Public Health England

Protecting and improving the nation's health

Office for National Statistics

National Cancer Registration and Analysis Service

Cancer Survival in England a collaboration between PHE and ONS

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2nd October 2018

What is cancer survival ?

- A statistic that measures the mortality of cancer patients compared to the mortality of the general population in which cancer is the only cause of death

- A measure that summarises a cohort of cancer patients pathways, from diagnosis to outcome in an overall estimate

Why are cancer survival statistics important ?

- One of the key measures of the effectiveness of **cancer services**

- Inform the NHS Outcomes Framework

  https://digital.nhs.uk/data-and-information/publications /clinical-indicators/nhs-outcomes-framework/current

- Provide reliable/accessible information to a wide range of groups

Why are cancer survival statistics important ?

- International comparisons (OECD countries)


UK cancer survival rates lag behind those of other European countries – study

Experts highlight need for earlier diagnosis and improved access to treatments, as figures show UK healthcare spend is lower than the European average

Guardian, 18 Jul 2017


THE LANCET

ARTICLES | VOLUME 391, ISSUE 10125, P1023-1075, MARCH 17, 2018

Global surveillance of trends in cancer survival 2000–14 (CONCORD-3): analysis of individual records for 37 513 025 patients diagnosed with one of 18 cancers from 322 population-based registries in 71 countries

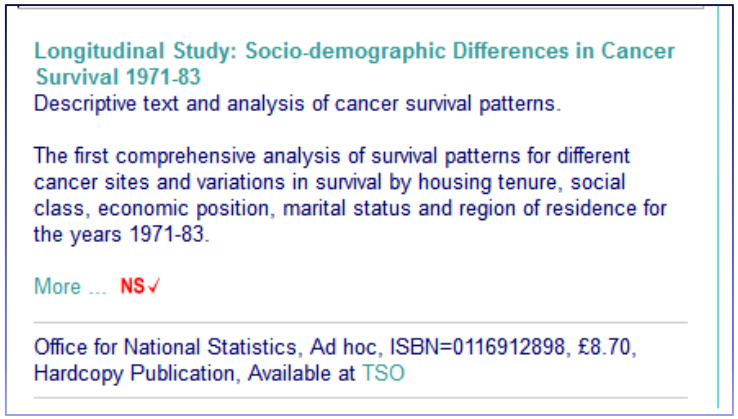
Claudia Allemani, PhD · Tomohiro Matsuda, PhD · Veronica Di Carlo, MSc · Rhea Harewood, MSc · Melissa Matz, PhD · Maja Nikšić, PhD · et al Show all authors · Show footnotes

Published: January 30, 2018 · DOI: https://doi.org/10.1016/S0140-6736(17)33326-3 · Check for updates

- the Independent Cancer Task Force set out **six strategic priorities** to help improve cancer survival
  - reducing CCG-variation
  - ambition to increase one-year survival to 75% by 2020 for all-cancers combined

Overview of Survival

Office for National Statistics has been publishing cancer survival statistics annually:
https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/conditionsanddiseases/bulletins/cancersurvivalinengland

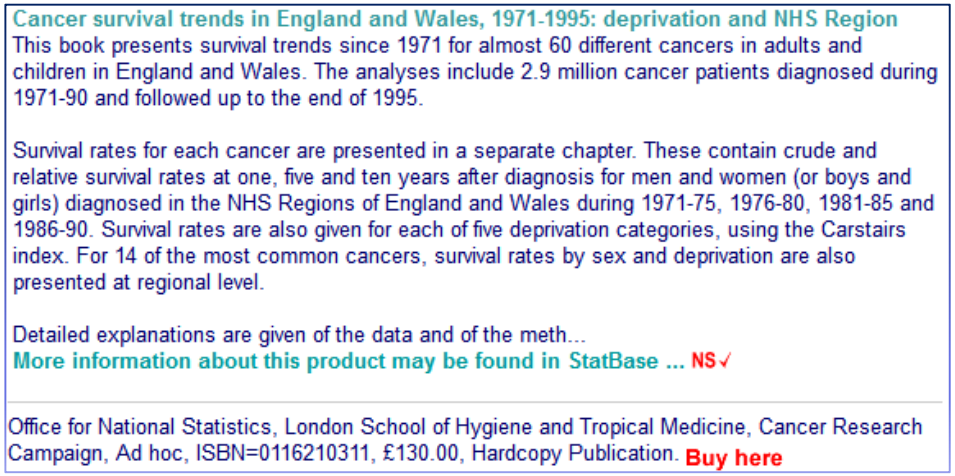


Longitudinal Study: Socio-demographic Differences in Cancer Survival 1971-83
Descriptive text and analysis of cancer survival patterns.

