

Statistical bulletin

Childhood cancer survival in England: Children diagnosed from 1990 to 2009 and followed up to 2014 (experimental statistics)

Long-term trends in the number of children (aged 0 to 14) surviving cancer 5 years after diagnosis.

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Release date:
15 January 2016

Next release:
To be announced

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1 . Main points

- The general trend of increasing 5-year survival has continued for all children (aged 0 to 14 years) diagnosed with cancer in the 20 years from 1990 to 2009
- This pattern of increasing 5-year survival is evident in each of the age groups 0 to 4 years, 5 to 9 years and 10 to 14 years
- Interpretation of survival estimates should be focused on overall trends up to 2009, rather than estimates for any particular year. This is because the number of children diagnosed each year is relatively small and the survival estimates for single calendar years are therefore less stable

2 . Summary

This bulletin presents estimates of 5-year overall survival (Background note 1) for all cancers combined. Data are presented on survival for all children (0 to 14 years) diagnosed with cancer (Background note 2) in England during the 20-year period from 1990 to 2009 and followed up to 31 December 2014. Survival estimates are reported by age group and for all ages combined, both unstandardised and age-standardised (Background note 3).

Confidence intervals are included in the reference tables and can be used to give an indication of the variability in the survival estimates. Further information on the methods used to estimate 5-year survival can be found in the background notes.

These statistics are designated as Experimental Statistics. Experimental Statistics are those which are in the testing phase, are not yet fully developed and have not been submitted for assessment to the UK Statistics Authority. Experimental Statistics are published in order to involve customers and stakeholders in their development and as a means of building in quality at an early stage. A user consultation will be opened in the future. Further information on [Experimental Statistics](#) can be found on our website.

3 . Collaboration

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

London School of Hygiene and Tropical Medicine



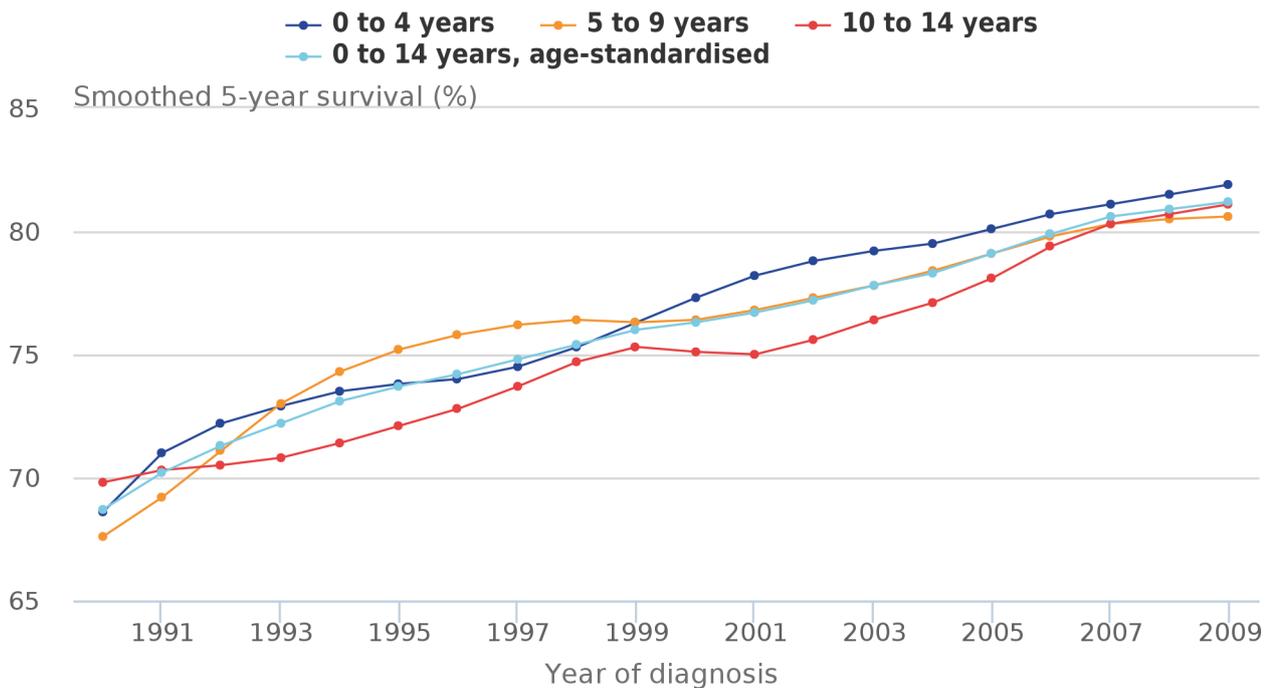
4 . 5-year survival for children diagnosed between 1990 and 2009

