Office for National Statistics

Statistical bulletin

Unexplained deaths in infancy , England and Wales: 2011

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 . Main points

- A total of 244 unexplained infant deaths occurred in England and Wales in 2011, which is a rate of 0.34 deaths per 1,000 live births

- This bulletin looks at deaths occurring between 2004 and 2011. In 2004, there were 317 unexplained deaths, which is a rate of 0.50 deaths per 1,000 live births

- Unexplained infant deaths accounted for 8% of all infant deaths occurring in 2011

- In 2011 8 out of 10 unexplained infant deaths occurred in the post-neonatal period (between 28 days and one year)

- Almost two-thirds (64%) of unexplained infant deaths were boys in 2011 (155 deaths)

- The rate of unexplained infant deaths for babies born outside marriage, and registered by the mother only, was 0.91 per 1,000 live births

- The rate of unexplained infant deaths for babies born inside marriage was 0.19 per 1,000 live birth

2 . Background

This report on unexplained infant deaths in England and Wales includes both sudden infant 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). The term 'unascertained' is used by pathologists when the death does not fulfil the criteria used for sudden infant deaths and doubt remains about its cause. However, there is some evidence to suggest that these terms are used interchangeably by coroners certifying these deaths (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 evidence it is appropriate to include both groups in any analysis of unexplained infant deaths. Figures for 2011 are provisional.

3 . Key risk factors

Risk factors for unexplained infant death include the sex of the baby, birthweight, maternal age, marital status and socio-economic classification. These factors are considered in this bulletin and reference tables. Other risk factors include sleeping position, unsafe sleep environments including bed-sharing, not breastfeeding, temperature and exposure to tobacco smoke (Ostfeld et al, 2010).

Figure1: Unexplained infant death rates, 2004–2011

England & Wales

Figure1: Unexplained infant death rates, 2004–2011

England & Wales

Rates per 1,000 live births

— Unexplained infant deaths   — Unascertained infant deaths

— Sudden infant deaths
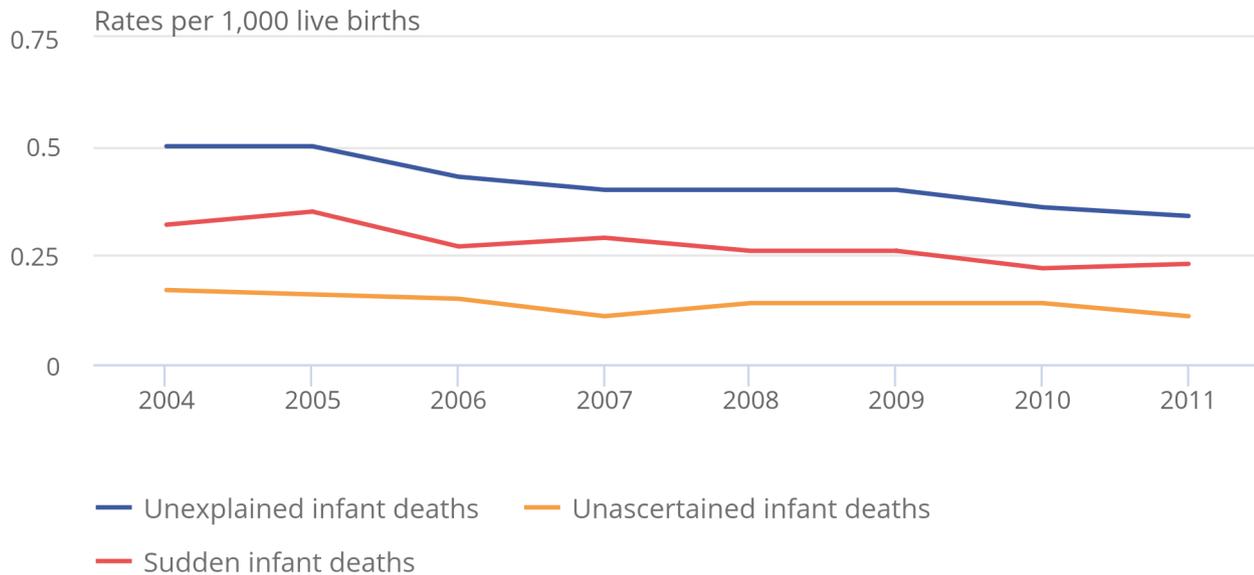
Source: Office for National Statistics

Notes:

1. Data for 2011 are provisional

2. Infant deaths occur under one year after live birth

In 2011 there were 244 unexplained infant deaths in England and Wales, which is a rate of 0.34 deaths per 1,000 live births. Of the 244 unexplained infant deaths, 167 (68%) were recorded as 'sudden infant deaths' and 77 (32%) were recorded as 'unascertained'. The sudden infant death rate and the unascertained infant death rate were 0.23 and 0.11 deaths per 1,000 live births respectively. In 2011, unexplained infant deaths accounted for 8% of all infant deaths.

