Office for National Statistics

Statistical bulletin

Unexplained deaths in infancy, England and Wales: 2012

Annual data on sudden infant deaths in England and Wales and infant deaths for which the cause remained unascertained after a full investigation, with associated risk factors.

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1 . Key points

- 221 unexplained infant deaths occurred in England and Wales in 2012, a rate of 0.30 deaths per 1,000 live births

- Almost three-quarters (71%) of these unexplained deaths were recorded as sudden infant deaths, and 29% were recorded as unascertained

- Unexplained infant deaths accounted for 8% of all infant deaths occurring in 2012

- Eight out of ten unexplained infant deaths occurred in the post-neonatal period (between 28 days and 1 year)

- Almost two-thirds (64%) of unexplained infant deaths were boys in 2012 (141 deaths)

- The rate of unexplained infant death was three times higher among low birthweight babies (less than 2,500 g) than babies with a normal birthweight (2,500g and over)

2 . Background

This report on unexplained infant deaths includes both sudden infant deaths, often called 'cot deaths', and deaths for which the cause remained unascertained after a full investigation. Sudden infant death, which was first recognised in the early 1960s, is defined as 'the sudden unexpected death of any infant or young child which is unexpected by history and in which a thorough post-mortem examination fails to demonstrate an adequate cause of death' (Beckwith, 1970). 'Unascertained' is used by pathologists when the death does not fulfil the criteria used for sudden infant deaths and there is still doubt about its cause. However, there is evidence to suggest that these terms are used interchangeably by coroners (Limerick and Bacon, 2004) and research has shown that the characteristics of babies dying of these two causes are very similar (Corbin, 2005). Based on this, it is appropriate to include both groups in any analysis of unexplained infant deaths. ONS has kept a database of unexplained infant deaths, using the above definition, since 2004. The figures show deaths occurring, rather than registered, in each calendar year. However, ONS is only notified of a death when it is registered. Unexplained deaths are nearly always certified by coroners, which can mean that there is a delay between when the death occurs and when it is registered. In 2012, the median registration delay for an unexplained infant death was 194 days. Because of these late registrations, figures for 2012 are provisional and will be revised in next year's bulletin.
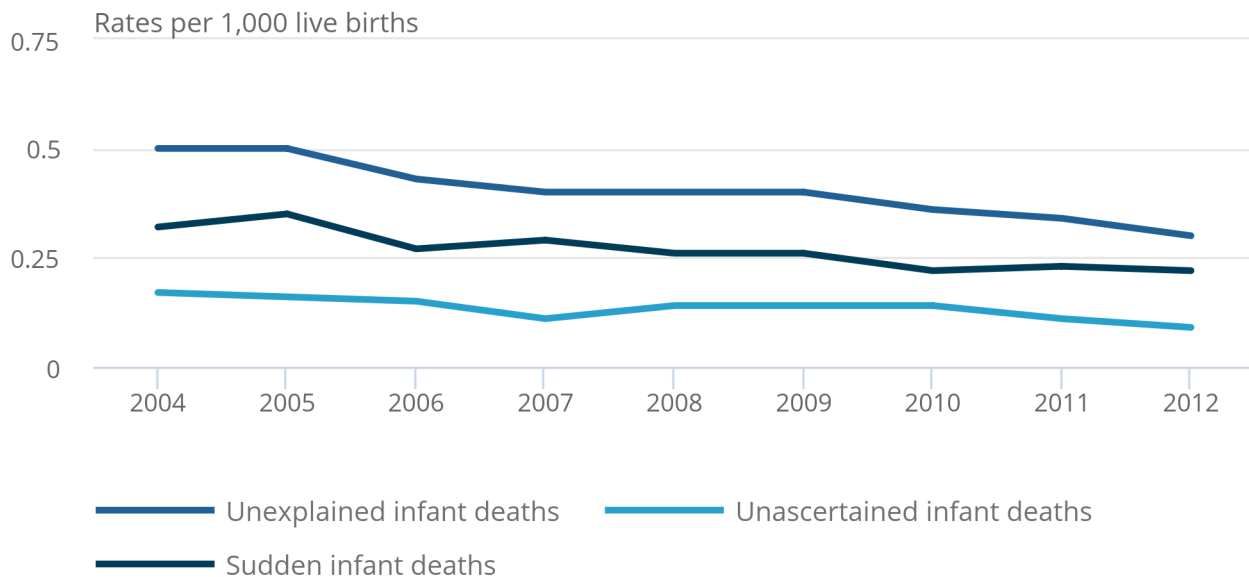
3 . Key risk factors

