

Statistical bulletin

# Child and infant mortality in England and Wales: 2011

Stillbirths, infant and childhood deaths occurring annually in England and Wales, and associated risk factors.



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# 1 . Main findings

- There were 3,025 infant deaths (deaths under 1 year) in England and Wales in 2011 compared with 3,077 infant deaths in 2010 and 7,021 in 1981
- In 2011 the infant mortality rate was 4.2 deaths per 1,000 live births, the lowest ever recorded in England and Wales, and compares with an infant mortality rate of 4.3 deaths per 1,000 live births in 2010 and 11.1 deaths per 1,000 live births in 1981
- Infant mortality rates were lowest for babies of mothers aged 35 to 39 years (3.7 deaths per 1,000 live births) and highest for babies of mothers aged 40 years and over (5.5 deaths per 1,000 live births)
- In 2011 the infant mortality rates for very low birthweight babies (under 1,500 grams) and low birthweight babies (under 2,500 grams) were 172.6 and 36.5 deaths per 1,000 live births respectively

## 2 . Summary

This statistical bulletin presents final statistics on infant deaths and childhood deaths that occurred in 2011 in England and Wales. It also contains additional analyses by some of the key risk factors affecting infant deaths, including age of mother and birthweight. These characteristics are derived from linking the death registration to the corresponding birth registration record. Data are also available for babies born in 2010 who died before their first birthday: [the 2010 birth cohort for infant deaths](#).

This is the first time that final 2011 figures on infant and childhood mortality, based on occurrences, have been published by the Office for National Statistics (ONS). It is also the first time that the 2010 birth cohort data for infant deaths has been published.

Details of why the figures in this bulletin may differ from other publications are in background note 3.

## 3 . Background

Although infant mortality rates have continued to fall in England and Wales over the past 30 years, the rates of change varied over the period. The change in the first half of the period was more than twice that in the second half. General improvements in healthcare and more specific improvements in midwifery and neonatal intensive care can partly explain the overall fall in the rate of change.

Despite the downward trend, evidence in the [Marmot Review : Fair Society, Healthy Lives](#) noted that factors including births outside marriage, maternal age under the age of 20 and deprivation, were independently associated with an increased risk of infant mortality. The review went on to say that 'low birth weight in particular is associated with poorer long-term health outcomes and the evidence also suggests that maternal health is related to socioeconomic status'.

## 4 . Infant and perinatal mortality rates

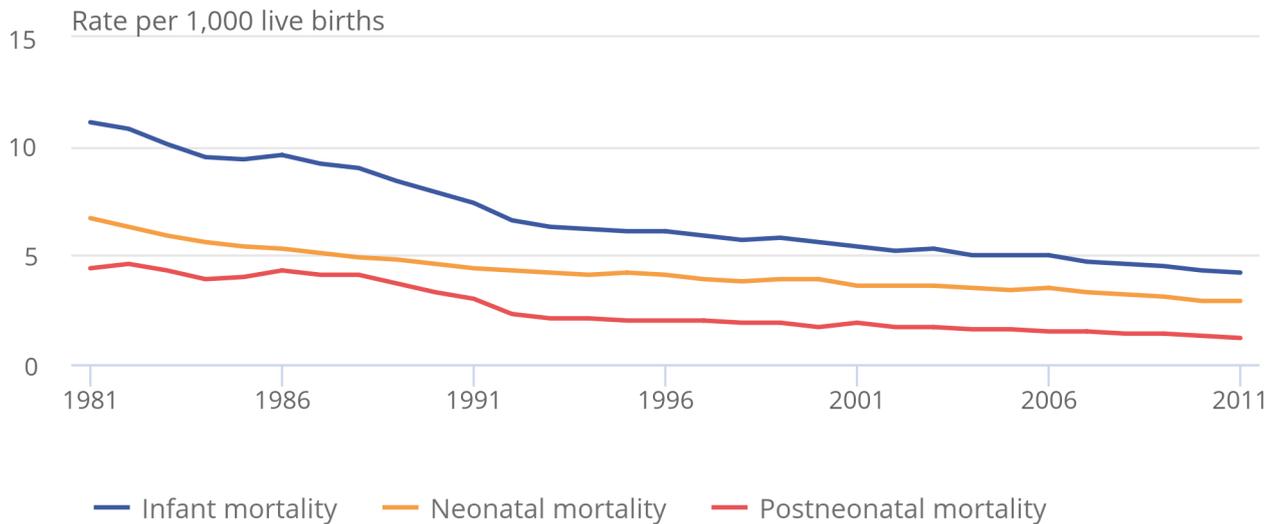
There were 3,025 infant deaths in England and Wales in 2011 resulting in an infant mortality rate of 4.2 deaths per 1,000 live births (the lowest rate ever recorded in England and Wales). Since 1981 when the rate was 11.1 deaths per 1,000 live births, there has been a 62% fall in infant mortality rates in England and Wales. This continues the overall decline in infant mortality rates in England and Wales over the past 30 years (Figure 1). The infant mortality rate in 2010 was 4.3 deaths per 1,000 live births. Small fluctuations in the infant mortality rate have occurred over recent years.