Figures for 2010 have been revised to take account of any late registrations. These final figures show that there were 261 unexplained infant deaths in 2010, which is a rate of 0.36 deaths per 1,000 live births. Of these, 161 deaths (62%) were recorded as 'sudden infant deaths' and 100 (38%) were recorded as 'unascertained'.

The fall from 0.36 to 0.34 deaths per 1,000 live births between 2010 and 2011 is not a significant change. However, the fall from 0.50 deaths per 1,000 live births in 2004 to 0.34 in 2011 is a significant change. For further information about statistical significance, please refer to background note seven.

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

In 2011, 8 out of 10 unexplained infant deaths (80%) 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 (29%) of all infant deaths in 2011 occurred in the postneonatal period, with the majority (71%) occurring in the neonatal period, that is the first 28 days after birth (see [Child Mortality Statistics: Childhood, Infant and Perinatal, 2011](#)). Figures for unexplained infant deaths by the babies' age at death, for the years 2004 to 2011, can be seen in [Table 2 (181 Kb Excel sheet)](#) of the downloadable data file.

Figure 2: Unexplained infant deaths, by sex and age at death, 2011

England and Wales

Figure 2: Unexplained infant deaths, by sex and age at death, 2011

England and Wales
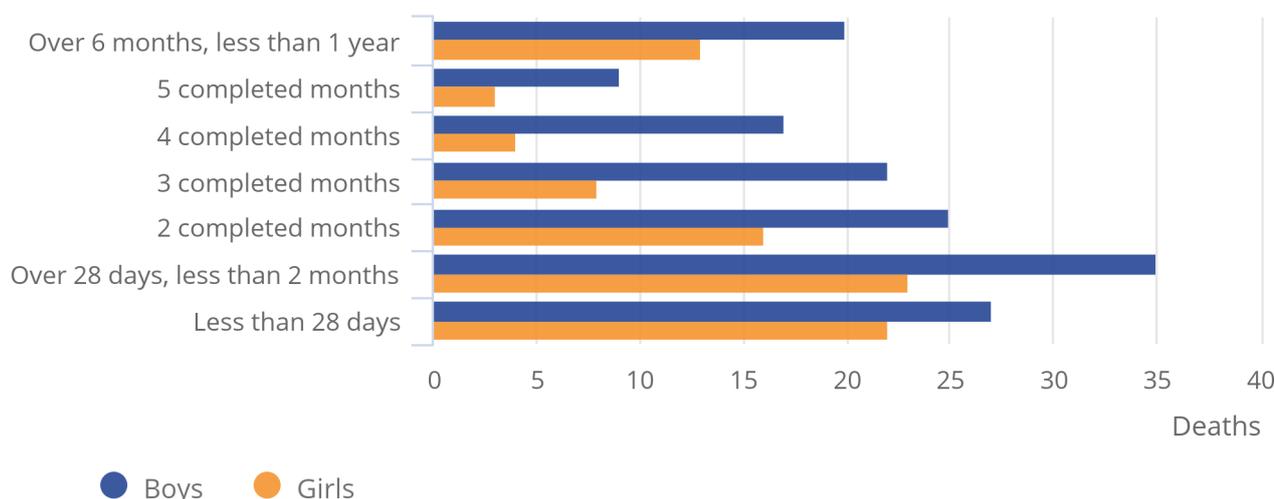
Source: Office for National Statistics

Notes:

1. Figures for 2011 are provisional

The rate of unexplained infant deaths tends to be higher among boys than girls. Figure 2 shows the number of unexplained infant deaths in 2011 by sex and age at death. For both boys and girls, the highest proportion of deaths occurred over 28 days but less than two months. For boys, 23% of all unexplained infant deaths (35 deaths) occurred in this age group. The comparable figure for girls was 26% (23 deaths). Overall, there were 155 male unexplained infant deaths in 2011, which is a rate of 0.42 deaths per 1,000 live births. This accounted for 64% of unexplained infant deaths. In comparison, boys accounted for 51% of all live births in 2011. The unexplained infant death rate for girls was 0.25 per 1,000 live births (36% of unexplained infant deaths). Research shows that girls are less vulnerable to some perinatal conditions, congenital abnormalities and certain infectious diseases, and that this gives them a biological advantage in terms of survival (United Nations, 2011).

