note a limitation of these analyses: the cancer patients included in the analyses are those who lived in the territory assigned to that CCG when they were diagnosed, as explained in the article, Dismantling the signposts to public health? NHS data under the Health and Social Care Act 2012 .

The survival estimates must be interpreted with care. They do not reflect the survival prospects for any individual cancer patient; they represent the survival for all cancer patients in a given area, in a given period of time, diagnosed with a specified tumour.

More information on the methodology can be found in the Quality and Methodology Information report. For a brief outline of the similarities and differences between our cancer survival outputs please refer to Table 2.

Table 2: Similarities and differences between the latest cancer survival publications

	Cancer survival in England	Index of survival for CCG in England	Geographic patterns
Purpose	Provides 1-year and 5-year net cancer survival for adults in England, for all cases and by stage at diagnoses. Provides 1-, 5- and 10-year predictions of net cancer survival for adults diagnosed in 2016 in England.	Provides 1-year net survival for all-cancers combined; for breast, colorectal and lung cancer separately; and for these three cancers combined.	Provides 1-year and 5-year cancer survival estimates for England by STP, CA and NHS Region.
Age	All these publications relate to cancer survival for adults aged 15 to 99 years.		
Data source	All publications use data from the National Cancer Registration and Analysis Service, Public Health England.		
Sites	Provides estimates for 29 cancer sites.	Provides an all cancer survival estimate (excluding prostate cancer). Provides estimates for breast, colorectal and lung cancer separately.	Provides estimates for 14 cancer sites.
Timeframe	Cohorts, diagnosed between 2012-2016 followed up to 2017.	Trend (2001-2016) of adults followed up to 2017.	Cohorts, diagnosed between 2011-2015 followed up to 2016. Trends; 1-year (2008-2015) and 5-year (2004-2011) followed up to 2016.
Geographies	England cancer survival estimate.	England cancer survival estimate. Provides lower level geographies; CCG, STP and CA.	England cancer survival estimate. Provides lower level geographies; STP, CA and NHS region.

Source: Public Health England – National Cancer Registration and Analysis Service, Office for National Statistics

The Office for National Statistics also publishes statistics on Childhood Cancer Survival for children aged (0 to 14 years) diagnosed with cancer in England. This release provides an all cancer survival estimate trend for the years 2001 to 2016 followed up to 2017 using data from the National Cancer Registration and Analysis Service, Public Health England.

9 . Who uses these statistics and for what purpose?

Given that a significant gap remains in survival compared with the European average (PDF, 1.0MB), the Department of Health and Social Care (DHSC) identified cancer as a specific improvement area for preventing people dying prematurely in the National Strategy (announced in 2011). In 2014, a new five-year cancer strategy for England (PDF, 4.9MB) was developed by the Independent Cancer Task Force. This sets out recommendations for how the NHS can improve cancer outcomes for patients. The implementation of these recommendations is being monitored by government bodies.

Survival estimates are used to formulate, monitor and assess health policy and healthcare provision and planning. These estimates feed into the Clinical Commissioning Group (CCG) Outcomes Indicator Set (CCG OIS) , which:

"provides clear, comparative information for CCGs about the quality of health services and the associated health outcomes. The indicators measure outcomes at CCG level to help inform priority setting and drive local improvement. The CCG OIS does not set thresholds or levels of ambition."

The CCG OIS also contributes to the National Health Service (NHS) Outcomes Framework, which focuses on measuring health outcomes and includes 1-year and 5-year net survival from colorectal, breast and lung cancers. The NHS Five Year Forward View (2014) set out: "that improvements in outcomes will require action on three fronts: better preventions, swifter access to diagnosis, and better treatment and care for all those diagnosed with cancer."

A detailed list of users of cancer survival estimates can be found in the Quality and Methodology Information report.

