Office for National Statistics

Statistical bulletin

Cancer survival in England: national estimates for patients followed up to 2017

1-year, 5-year and 10-year net-survival estimates for adults diagnosed with cancer between 2012 and 2016 and followed up to 2017, and by stage at diagnosis.

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Release date:
24 January 2019

Next release:
To be announced

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1 . Main points

- For the first time we have been able to produce robust 1-year and 5-year net cancer survival estimates by stage at diagnosis based on five years' worth of cancer diagnoses (2012 to 2016), making them comparable with the adult cancer survival estimates.
- Adults diagnosed at stage 1 with either melanoma of the skin, prostate or breast (women only) cancer have the same chance of surviving 1-year after diagnosis as an individual in the general population.
- Melanoma of the skin had the highest net-survival estimate for 1-year survival in both men (97.4%) and women (98.6%) and for 5-year survival in both men (89.2%) and women (93.9%).
- Pancreatic cancer had the lowest net-survival estimate for 1-year survival in men (23.7%) and women (25.3%) and for 5-year survival in both men (6.4%) and women (7.5%).
- Predicted 10-year survival was also highest for melanoma of the skin for both men and women at 85.0% and 90.9% respectively, and lowest for lung cancer for both men and women at 7.0% and 10.6% respectively.

2 . Statistician's comment

Sarah Caul, Head of Cancer Analysis, said:

"In general, we have seen an increase in people's chances of survival across different types of cancer since our estimates for 2006 to 2010. Melanoma of the skin, prostate and breast cancer have continued to have the highest chances of survival across all age-standardised estimates compared to other cancer types. The higher survival figures could partly be explained by a high percentage of prostate and breast cancer patients being diagnosed at an earlier stage.

"This is the first time we have been able to look at this in more detail to examine how estimates for 5-year survival can change depending on what stage the disease is at when diagnosed. This research shows a mixed picture but does stress the need for awareness and early diagnosis."

3 . 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). 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. ONS works with PHE to quality assure the outputs. 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, 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.

Public Health England

4 . Things you need to know about this release

Office for National Statistics (ONS) and Public Health England (PHE) are working in partnership to produce England cancer survival estimates. Among the 29 cancer sites forming the National Statistics this year, we report on three additional cancer sites compared with the last publication: anus, urinary tract, and kidney and urinary tract.

The following analysis focuses on patients diagnosed between 2012 and 2016 and followed up to 2017. Breakdowns are available for 1-year, 5-year and 10-year net cancer survival in adults for the 29 most common cancers. 1-year and 5-year net cancer survival are also presented broken down by stage.

Survival estimates are presented for men, women and both sexes combined (persons). Six cancers occur for a single sex (cervix, ovary, uterus, vulva, testis and prostate). We present survival for cancer of the larynx only in men and for breast cancer only in women, since these cancers are relatively uncommon in the opposite sex. We report survival by age group and for all ages combined. To allow comparisons, estimates are age-standardised using the International Cancer Survival Standard (ICSS). Confidence intervals are provided in datasets to indicate the precision of survival estimates.

1-year and 5-year survival have been estimated using the complete approach in this publication. To respond to policy needs for estimates of long-term survival, 10-year survival estimates have been produced using the hybrid approach. The hybrid approach combines the most recent follow-up data for up to 10 years. Survival estimates are only presented if sufficient data were available to make robust estimates of survival. Further information on the methods can be found in the Quality and methodology section.

For the net-survival by stage at diagnosis analysis, we now have five diagnosis years with good levels of stage completeness, meaning this patient cohort is now consistent with those presented in the adult cancer survival. Survival by stage is not available for all the 29 most common cancer sites due to patient numbers with a known stage, complexities within the sub-types of the cancers and because staging systems do not exist for all cancer types (see Section 6 for more detail).

Cancer survival by stage at diagnosis and childhood cancer survival estimates use the same methodology paper (see Section 13 for more detail) and are designated as Experimental Statistics. Experimental Statistics are published with the view to involve customers and stakeholders in their development and as a means of building in quality at an early phase. We are currently assessing the extent to which the adult cancer survival by stage at diagnosis and cancer survival for children statistics meet the professional standards set out in the statutory Code of Practice for Statistics.

The national childhood cancer survival section briefly summarises findings we published in June 2018.

This bulletin of national survival statistics enables the monitoring of changes in cancer survival over time, to assess progress in achieving the aims set out by the Independent Cancer Taskforce as outlined in Achieving world-class cancer outcomes: a strategy for England 2015 to 2020.

Cancer registrations in England can take up to five years after the end of a given calendar year to reach 100% completeness, due to the continuing accrual of late registrations. We do not revise the back series to account for late registrations. Please see the Cancer Registrations Statistics bulletin for more information.

This bulletin was originally planned to be published on 14 June 2018 but was delayed due to issues affecting the adult 5-year and 10-year estimates. The 2012 to 2016 estimates cannot be compared with the 2011 to 2015 time series due to the difference in methodology used. There have been changes to the method of calculating survival in England in adults and by stage at diagnosis for patients followed up to 2017. The main change involved updating 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.

5 . Melanoma has the highest net-survival estimates

Age-standardised estimates of 1-year and 5-year net-survival by cancer site are presented in Figure 1 for men and Figure 2 for women, ordered by 1-year survival.

Figure 1: Age-standardised 1-year and 5-year net-survival for men (aged 15 to 99 years) diagnosed with cancer