5 . Unexplained infant deaths by month of occurrence

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 2011 there were 2,275 unexplained infant deaths, 28% of which occurred during winter compared with 21% during summer. December had the highest number of deaths (221 deaths) in the period 2004 to 2011; August had the lowest (147 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.

In 2011, the month with the highest number of unexplained infant deaths was March (30 deaths) followed by November (27 deaths). December and July had the fewest deaths, with 15 deaths in each month. The data for unexplained infant deaths by month of occurrence, for the years 2004 to 2011, can be seen in Table 3 (181 Kb Excel sheet) of the downloadable data file.

6 . Unexplained infant deaths by region

In 2011, rates by region showed no significant differences. However, over the period 2004 to 2011 the East of England had the lowest rate of unexplained infant deaths (0.32 deaths per 1,000 live births), followed by London (0.33 deaths per 1,000 live births). The highest rates over this period were in the North West and Wales at 0.58 and 0.55 deaths per 1,000 live births respectively. The difference between the higher rates (North West and Wales) and the lower rates (East of England and London) is statistically significant. Figures for unexplained infant deaths by region, for the years 2004 to 2011, can be seen in Table 4 (181 Kb Excel sheet) of the downloadable data file.

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).

The Health and Social Care Information Centre (HSCIC, formerly known as the NHS Information Centre, NHS IC) publishes data on smoking status at the time of delivery for England. Results for 2012/13 show that 12.7% of women in England were recorded as being smokers at the time of delivery, with the North East having the highest proportion (19.7%), followed by Yorkshire and The Humber (16.5%). London had the lowest proportion at just 5.7%. 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 (NHS IC, March 2011).

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

Birthweight is a key determinant of infant mortality and is associated with premature birth and factors affecting foetal growth during pregnancy, such as maternal smoking. In 2011, the rate of unexplained infant deaths for low birthweight babies (less than 2,500 grams) was 0.98 deaths per 1,000 live births compared with 0.28 deaths per 1,000 live births for babies with a normal birthweight (2,500 grams and over). Figures for unexplained infant deaths by birthweight, for the years 2004 to 2011, can be seen in Table 5 (181 Kb Excel sheet) of the downloadable data file.

Figure 3: Unexplained infant deaths, by age of mother, 2011

England and Wales

Figure 3: Unexplained infant deaths, by age of mother, 2011

England and Wales
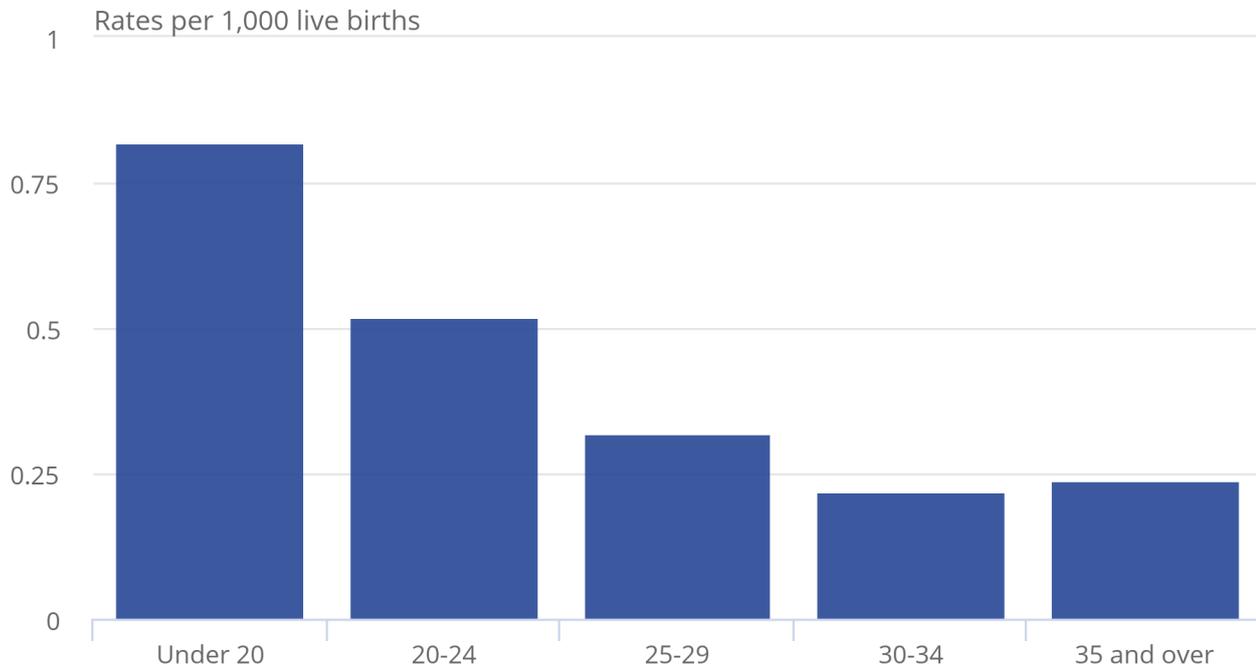
Source: Office for National Statistics