**Figure 1: Infant, neonatal and postneonatal mortality rates: 1981-2011**

England and Wales

Figure 1: Infant, neonatal and postneonatal mortality rates:  
1981-2011

England and Wales



Source: Office for National Statistics

Notes:

1. Neonatal - deaths under 28 days
2. Postneonatal - deaths between 28 days and 1 year
3. Infant - deaths under 1 year

Over the same period, there has been a similar fall in neonatal mortality rates (deaths under 28 days) and postneonatal mortality rates (deaths between 28 days and 1 year). The neonatal mortality rate fell by 57%, from 6.7 deaths per 1,000 live births in 1981 to 2.9 deaths per 1,000 live births in 2011. The postneonatal mortality rate fell by 73% over the same period, from 4.4 deaths per 1,000 live births in 1981 to 1.2 deaths per 1,000 live births in 2011.

In 2011 there were 3,811 stillbirths and 1,639 deaths at age under 7 days, resulting in a perinatal mortality rate of 7.5 deaths per 1,000 total births. Since 1981, when the perinatal mortality rate was 11.8 deaths per 1,000 total births, the rate fell by more than a third.

## 5 . Linking birth and death records

Linking birth and infant death records improves our understanding of the key characteristics of the baby's parents that were registered on the birth registration record (see background note 4). In 2011, 98% of infant deaths in England and Wales were successfully linked to their corresponding birth registration record. The linkage rate for infant deaths has remained consistent since the linking exercise began.

## 6 . Age of mother at birth

The infant mortality rate for all infant deaths linked to their corresponding birth registration record was 4.1 deaths per 1,000 live births in 2011. For these linked deaths, infant mortality rates were lowest for babies of mothers aged 35 to 39 years (3.7 deaths per 1,000 live births) and highest for mothers aged 40 years and over (5.5 deaths per 1,000 live births).