Diagnosed in 2012 to 2016 and followed up to 2017, England

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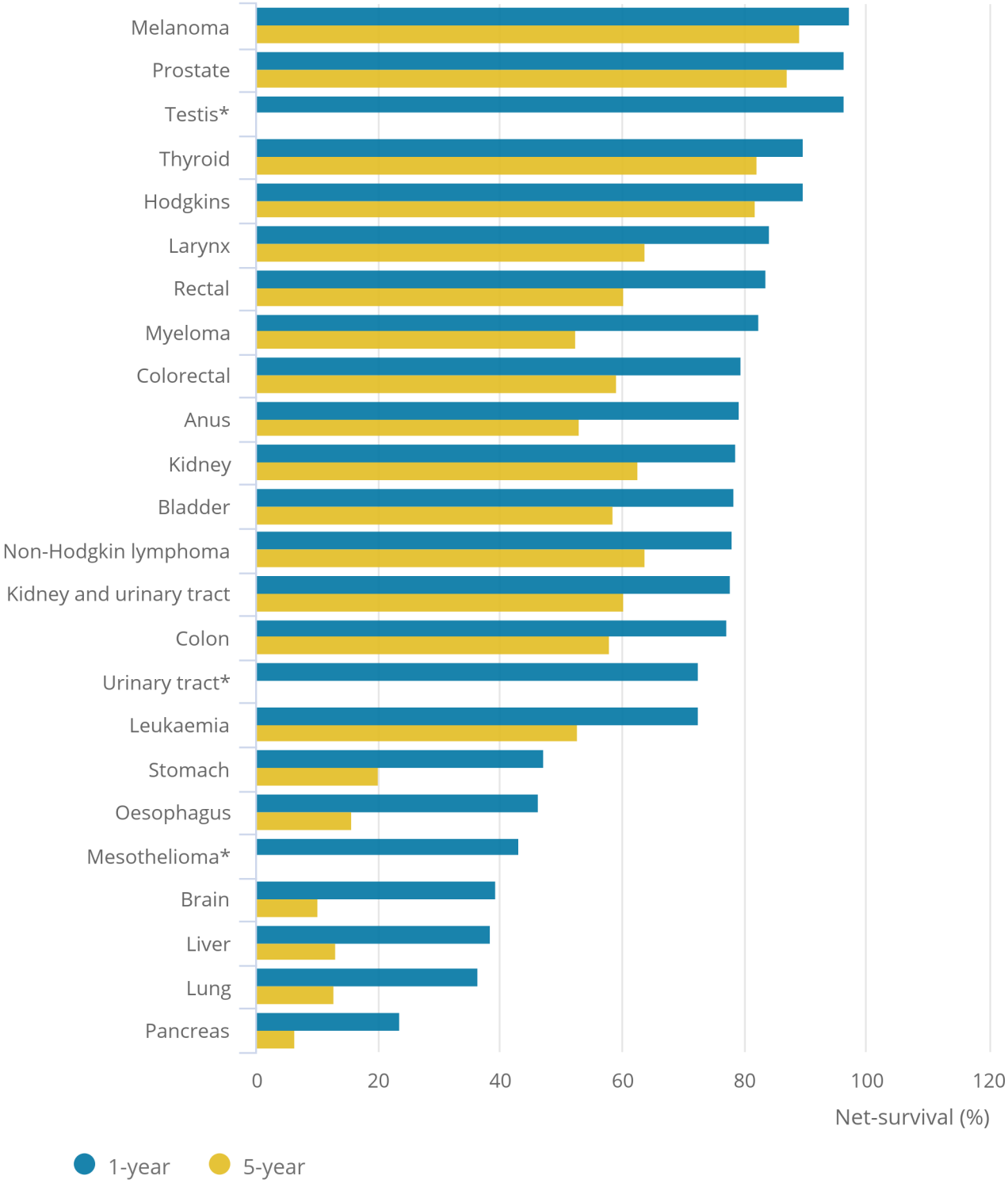
Diagnosed in 2012 to 2016 and followed up to 2017, England



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

Notes:

1. The asterisk (*) denotes that a 5-year age-standardised estimate is not available.

Figure 2: Age-standardised 1-year and 5-year net-survival for women (aged 15 to 99 years) diagnosed with a common cancer

Diagnosed in 2012 to 2016 and followed up to 2017, England

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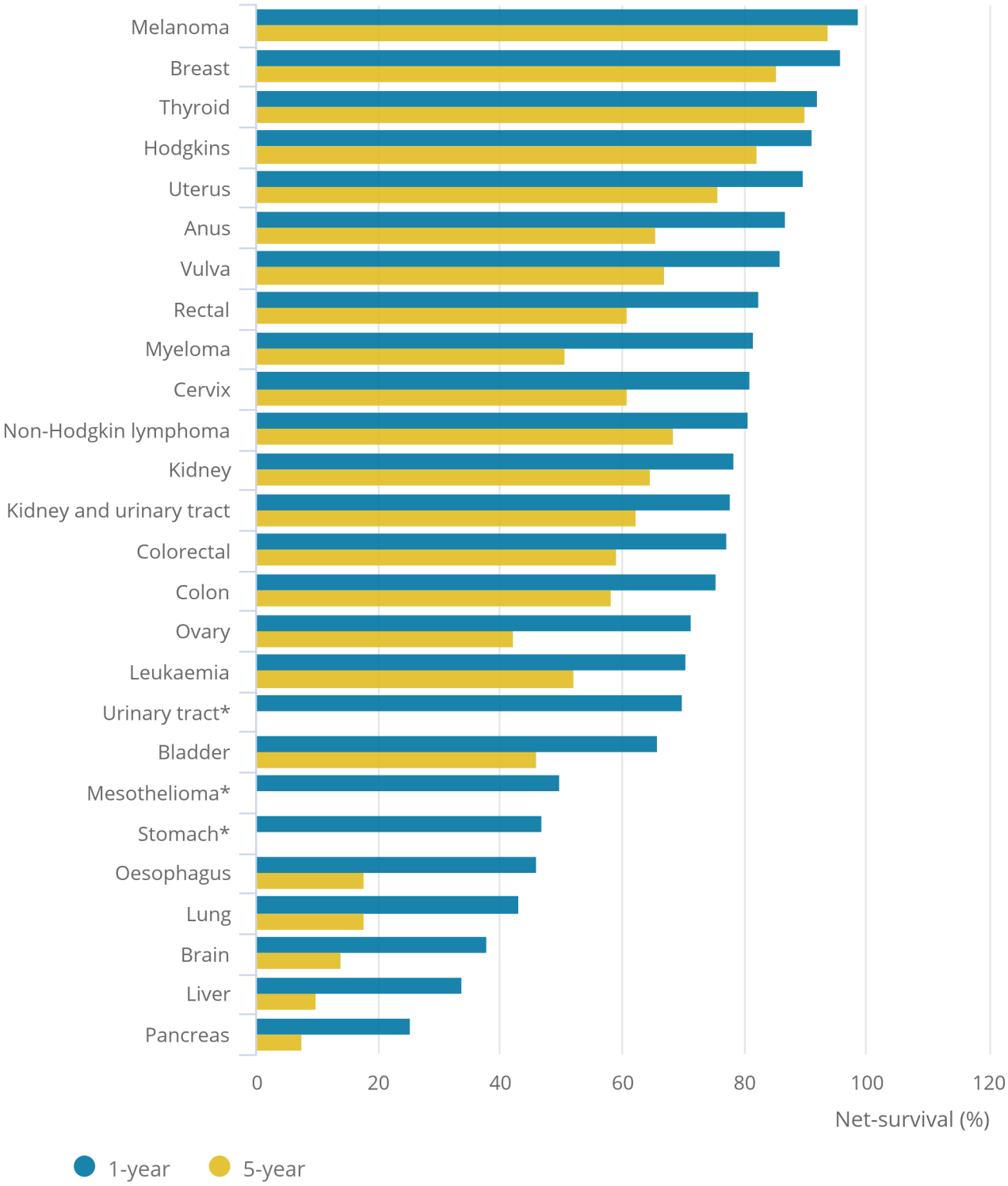
Diagnosed in 2012 to 2016 and followed up to 2017, England



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

Notes:

1. The asterisk (*) denotes that a 5-year age-standardised estimate is not available.

Figures 1 and 2 were ordered by 1-year net-survival. The pattern of cancers from high to low 5-year net-survival estimates are not always the same as for 1-year net-survival, or between men and women. However, melanoma of the skin had the highest survival estimate and pancreatic cancer had the lowest survival estimate of all cancers for both 1-year and 5-year survival, for both men and women. For melanoma of the skin, the 1-year survival estimate for men was 97.4% and for women was 98.6%, and the 5-year net-survival estimates for men and women were 89.2% and 93.9% respectively. Pancreatic cancer had the lowest 1-year survival for men (23.7%) and women (25.3%) and 5-year survival for both men (6.4%) and women (7.5%).

For both men and women, 5-year survival was below 20% for oesophagus, liver, brain, lung and pancreatic cancers.

6 . How does stage at diagnosis affect net-survival?