Risk factors for unexplained infant death include the baby's sex, birthweight, maternal age, marital status and socio-economic classification. These factors are looked at here and supporting data are included in the reference tables. Other risk factors include sleeping position, sleep environments including unplanned bed-sharing and sleeping with a baby on a sofa, not breastfeeding, temperature and exposure to tobacco smoke (Ostfeld et al, 2010).

Figure 1: Unexplained infant death rates, 2004–2012 (1,2)

England & Wales

Figure 1: Unexplained infant death rates, 2004–2012 (1,2)

England & Wales

Rates per 1,000 live births

Legend:
- Unexplained infant deaths
- Unascertained infant deaths
- Sudden infant deaths

Source: Office for National Statistics

Notes:

1. Data for 2012 are provisional

2. Based on deaths occurring in each calendar year

3. Infant deaths occur under one year after live birth

In 2012 there were 221 unexplained infant deaths in England and Wales, or 0.30 deaths per 1,000 live births (see Figure 1). Almost three-quarters (71%) of these deaths were recorded as sudden infant deaths and 29% were recorded as unascertained. The sudden infant death rate and the unascertained infant death rate were 0.22 and 0.09 deaths per 1,000 live births respectively. In 2012, unexplained infant deaths accounted for 7% of all infant deaths, compared with 8% in 2011.

Figures for 2011 have been revised to include any late registrations. These final figures show that there were 247 unexplained infant deaths in 2011, an increase of 3 deaths compared with the provisional figure. The rate remains the same at 0.34 deaths per 1,000 live births. Of these, 169 deaths (68%) were sudden infant deaths and 78 (32%) were recorded as unascertained.

The fall from 0.34 to 0.30 deaths per 1,000 live births between 2011 and 2012 is not a significant change. However, the fall from 0.50 deaths per 1,000 live births in 2004 to 0.30 in 2012 is a significant change. For further information about statistical significance, please refer to Background note seven.

The data for unexplained, sudden and unascertained infant deaths can be seen in Table 1 of the downloadable reference file.

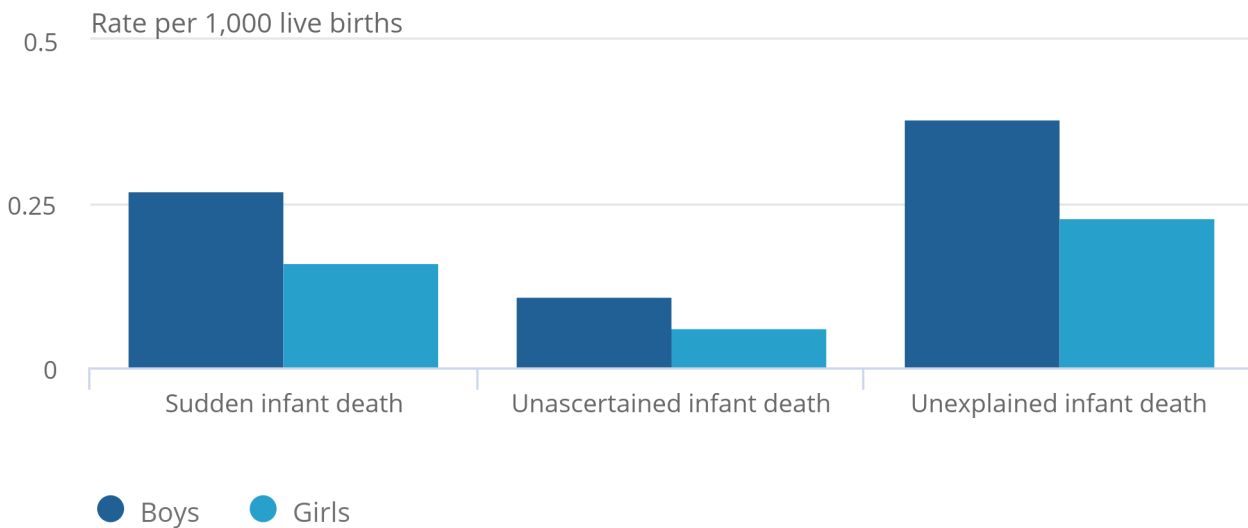# 4 . Unexplained infant deaths by babies' age and sex