## 7 . Birthweight

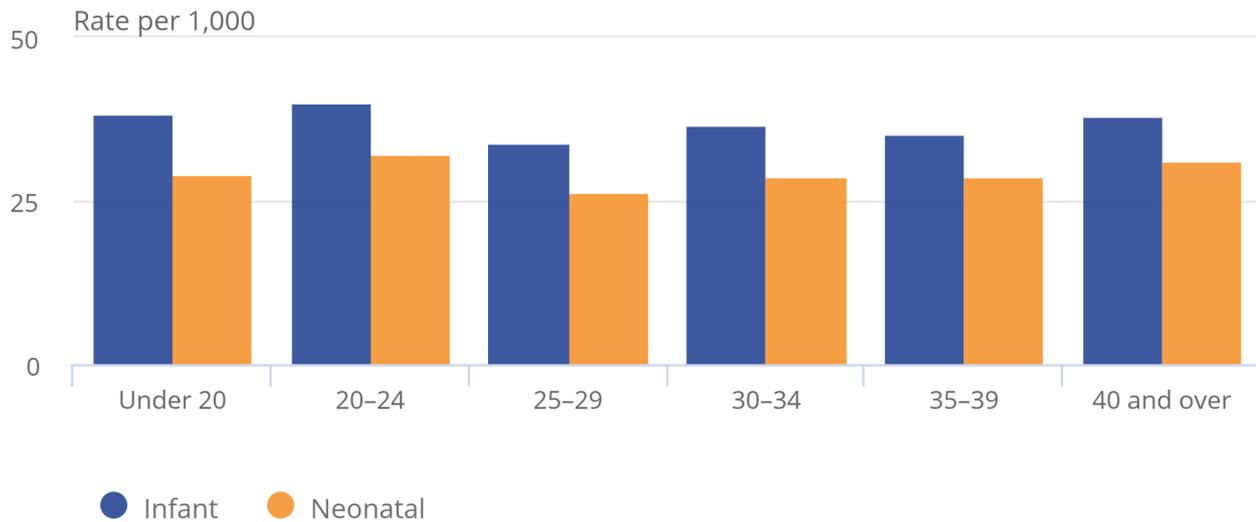
Low birthweight, one of the known risk factors for infant deaths, can be caused by a number of factors. For example, smoking has been identified as a major risk factor contributing to low birthweight. Babies born to women who smoke weigh on average 200g less than babies born to non-smokers ([Department of Health, 2001](#)).

**Figure 2: Infant and neonatal mortality rates for low birthweight babies: by age of mother, 2011**

England and Wales

Figure 2: Infant and neonatal mortality rates for low birthweight babies: by age of mother, 2011

England and Wales



Source: Office for National Statistics

Notes:

1. Linked infant deaths (occurred in 2011)
2. Babies weighing less than 2,500 grams
3. Infant - deaths under 1 year
4. Neonatal - deaths under 28 days

In 2011 the infant mortality rates for very low birthweight babies (under 1,500 grams) and low birthweight babies (under 2,500 grams) were 172.6 and 36.5 deaths per 1,000 live births respectively. This is significantly higher than the rate of 1.4 deaths per 1,000 live births among babies of normal birthweight (over 2,500 grams).

For babies of low birthweight, the infant mortality rate was highest among mothers aged 20 to 24 years (40.0 deaths per 1,000 live births) and lowest among mothers aged 25 to 29 years (33.9 deaths per 1,000 live births) (Figure 2). Although the neonatal death rates for low birthweight babies were lower than the corresponding infant mortality rates, they showed a similar pattern by mother's age.

## 8 . Socio-economic status

Significant differences in infant mortality rates by socio-economic group persist in England and Wales ( [Oakley et. al. 2009 \(720.5 Kb Pdf\)](#)). One measure of social circumstances is that of the father's occupational status. This is collected at birth for married women and, if the birth was outside marriage, where the father jointly registered the birth. Infant mortality rates were highest for babies with fathers employed in semi-routine occupations (4.9 deaths per 1,000 live births) and lowest for those employed in the managerial and professional occupations which had 2.8 and 2.5 deaths per 1,000 live births respectively.

Perinatal mortality rates were highest among babies with fathers employed in routine occupations or have never worked or are long-term unemployed (8.4 deaths per 1,000 total births) and lowest among large employers and higher managerial occupations (4.8 deaths per 1,000 total births). These variations may be the result of the link between lower socio-economic status and poorer maternal health which can ultimately affect infant mortality rates ([Oakley et. al. 2009 \(720.5 Kb Pdf\)](#)).

