

Statistical bulletin

Child and infant mortality in England and Wales: 2017

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



Release date: 17 June 2019

Next release: February to March 2020

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1. Main points

- There were 2,636 infant deaths (aged under 1 year) that occurred in England and Wales in 2017, a decrease of 0.6% compared with 2,651 in 2016.
- There were also fewer live births in England and Wales in 2017 and this meant the infant mortality rate increased to 3.9 deaths per 1,000 live births compared with 3.8 in 2016.
- The infant mortality rate decreased from 12.0 deaths per 1,000 live births in 1980 to a record low of 3.6 deaths per 1,000 live births in 2014; since then it has increased to 3.9 deaths per 1,000 live births in 2017.
- The infant mortality rate was highest in the most deprived areas of England at 5.2 deaths per 1,000 live births and lowest in the least deprived areas at 2.7 deaths per 1,000 live births; rates in both areas have decreased compared with 2008 but the rate in the most deprived areas has decreased more, by 23.5%.
- The infant mortality rate was highest among low birthweight babies (under 2,500 grams) at 34.7 deaths per 1,000 live births in 2017, an increase of 5.8% from 2016.

2. Statistician's comment

"There was a decrease in the number of infant deaths in England and Wales in 2017. However, as there were also fewer live births the proportion of infant deaths increased compared with 2016.

"The infant mortality rate had been reducing since the 1980s, but since an all-time low in 2014 the rate has increased every year between 2014 to 2017. These changes are small and subject to random fluctuations but when compared directly, the rate in 2017 is significantly higher than 2014. However further monitoring over the next few years is needed to confirm a change in the trend."

Vasita Patel, Vital Statistics Outputs Branch, Office for National Statistics

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3. Things you need to know about this release

Important information for interpreting these birth and child mortality statistics:

- birth and death statistics are compiled from information supplied when deaths are certified and both births and deaths are registered as part of civil registration, a legal requirement
- figures represent births and deaths that occurred in England and Wales, these include the births and deaths of individuals whose usual residence is outside England and Wales
- the <u>child mortality (death cohort) tables</u> show the number of infant deaths that occurred in the 2017 calendar year, linked to their corresponding birth record (Sections 4 to 8)
- the <u>infant mortality (birth cohort) tables</u> show the number of births that occurred in the 2016 calendar year, where the baby died before their first birthday (the death could have occurred in either in 2016 or 2017), linked to their corresponding birth notification and death registration (Section 9)
- for babies born in 2016, 99.9% were successfully linked to their birth notification (Section 9)
- all of the infant deaths in the <u>child mortality (death cohort) tables</u> occurred in 2017 but many of the deaths in the <u>infant mortality (birth cohort) tables</u> occurred in 2016, so the numbers and rates will not match
- within this bulletin, a change which is described as statistically significant has primarily been assessed using confidence intervals; for infant mortality data where we have all the death records, they help tell the difference between a change caused by random fluctuations between years and a real change in the infant mortality rate if the confidence interval around a figure does not overlap with the interval around another, we can say with more confidence that the difference is likely to be a real change rather than simply down to chance.
- definitions of the main terms used in this release can be found in the Quality and methodology section
- we also publish infant mortality statistics according to the year in which the death was registered (<u>death registrations summary tables</u> and <u>deaths registered by area of usual residence</u>) these will be different to those based on the year the death occurred that are published in this bulletin
- figures based on year of registration are released sooner than those based on the year of occurrence, which are presented here; occurrence figures allow us to capture late death registrations and therefore give a more accurate picture of what happened in any given year and allow for meaningful comparisons over time

4 . Increase in the infant mortality rate in England and Wales in 2017

There were 2,636 infant deaths that occurred in England and Wales in 2017, a 0.6% decrease from 2016. There were also 2.5% fewer live births in 2017. Together, these changes led to an increase in the infant mortality rate from 3.8 deaths per 1,000 live births in 2016, to 3.9 deaths per 1,000 live births in 2017. However, this is not a statistically significant increase.

During the last decade, the infant mortality rate in England decreased significantly from 4.6 deaths per 1,000 live births in 2008 to 3.6 deaths per 1,000 live births in 2014. Since 2014, it has increased again, reaching 3.9 deaths per 1,000 live births in 2017. This is a statistically significant increase but the infant mortality rate is still 15.2% lower than 2008 and further monitoring is needed to confirm a change in the trend.