In 2012, 83% of unexplained infant deaths occurred in the postneonatal period, which is at least 28 days but less than one year after birth. In comparison, only 3 out of 10 (30%) of all infant deaths in 2012 occurred in the postneonatal period, with the majority (70%) occurring in the neonatal period, that is the first 28 days after birth ([Child Mortality Statistics: Childhood, Infant and Perinatal, 2012](#)). Almost half (48%) of unexplained infant deaths in the postneonatal period occurred after 28 completed days but before 2 completed months. Figures for unexplained infant deaths by the babies' age at death, for the years 2004 to 2012, can be seen in Table 2 of the downloadable data file.

Figure 2: Sudden infant death, unascertained infant death and unexplained infant death rates by sex, 2012 (1,2)

England & Wales

Figure 2: Sudden infant death, unascertained infant death and unexplained infant death rates by sex, 2012 (1,2)

England & Wales

Source: Office for National Statistics

Notes:

1. Data for 2012 are provisional

2. Based on deaths occurring in each calendar year

Overall, boys are at greater risk of infant death: boys made up 57% of all infant deaths in 2012, although they accounted for 51% of live births. Research shows that girls are less vulnerable to some perinatal conditions, congenital abnormalities and certain infectious diseases, giving them a biological advantage in terms of survival (United Nations, 2011). In 2012, 64% of unexplained infant deaths were boys (141 deaths), compared with 36% for girls (80 deaths).

Figure 2 shows that in 2012 the rate of sudden infant death among boys was higher than the rate of unexplained infant deaths (both sudden infant deaths and unascertained infant deaths) among girls.

5 . Unexplained infant deaths by month

Typically, the highest proportion of unexplained infant deaths occur over the winter period (December to February), while the lowest proportion occur during the summer (June to August). Over the period 2004 to 2012, out of 2,499 unexplained infant deaths 28% occurred during winter compared with 23% during summer. December had the highest number of deaths (244 deaths) in the period 2004 to 2012, and August had the lowest (165 deaths). Two risk factors for unexplained infant death are overheating and an unsafe sleeping environment, such as the baby's head being covered. These situations may be more likely to occur during winter, through the use of extra clothing or blankets and central heating at night.

However, in 2012 the same proportion of unexplained infant deaths (27%) occurred in the summer and winter months. With the exception of February, the mean temperatures in winter 2011/12 were warmer than average, making this winter period the warmest since 2006/07. A quarter (25%) of unexplained deaths occurred in spring, and 21% occurred in autumn. The month with the highest number of unexplained infant deaths was July (26 deaths) followed by January and May (both 23 deaths). After August, July was the second hottest month in 2012, with a mean monthly temperature of 15.1 degrees. However, this was lower than the five-year average temperature of 15.8 degrees. Fifteen deaths occurred in February, March, June, September and November (ONS, 2012). The data for unexplained infant deaths by month of occurrence, for the years 2004 to 2012, can be seen in Table 3 of the downloadable data file (258 Kb Excel sheet) .