## 9 . Mother's country of birth

The infant mortality rate for babies of mothers born outside the UK was 4.4 deaths per 1,000 live births compared with 4.1 deaths per 1,000 live births for mothers born inside the UK. The highest infant mortality rates were for babies of mothers born in the Caribbean (9.6 deaths per 1,000 live births) and mothers born in Pakistan (7.6 deaths per 1,000 live births). Babies of mothers born in Central Africa had the highest stillbirth rate (10.9 deaths per 1,000 total births). Differences in infant mortality rates by mother's country of birth are likely to reflect underlying factors including mother's age, together with a range of other socio-demographic characteristics mentioned earlier in this bulletin.

## 10 . Child mortality rates

Between 1981 and 2011 the age-specific mortality rate for children aged 1 to 14 years fell by 63%, from 30 deaths per 100,000 population in 1981 to 11 deaths per 100,000 in 2011. The age-specific mortality rate for children aged 1 to 4 years fell by 68% over the same period, from 50 deaths per 100,000 population in 1981 to 16 deaths per 100,000 in 2011. Over the past 30 years child death rates from respiratory and circulatory diseases in England and Wales have been falling, as they have for the whole population, reflecting advances in medical care and preventative measures generally. In 2011 congenital related conditions and cancers were the most common form of death for children aged under 16 years.

## 11 . Singleton and multiple births using the 2010 birth cohort tables

Of the 723,165 live births in 2010, a total of 3,078 infants had died before their first birthday, resulting in an infant mortality rate of 4.3 deaths per 1,000 live births. There were 3,714 stillbirths and 1,661 deaths at age under seven days over the same time period, resulting in a perinatal mortality rate of 7.4 deaths per 1,000 total births (live births and stillbirths).

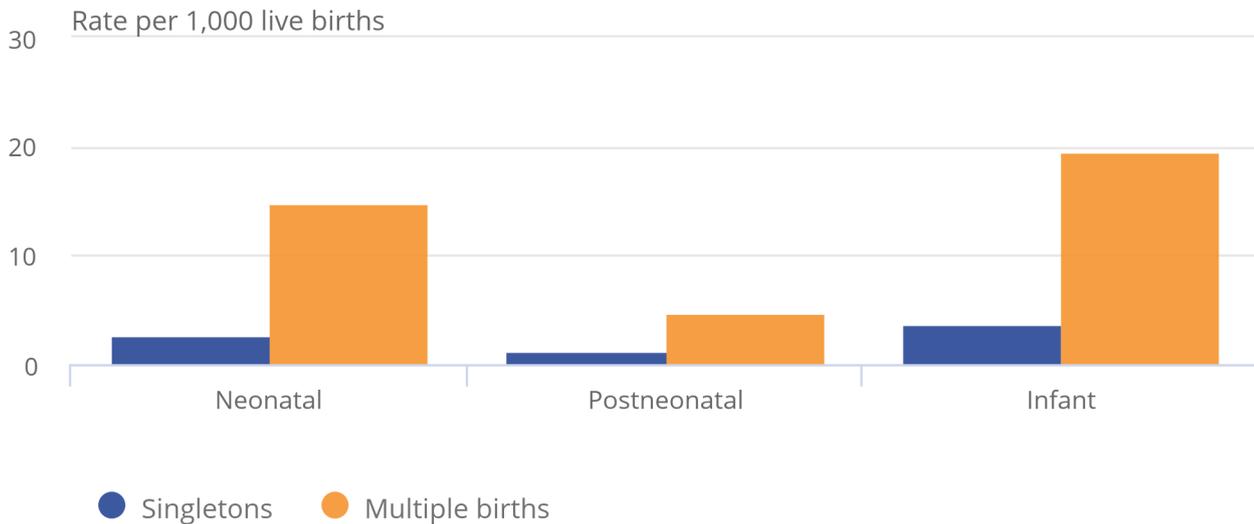
The infant mortality rate for multiple births in the 2010 birth cohort was five times higher than for singletons (19.5 deaths per 1,000 live births compared with 3.8 deaths per 1,000 live births). This was most marked in the first 28 days of life (neonatal deaths) when the mortality rate for multiple births was nearly six times higher than for singletons (14.7 deaths per 1,000 live births compared with 2.6 deaths per 1,000 live births). For those who survived beyond their first month but died before their first birthday (postneonatal deaths), the mortality rate was four times higher for multiple births (4.8 per 1,000 live births) compared with singleton births (1.2 deaths per 1,000 live births) (Figure 3).