10 . Links to other related statistics

Other statistics related to cancer are available:

- if you are interested in adult cancer survival, split out by stage of diagnosis please refer to Cancer survival in England statistical bulletins

- if you are interested in childhood cancer survival please refer to Cancer survival in England – childhood

- if you are interested in cancer survival by NHS Region, Cancer Alliance, Sustainability and Transformation Partnerships please refer to Geographic patterns of cancer survival in England statistical bulletins

- if you are interested in the number of cancer diagnoses please refer to Cancer registration statistics, England statistical bulletins

The issue of comparability of cancer survival statistics across the UK has been discussed at the UK and Ireland Association of Cancer Registries (UKIACR) Executive Board and a consensus has been made to use the International Cancer Survival Standard (ICSS) weights in cancer survival analysis in England, Scotland, Wales, Northern Ireland and the Republic of Ireland (as well as the same exclusions in data) so that results can be comparable across all countries in the UK and Ireland. Statistics on cancer around the UK 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

11 . Quality and methodology

The Index of Cancer Survival Quality and Methodology Information report contains important information on:

- the strengths and limitations of the data and how it compares with related data

- uses and users of the data

- how the output was created

- the quality of the output including the accuracy of the data

All adults (aged 15 to 99 years) who were diagnosed with a first, primary, invasive malignancy were eligible for inclusion. Patients diagnosed with malignancy of the skin other than melanoma were excluded. Cancer of the prostate was also excluded from the index, because the widespread introduction of prostate-specific antigen (PSA) testing since the early 1990s has led to difficulty in the interpretation of survival trends, as explained in Excess cases of prostate cancer and estimated over diagnosis associated with PSA testing in East Anglia.

Changes to methods involve the adoption of new weights based on the International Classification of Survival Standard (ICSS). The impact of these changes have been reviewed in the Impact of updating cancer survival methodologies for subnational estimates; Index of cancer survival for Clinical Commissioning Groups in England paper.

There has also been an update to the life tables; further details of this change and other minor changes to the process used for calculating survival in England and to the back-series data are provided in The impact of updating cancer survival methodologies for national estimates, 2019.

More information on methodology can be found in the Quality and Methodology Information report.

Details of the data included in this analysis

We extracted the data used in these analyses from the cancer registration database held by the National Cancer Registration and Analysis Service (NCRAS) on 14 August 2018.

Patients with incomplete data (for dates of birth, diagnosis or vital status, sex, or Clinical Commissioning Group (CCG)) or invalid data (non-malignant tumour behaviour or where morphology was inconsistent with the site) were excluded from analysis (4.0%). Patients were also excluded where the vital status (whether alive, emigrated, dead or not traced) on 31 December 2017 was unknown (0.1%); the cancer was only registered from a death certificate (DCO) and the survival time was therefore unknown (1.8%); or the patient had synchronous or multiple primary tumours (10.2%).

The analyses included 3,139,604 patients in total (all-cancers combined), of which 1,504,943 patients were diagnosed with breast (women), colorectal and lung cancers, constituting 47.9% of all patients included in the analyses. Patients with zero survival time (1.8% of all patients) were included in the analyses, and one day was added to their survival time.

It was sometimes impossible to produce robust estimates of survival for one or more of the age groups, most often for patients in the age group 15 to 44 years. In this situation, the missing value for a CCG is replaced by the corresponding value for their "parent" Cancer Alliance (CA) or, if that is also missing, the missing value for both the CCG and CA is replaced by the value for England. Similarly, any missing values for Sustainability and Transformation Partnerships (STPs) are replaced by the value for England.

For the CCG estimates, this problem affected 8,013 (25.7%) of the 31,200 separate survival estimates by age, sex, calendar year and CCG for lung cancer; 5,816 (18.6%) of the 31,200 estimates for colorectal cancer; 29 (0.2%) of the 15,600 estimates for breast cancer; and 6 (0.0%) of the 31,200 estimates for other cancers.

For the STP estimates, this problem affected 1,453 (9.9%) of the 14,700 separate survival estimates by age, sex, calendar year, STP and follow-up for lung cancer and 353 (2.4%) of the 14,700 estimates for colorectal cancer; 1 (0.0%) of the 7,350 estimates for breast cancer; it did not affect any of the estimates for other cancers.

For the CA estimates, this problem affected 108 (1.6%) of the 6,650 separate survival estimates by age, sex, calendar year, CA and follow-up for lung cancer and 7 (0.1%) of the 6,650 estimates for colorectal cancer; it did not affect any of the estimates for breast cancer or other cancers.

12 . Authors

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Office for National Statistics: Sarah Caul; Sophie John; Matthew Peet; Lorna Ushaw.

13 . Acknowledgements

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