During the last decade in Wales, the infant mortality rate declined by 15.0% from 4.0 deaths per 1,000 live births in 2008 to 3.4 deaths per 1,000 live births in 2017. There are a small number of infant deaths every year in Wales and these small numbers mean there is more random variation in the infant mortality rate from year to year. This makes it harder to tell whether this decrease is significant.

This can be addressed by aggregating the figures for 2008 to 2010 and comparing them with 2015 to 2017. In this case, there is a decrease in the infant mortality rate in Wales from 4.2 deaths per 1,000 live births to 3.3 deaths per 1,000 live births respectively (Figure 1). The larger numbers involved make this comparison more robust and show that the decrease is significant.

Over the past decade, the neonatal mortality rate (deaths of those under 28 days) declined in England up until 2014, when the rate reached an all-time low of 2.5 deaths per 1,000 live births. However, since 2014, the neonatal mortality rate has increased, reaching a rate of 2.8 deaths per 1,000 live births in 2017. Despite this increase, the neonatal mortality rate in 2017 was 12.5% lower than 2008. The neonatal mortality rate also declined by 13.8% in Wales between 2008 and 2017 (Figure 1).

The stillbirth rate of 4.1 stillbirths per 1,000 total births in England for 2017 was significantly lower than 2008. In Wales, the stillbirth rate increased by 2.2% in 2017 compared with a decade ago. However, the small number of stillbirths in Wales means annual stillbirth rates are more susceptible to random fluctuations, making it harder to determine if a change is significant (Figure 1). This can be addressed by aggregating the stillbirths for 2008 to 2010 and comparing them with 2015 to 2017 for a more robust comparison. When we do this, we find that the stillbirth rate has declined from 5.0 to 4.8 stillbirths per 1,000 total births respectively. However, this decrease is not statistically significant.

Notwithstanding recent increases since 2014, the overall decline in the infant mortality rate in recent decades could be partially due to general improvements in healthcare and more specific improvements in midwifery and neonatal intensive care (PDF, 1.54MB).

There are also government policies and campaigns such as the government ambition to reduce stillbirth and neonatal mortality rates by 50% by 2025 in England (health is a devolved matter meaning it is the responsibility of the individual countries of the UK, which is why this target is only for England).

Progress against this ambition is tracked by the Department of Health and Social Care (DHSC) using neonatal mortality rates based on the year the death was registered, while the figures presented in this bulletin are based on the year the death occurred. Figures based on year of registration are released sooner than those based on the year of occurrence. Figures based on year of occurrence include more late registrations and give a more accurate picture of what happened in any given year.

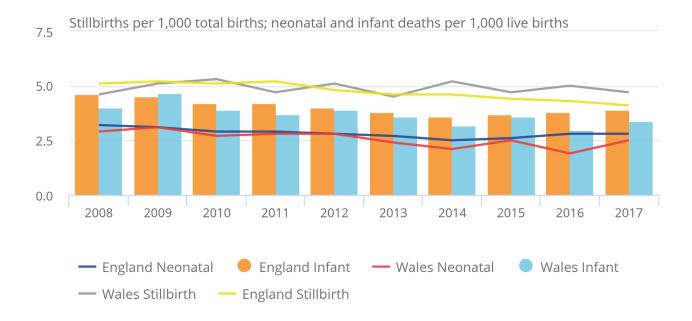
That being said, <u>registration and occurrence</u>-based figures for any given year will be very similar. Therefore the neonatal mortality and stillbirth rates in England in 2010, which are the baseline for the government ambition, are useful context to the figures presented in this bulletin. These were 5.1 stillbirths per 1,000 total births and 3.0 neonatal deaths (based on registrations) per 1,000 live births.