**Figure 3: Infant mortality rate for single and multiple births, babies born in 2010**

England and Wales

Figure 3: Infant mortality rate for single and multiple births, babies born in 2010

England and Wales



Source: Office for National Statistics

Notes:

1. Neonatal - deaths under 28 days
2. Postneonatal - deaths between 28 days and 1 year
3. Infant - deaths under 1 year

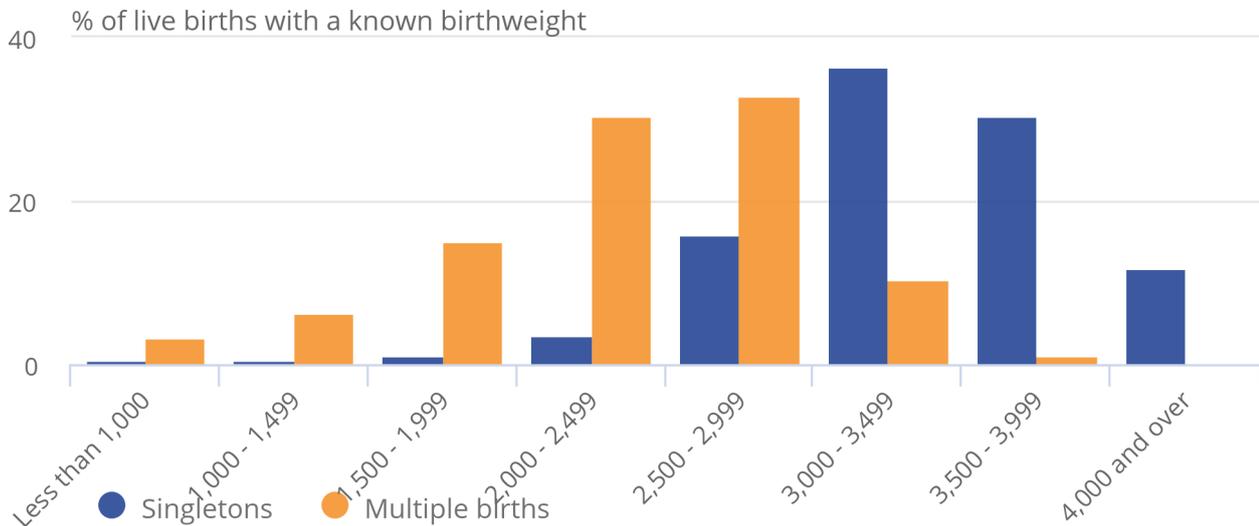
On average, multiple births tend to have a lower birthweight than singletons, which is one reason why the infant mortality rate is higher for this group. Just over half of multiple birth babies (55% of those with a known birthweight) were low birthweight (less than 2,500 grams) and 9.7% of those with a known birthweight were very low birthweight (less than 1,500 grams) (Figure 4).

**Figure 4: Live births: birthweight (grams) for singleton and multiple births, babies born in 2010**

England and Wales

Figure 4: Live births: birthweight (grams) for singleton and multiple births, babies born in 2010

England and Wales



Source: Office for National Statistics

In contrast, 5.5% of singletons were born with a low birthweight and 0.9% were very low birthweight. The main reason why multiple birth babies tend to have lower birthweight than singleton babies is because multiple births rarely go to term.

The highest infant mortality rates were for the extremely low birthweight babies (less than 1,000 grams), for singletons the rate was 282.9 deaths per 1,000 live births and for multiples the rate was 366.1 deaths per 1,000 live births.