The first comprehensive analysis of survival patterns for different cancer sites and variations in survival by housing tenure, social class, economic position, marital status and region of residence for the years 1971-83.

More ... NS✓

Office for National Statistics, Ad hoc, ISBN=0116912898, £8.70, Hardcopy Publication, Available at TSO



Cancer survival trends in England and Wales, 1971-1995: deprivation and NHS Region
This book presents survival trends since 1971 for almost 60 different cancers in adults and children in England and Wales. The analyses include 2.9 million cancer patients diagnosed during 1971-90 and followed up to the end of 1995.

Survival rates for each cancer are presented in a separate chapter. These contain crude and relative survival rates at one, five and ten years after diagnosis for men and women (or boys and girls) diagnosed in the NHS Regions of England and Wales during 1971-75, 1976-80, 1981-85 and 1986-90. Survival rates are also given for each of five deprivation categories, using the Carstairs index. For 14 of the most common cancers, survival rates by sex and deprivation are also presented at regional level.

Detailed explanations are given of the data and of the meth...
More information about this product may be found in StatBase ... NS✓

Office for National Statistics, London School of Hygiene and Tropical Medicine, Cancer Research Campaign, Ad hoc, ISBN=0116210311, £130.00, Hardcopy Publication. **Buy here**

Statistical bulletin:

Cancer survival in England – childhood: patients followed up to 2017

Long-term survival trends for children (aged 0 to 14 years) diagnosed with cancer in England. Adult and stage of diagnosis survival estimates will be published in a separate release, later in 2018.

This is the latest release

Contact:	Release date:	Next release:
Andy King (ONS) and John Broggio (PHE)	14 June 2018	To be announced

Office for National Statistics

Users

Health-policy makers

Government Bodies

Cancer Charities

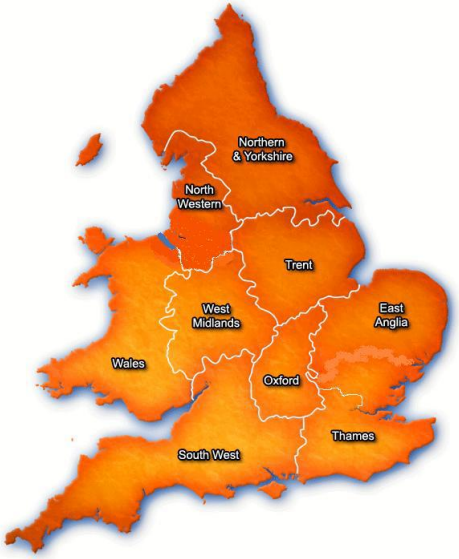
Clinical Commissioning Groups (CCGs)

Academia/ research

Media

PHE and ONS collaboration

8 regional cancer registries



Collect, quality assures and store regional cancer data from England

Office for National Statistics

Health Analysis and Life Events

Collate, quality assures

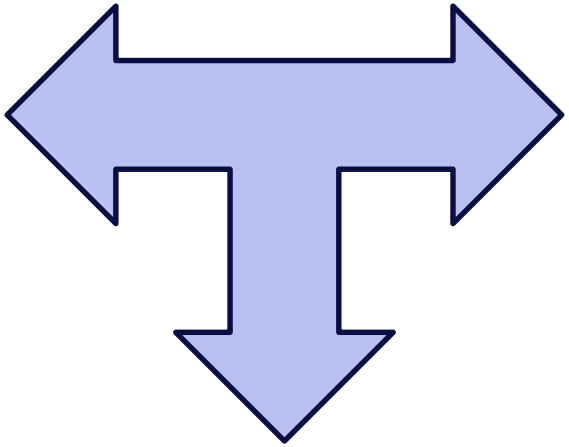
Publishes cancer incidence and **cancer survival**

PHE and ONS collaboration

Public Health England

National Cancer Registration and Analysis Service

Collects, quality assures and stores all cancer data from England



Office for National Statistics

Health Analysis and Life Events

Publishes cancer incidence and **cancer survival**

PHE and ONS collaboration

2016 2017 2018

Statistical bulletin:

Cancer survival by stage at diagnosis for England (experimental statistics): Adults diagnosed 2012, 2013 and 2014 and followed up to 2015

Survival for people diagnosed by cancer type, split by stage at diagnosis. Data based on people diagnosed in England in 2012, 2013 and 2014. Produced in collaboration with Public Health England (PHE).