Figure 1: Neonatal and infant mortality rates have generally been declining since 2008

Stillbirth, neonatal and infant mortality rates for England, and Wales, 2008 to 2017

Figure 1: Neonatal and infant mortality rates have generally been declining since 2008

Stillbirth, neonatal and infant mortality rates for England, and Wales, 2008 to 2017



Source: Office for National Statistics

- Deaths occurring in a calendar year.
- 2. Neonatal deaths of those aged under 28 days.
- 3. Infant deaths of those aged under 1 year.
- 4. Rates Stillbirths per 1,000 total births. Neonatal and infant deaths per 1,000 live births.
- 5. Stillbirth a child which has issued forth from its mother after the 24th week of pregnancy, and which did not at any time after becoming completely expelled from its mother breathe or show other signs of life

5 . Infant mortality rates were highest in the most deprived areas in England in 2017

The Index of Multiple Deprivation (IMD) is an overall measure of deprivation based on factors such as income, employment, health and education within an area. There are different measurements for England and Wales, which are not comparable.

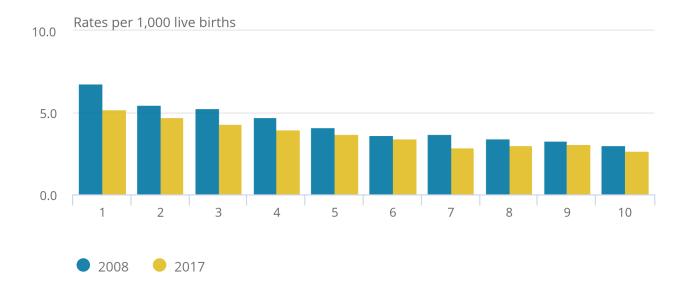
In 2017, the infant mortality rates were higher in the most deprived areas than in the least deprived areas in England. The rate was 5.2 deaths per 1,000 live births in the most deprived areas compared with 2.7 deaths per 1,000 live births in the least deprived. However, the infant mortality rate has decreased by 23.5% in the most deprived areas in England over the last 10 years. This decrease is statistically significant. The rate in the least deprived areas also decreased during this period, by 10.0%, but this change is not statistically significant (Figure 2).

Figure 2: Decrease in the infant mortality rates for most and least deprived areas in England since 2008

Infant mortality rate by Index of Multiple Deprivation, England, 2008 and 2017

Figure 2: Decrease in the infant mortality rates for most and least deprived areas in England since 2008

Infant mortality rate by Index of Multiple Deprivation, England, 2008 and 2017



Source: Office for National Statistics

- 1. Data in this figure is available to download.
- 2. Infant deaths of those aged under 1 year.
- 3. Index of Multiple Deprivation (IMD) decile range from 1 to 10, with 1 being the most deprived and 10 being the least deprived.
- 4. Deprivation deciles have been calculated separately for Lower level Super Output Areas (LSOAs) in England and for LSOAs in Wales as their IMDs are not comparable.
- 5. In most cases, IMD and WIMD deprivation scores accurately linked onto the LSOAs. However, for 5% of the LSOAs this was not possible because of geography boundary changes that were implemented in 2011. For these cases, an average deprivation score of all LSOAs was calculated and an average score imputed to these select LSOAs.

The picture is less clear in Wales. The number of infant deaths in Wales is relatively small, especially when broken down by area deprivation. This affects how robust the figures are for any given year.

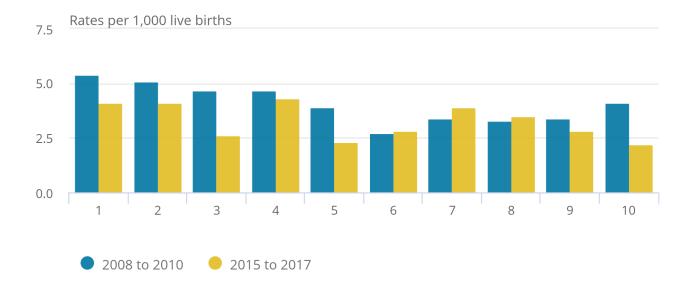
This can be addressed by aggregating the figures for 2008 to 2010 and comparing them with 2015 to 2017. Overall, combining the years show that the infant mortality rates were generally higher in the most deprived areas and lower in the least deprived areas (Figure 3). More specifically, the infant mortality rates have decreased in all deciles, except the 6th, 7th and 8th deciles. The largest increase was seen in the 7th decile as the rate increased from 3.4 deaths per 1,000 live births in 2008 to 2010, to 3.9 deaths per 1,000 live births in 2015 to 2017. However, this increase is not statistically significant.