We present 1-year and 5-year net-survival estimates for the years 2012 to 2016 for individuals diagnosed with cancer at different stages (1 to 4), for individuals where the survival estimates were unknown or not provided, and for individuals whose cancer was unstageable. Stage data were calculated for 27 cancer sites, excluding pancreatic and non-Hodgkin lymphoma. This is the first time we have had data to provide 5-year estimates by stage.

Generally, those who are diagnosed at an earlier stage have a better chance of survival. For many cancer types, 1-year survival is relatively high if diagnosed at stages 1 to 3, with a fall in survival if diagnosed at stage 4. This pattern holds for cancers of the larynx (men only), stomach, urinary tract, vulva (women only), uterus (women only), cervix (women only), kidney, colon, colorectal and rectal. Data by stage for other sites are available within the datasets.

The pattern for liver cancer is slightly different, whereby there is a large drop in 1-year survival estimates from stage 2 to stage 3. For men, survival estimates drop from 71.0% at stage 2 to 39.1% at stage 3. For women, the drop is from 65.0% at stage 2 to 39.2% when diagnosed at stage 3.

For Hodgkin lymphoma, survival is generally high regardless of stage. Even when diagnosis is at stage 4, survival for Hodgkin lymphoma is at 86.7% for both men and women.

7 . Focus on common cancers and survival

The proportion and number of cases diagnosed at each stage varies between different cancers and between men and women (Table 1). We have focused on the most common cancer for men and women, prostate and breast respectively, and the cancer that is most diagnosed at stage 1 (melanoma) and most diagnosed at stage 4 (lung).

Table 1: Number of patient diagnoses and proportion diagnosed at each stage, adults (aged 15 to 99 years), England
Diagnosed in 2012 to 2016 and followed up to 2017, England

Cancer site	Sex	Number of registrations	Stage 1 (%)	Stage 2 (%)	Stage 3 (%)	Stage 4 (%)	Unstageable (%)	Stage unknown / missing (%)
Breast	Women	207548	38.8	36.6	8.7	5.0	0.3	10.7
Lung	Men	97843	13.1	7.7	20.1	50.3	0.6	8.1
	Women	83571	16.7	7.0	18.9	48.3	0.6	8.3
Melanoma	Men	30126	57.2	20.4	6.2	2.9	0.0	13.2
	Women	30404	66.1	15.9	4.7	1.7	0.0	11.6
Prostate	Men	199045	30.4	19.0	18.4	18.3	0.5	13.3

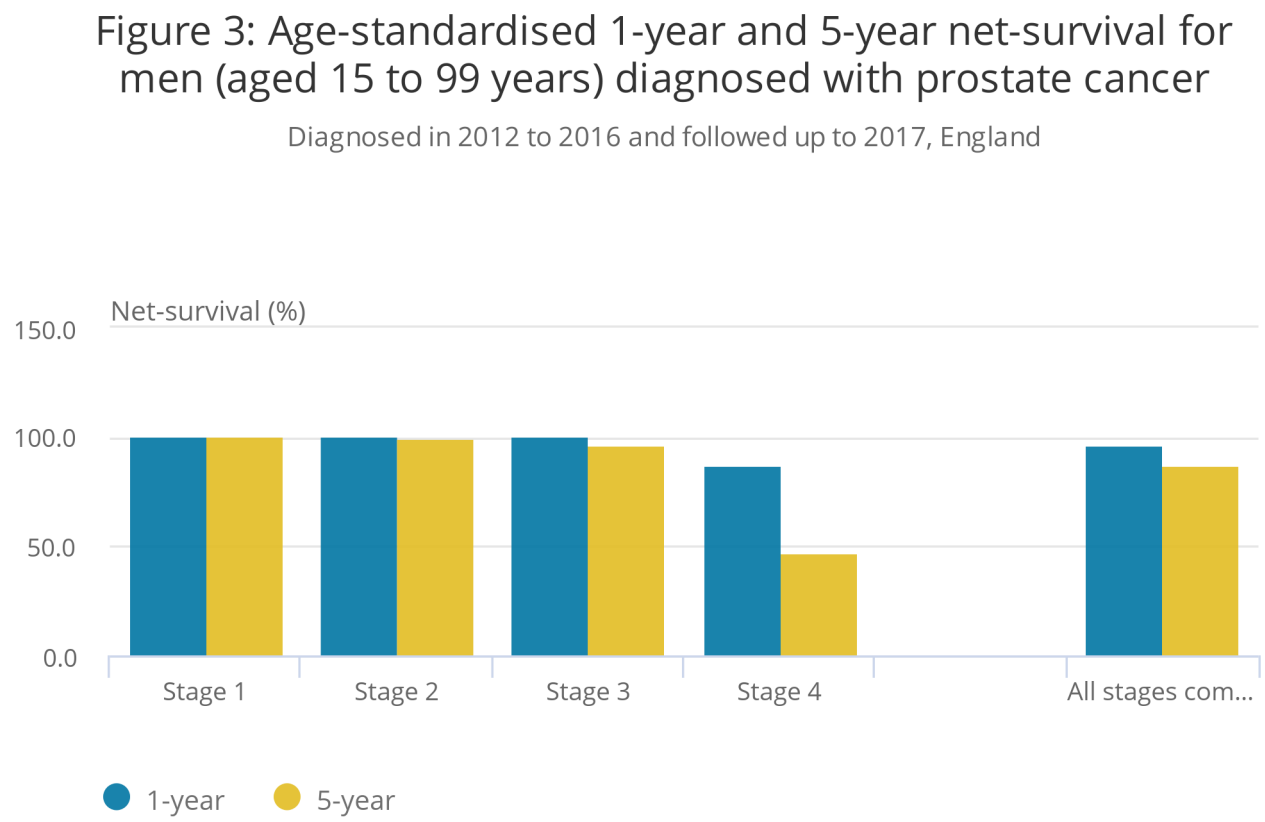
Source: Public Health England – National Cancer Registration and Analysis Service, Office for National Statistics

Prostate cancer (men only)

Between 2012 and 2016, prostate cancer was the most common cancer for men, accounting for nearly 35% of all cancer registrations in men.

Figure 3: Age-standardised 1-year and 5-year net-survival for men (aged 15 to 99 years) diagnosed with prostate cancer