Notes:

1. Figures for 2011 are provisional

There is a clear correlation between the age of the mother at the time of giving birth and unexplained infant deaths, for women under the age of 34. Figure 3 shows the rate of unexplained infant deaths by age of mother in 2011. The unexplained infant death rate was 0.82 deaths per 1,000 live births for mothers aged under 20, falling to 0.52 for mothers aged between 20 and 24, to 0.32 for mothers aged between 25 and 29, and to 0.22 for mothers aged between 30 and 34. Rates begin to rise again slightly in mothers aged 35 and over (0.24 deaths per 1,000).

Rates for unexplained infant deaths have fallen for all age groups since 2004. For mothers aged between 20 and 24, the rate fell from 0.83 to 0.52 deaths per 1,000 live births between 2004 and 2011. This change is statistically significant. Falls in rates for the other age groups were not significant. Figures for unexplained infant deaths by age of mother, for the years 2004 to 2011, can be seen in Table 6 (181 Kb Excel sheet) of the downloadable data file.

For babies of mothers born in England and Wales, the unexplained infant death rate was 0.37 per 1,000 live births in 2011, compared with 0.24 per 1,000 live births for babies of mothers born outside England and Wales. Figures for unexplained infant deaths by mother's country of birth, for the years 2004 to 2011, can be seen in Table 7 (181 Kb Excel sheet) of the downloadable data file.

8 . Unexplained infant deaths by parents' marital status and National Statistics Socio-economic Classification (NS-SEC)

Marital status is another key risk factor. In 2011 the unexplained infant death rate for babies born within marriage was 0.19 deaths per 1,000 live births. In comparison, the rate for babies born outside marriage was more than double, at 0.50 deaths per 1,000 live births. For those babies born outside marriage whose birth was registered by the mother only, the comparable figure was 0.91 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). Within marriage, the rate was highest among mothers who had two or more previous births (0.32 deaths per 1,000 live births). Figures for unexplained infant deaths by mother's marital status, for the years 2004 to 2011, can be seen in Table 8 (181 Kb Excel sheet) of the downloadable data file.

Figure 4: Unexplained infant deaths, by NS-SEC of parents, 2011

England and Wales

Figure 4: Unexplained infant deaths, by NS-SEC of parents, 2011

England and Wales

Rates per 1,000 live births

● Outside marriage, joint registration   ● Inside marriage
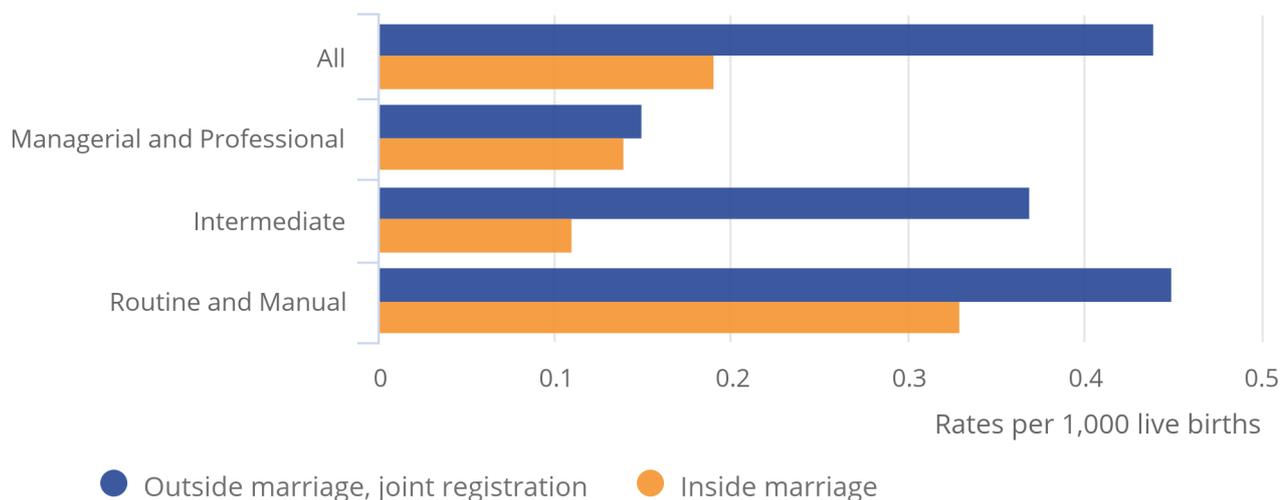
Source: Office for National Statistics