Figure 3: Lowest infant mortality rate in the least deprived area in Wales

Infant mortality rate by Index of Multiple Deprivation (IMD) for Wales, 2008 to 2010 and 2015 to 2017

Figure 3: Lowest infant mortality rate in the least deprived area in Wales

Infant mortality rate by Index of Multiple Deprivation (IMD) for Wales, 2008 to 2010 and 2015 to 2017



Source: Office for National Statistics

- 1. Data in this figure is available to download.
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- 5. In most cases, IMD and WIMD deprivation scores accurately linked onto the LSOAs. However, for 5% of the LSOAs this was not possible because of geography boundary changes that were implemented in 2011. For these cases, an average deprivation score of all LSOAs was calculated and an average score imputed to these select LSOAs.

6. Infant mortality rates were highest in routine and manual occupation groups in England and Wales in 2017

The <u>National Statistics Socio-Economic Classification (NS-SEC)</u> provides an indication of socio-economic position based on occupation. It is an Office for National Statistics standard classification.

In 2017, infant mortality rates for higher managerial, administrative and professional occupation NS-SEC groups were lowest at 2.9 deaths per 1,000 live births; this rate has increased by 7.4% from 2016. Meanwhile, infant mortality rates were highest at 4.7 deaths per 1,000 live births for routine and manual occupation NS-SEC groups in 2017, but this rate has decreased by 2.1% since 2016 (Figure 4).

Between 2011 and 2014, the infant mortality rate for higher managerial, administrative and professional occupation NS-SEC groups decreased by 12.9%. Since 2014, the infant mortality rate for these NS-SEC groups increased by 7.4%.

However, none of the changes mentioned in this section so far are statistically significant. As a result, it is not possible to say with confidence that these differences are caused by a real change; there is a chance they are random fluctuations.

Between 2011 and 2014, the infant mortality rate for routine and manual occupation NS-SEC groups decreased by 10.4%. This decrease was statistically significant. Since 2014, the infant mortality rate for these NS-SEC groups increased by 9.3%. This increase is not statistically significant.

Figure 4: Increase in infant mortality rates for higher managerial, administrative and professional occupations NS-SEC groups since 2016

Infant mortality rate by grouped National Statistics Socio-economic Classification (NS-SEC) classes for England and Wales, 2011 to 2017

Figure 4: Increase in infant mortality rates for higher managerial, administrative and professional occupations NS-SEC groups since 2016

Infant mortality rate by grouped National Statistics Socio-economic Classification (NS-SEC) classes for England and Wales, 2011 to 2017



Source: Office for National Statistics

Notes:

- 1. Data in this figure is available to download.
- 2. From the 2011 data year the ONS has used the combined method for reporting National Statistics Socio-economic Classification (NS-SEC) for birth statistics (using the most advantaged NS-SEC of either parent and creating a household level classification rather than just using the father's classification).
- 3. In 2011, NS-SEC was rebased on the new Standard Occupational Classification (SOC2010). Compared with the SOC2000 NS-SEC a number of changes have resulted (Rose and Pevalin, 2010), consequently figures for 2011 onwards are not directly comparable to previous years.
- 4. More information about NS-SEC and the three-class grouping.

Variations in infant mortality by socio-economic classification may be the result of the link between increasing levels of deprivation and poorer maternal health, which can ultimately affect infant mortality. Studies have shown that mothers from routine and manual occupation are <u>more likely to smoke before or during pregnancy</u> and are <u>less likely to breastfeed</u>, which can result in poorer immunity and poorer digestive health for the baby.

7. Cancers continue to be the most common cause of death for children aged 1 to 15 years

The childhood mortality rate decreased from 9.7 deaths per 100,000 population of the same age in 2016 to 9.4 deaths per 100,000 population of the same age in 2017. This decline is not statistically significant. However, during the last decade, the childhood mortality rate has declined by 23.6%, from 12.3 deaths per 100,000 population of the same age in 2008. This decline is statistically significant.