Cancer survival in England Adults, Childhood and Stage (June 2017)

Index of cancer survival for Clinical Commissioning Groups (CCGs) in England (Nov 2017)

Geographic patterns of cancer survival in England NHS Region, Cancer Alliance and STPs (Feb 2018)

Cancer survival in England Childhood (June 2018)

…

PHE and ONS collaboration

Benefits

- Data quality assured and stored by NCRAS
- Reduced work duplication
- Reduced cross-government sensitive data transfer
- Increased transparency of methods used
- Bulletins, QMIs and impact papers revised by the partnership
- Improved timeliness (e.g. childhood published 8 months earlier)
- Work carried out within the Civil Service

PHE and ONS collaboration

Communication strategies adopted to facilitate the collaboration:

- Weekly **calls** supplemented by **f2f** meetings at key points
- **Trello** for working across organisations
- Shared PID **drive** in PHE for working across locations
- **Workshops** across government, NHS England and other key stakeholders to keep the output focussed & relevant
- Working with **world leading academic teams** to ensure remaining at the forefront of methodologies and developing new applications of existing statistical frameworks to survival analysis

Current methodology – children

All cause survival

- (Actuarial) Kaplan-Meier method (sts list).
- Assumes that all patients mortality is related to the disease.
- No lifetables needed.

Current methodology – adults

Net survival

- The survival that would be observed if the only possible underlying cause of death was the disease under study.
- Estimated using either cause-specific or **relative survival setting**.
- Used in population-based cancer studies.
- Based on the assumption of independent competing causes of death.
- Defined as the ratio of the proportion of observed survivors in a cohort of cancer patients to the proportion of expected survivors in a comparable set of the general population.
- Uses lifetables.

Current methodology – adults

Net survival

- Maja Pohar Perme et al (2012) proposed an improvement to the survival estimator that reduces the bias

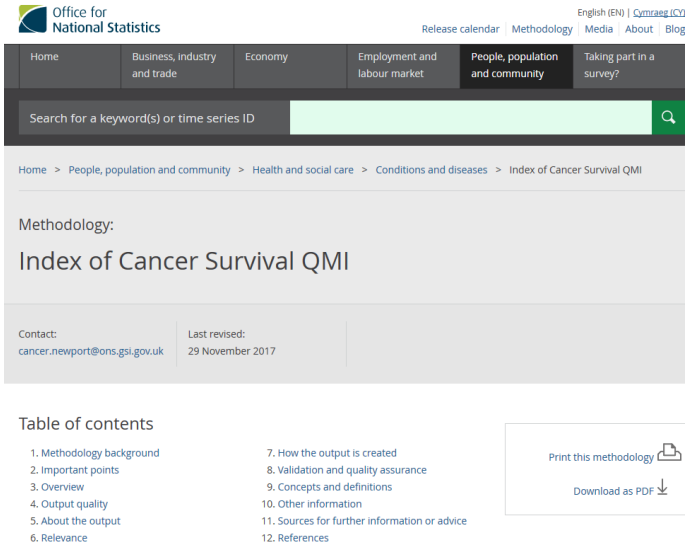
- Use the Pohar-Perme estimator (stns)

Current methodology – adults

Net survival

Issue: Small numbers in the 207 CCGs

- Due to small numbers we estimate net cancer survival for small areas (such as CCGs and STPs) using flexible parametric modelling with restricted cubic splines (stpm2) developed by Royston and Parmar (2002).



Methodology: Implementation

- Produced SQL query to extract all cancer data 1971 onwards.
- Coded all survival methods in Stata 15.
- Use of high performance machines.
- To consolidate the skills in these survival estimation techniques, the team attended a 5-day course at the London School of Hygiene and Tropical Medicine “Cancer Survival: Principles, Methods, Applications” (July 2017).
- Developed robust quality assurance (QA) processes that included implementing parallel runs of the analyses and QA framework.