Notes:

1. Figures for 2011 are provisional

2. 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

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 derives 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 0.45 deaths per 1,000 live births. The rate was lowest for babies where the more advantaged NS-SEC of the parents was the intermediate group and the parents were married at 0.11 deaths per 1,000 live births. Historically, the lowest rate has been where the dominant NS-SEC of the parents was the managerial and professional group and the parents were married (0.14 deaths per 1,000 live births in 2011). However, these rates are based on very small numbers in most cases. Figures for unexplained infant deaths by NS-SEC based on the most favourable socio-economic position of the parents, for the years 2004 to 2011, can be seen in Table 9 (181 Kb Excel sheet) of the downloadable data file.

9 . Methods

The majority of unexplained infant deaths are certified by a coroner either with or without an inquest. This means that there can be considerable delay between a death occurring and the death being registered. This report is based on data available up to 29 May 2013. Figures for 2011 are provisional, as we expect to receive a small number of registrations related to infant deaths that occurred in 2011 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 2011 and 98% of all infant deaths in this period have been linked to their corresponding birth records. Of the 2% that remain unlinked, 312 were born outside England and Wales, and 326 were not linked because no record of the birth could be found. 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.

In 2013, rates were recalculated for the period 2004-2010 using the latest available data, meaning these figures may not be comparable with figures published in previous years. However, the changes have had no significant impact on rates.

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.

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)

11. 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 at:

NHS Choices

National Assembly for Wales

The Lullaby Trust

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

Future changes to mortality outputs are outlined in the plan for mortality outputs (116 Kb Pdf) available on the ONS website.

12. 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 on the ONS website. 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, 2004–2011

Table 2: Sudden infant deaths, unascertained deaths and unexplained deaths by age at death, England and Wales, 2004–2011

Table 3: Sudden infant deaths, unascertained deaths and unexplained infant deaths by month of occurrence, England and Wales, 2004–2011

Table 4: Unexplained infant deaths by Region, England and Wales, 2004–2011

Table 5: Unexplained infant deaths (numbers and rates) by birthweight, England and Wales, 2004–2011

Table 6: Unexplained infant deaths by mother's age, England and Wales, 2004–2011

Table 7: Unexplained infant deaths by mother's country of birth, England and Wales, 2004–2011

Table 8: Unexplained infant deaths by marital status, parity (within marriage) and type of registration, England and Wales, 2004–2011

Table 9: Unexplained infant deaths by NS-SEC, England and Wales, 2004–2011

A second workbook 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, 2004–2011

Table 2: Unexpected and unexplained infant deaths, England and Wales, 2004–2011

Table 3: Proportion of unexpected and unexplained deaths investigated at inquest, England and Wales, 2004–2011

Table 4: Unexpected postneonatal deaths by grouped cause, England and Wales, 2004–2011

Table 5: Unexpected postneonatal deaths by cause: accident and injury, England and Wales, 2004–2011

13. References

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United Nations, Department of Economic and Social Affairs, Population Division (2011). Sex differentials in childhood mortality (United Nations publication ST/ESA/SER.A/314), http://www.un.org/esa/population /publications/SexDifChildMort/SexDifferentialsChildhoodMortality.pdf

14. Background notes

1. The deaths included in this report were those that occurred during 2004 to 2011 and were linked to their corresponding birth records. For this eight-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, and therefore there can be some delay between death and registration. This report is based on data available up to 29 May 2013 and figures for 2011 are provisional.

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. Data for 2011 are provisional and will be finalised in next year's Unexplained Deaths in Infancy in England and Wales statistical bulletin.

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

10. 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:

    Mortality Analysis Team Life Events and Population Sources Division Office for National Statistics Government Buildings Cardiff Road Newport NP10 8XG

    Tel: +44 (0)1633 455898 E-mail: CIM@ons.gsi.gov.uk

    The ONS charging policy is available on the ONS website.

11. Follow ONS on Twitter and Facebook.

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