Neoplasms (cancers) accounted for the largest proportion of deaths of children aged 1 to 15 years for both sexes, followed by external causes of morbidity and mortality (Figure 5). In 2017, there were 250 childhood deaths to neoplasms (cancers) and 204 childhood deaths to external causes of morbidity and mortality.

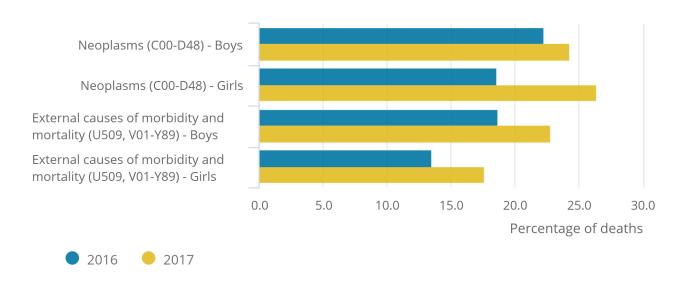
Deaths due to cancer noticeably increased by 32.1% for girls aged 1 to 15 years from 2016 to 2017, compared with a 12.1% increase for boys. The number of deaths due to external causes of morbidity and mortality increased more for boys than girls by 25.0% and 21.3% respectively from 2016.

Figure 5: The most common cause of death for children aged 1 to 15 years was cancer

Percentage of childhood deaths by underlying cause and sex for England and Wales, 2016 and 2017

Figure 5: The most common cause of death for children aged 1 to 15 years was cancer

Percentage of childhood deaths by underlying cause and sex for England and Wales, 2016 and 2017



Source: Office for National Statistics

Notes:

- 1. Deaths occurring in a calendar year.
- 2. Childhood deaths 1 to 15 years.
- 3. ICD International Classification of Diseases.

8. Largest increase in the infant mortality rate for low birthweight babies with mothers aged 20 to 24 years

One of the known risk factors for infant mortality is low birthweight. In 2017, the infant mortality rates for low birthweight babies (under 2,500 grams) increased by 5.8% from 2016, to 34.7 deaths per 1,000 live births. This is higher than the rate for normal birthweight (over 2,500 grams) babies, which remained at 1.0 death per 1,000 live births from 2016.

For low birthweight babies (under 2,500 grams), the largest increase in the infant mortality rate by age was seen in mothers aged 20 to 24 years and the largest decrease in mothers aged 40 and over (Table 1). However, the infant mortality rate remained highest among mothers aged under 20 years, at 42.1 deaths per 1,000 live births, and was lowest among mothers aged 25 to 29 years, at 33.0 deaths per 1,000 live births.

For babies with normal birthweight (over 2,500 grams), the most noticeable increase in the infant mortality rate was among mothers aged under 20 years and the largest decrease was among mothers aged 30 to 34 years (Table 1).

For normal birthweight babies (over 2,500 grams), the highest infant mortality rate by age was 2.2 deaths per 1,000 live births among mothers aged under 20 years. The lowest rate of 0.8 deaths per 1,000 live births was among mothers aged 30 to 34 and 35 to 39 years.

Table 1: Percentage change in infant mortality rate for low and normal birthweight babies by age of mother, 2016 and 2017

England and Wales

% change in infant mortality rate

Mother's age Low birthweight Normal birthweight

All	5.8	0.0
under 20	-1.4	29.4
20 to 24	14.6	-7.1
25 to 29	-1.2	11.1
30 to 34	10.9	-11.1
35 to 39	13.2	0.0
40 and over	-14.9	-9.1

Source: Office for National Statistics

Notes

- 1. Deaths occurring in a calendar year Back to table
- 2. Infant deaths of those aged under 1 year. Back to table
- 3. Low birthweight babies are those born weighing less than 2,500 grams. Back to table
- 4. Normal birthweight babies are those born weighing more than 2,500 grams. Back to table

9. Decline in the infant mortality rate for pre-term (24 to 36 weeks) babies born in 2016

As described in Section 3, infant mortality (birth cohort) tables that accompany this release show the number of births that occurred in the 2016 calendar year, where the baby died before their first birthday.

The death could have occurred in either in 2016 or 2017, but most occurred in 2016. Therefore these figures are not directly comparable with the figures that appear in the <u>child mortality (death cohort) tables</u>, which are described in Sections 4 to 8.

