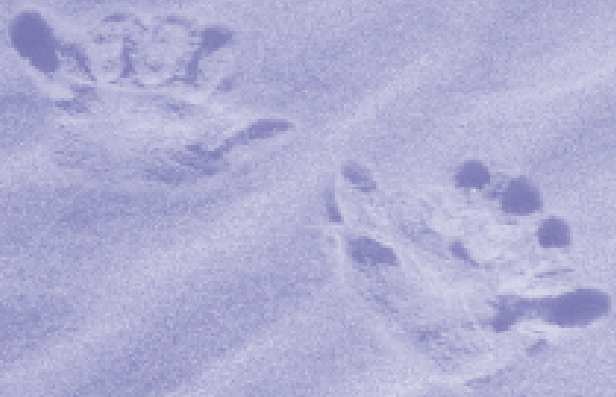
Centre for Maternal and Child Enquiries

CMACE

Perinatal Mortality 2008



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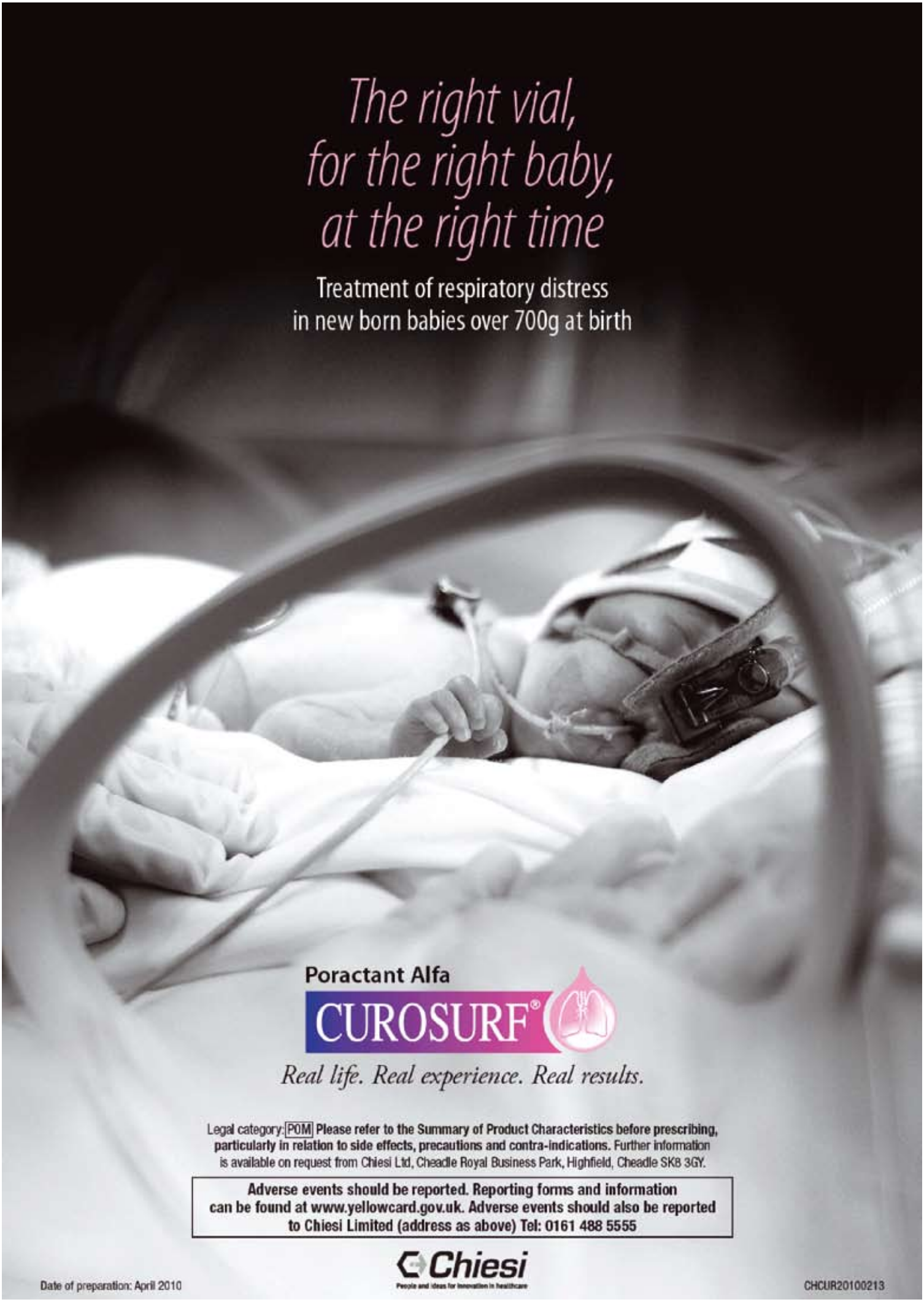
United Kingdom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CMACE Mission Statement

Our aim is to improve the health of mothers, babies and children by carrying out confidential enquiries and related work on a nationwide basis and by widely disseminating our findings and recommendations.