Diagnosed in 2012 to 2016 and followed up to 2017, England



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

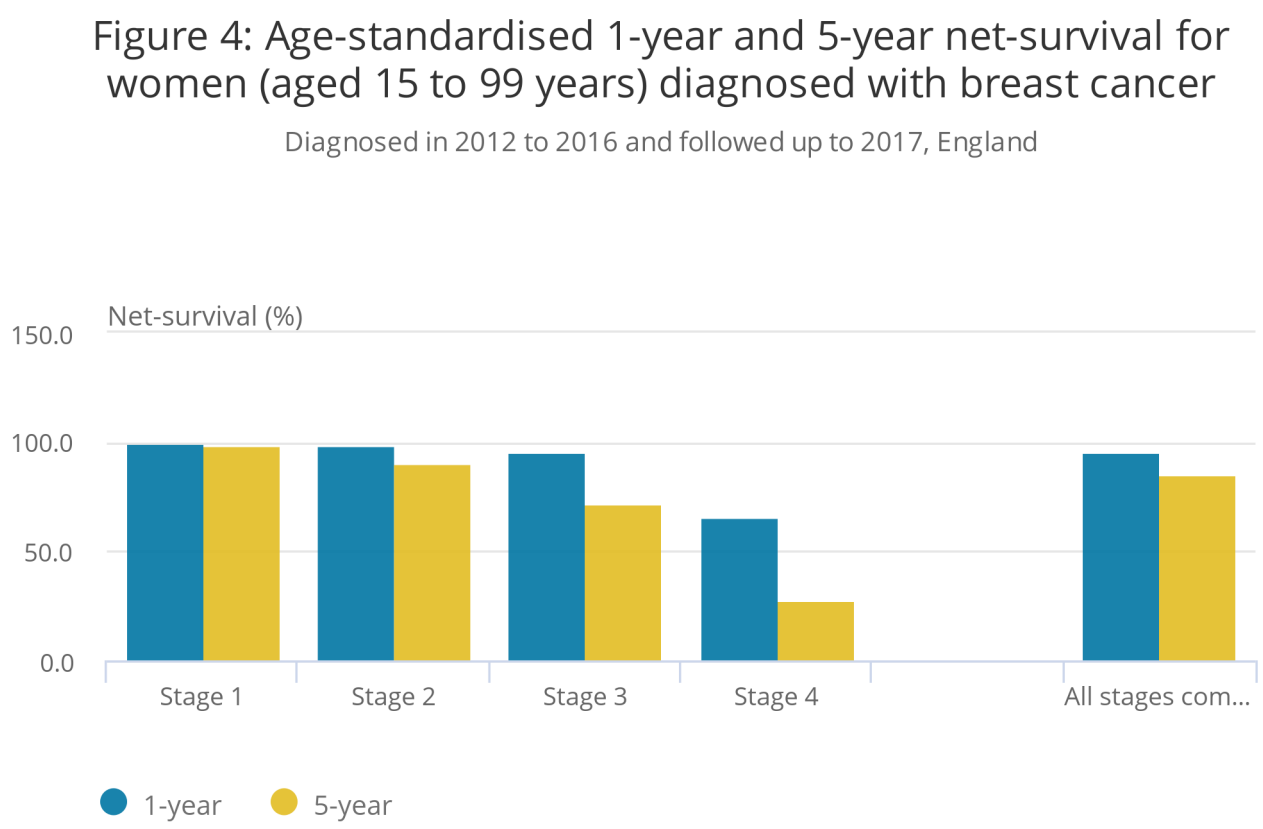
1-year survival estimates for men diagnosed with prostate cancer at stages 1 to 3 were just over 100%, meaning that fewer men with prostate cancer died than expected when compared with men in the general population. A statistically significant lower survival estimate was evident for those diagnosed at stage 4, at 87.6%.

Even 5-year survival estimates were over 100% for stages 1 and 2, with good survival at stage 3 at 96.5% and a larger drop at stage 4 to 47.7%. While there is no national screening programme for prostate cancer, some men have a Prostate Specific Antigen (PSA) test at their GPs, which could explain why men who are diagnosed at an early stage have survival rates similar to that of the general (male) population.

1-year and 5-year net-survival estimates for prostate cancer have increased significantly since the net-survival estimates in 2006 to 2010.

Figure 4: Age-standardised 1-year and 5-year net-survival for women (aged 15 to 99 years) diagnosed with breast cancer

Diagnosed in 2012 to 2016 and followed up to 2017, England



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

Breast cancer is the most common cancer in women. 1-year net-survival for breast cancer is generally high (over 90%), unless diagnosed at stage 4 when net-survival falls to 66%. For 5-year survival the same pattern is evident, however, the stage 3 net-survival estimate drops from 72.2% to 27.9% in stage 4.

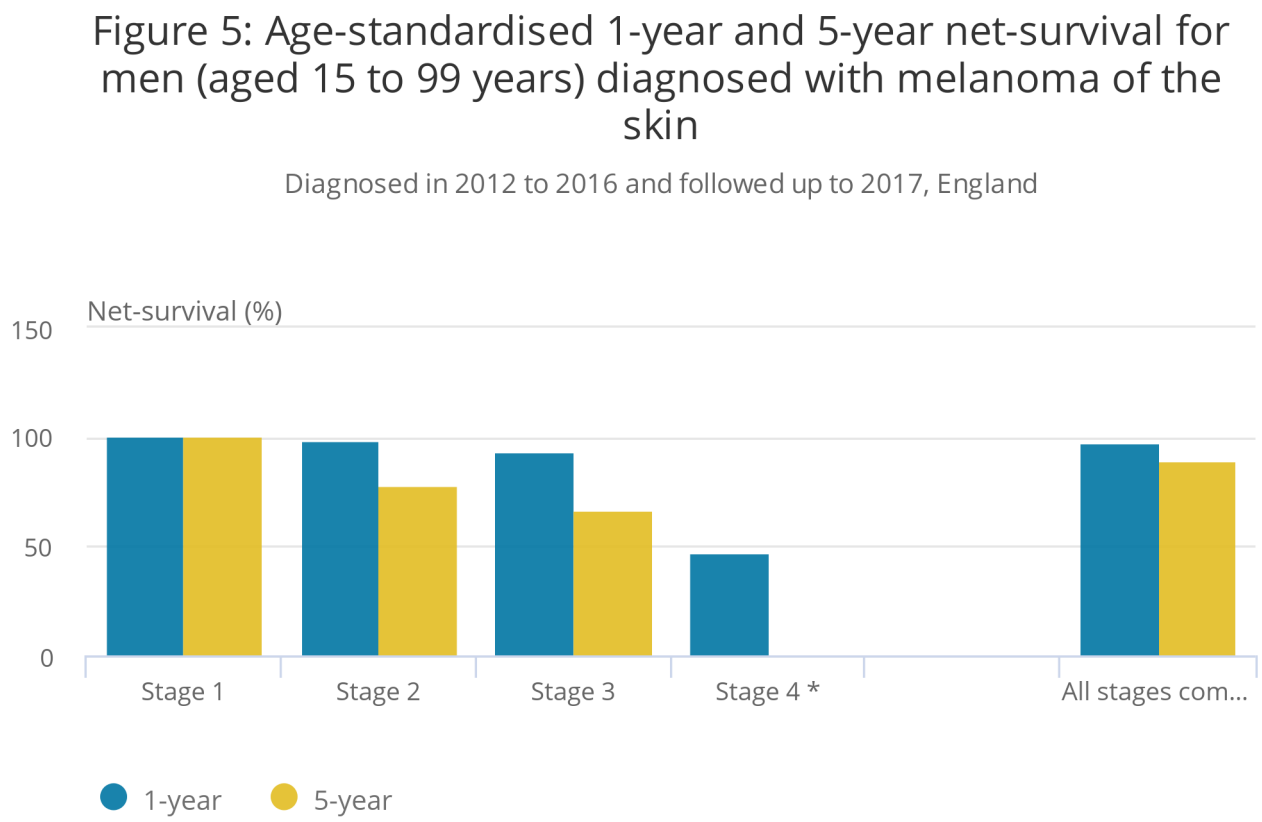
For breast cancer, 75.4% of patients are diagnosed at stage 1 or 2 (Table 1) accounting for the high 1-year and 5-year net-survival (Figure 2). For breast cancer, both 1-year and 5-year net-survival estimates have increased significantly since the 2006 to 2010 cohort.