For the 2016 birth cohort, the infant mortality rate for babies born pre-term (24 to 36 weeks) was 18.7 deaths per 1,000 live births, a 5.6% decrease compared with the 2015 birth cohort (Figure 6).

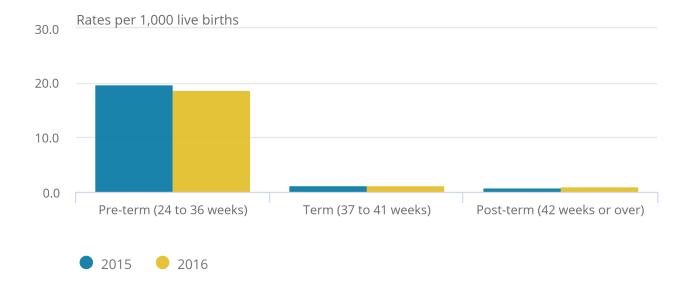
Conversely, the infant mortality rate for babies born post-term (42 weeks and over) was 22.2% higher in 2016 compared with 2015. Despite this, the infant mortality for post-term babies in the 2016 birth cohort remained lower than both pre-term and term babies, at 1.1 deaths per 1,000 live births (Figure 6).

Figure 6: Infant mortality rate for pre-term babies was lower in 2016

Infant mortality rate by gestational weeks for England and Wales, 2015 and 2016 birth cohorts

Figure 6: Infant mortality rate for pre-term babies was lower in 2016

Infant mortality rate by gestational weeks for England and Wales, 2015 and 2016 birth cohorts



Source: Office for National Statistics

- 1. Deaths occurring in a calendar year.
- 2. Infant deaths of those aged under 1 year.
- 3. Pre-term 24 to 36 weeks.
- 4. Term 37 to 41 weeks.
- 5. Post-term 42 weeks or over.
- 6. Excludes those with low gestational age inconsistent with birthweight, or gestational age not stated.

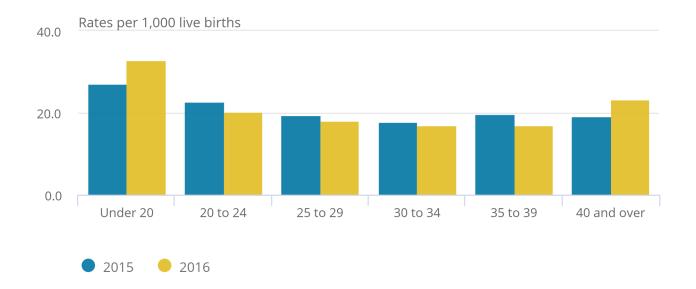
For pre-term babies (24 to 36 weeks), the highest infant mortality rate was among mothers aged under 20 years, at 32.8 deaths per 1,000 live births in 2016, an increase of 21.0% from 2015. This increase is not statistically significant. For pre-term babies, the lowest infant mortality rate of 17.0 deaths per 1,000 live births was among mothers aged 30 to 34 years and 35 to 39 years in 2016 (Figure 7). The largest decrease of 13.7% was among mothers aged 35 to 39 years from 2015. This decrease is not statistically significant.

Figure 7: Highest infant mortality rate for pre-term babies among mothers aged under 20 years in 2016

Infant mortality rate for pre-term babies by age of mother for England and Wales, 2015 and 2016

Figure 7: Highest infant mortality rate for pre-term babies among mothers aged under 20 years in 2016

Infant mortality rate for pre-term babies by age of mother for England and Wales, 2015 and 2016



Source: Office for National Statistics

Notes:

- Deaths occurring in a calendar year.
- 2. Infant deaths of those aged under 1 year.
- 3. Pre-term 24 to 36 weeks.
- 4. Excludes those with low gestational age inconsistent with birthweight, or gestational age not stated.

10. What's changed in this release?

In order to capture more of the late infant death registrations, the timings of the extracts taken to produce the infant death figures in the <u>infant mortality (birth cohort) tables</u> have been changed. This change means approximately 5% to 6% more infant deaths are included in the 2016 infant mortality (birth cohort) figures compared with figures for 2014 or earlier (the 2015 figures use the same methodology and are comparable with the figures presented in this release).