## Age of mother at birth

Nearly two-thirds (63%) of all multiple births in 2010 were to women aged 30 years or over compared with 47% of all singleton babies. The 2010 birth cohort tables for infant deaths show that mothers aged 40 years and over have the highest infant mortality rate for singletons (5.5 deaths per 1,000 live births). Younger mothers (under 20 years) have the highest infant mortality rate for multiple births (42.4 deaths per 1,000 live births).

## Marital status and registration type

The infant mortality rate for babies born inside marriage was lower than for those born outside marriage. The 2010 birth cohort for infant deaths shows that for singletons, there were 3.5 deaths per 1,000 live births inside marriage and 4.1 deaths per 1,000 live births outside marriage. For multiple births there were 16.9 deaths per 1,000 live births inside marriage and 23.5 deaths per 1,000 live births outside marriage.

The infant mortality rate for singletons was highest for those registered solely by their mother, or registered jointly by parents living at different addresses (5.1 and 4.7 deaths per 1,000 live births respectively). For multiple births the infant mortality rate was highest for those jointly registered by both parents living at different addresses (34.1 deaths per 1,000 live births) compared with 19.6 deaths per 1,000 live births for those registered solely by the mother. The very small numbers in these groups affects the robustness of estimated mortality rates. Differences in mortality rates by marital status and birth registration type will also reflect complex underlying factors including mother's age and social circumstances ([Messer, 2011](#)).

For married women the infant mortality rate for singleton births was higher for women who have previously had three or more children (5.3 deaths per 1,000 live births) compared with women who have had no previous children (3.7 deaths per 1,000 live births). Other factors may be relevant here, especially the mother's age. For multiple births, the infant mortality rate was higher for women who have had no previous children (21.6 deaths per 1,000 live births).

## Socio-economic status

The 2010 birth cohort tables for infant deaths show that for singleton births, the highest infant mortality rate was found for the National Statistics Socio-economic Classification (NS-SEC) group describing semi-routine occupations (Group 6) with a mortality rate of 4.8 deaths per 1,000 live births compared with the managerial and professional occupations (Groups 1.1 and 1.2) which had 2.2 and 2.7 deaths per 1,000 live births respectively. The pattern was less clear for multiple births where there were smaller numbers. Studies have shown that infant mortality rates are comparatively higher for low income families ([Duncan and Brooks-Gunn, 2000](#)). Infants born into low-income households are less likely to be breastfed ([Mayhew and Bradshaw, 2005](#)) which can result in poorer immunity and poorer digestive health for the baby.

## 12 . Users and uses of infant mortality statistics

Infant mortality is seen as a key measure among health outcomes and there is a long established link between social and health inequalities, and infant mortality. The Department of Health (DH) is a key user of child mortality statistics. Previously, the department has used infant mortality data in conjunction with other analyses performed by the Office for National Statistics to monitor the Public Service Agreement (PSA) target on infant mortality for England and Wales. Currently, infant mortality continues to take a central role in DH's work on tackling health inequalities within the [NHS Outcomes Framework 2012/13](#).

There are also two specific users of the birth cohort data; the Department of Midwifery and Child Health, City University London; and the Public Health Observatories (PHOs) in England. PHOs produce information, data and intelligence on people's health at a local level.

Other users of infant mortality data include academics, independent researchers, charities and media.

## 13 . Impact of coding changes

In January 2011 the Office for National Statistics (ONS) introduced a new version of the Tenth Revision of the International Classification of Diseases (ICD-10) used to code cause of death. A recent study ([ONS, 2011](#)) found no impact on the ONS broad cause groups.

The broad ONS cause groups showed that immaturity-related conditions, for example, respiratory and cardiovascular disorders, were the most common cause of infant deaths, with 47% due to these causes. Congenital anomalies were another major cause group, accounting for 30% of all infant deaths. Congenital anomalies accounted for 40% of all postneonatal deaths and 26% of all neonatal deaths.

## 14 . Planned changes to child mortality outputs

Planned changes to child mortality publications are covered in an information note, available on the ONS website.

## 15. Further information

More data on [childhood, infant and perinatal mortality statistics](#) in England and Wales in 2011 are available on the ONS website.