6 . Unexplained infant deaths by regions of England and Wales

In 2012, none of the differences in rates between Wales and the regions of England were statistically significant. The North West recorded the lowest rate, at 0.21 deaths per 1,000 live births and the East Midlands had the highest rate at 0.41 deaths.
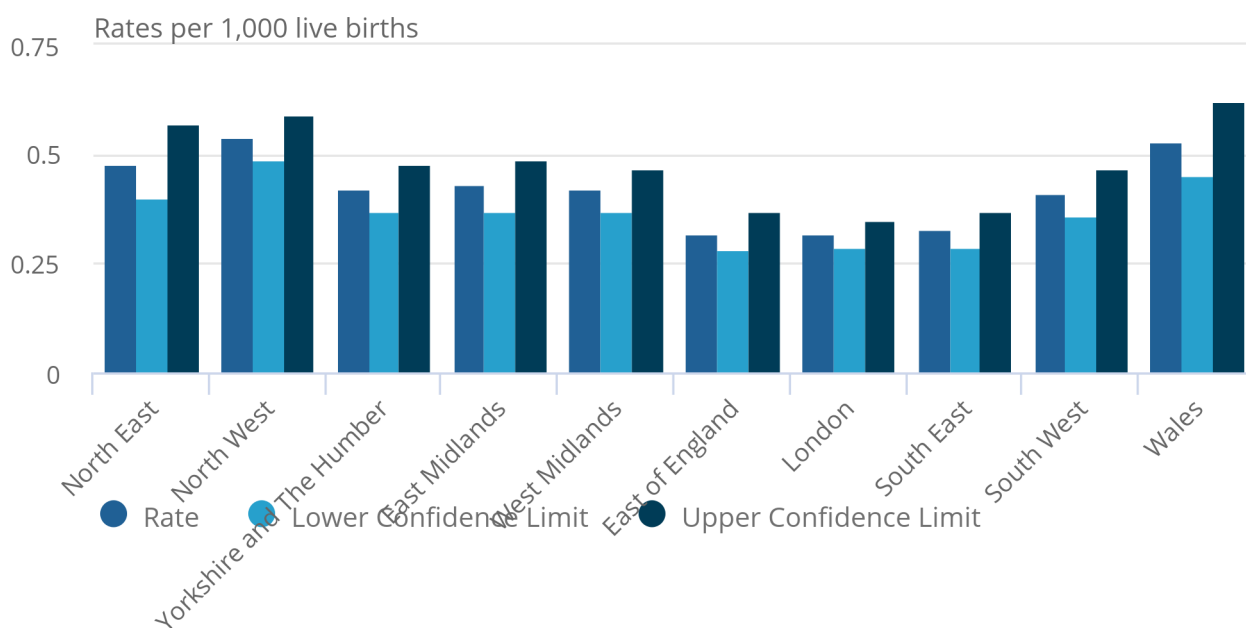
Figure 3 shows the rates of unexplained deaths for Wales and regions of England over the period 2004 to 2012. Rates in the East of England and London (0.32 deaths per 1,000 live births) were significantly lower than those for the North East, the North West, and Wales. The highest rates over this period were in the North West and Wales at 0.54 and 0.53 deaths per 1,000 live births respectively. Figures for unexplained infant deaths for Wales and the regions of England, for the years 2004 to 2012, can be seen in Table 4 of the downloadable data file (258 Kb Excel sheet) .