Early detection of breast cancer is probably due to a combination of factors including the National Breast Cancer Screening Programme and well-understood symptoms. The National Breast Cancer Screening Programme targets those aged 50 to 70 years. Some younger (aged 47 to 49 years) and older women (aged 71 to 73 years) are invited for screening as part of an age extension trial from 2009. The screening programme identifies cancers in patients before they have come forward with symptoms, which means patients may be diagnosed at an earlier stage.

An age pattern is evident with breast cancer where 5-year net-survival is higher for some of the older age groups than younger age groups. This phenomenon is because the different types of breast cancer that are typically diagnosed vary significantly with age. Breast cancers diagnosed in younger women are more likely to be aggressive types of breast cancer than those diagnosed in older women. Data by age groups is available within the datasets.

Figure 5: Age-standardised 1-year and 5-year net-survival for men (aged 15 to 99 years) diagnosed with melanoma of the skin

Diagnosed in 2012 to 2016 and followed up to 2017, England



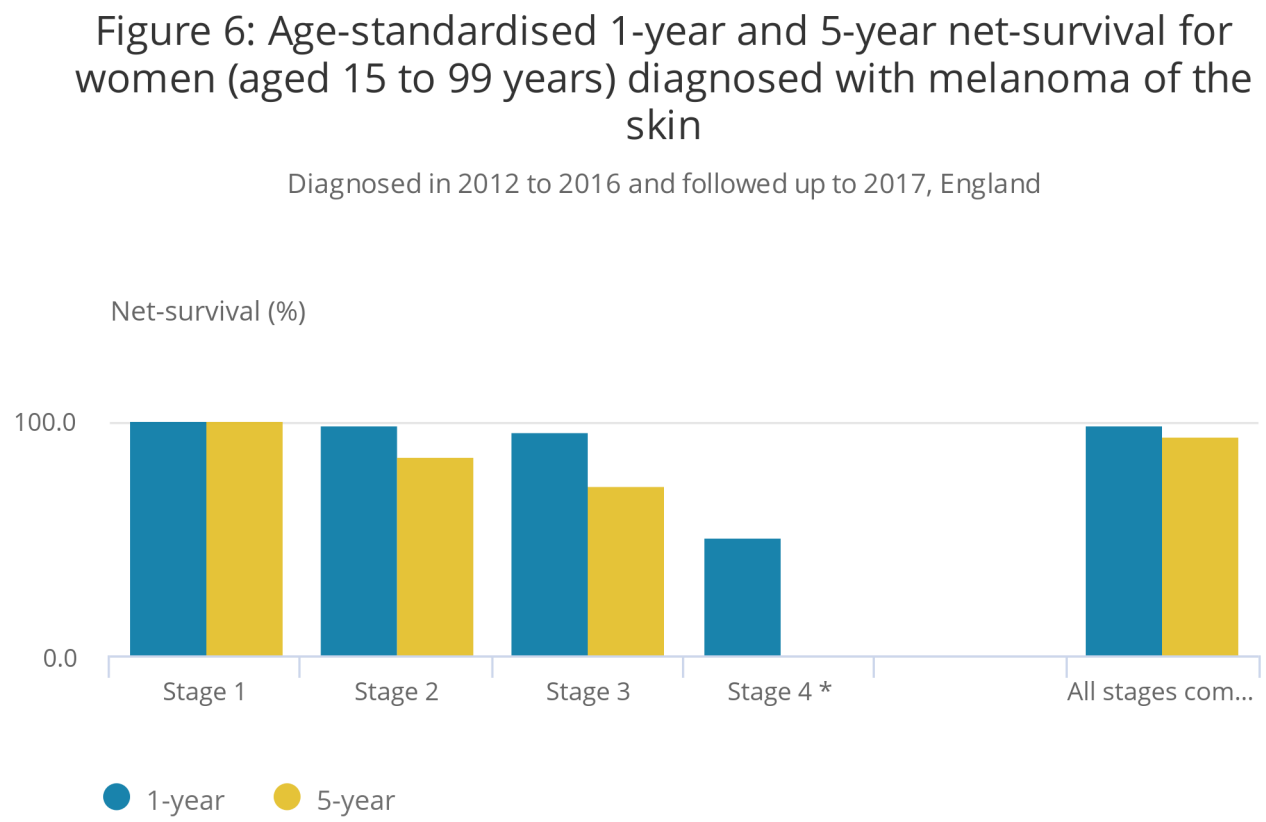
Source: Public Health England – National Cancer Registration and Analysis Service, Office for National Statistics

Notes:

1. The asterisk (*) denotes that a 5-year age-standardised estimate is not available.

Figure 6: Age-standardised 1-year and 5-year net-survival for women (aged 15 to 99 years) diagnosed with melanoma of the skin

Diagnosed in 2012 to 2016 and followed up to 2017, England



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

Notes:

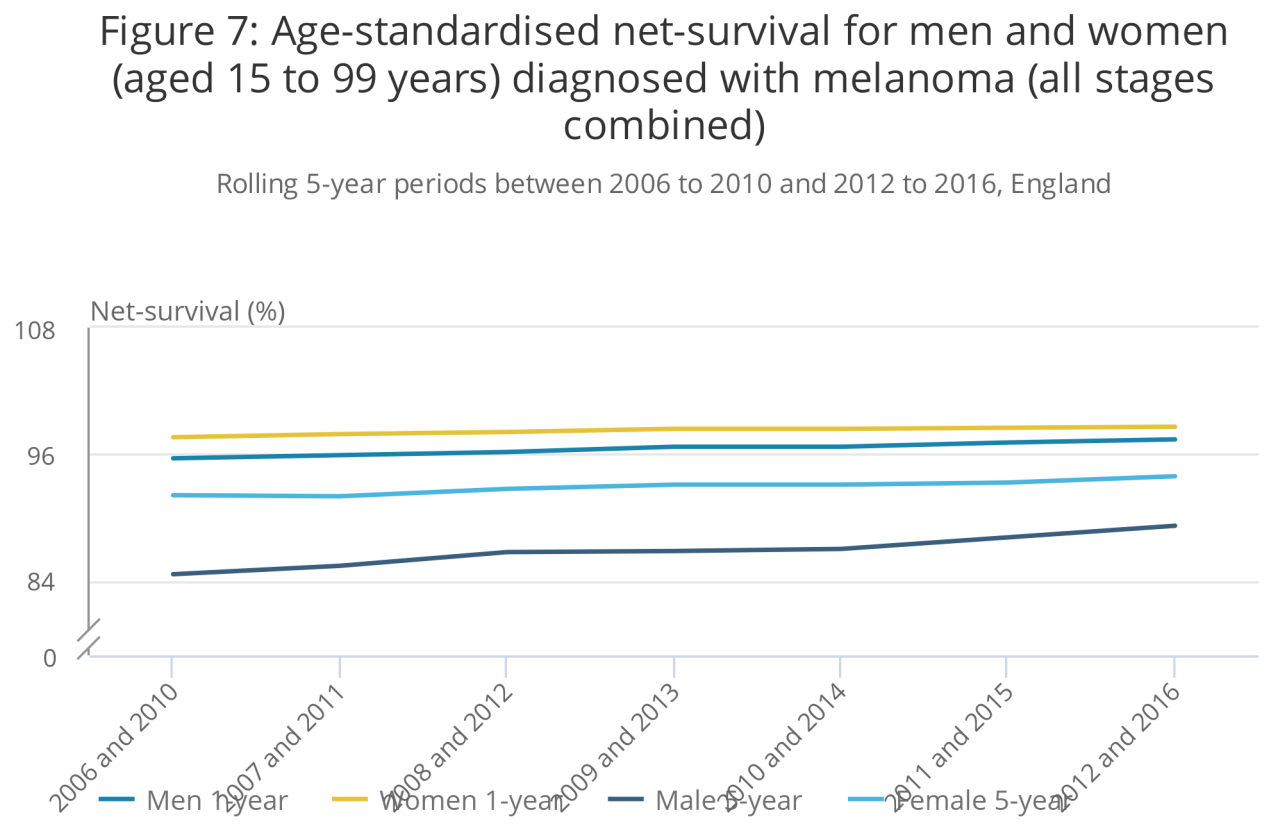
1. The asterisk (*) denotes that a 5-year age-standardised estimate is not available.