All data for the [birth cohort tables for infant deaths](#) in England and Wales in 2009 are available on the ONS website.

A [Quality and Methodology Information \(218.6 Kb Pdf\)](#) document for Child mortality statistics is available on the ONS website.

Further information on data quality, legislation and procedures relating to childhood, infant and perinatal mortality is available on the ONS website in [Child mortality statistics metadata \(163.2 Kb Pdf\)](#).

[Gestation specific mortality](#) presents data on live births and infant deaths by gestational age, while [Infant and perinatal mortality by social and biological factors](#) provides statistics on infant and perinatal mortality by father's occupation; mother's country of birth; birthweight; and mother's age. [Unexplained deaths in infancy](#) includes both sudden infant deaths and deaths for which the cause remained unknown or unascertained.

For infant mortality data for other UK countries please see the [latest infant death statistics for Northern Ireland](#) and the [latest infant death statistics for Scotland](#).

The [Births summary tables](#), England and Wales provide key summary statistics for live births in England and Wales.

More general information on the collection, production and quality of mortality data is available in [Mortality metadata \(2.7 Mb Pdf\)](#).

## 16. References

Department of Health (2001) '[A Research Development Strategy for Public Health](#)'. London: Department of Health.

Duncan, G. and Brooks-Gunn, J. (2000) '[Family Poverty, Welfare Reform, and Child Development](#)', Child Development, Vol. 71, No. 1, pp. 188–196.

Health Fertilisation Embryology Authority (2007) '[The best possible start to life](#)'.

Jefferies, J. (2008) '[Fertility Assumptions for the 2006-based national population projections](#)' (297 Kb Pdf), Population Trends 131, pp 19–27.

Marmot, M. (2010) '[Fair Society, Healthy Lives – Strategic Review of Health Inequalities in England post-2010](#)'. London: The Marmot Review.

Mayhew, E. and Bradshaw, J. (2005) '[Mothers, Babies and the Risks of Poverty](#)', Poverty 121 (Summer 2005), pp 13-16.

Messer, J. (2011) '[An analysis of socio-demographic characteristics of sole registered births and infant deaths](#)', Health Statistics Quarterly 50, pp 79–107.

Oakley, L. et al (2009) '[Multivariate analysis of infant death in England and Wales in 2005–06, with focus on socio-economic status and deprivation](#)' (720.5 Kb Pdf), Health Statistics Quarterly 42, pp 22–33.

Office for National Statistics (2011) [Results from the ICD-10 v2010 bridge coding study: stillbirths and neonatal deaths](#).

## 17. Background notes

1. The live birth and stillbirth numbers are based on all births that occurred in the reference year, plus any late birth registrations from the previous year. Infant and child mortality figures are based on deaths that occurred in the reference year and may differ from previously published figures based on deaths registered in a reference year.
2. In the birth cohort tables, the infant death figures are based on babies born in 2010 who died before their first birthday: the 2010 birth cohort for infant deaths. This includes babies who died either in 2010, or in 2011, and were under 1 year of age.
3. The infant death figures in this bulletin differ slightly from those in the [Infant and perinatal mortality by social and biological factors, 2011](#) which presented provisional figures for 2011. The difference between these figures is relatively small (in 2011, the difference between provisional infant death figures in [Infant and perinatal mortality by social and biological factors](#) and final infant death figures in this bulletin was around 0.1%). The live births and stillbirths figures also differ slightly. In this bulletin these are based on birth occurrences plus late registrations from the previous year, while the '[social and biological factors](#)' report uses occurrences only within each year.

ONS also publishes infant mortality statistics according to the year in which the death was registered. Mortality data based on death registrations can include deaths that occurred in previous years, meaning that the total number of infant deaths based on death registrations may differ from the total number of infant deaths used in this statistical bulletin. Figures based on death registrations provide more timely infant mortality statistics.