For children (aged 0 to 14) diagnosed with cancer in 2009, age-standardised 5-year survival was 80.9%. The most common cancers diagnosed in childhood are leukaemias and malignant neoplasm of brain.

Survival for children diagnosed with cancer improved throughout the period 1990 to 2009 (Figure 1). From 1990 to 1995, 5-year survival was below 75%; for children diagnosed since 2004, 5-year survival has consistently been above 78%. The trend of increasing 5-year survival is evident in each of the age groups 0 to 4 years, 5 to 9 years and 10 to 14 years.

The increase in survival for children with cancer is likely to be due to improvements in treatment and supportive care. The increases in survival for many of the principal types of childhood cancer have occurred in parallel with clinical trials in the same period of time. Trends in population-based survival for a wide range of childhood cancers in Britain increased significantly between 1978 and 2005 for every diagnostic category¹.

Figure 1: Smoothed trends in 5-year survival (%) for children (aged 0 to 14) diagnosed with cancer in England between 1990 and 2009



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

Notes:

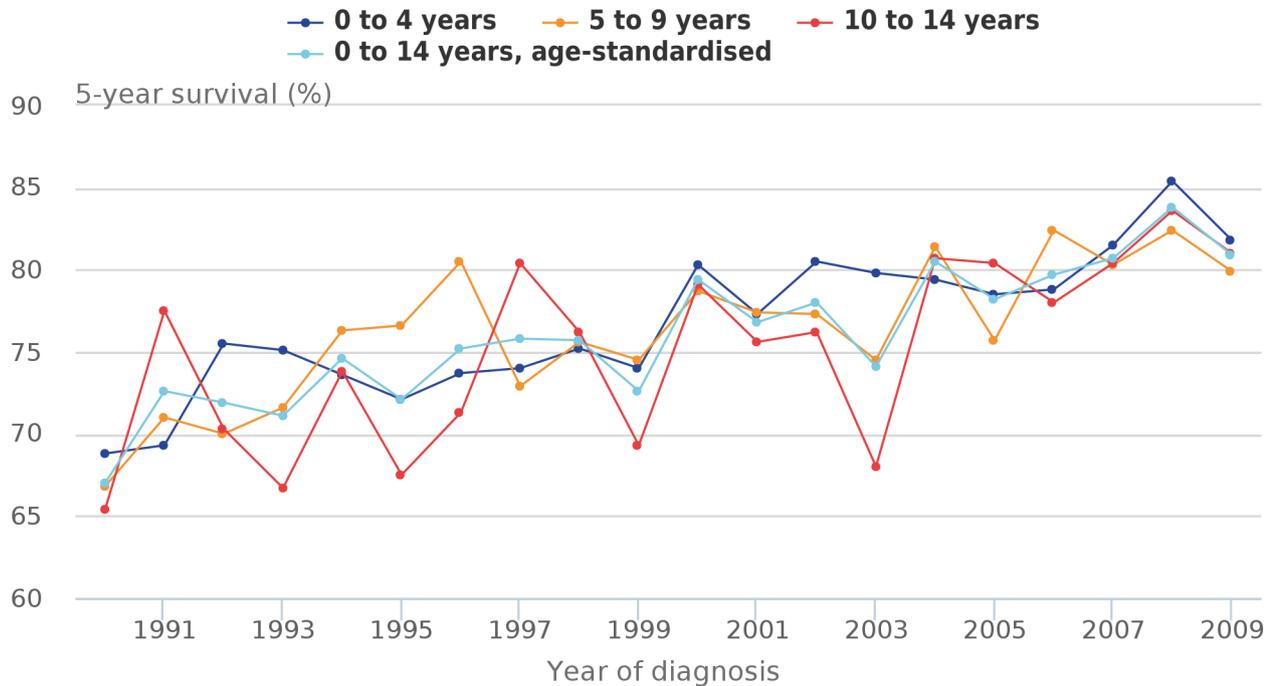
1. Age-group specific estimates are presented for children aged 0 to 4, 5 to 9, and 10 to 14.
2. These data have been smoothed using the “lowess” technique (locally weighted scatterplot smoothing) because of the year-to-year variation in the survival estimates.
3. The vertical axis of Figure 1 has been fixed between 65% and 90% to display the trends more clearly.
4. Cancer survival has improved for all 3 age groups, with a higher percentage of children surviving 5 years after diagnosis in 2009 than in 1990.