Melanoma is a type of skin cancer that is more likely to cause death than other, less aggressive, types of skin cancer. Despite this, melanoma of the skin has the highest net-survival estimates of all cancers for both men and women for 1-year and 5-year estimates (Figures 1 and 2). However, 1-year net-survival nearly halves if diagnosed at stage 4, falling from 93.6% at stage 3 to 47.6% at stage 4 in men, and from 95.7% to 51.0% in women respectively (Figures 5 and 6). Net-survival for melanoma of the skin is generally high because over half of individuals are diagnosed at stage 1 (57.2% for men, 66.1% for women; Table 1). High rates of early detection may be due to good awareness of symptoms, or because the cancer is on the skin and easier to see.

When comparing with earlier cohorts of data we can see that since 2006 to 2010, an increase in all stage net-survival estimates is evident for men and women diagnosed with melanoma (Figure 7).

Figure 7: Age-standardised net-survival for men and women (aged 15 to 99 years) diagnosed with melanoma (all stages combined)

Rolling 5-year periods between 2006 to 2010 and 2012 to 2016, England



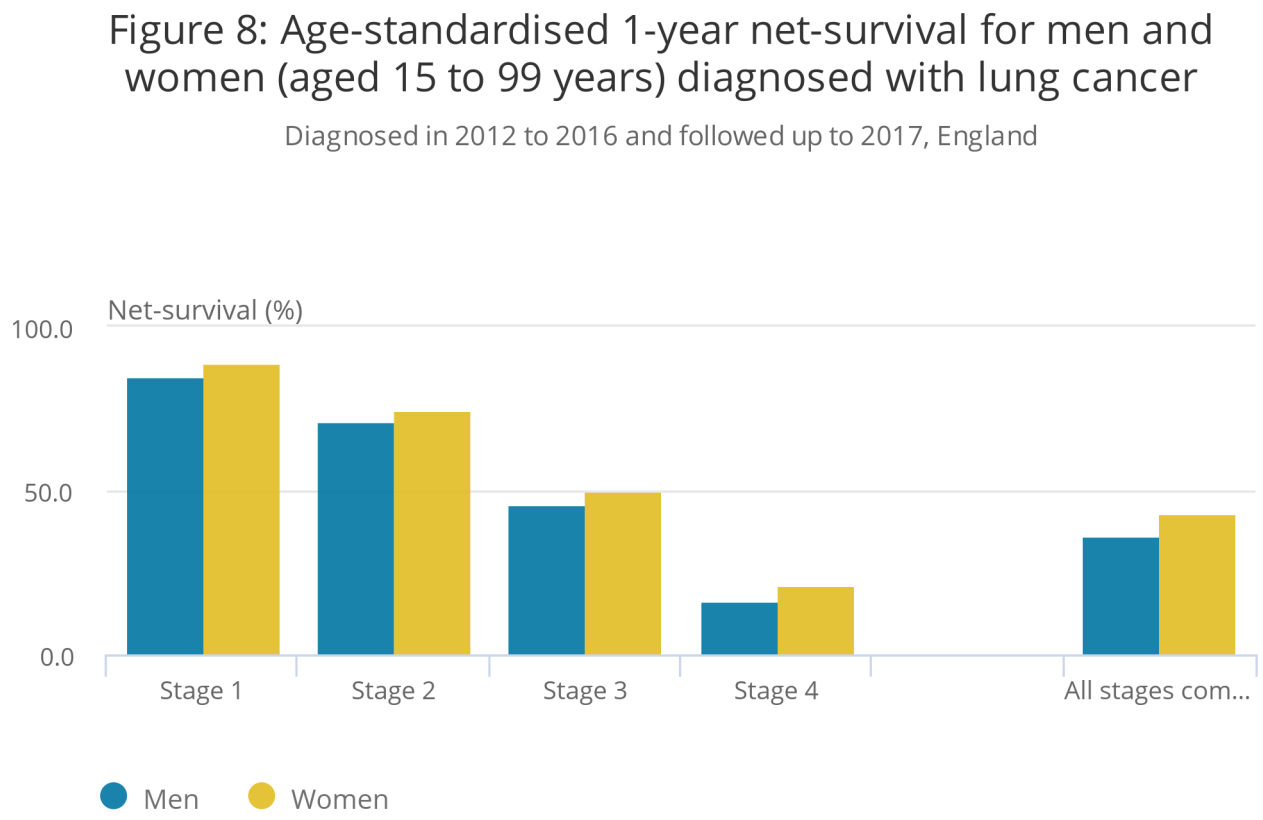
Source: Public Health England – National Cancer Registration and Analysis Service, Office for National Statistics

The 1-year net-survival estimates for melanoma increase at a slower rate than the 5-year estimates, however, the 1-year estimates were already over 95% for both men and women in the 2006 to 2010 cohort, giving them less scope to increase than the 5-year estimates. The most marked increase was in the 5-year net-survival estimate for men, which increased from 84.6% to 89.2% in the 2012 to 2016 cohort.

Lung cancer

Figure 8: Age-standardised 1-year net-survival for men and women (aged 15 to 99 years) diagnosed with lung cancer