Figure 3 Unexplained Infant Death Rates, with Confidence Intervals, for Wales and Regions of England, 2004-2012 [1],[2]

England and Wales

Figure 3 Unexplained Infant Death Rates, with Confidence Intervals, for Wales and Regions of England, 2004-2012 [1],[2]

England and Wales

Source: Office for National Statistics

Notes:

1. Figures for 2012 are provisional

2. Based on deaths occurring in each calendar year

Two key risks associated with unexplained infant deaths are maternal smoking during pregnancy and postnatal exposure to tobacco smoke (Mitchell et al, 1993; MacDorman et al, 1997). Research shows that babies whose mothers smoke have an increased risk of sudden infant death syndrome, compared with babies whose mothers do not smoke, and that the level of risk increases with increasing levels of maternal smoking (Mitchell et al, 1993). A more recent study in the USA found a statistical association between the decline in cases of sudden infant death between 1995 and 2006 and the increasing prevalence of smoke-free homes among homes with infants, even after controlling for sleeping position (Behm et al, 2012).

The Health and Social Care Information Centre (HSCIC, formerly the NHS Information Centre, NHS IC) publishes data on mothers' smoking status at the time of delivery for England. Results for 2013/14 show that 12.0% of women in England were recorded as being smokers at the time of delivery, which is slightly lower than in 2012/13 (12.7%). Figures for the four Commissioning Regions show that the North of England has the highest proportion of women recorded as smokers at the time of delivery (16.2%) followed by the Midlands and the East of England (12.7%), then the South of England (11.6). London has the lowest proportion at 5.1%. At Clinical Commissioning Group level, smoking prevalence varied from 1.9% in NHS Central London (Westminster) to 27.5% in NHS Blackpool. Reducing smoking during pregnancy to 11% or less by the end of 2015 is one of three national ambitions laid out in The Tobacco Control Plan (HSCIC, 2014).

Following a change in the disclosure control guidelines for birth and death registration statistics in early 2014, this is the first year that ONS have published numbers and rates of unexplained deaths in infancy for local authorities. It should be noted that ONS does not calculate mortality rates where there were fewer than 3 deaths, and advises caution when considering mortality rates based on fewer than 20 deaths.

Over the period 2004 to 2012, only 6% of local authorities recorded no unexplained infant deaths. For local authorities where there were sufficient numbers of deaths to calculate rates, 7 local authorities recorded rates of one or more death per 1,000 live births, and 14 local authorities had rates that were significantly higher than the rate for England and Wales (0.40 deaths per 1,000 live births). Four local authorities had rates of unexplained infant deaths that were significantly lower than this figure. Only 5% of local authorities reported 20 or more unexplained infant deaths. Figures for unexplained infant deaths by local authority, for the years 2004 to 2012, can be seen in Table 5 of the downloadable data file (258 Kb Excel sheet) .

7 . Unexplained infant deaths by birthweight and characteristics of the mother

Low birthweight is associated with infant mortality, premature birth and factors affecting foetal growth during pregnancy, such as maternal smoking. In 2012, the rate of unexplained infant deaths for low birthweight babies (less than 2,500 grams) was 0.81 deaths per 1,000 live births. This is three times higher than babies whose birthweight was 2,500 grams and over (0.27 deaths per 1,000 live births). Figures for unexplained infant deaths by birthweight, for the years 2004 to 2012, can be seen in Table 6 of the downloadable data file (258 Kb Excel sheet) .

In 2012, the rate of unexplained infant death was highest in mothers aged under 20, at 0.8 deaths per 1,000 live births. This was significantly higher than all other age groups except mothers aged between 20 and 24 years (0.55 deaths per 1,000 live births). Rates of infant deaths where the mother was aged between 20 and 24 years were also significantly higher than those for older mothers. The exception to this was the infant mortality rate of babies born to mothers aged 40 or over (0.23 deaths per 1,000 live births). However, this rate was based on just seven deaths and so should be treated with caution. Figures for unexplained infant deaths by age of mother, for the years 2004 to 2012, can be seen in Table 7 of the downloadable data file (258 Kb Excel sheet) .

In 2012, the unexplained infant death rate was higher for babies of mothers born in England and Wales (0.36 deaths per 1,000 live births), compared with those born in other countries (0.16 deaths per 1,000 live births). Figures for unexplained infant deaths by mother's country of birth, for the years 2004 to 2012, can be seen in Table 7 of the downloadable data file (258 Kb Excel sheet) .