5. Interpretation of these statistics

In Figure 1 the year-to-year variation in 5-year survival has been removed by smoothing (Background note 5). The unsmoothed data presented in Figure 2 provides an understanding of the wide fluctuations in 5-year survival that were removed from Figure 1. Fluctuations in the time series occur due to sparse data. There are small numbers of cancer diagnoses and deaths each year among children in England. Therefore, interpretation of these data should be focused on overall trends up to 2009, rather than the survival estimates for any particular year.

For instance, there is an increasing trend in 5-year survival during the period 1990 to 2009 (Figure 2). Yet, when looking at the 2009 estimate compared with the 2008 estimate, survival appears to have declined. However, we cannot be certain that there has been a genuine change in the trend in 5-year survival until more recent data are available. Care should be taken when interpreting this decline, because it is almost certainly due to fluctuation in the time series rather than a genuine decline in cancer survival.

Figure 2: Five-year survival (%) for children (aged 0 to 14) diagnosed with cancer in England between 1990 and 2009



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

Notes:

1. Age-group specific estimates are presented for children aged 0 to 4, 5 to 9, and 10 to 14.
2. Interpretation should be focused on overall trends up to 2009, rather than the survival estimates for any particular year. This is because the number of children diagnosed each year is relatively small and the survival estimates for single calendar years are therefore less stable.
3. The vertical axis of Figure 2 has been fixed between 65% and 90% to enable comparison between Figure 1 and Figure 2.
4. Fluctuations in cancer survival are due to small numbers of childhood cancer diagnoses, and deaths, each year in England. Therefore focus should be on the overall trend rather than on survival estimates for any individual year.

6 . Users and uses

This is our third bulletin on childhood cancer survival in England. These statistics were prompted by the introduction of a cancer survival indicator for children in the NHS Outcomes Framework 2013–2014². The NHS Outcomes Framework was established to monitor overall changes in performance of the NHS and the quality of health outcomes.

Users of cancer survival estimates also include government organisations, policy-makers, 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 and treatment
- 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
- feed in to national cancer plans, such as: "[Achieving world-class cancer outcomes: A Strategy for England 2015 to 2020](#)", which outlines 6 strategic priorities to help improve cancer survival in England by 2020³
- inform cancer research

7. References

1. Stiller CA, Kroll ME, Pritchard-Jones K. [Population survival from childhood cancer in Britain during 1978–2005 by eras of entry to clinical trials](#). *Ann Oncol* 2012; 23: 2464–9.
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4. Li R, Abela L, Moore J, Woods LM, Nur U, Rachet B, Allemani C, Coleman MP. [Control of data quality for population-based cancer survival analysis](#). *Cancer Epidemiol* 2014; 38: 314–20.
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6. Office for National Statistics. [Cancer survival for children in England, children diagnosed 1990-2006 and followed up to 2011](#). Newport: Office for National Statistics, 2013.
7. Office for National Statistics. [Cancer Survival Statistical Bulletins Quality and Methodology Information](#). Newport: Office for National Statistics, 2015.

8. Authors

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9. Acknowledgement

The Office for National Statistics and the London School of Hygiene & Tropical Medicine wish to acknowledge the work of the National Cancer Registration Service in Public Health England, which provides the raw data for analyses.