4. The linkage of infant death records to their corresponding birth registration record has been conducted since 1975 to obtain information on social and biological factors of the baby and parents collected at birth registration. These include the baby's birthweight; mother's age; mother's country of birth; father's socio-economic status (based on his occupation); and for those born within marriage, the number of previous children born. The main reasons for this are either; a birth registration record cannot be found, or the birth was registered outside England and Wales.

5. Definitions used in child mortality statistics:
  - Stillbirth – born after 24 or more weeks completed gestation and which did not, at any time, breathe or show signs of life
  - Early neonatal – deaths under 7 days
  - Perinatal – stillbirths and early neonatal deaths
  - Neonatal – deaths under 28 days
  - Postneonatal – deaths between 28 days and 1 year
  - Infant – deaths under 1 year
  - Childhood – deaths between 1 and 15 years of age

Stillbirths and perinatal mortality rates are reported per 1,000 total births (live and stillbirths). Early neonatal, neonatal, postneonatal and infant mortality rates are reported per 1,000 live births. Childhood mortality rates are reported per 100,000 population of the same age.

6. On 1 October 1992, the legal definition of a stillbirth was changed from a baby born dead after 28 or more weeks completed gestation to one born dead after 24 or more weeks completed gestation. This means that perinatal and stillbirth data for 2011 can only be compared with data from 1993 onwards.
7. The National Statistics Socio-economic Classification (NS-SEC) has eight analytic classes, the first of which can be subdivided:
  - 1 Higher managerial and professional occupations
    - 1.1 Large employers and higher managerial occupations
    - 1.2 Higher professional occupations
  - 2 Lower managerial and professional occupations
  - 3 Intermediate occupations
  - 4 Small employers and own-account workers
  - 5 Lower supervisory and technical occupations
  - 6 Semi-routine occupations
  - 7 Routine occupations
  - 8 Never worked and long-term unemployed

Students, occupations not stated or inadequately described, and occupations not classifiable for other reasons are added as 'Not classified'.

8. The population estimates used for the calculation of mortality rates are the latest consistent estimates available at the time of production. Further information on [population estimates](#) and their methodology can be found on the ONS website.
9. The Tenth Revision of the [International Statistical Classification of Diseases and Related Health Problems \(ICD–10\)](#) has been used to classify cause of death at age 28 days and above.
10. A hierarchical classification in ICD–10 has also been developed by ONS for statistics relating to stillbirths and neonatal deaths. These are derived from a special death certificate (instead of the standard death certificate), introduced by ONS in 1986. More information on neonatal and stillbirth cause of death certificates can be found in section 2.9 of [Child mortality statistics metadata \(163.2 Kb Pdf\)](#).
11. A list of the names of those given pre-publication access to the statistics and written commentary is available in [pre-release access - Child Mortality Statistics \(33.6 Kb Pdf\)](#). The rules and principles which govern pre-release access are featured within the [Pre-release Access to Official Statistics Order 2008](#).
12. Special extracts and tabulations of child mortality data for England and Wales are available to order (subject to legal frameworks, disclosure control, resources and agreements of costs, where appropriate). Such enquiries should be made to:

Vital Statistics Outputs Branch  
Life events and Population Sources Division  
Office for National Statistics  
Segensworth Road  
Titchfield  
Fareham  
Hampshire  
PO15 5RR

Tel: +44 (0)1329 444 110

E-mail: [vsob@ons.gsi.gov.uk](mailto:vsob@ons.gsi.gov.uk)

13. We would welcome feedback on the content, format and relevance of this release. The Health and Life Events user engagement strategy is available to download from the ONS website. Please send feedback to the postal or email address above.
14. Follow ONS on [Twitter](#) and [Facebook](#).
15. Next publication date: January/February 2014.
16. Details of the policy governing the release of new data are available by visiting [www.statisticsauthority.gov.uk/assessment/code-of-practice/index.html](http://www.statisticsauthority.gov.uk/assessment/code-of-practice/index.html) or from the Media Relations Office email: [media.relations@ons.gsi.gov.uk](mailto: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.