8 . Unexplained infant deaths by parents' marital status and National Statistics Socio-economic Classification (NS-SEC)
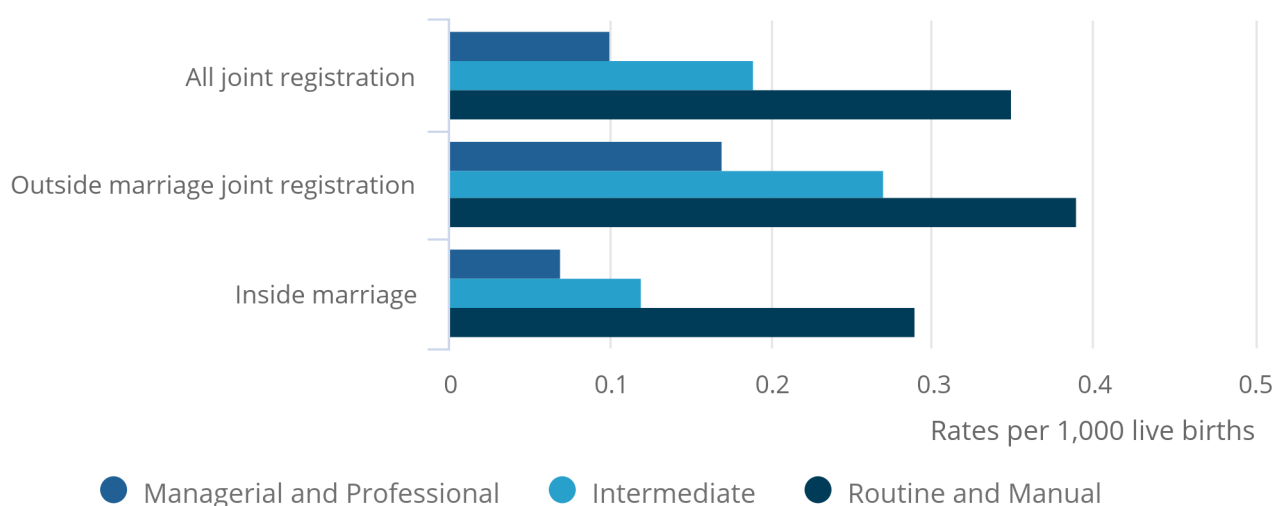
Marital status is another key risk factor. In 2012 the unexplained infant death rate for babies born within marriage was 0.14 deaths per 1,000 live births. In comparison, the rate for babies born outside marriage was more than three times higher, at 0.48 deaths per 1,000 live births. The rate was highest for those babies born outside marriage whose birth was registered by the mother only, at 0.86 deaths per 1,000 live births. It is thought that differences in death rates by marital status and birth registration reflect complex factors including mother's age and social circumstances (Blair et al 2006). Figures for unexplained infant deaths by mother's marital status, for the years 2004 to 2012, can be seen in Table 9 of the downloadable data file (258 Kb Excel sheet) .

Figure 4: Unexplained infant death rates, by NS-SEC of parents, 2012 (1,2,3)

England & Wales

Figure 4: Unexplained infant death rates, by NS-SEC of parents, 2012 (1,2,3)

England & Wales

Source: Office for National Statistics

Notes:

1. Based on the dominant NS-SEC of the mother or father at death registration. Information on NS-SEC of the father outside marriage is not collected if the father does not attend the registration of the baby's birth. 'All' will include cases where the father's NS-SEC is not stated