Methodology: Innovation

We reproduced previous methods but introduced the use of the International Classification of Survival Standard (ICSS) weighting system to age-standardise the net survival estimates (Corazziari I et al. 2004).

Important advantages of the use of ICSS weights are:

- they are used internationally
- allow international comparisons as they are not country or diagnostic period specific.
- they are methodologically recommended as they account for the fact that different cancer sites have different age distributions

Methodology: Innovation

- Range of the geographies published was extended to include the NHS Sustainability and Transformation Partnerships (STPs) geographies in the CCG bulletin.

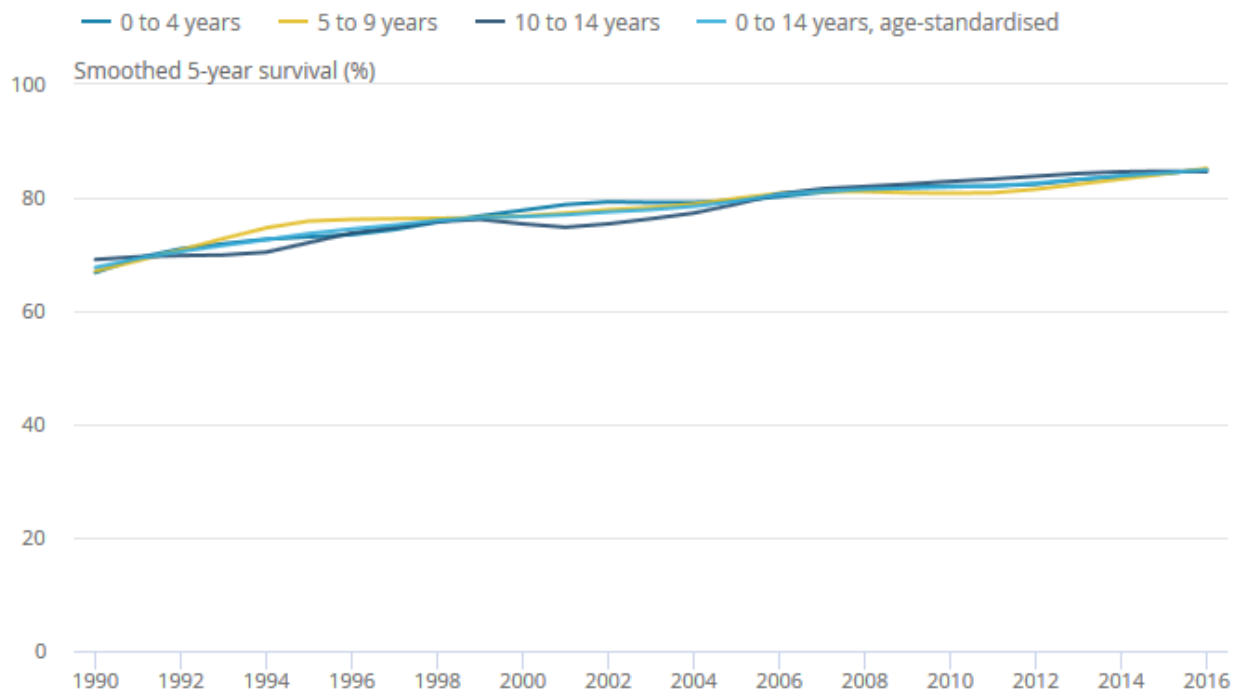
- Extend the range of survival estimates produced for England to include survival by stage for the first time.

- Explicitly state the definitions of criteria used to determine which estimates should be published (suppression rules).

- Improved robustness of the CCG-level analysis models by using both the Akaike Information Criterion (AIC) and the Bayesian Information Criteria (BIC) for model selection.