Diagnosed in 2012 to 2016 and followed up to 2017, England



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

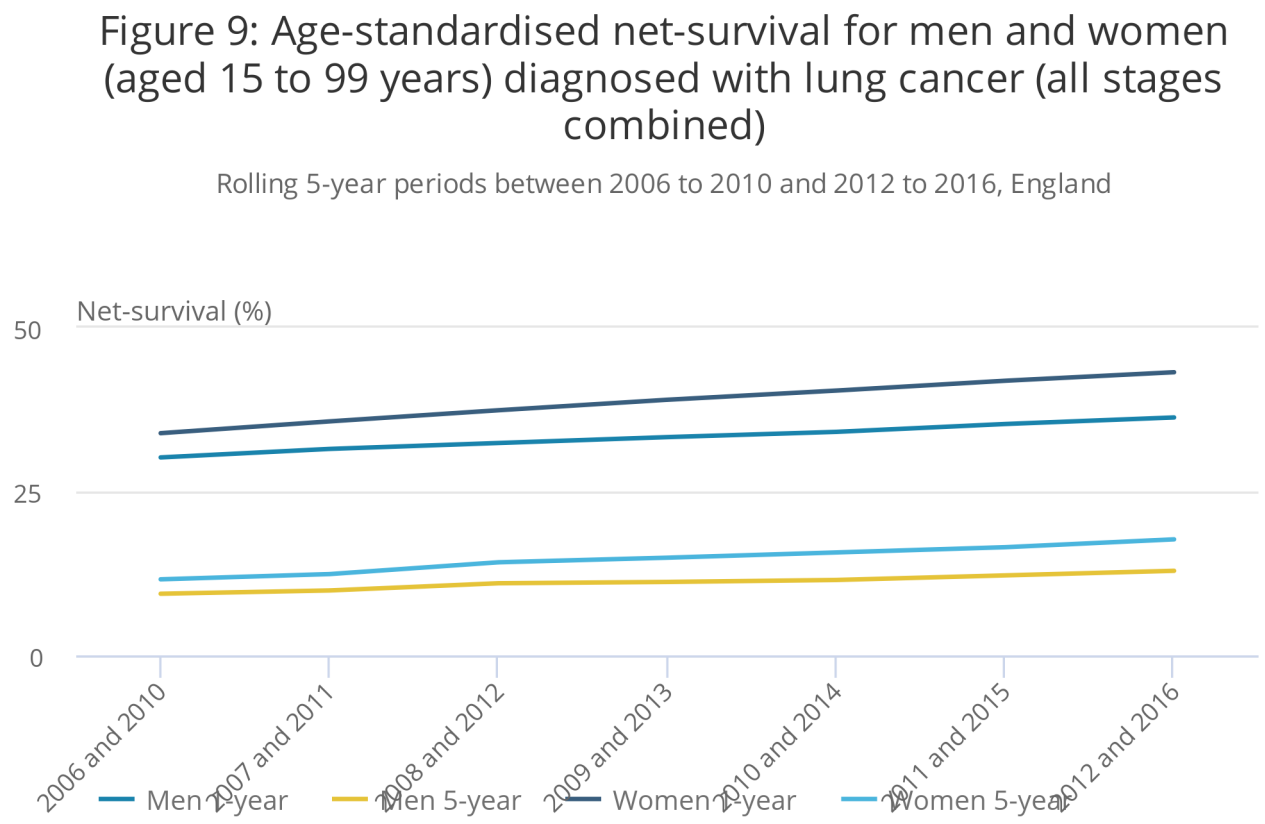
Lung cancer remains one of the most common types of cancer in England and has one of the lowest 5-year net-survival estimates at below 20% for men and women (Figures 1 and 2).

These low net-survival estimates can be explained by the fact that, in most cases, lung cancer is not detected at an early stage. For instance, in 2012 to 2016, 50.3% of men and 48.3% of women were not diagnosed with lung cancer until stage 4, which has low net-survival rates for men and women at 16.7% and 21.2% respectively.

Late detection is likely to be because symptoms for lung cancer usually do not appear until the cancer is more developed and can be difficult to identify[1].

Figure 9: Age-standardised net-survival for men and women (aged 15 to 99 years) diagnosed with lung cancer (all stages combined)

Rolling 5-year periods between 2006 to 2010 and 2012 to 2016, England



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

Encouragingly, while net-survival for lung cancer is low, we can see an increase in both 1-year and 5-year estimates for men and women over time. These increases seem to be more marked for women than for men. For both men and women, lung cancer 1-year and 5-year net-survival estimates in 2012 to 2016 have increased significantly since the net-survival estimates in 2006 to 2010.

Notes for: Focus on common cancers and survival

1. For more information, see Concerns raised about late diagnosis of lung cancer, Symptoms and the early diagnosis of lung cancer and A systematic review of symptomatic diagnosis of lung cancer.

8 . 10-year predicted net-survival in England

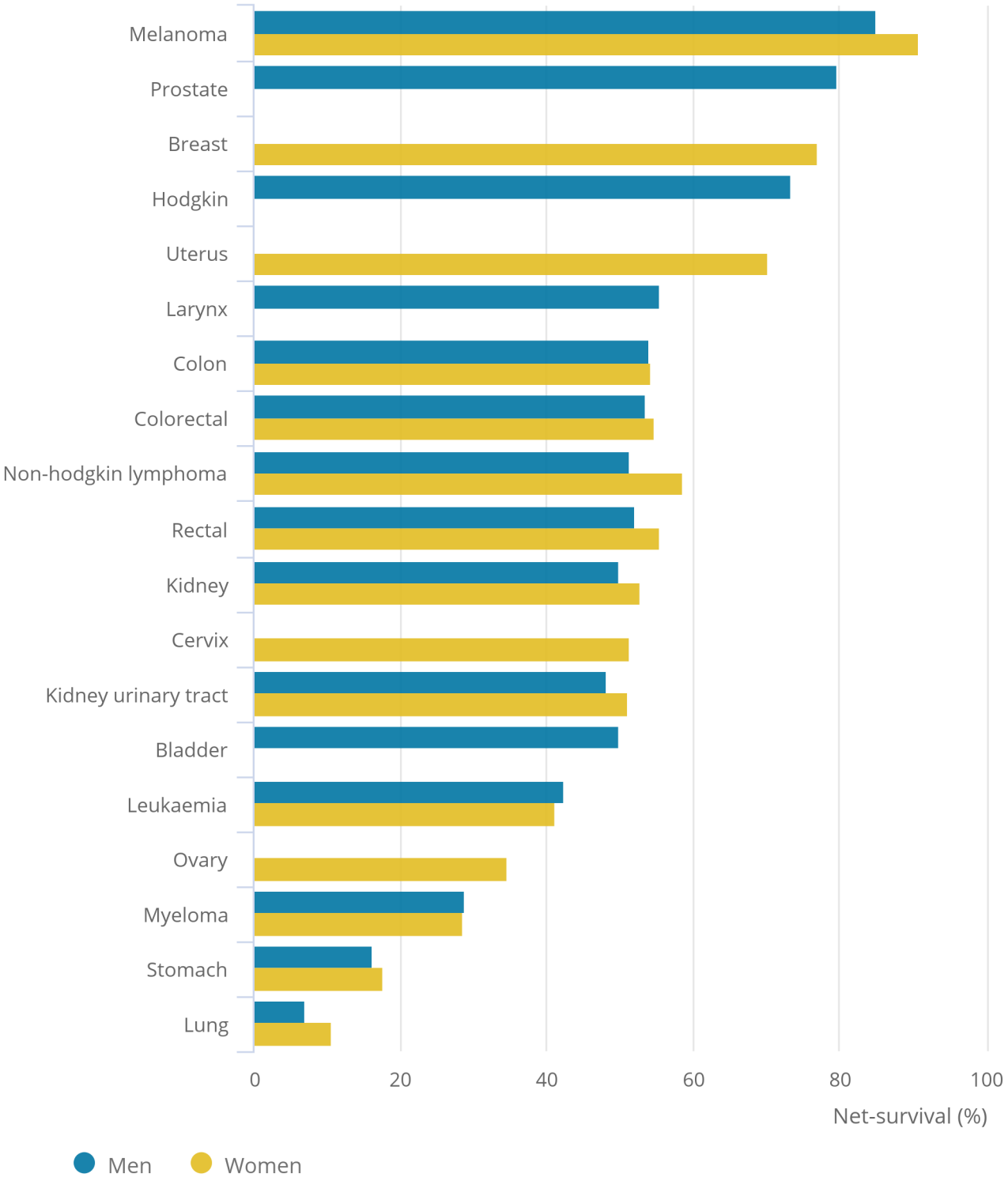
To respond to policy needs for estimates of long-term net-survival, 10-year net-survival estimates have been produced. To ensure that the 10-year estimates are timely they have been calculated using a predictive survival method. To complement and provide context for the 10-year estimates we have also provided 1-year and 5-year net-survival estimates using the same method. Due to the predicted nature of these estimates, only cancer sites that produce robust results are included.