2. Based on deaths occurring in each calendar year

3. Data for 2012 are provisional

Details of the father's occupation are only recorded where the birth is inside marriage or is jointly registered by both parents outside marriage. Historically, tables showing infant mortality by NS-SEC were produced using only the father's NS-SEC. However, the most advantaged socio-economic position of the parents is likely to have a direct impact on the household, whether it is derived from the mother or the father (ONS, 2013). The tables in this output have been produced using the more advantaged NS-SEC in the household. Comparing only those births that were jointly registered, unexplained infant death rates were highest for babies where the more advantaged NS-SEC of the parents was the routine and manual group and the parents were not married, at 0.39 deaths per 1,000 live births (see Figure 4). The rate was lowest for babies where the more advantaged NS-SEC of the parents was the managerial and professional group and the parents were married, at 0.07 deaths per 1,000 live births. In most cases, these rates are based on very small numbers. However, when looking at all jointly registered babies, the difference between infant mortality rates where the more advantaged NS-SEC is managerial and professional (0.1 deaths per 1,000 live births) and where it is routine and manual (0.35 deaths per 1,000 live births) is a significant one. Figures for unexplained infant deaths by NS-SEC based on the most advantaged socio-economic position of the parents, for the years 2004 to 2012, can be seen in Table 10 of the downloadable data file (258 Kb Excel sheet) .

9 . Methods

In England and Wales, deaths should be registered within five days of the death occurring. However, the majority of unexplained infant deaths are referred to a coroner for certification, which means that there can be a considerable delay between a death occurring and it being registered. In 2012, no unexplained infant deaths were registered within 5 days; the median delay was 194 days. This report is based on data available up to 5 June 2014. Figures for 2012 are provisional, as we expect to receive a small number of registrations related to infant deaths that occurred in 2012 after this date.

Since 2004, ONS has maintained a database of unexplained deaths in infancy. This is created using a late extract from the standard deaths registrations database. The extract is taken late to allow enough time for registration following certification by a coroner. The deaths in this report occurred between 2004 and 2012 and 98% of all infant deaths in this period have been linked to their corresponding birth records. Of the 2% that remain unlinked, 45% were born outside England and Wales, and 55% were not linked because no record of the birth could be found.

In 2011, rates were recalculated back to 2004 using the latest available data, meaning these figures may not be comparable with figures published in previous years. However, the changes had no significant impact on rates.

From the linked records, information about parents that is routinely collected at birth registration can be used to analyse the data by certain risk factors.

10 . Users and uses of unexplained deaths in infancy statistics

There is a great deal of interest in the deaths of apparently healthy babies. Key users of these data include The Lullaby Trust (formerly the Foundation for the Study of Infant Deaths, FSID), who raise awareness about sudden infant deaths. Other key users include the Department of Health, Welsh Government and independent researchers, including academics.

In July 2014, NICE held a consultation to review their guidelines on co-sleeping because of research showing links between sudden infant death and co-sleeping. New guidelines are expected to be published in December 2014.

The Office for National Statistics (ONS) is the only producer of National Statistics on unexplained deaths in infancy for England and Wales. Infant mortality statistics for Scotland and Northern Ireland are the responsibility of National Records of Scotland and the Northern Ireland Statistics and Research Agency (NISRA) respectively.

Statistics on infant mortality in Scotland are available at NRS: Statistics

Statistics on infant mortality in Northern Ireland are available at Northern Ireland Statistics & Research Agency (NISRA).

. Further information

The NHS and Welsh Government have worked with The Lullaby Trust, formerly the Foundation for the Study of Infant Death (FSID), to publish advice and guidance for parents that aims to reduce the risk of cot death. This information is available from NHS Choices, the National Assembly for Wales website and The Lullaby Trust.

A Quality and Methodological Information Report is available to download on the ONS website.

. Results available to download

Unexplained deaths in infancy figures for England and Wales, England, Wales, and regions in England can be found in a Microsoft Excel workbook (258 Kb Excel sheet) .