The <u>child mortality</u> (<u>death cohort</u>) <u>figures</u>, which are analysed in Sections 4 to 8 of this bulletin are unaffected. These are comparable with previous death cohort child mortality figures. The total number of live births and stillbirths published in <u>birth characteristics Tables 7 to 11</u> will not change.

11. Links to related statistics

More data on Infant mortality (birth cohort) tables 2016 are available.

<u>Unexplained deaths in infancy</u> includes both sudden infant deaths and deaths for which the cause remained unknown or unascertained.

More data on <u>births</u> and <u>deaths</u> (based on deaths registered in a calendar year) in England and Wales in 2017 are available.

For infant mortality data for other UK countries (based on registrations), please see the latest infant death statistics for Northern Ireland and the latest infant death statistics for Scotland.

The number of infant deaths and rates (based on deaths registered in a calendar year) for the UK and constituent countries can be found in the <u>Vital statistics in the UK: births, deaths and marriages</u>.

Special extracts and tabulations of deaths data for England and Wales are available to order (subject to legal frameworks, disclosure control, resources and the ONS charging policy, where appropriate). Enquiries should be made to Vital Statistics Outputs Branch by email to vsob@ons.gov.uk or by telephone on +44 (0)1329 444110. User requested data will be published.

12. Quality and methodology

Definitions used in child and infant 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 of those aged under 7 days.

Perinatal – stillbirths and early neonatal deaths.

Neonatal – deaths of those aged under 28 days.

Postneonatal – deaths of those aged between 28 days and 1 year.

Infant – deaths of those aged under 1 year.

Childhood – deaths of those aged between 1 and 15 years.

Significance test

Within this bulletin, a change which is described as statistically significant has primarily been assessed using confidence intervals, which are a measure of uncertainty.

Statistically significant basically means that there is only a 1 in 20 chance (or less) that the difference was caused by random fluctuations in the data. This is enough to convince us that the difference is likely to be a real change.

We have a record of all deaths in our mortality figures so the number of deaths, and the death rate, are exact. They are not estimates. However, there will still be random fluctuations from one year to the next even if the underlying risk of an infant dying has not changed. The confidence intervals help us assess how likely it is that a difference between years could be a result of these random fluctuations, or whether it's more likely the difference is a real change:

If the confidence interval around a figure does not overlap with the interval around another, we can say with confidence that the difference is unlikely to be down to chance. Or in other words, there is good evidence that the difference reflects a real underlying change in the world. When the confidence intervals do overlap, the difference might still be what we would call 'statistically significant' if the overlap is relatively small and the numbers involved are large (and therefore more robust). In these cases, we use additional tests to confirm one way or another.

Child mortality Quality and Methodology Information

The <u>Child and infant mortality statistics Quality and Methodology Information</u> 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

Our <u>User guide to child and infant mortality statistics</u> provides further information on data quality, legislation and procedures relating to mortality and includes a glossary of terms.

Linkage of births and deaths

Linking infant deaths to their corresponding birth registration improves our understanding of the main characteristics of the baby and the baby's parents (these include the baby's birthweight; mother's age; mother's country of birth; parents' socioeconomic classification; and the number of previous children).

In 2017, 98.0% of infant deaths in England and Wales were successfully linked to their birth registration record. The linkage rate has remained consistent since the linking exercise began. The main reasons for an infant death not being linked are either: a birth registration record cannot be found, or the birth was registered outside England and Wales.

Coding the underlying cause of death

Deaths are cause coded using the World Health Organisation's (WHO) International Classification of Diseases (ICD). Deaths are coded to ICD-10 using <u>IRIS</u> software (version 2013). Cause of death reported in this bulletin represents the final underlying cause of death for ages 28 days and over. This takes account of additional information received from medical practitioners or coroners after the death has been registered.

In England and Wales, stillbirths and neonatal deaths are registered using a special death certificate, which enables reporting of relevant diseases or conditions in both the infant and the mother. The Office for National Statistics (ONS) has developed a hierarchical classification system in ICD-10 to produce broad cause groups that enable direct comparison of neonatal and postneonatal deaths. More information on neonatal cause of death certificates can be found in the <u>User guide to child and infant mortality statistics</u>.