10. Background notes

1. We report the cumulative probability of overall survival up to 5 years after diagnosis using the Kaplan-Meier method. All deaths are included in the analysis, whatever the cause of death written on the death certificate. In adults, by contrast, the net survival indicator is used in order to compensate for mortality from other causes, which may be considerable. For children with cancer, overall survival is considered a reliable

estimator of cancer survival because, unlike in adults, death within 5 years of diagnosis is almost always due to the cancer.

2. All children (aged 0 to 14 years) resident in England who were diagnosed with cancer before their 15th birthday between 1990 and 2009 were considered eligible for inclusion in the survival analyses. The term 'cancer' refers to primary, invasive, malignant neoplasms of any organ, but the analyses also included non-malignant neoplasms of the brain and central nervous system (International Classification of Diseases, 10th Revision (ICD-10) codes D33 and D43). Cancers of the skin other than melanoma (C44) and secondary and unspecified malignant neoplasms (ICD-10 codes C77 to C79) are excluded. Further details of the eligibility and exclusion criteria have been published⁴.
3. Survival varies with age at diagnosis, and the age profile of patients can change over time. To enable comparison of overall survival in the age range 0 to 14 years over long periods of time, age-standardised estimates are calculated as a weighted sum of the age-specific survival estimates. For children, it is conventional to use equal weights for each of the 5-year age groups (0 to 4, 5 to 9 and 10 to 14 years), which is then equivalent to taking the simple arithmetic mean of the age-specific survival estimates.
4. The "cohort approach" to estimating survival is applied, therefore follow-up data for at least 5 years up to 2014 are available for all patients diagnosed between 1990 and 2009 (vital status: alive, dead, or has emigrated). Children whose tumour was only reported on a death certificate were excluded, because their duration of survival is unknown, however, they only represent 0.5% of all childhood tumours in the period covered.
5. Figure 1 presents smoothed 5-year survival estimates to show trends over time. These data have been smoothed using the "lowess" technique (locally weighted scatterplot smoothing) because of the year-to-year variation in the survival estimates. The "lowess" technique is one of many techniques used to smooth fluctuating estimates in order to highlight patterns in the data such as temporal trends⁵. Figure 1 presents smoothed trends, so the values plotted in the graph are not identical to the survival estimates shown in reference Table 1.
6. The data for this report were extracted for analysis on 17 May 2015. Cancer registrations are subject to year-on-year change as late registrations may arrive up to 5 years after the end of a given calendar period or existing registrations may be amended or deleted. Each patient's vital status at 31 December 2014 was known for 98.4% of cancers registered between 1990 and 2009.
7. The cancer registration data in this publication have been collected by the National Cancer Registration Service in Public Health England. The data for the first bulletin⁶ were provided by the Childhood Cancer Research Group, University of Oxford, using data from the National Registry of Childhood Tumours (NRCT). The Childhood Cancer Research Group was disbanded in 2014 and the NRCT dataset was frozen, with the most recent complete year of incidence registrations for 2010. The number of incident cases varies slightly between the two data sources.
8. Further information about these cancer survival estimates can be found in the Cancer Survival Quality and Methodology Information paper⁷ which provides more details and important qualitative information on the quality of statistics and a summary of the methods used to compile them.
9. Further cancer statistics for the UK can be found through the:
 - Scottish cancer registry managed by the [Information Services Division](#)
 - [Welsh Cancer Intelligence Surveillance Unit](#)
 - [Northern Ireland Cancer Registry](#)
10. A [list of the names](#) of those given pre-publication access to the statistics and written commentary is available in the Pre-release Access List: Cancer survival for children in England: children diagnosed from 1990 to 2009 and followed up to 2014. The rules and principles which govern pre-release access are featured within the Pre-release Access to Official Statistics Order 2008.
11. The Office for National Statistics (ONS) is the executive office of the UK Statistics Authority, a non-ministerial department which reports directly to Parliament. ONS is the UK government's single largest statistical producer. It compiles information about the UK's society and economy, and provides the evidence base for policy and decision-making, the allocation of resources, and public accountability.

12. Details of the policy governing the release of new data are available by visiting www.statisticsauthority.gov.uk/assessment/code-of-practice/index.html or from the Media Relations Office email: media.relations@ons.gsi.gov.uk