The workbook contains the following tables:

Table 1: Sudden infant deaths, unascertained deaths and unexplained infant deaths by sex and age at death, England and Wales, 2004–2012

Table 2: Sudden infant deaths, unascertained deaths and unexplained deaths by age at death, England and Wales, 2004–2012

Table 3: Sudden infant deaths, unascertained deaths and unexplained infant deaths by month of occurrence, England and Wales, 2004–2012

Table 4: Unexplained infant deaths by Region, England and Wales, 2004–2012

Table 5: Unexplained infant deaths by local authority, England and Wales, 2004–2012

Table 6: Unexplained infant deaths (numbers and rates) by birthweight, England and Wales, 2004–2012

Table 7: Unexplained infant deaths by mother's age, England and Wales, 2004–2012

Table 8: Unexplained infant deaths by mother's country of birth, England and Wales, 2004–2012

Table 9: Unexplained infant deaths by marital status, parity (within marriage) and type of registration, England and Wales, 2004–2012

Table 10: Unexplained infant deaths by NS-SEC, England and Wales, 2004–2012

A second workbook (101.5 Kb Excel sheet) has been published accompanying this bulletin, using The Lullaby Trust's definition of 'unexpected' unexplained deaths in infancy. Unexpected deaths are those where the death was certified by a coroner and not by a doctor. The workbook contains the following tables:

Table 1: Births and infant deaths, England and Wales, 2004–2012

Table 2: Unexpected and unexplained infant deaths, England and Wales, 2004–2012

Table 3: Proportion of unexpected and unexplained deaths investigated at inquest, England and Wales, 2004–2012

Table 4: Unexpected postneonatal deaths by grouped cause, England and Wales, 2004–2012

Table 5: Unexpected postneonatal deaths by cause: accident and injury, England and Wales, 2004–2012

. References

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. Background notes

1. The deaths included in this bulletin were those that occurred during 2004 to 2012 and were linked to their corresponding birth records. For this nine-year period, the linkage rate for all infant deaths was 98.0%. The linkage rate has been consistent since records began.

2. From the linked records, information about parents that was collected at birth registration can be used for analysis of the data according to certain risk factors including birthweight, mother's age at birth of child, mother's country of birth, marital status and parity, and father's socio-economic status based on his occupation.

3. The majority of unexplained deaths are certified by a coroner, either with or without an inquest, so there can be some delay between death and registration. This report is based on data available up to 5 June 2014 and figures for 2012 are provisional. Figures for 2012 will be finalised in next year's bulletin.

4. Definition of unexplained deaths in infancy:

   Unexplained deaths include both sudden infant deaths and unascertained deaths.

   Sudden infant deaths ICD–10 code R95 Sudden infant death syndrome: include any mention of 'sudden infant death', 'cot death', 'SIDS', 'crib death', or another similar term anywhere on the death certificate.

Unascertained deaths ICD–10 code R99 other ill-defined and unspecified causes of mortality: include cases where the only mention on the death certificate is unascertained death.

5. Infant deaths are divided into neonatal (less than 28 days after live birth) and postneonatal (between 28 days and one year).

6. Mortality rates are presented as deaths per 1,000 live births.

7. Within this bulletin, a difference which is described as 'statistically significant' has been assessed using 95% confidence intervals. Confidence intervals are a measure of the statistical precision of an estimate and show the range of uncertainty around the estimated figure. Calculations based on small numbers are often subject to random fluctuations. As a general rule, if the confidence interval around a figure overlaps with the interval around another, we cannot say with certainty that there is more than a chance difference between the two figures.

8. Earlier reports for unexplained deaths in infancy for 2003 to 2007 were published annually in the autumn edition of Health Statistics Quarterly.

9. Special extracts and tabulations of unexplained deaths in infancy data for England and Wales are available to order for a charge (subject to legal frameworks, disclosure control, resources and agreement of costs, where appropriate). For such requests enquiries should be made to:

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   Office for National Statistics Government Buildings Cardiff Road Newport NP10 8XG

   Tel: +44 (0)1633 455898 Email: CIM@ons.gov.uk

   The ONS charging policy is available on the ONS website. In line with the ONS approach to open data, ad hoc data extracts will be published on the website.

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   These National Statistics are produced to high professional standards and released according to the arrangements approved by the UK Statistics Authority.