Outputs

Figure 18: Smoothed trends in 5-year survival (%) for children (aged 0 to 14 years) diagnosed with cancer in England between 1990 and 2016

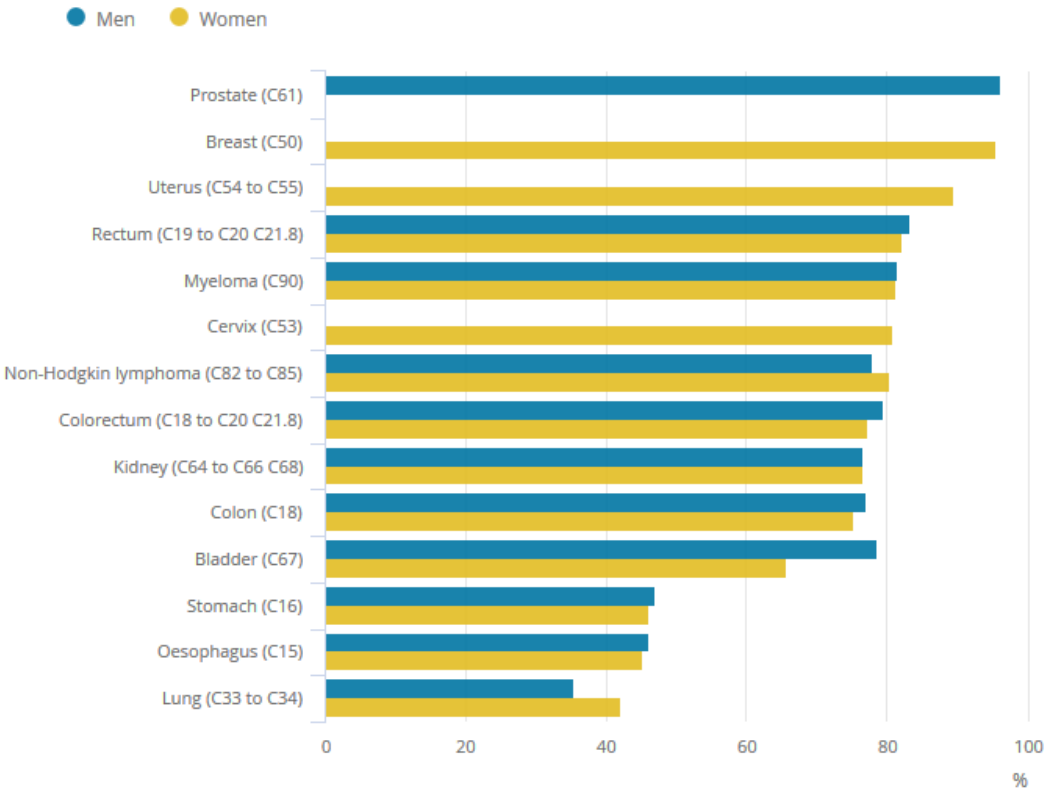


Source: National Cancer Registration and Analysis Service within Public Health England and Office for National Statistics

https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/conditionsanddiseases/bulletins/cancersurvivalinengland/adultstageatdiagnosisandchildhoodpatientsfollowedupto2016

Outputs

Figure 1: Age-standardised 1-year net survival (%) for adults diagnosed during the period 2011 to 2015 and followed up to 2016: England, 14 common cancers, by sex

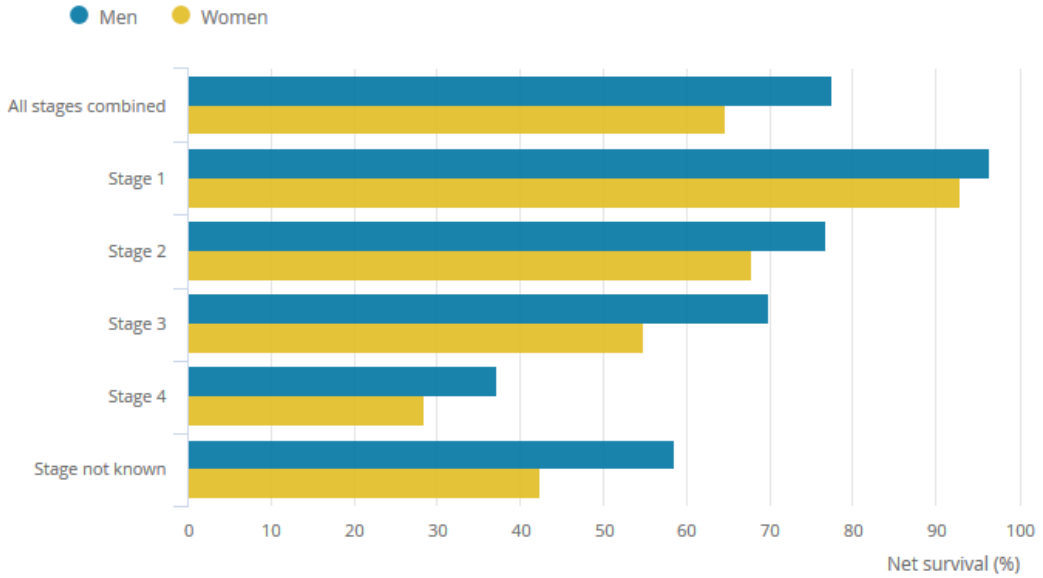


Source: National Cancer Registration and Analysis Service within Public Health England; Office for National Statistics