Figure 10: Predicted 10-year net-survival using the hybrid approach for men and women (aged 15 to 99 years)

England

Figure 10: Predicted 10-year net-survival using the hybrid approach for men and women (aged 15 to 99 years)

England



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

Notes:

1. The ':' symbol denotes that the age-standardised estimate is not available

In line with the 1-year and 5-year net-survival estimates, the highest net-survival at 10 years was for melanoma of the skin for both men and women, at 85.0% and 90.9% respectively. Predicted net-survival at 10 years for men was also high in prostate cancer (79.6%) and Hodgkin lymphoma (73.3%). For women, 10-year net-survival was also high for breast cancer (77.0%) and cancer of the uterus (70.3%).

Predicted 10-year net-survival was lowest for lung cancer for both men and women, at 7.0% and 10.6% respectively.

The largest difference in predicted 10-year net-survival estimates between men and women was for non-Hodgkin lymphoma, where women had a 7.2% higher chance of survival than men.

Using the hybrid approach, we can make comparisons of estimates calculated on the same basis between 1-year, 5-year, and 10-year age specific predicted net-survival. There are distinct patterns in net-survival by age group, with generally lower net-survival estimates among older patients. Estimates by age group are available in the accompanying datasets.

9 . Childhood cancer survival continues to improve

Childhood cancer survival is based on a different methodology to the adult and stage at diagnosis survival estimates contained in this delayed report. The childhood cancer survival statistics were published in June 2018. This section briefly summarises the findings.

Cancer survival in children (aged 0 to 14 years) continues to improve for all cancers combined; the general increasing trend of 5-year survival has continued, from 77.1% in 2001 to 84.0% predicted for those diagnosed in 2017. A similar increasing trend has also been observed for both 1-year and 10-year survival. These have been observed in each of the age groups produced: 0 to 4 years, 5 to 9 years and 10 to 14 years. Since there is a small difference between 5-year and 10-year survival estimates, children who survive for five years often live at least a further five years after diagnosis.

10 . Interpretation of these statistics

Cancer in adults is defined using the International Statistical Classification of Diseases 10th Revision (ICD-10) and by morphology and behaviour codes in the International Classification of Diseases for Oncology, Second Edition (ICD-O-2). The third edition of the International Classification of Childhood Cancer is used to define cancer in children (aged 0 to 14 years). These classification systems are needed due to the different distributions of cancer in children and adults but they are broadly equivalent.

Adult survival estimates are based on net-survival, which is calculated by comparing the survival of cancer patients with that of the general population. Whilst for children, overall survival is considered a reliable estimator of cancer survival because, unlike in adults, death within 10 years of diagnosis is almost always due to cancer.

Confidence intervals (at the 95% level) are included in the datasets, which are a measure of the statistical precision of a rate and shows the range of uncertainty around the calculated estimate.

Age-standardised estimates for adult, stage and childhood cancer are available to allow comparability between population groups and over time. Age-standardised estimates for adults have been calculated using the International Cancer Survival Standard (ICSS) age-weightings. For childhood cancer, the estimates are conventionally age-standardised by giving equal weight to all three age-groups (0 to 4 years, 5 to 9 years, and 10 to 14 years).

Where, for one or more, age bands did not fully meet the quality criteria due to lack of robustness, the age standardisation for the affected cancer site was calculated by combining the affected age range with a neighbouring age band. This may be in cases where, for the survival period being estimated, there were low numbers of patients (less than 10) alive at the estimation time or there were few deaths (less than two) in a surrounding period.

Where two or more non-adjacent age ranges are affected, or estimates for a combined age range fail one of the robustness criteria, there are insufficient robust estimates to calculate the age standardisation meaning an age-standardised estimate cannot be provided. More detailed information on the methods used to estimate national cancer survival in England can be found in the Cancer survival Quality and Methodology Information report.

11 . International comparisons

Overall, cancer survival has been improving steadily in England and cancer mortality continues to decrease. Despite this, cancer survival in England remains lower than similar countries in Europe and around the world according to recent studies.

Comparisons of survival by stage for breast, lung, colorectal and ovarian cancer, across six European countries, were carried out by the International Cancer Benchmarking Partnership (ICBP) and for 10 common cancers by the EUROCARE-5 project. The work highlighted differences in survival, thought to be caused by differences in how many cases were diagnosed early and survival for those diagnosed with stage 4 disease. However, these results were based on people diagnosed 10 to 20 years ago, when there was less stage at diagnosis data collected.

Findings from the global CONCORD-2 study and an epidemiology study have shown that 5-year survival rates for adult patients in England, diagnosed between 2005 and 2009, with leukaemia and cancers of the stomach, colon, rectum, liver, lung, breast, cervix, ovary and prostate were still lower than in Australia, Canada, Denmark, Norway and Sweden. CONCORD-3 has updated the earlier work to include diagnoses between 2010 and 2014 and shows that, for many tumours, the 5-year survival rates for England remain lower than in other similar countries but that the difference is smaller. Work is underway on EUROCARE-6 and ICBP2 to update the findings of the earlier results.

While Office for National Statistics (ONS) does not hold cancer data for Northern Ireland, Scotland or Wales, survival figures are published by the Northern Ireland Cancer Registry, the Scottish Cancer Registry and the Welsh Cancer Intelligence and Surveillance Unit, respectively.

12 . Policy context

Users of cancer survival estimates include government organisations, health policymakers, cancer charities, academics and researchers, cancer registries, the general public, and the media. Population-based cancer survival statistics are used to:

- plan services aimed at cancer prevention, treatment and earlier detection
- feed in to national cancer plans, such as Achieving world-class cancer outcomes: A Strategy for England 2015 to 2020, which recommends six strategic priorities to help improve cancer survival in England by 2020
- inform the NHS Outcomes Framework, which was established to monitor overall changes in performance of the NHS and the quality of health outcomes; the NHS Outcomes Framework 2016 to 2017 prompted the introduction of a cancer survival indicator for children and in the 2015 to 2016 NHS Outcomes Framework, indicators were set for 1-year and 5-year survival from colorectal, breast and lung cancers
- provide reliable and accessible information about cancer outcomes to a wide range of groups, including patients and health professionals via health awareness campaigns, cancer information leaflets and web pages
- inform cancer research

The adult cancer survival by stage at diagnosis analysis is used by the National Awareness and Early Diagnosis Initiative (NAEDI), which aims to improve cancer survival by earlier diagnosis. The data can help show the improvement in survival that could be made if more cancers were diagnosed earlier. They also show the pattern of survival and stage, which may help show where most improvement can be made.

13 . Quality and methodology

The Cancer survival Quality and Methodology Information (QMI) 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

Due to improvements in the methodology we have released an impact paper on how these changes have impacted the previously published cancer survival estimates.

14 . Authors

Responsible statisticians: John Broggio (Public Health England) and Sophie John (Office for National Statistics).

For queries relating to this bulletin, please contact us via email at cancer.newport@ons.gov.uk.

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

15 . Acknowledgements

This work uses data provided by patients and collected by the NHS as part of their care and support.