https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/conditionsanddiseases/bulletins/geographicpatternsofcancersurvivalinengland/adultsdiagnosed2011to2015andfollowedupto2016

Outputs

Figure 8: Age-standardised 1-year net survival (%) for men and women (aged 15 to 99 years) diagnosed with bladder cancer in 2015 and followed up to 2016, England



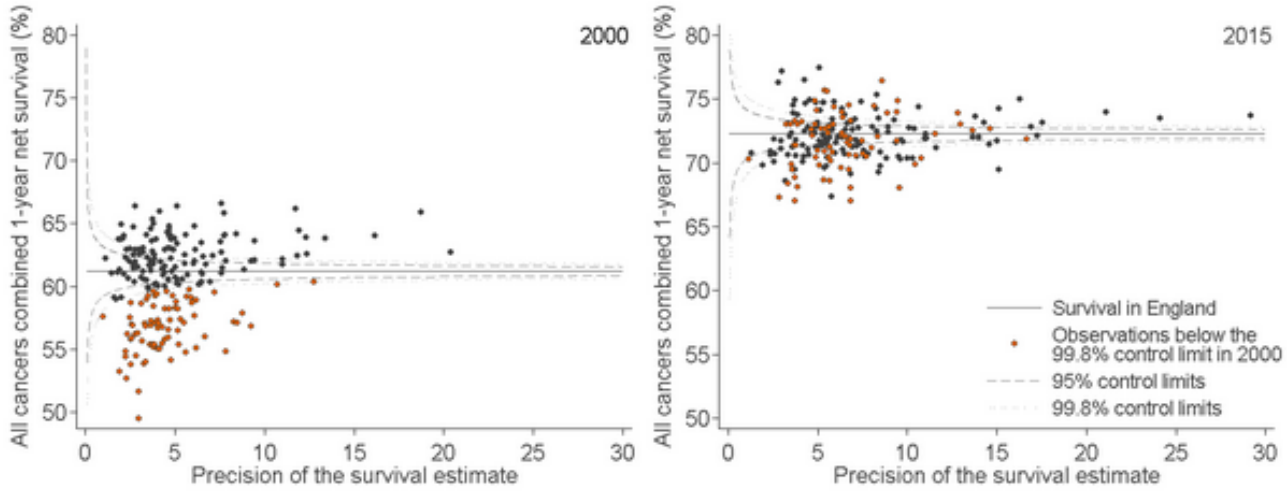
Source: National Cancer Registration and Analysis Service within Public Health England and Office for National Statistics

https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/conditionsanddiseases/bulletins/cancersurvivalinengland/adultstageatdiagnosisandchildhoodpatientsfollowedupto2016

Outputs

Figure 1: Funnel plot of the one-year survival index (%) for all cancers combined, for Clinical Commissioning Groups (CCG): England

Adults (aged 15 to 99 years) diagnosed in 2000 and in 2015



Source: National Cancer Registration and Analysis Service within Public Health England; Office for National Statistics

https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/conditionsanddiseases/bulletins/indexofcancersurvivalforclinicalcommissioninggroupsinengland/adultsdiagnosed2000to2015andfollowedupto2016

Next steps

- Producing and using regularly updated lifetables.
- Co-produce the survival estimates across ONS & PHE.
- Publish and implement a new method: hierarchical Bayesian modelling framework to allow comparisons between the CCGs and have “static” estimates.
- Extend survival by stage to more cancer sites.
- Further improve our timeliness.

Public Health England

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References

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Royston P, Parmar MK. 2002. “Flexible parametric proportional-hazards and proportional-odds models for censored survival data, with application to prognostic modelling and estimation of treatment effects”. Statistics in Medicine 21(15): 2175-2197.

Thank you!