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Disclaimers

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The recommendations contained in this report represent the view of CMACE, which was arrived at after a careful consideration of the available evidence. They do not override healthcare professionals' individual responsibility to make appropriate decisions in the circumstances of the individual patient, in consultation with the patient and/or guardian or carer.

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Abbreviations

BMI	Body Mass Index
CEMACH	Confidential Enquiry into Maternal and Child Health
CEMD	Confidential Enquiry into Maternal Deaths
CESDI	Confidential Enquiry into Stillbirths and Deaths in Infancy
CMACE	Centre for Maternal and Child Enquiries
GROS	General Register Office for Scotland
IMD	Index of Multiple Deprivation
IUGR	Intra-Uterine Growth Restriction
NHS QIS	National Health Service Quality Improvement Scotland
NISRA	Northern Ireland Statistics and Research Agency
NI CHS	Northern Ireland – Child Health System
ONS	Office for National Statistics
PCT	Primary Care Trust
PDN form	Perinatal Death Notification form
SGA	Small for Gestational Age
SHA	Strategic Health Authority
SSBID survey	Scottish Stillbirth and Infant Death survey

Glossary

Body Mass Index (BMI)	The body weight of an individual in kilograms divided by their height in metres squared. A BMI below 18.5 is categorised as underweight, a BMI of 18.5-24.9 is normal weight, a BMI of 25.0-29.9 is overweight and a BMI of 30 and above is obese.
Crown Dependencies	The Channel Islands and the Isle of Man.
Early neonatal death	Death of a live born baby occurring before seven completed days after birth.
Index of Multiple Deprivation (IMD)	This combines a number of indicators, chosen to cover a range of economic, social and housing issues, into a single deprivation score for each small area in England. This allows each area to be ranked relative to one another according to their level of deprivation.
Intra-Uterine Growth Restriction (IUGR)	This is a situation where growth is good initially in pregnancy but then drops later in pregnancy (e.g. a fetus on the 97th centile dropping to the 50th centile).
Late neonatal death	Death of a live born baby occurring from the seventh day and before 28 completed days after birth.
Live birth	Delivery of an infant, which, after complete separation from its mother, shows sign of life.
Maternities	Pregnancy resulting in a live birth at any gestation or stillbirth occurring at 24 weeks' gestation onwards, with multiple births being counted only once.
Perinatal death	Death of a fetus or a newborn in the perinatal period that commences at 24 completed weeks' gestation and ends before seven completed days after birth.
Rate ratio	The ratio of the rate of a health outcome in an exposed population to the rate in the unexposed population.
Small for Gestational Age (SGA)	A baby that has a birth weight less than the 10th percentile of all babies with the same gender and gestational age.
Stillbirth	A baby delivered without signs of life after 23^{+6} weeks of pregnancy.
Termination of pregnancy	Term used to describe the deliberate ending of a pregnancy with the intention that the fetus will not survive.

Preface

The CMACE report “Perinatal Mortality 2008” is both encouraging and sobering at the same time. Of nearly 800,000 births in the UK in 2008, there were 6,600 babies who died during pregnancy or shortly after birth. Each one of these deaths is a tragedy for the mother and family concerned. The beginning of life remains one of its most hazardous times.

Nonetheless the number of stillbirths and of babies who die soon after birth is falling. The improvement in neonatal mortality is particularly marked with a reduction since 2000 of nearly 20% in deaths of babies in their first four weeks of life. This is an achievement for those clinicians and people in all walks of life who strive to improve outcomes for babies. It should encourage them in their belief that we are far from having reached an irreducible minimum in the perinatal mortality rate and that a sustained effort will yield still further falls in the future.

The CMACE report highlights significant findings that merit further attention. Mothers of black ethnic origin are 2.3 times more likely to have a stillbirth or neonatal death than those of white ethnic origin. Mothers in more deprived areas are twice as likely to have a stillbirth or neonatal death as those in less deprived areas. A quarter of all stillbirths and neonatal deaths are to mothers who are clinically obese. There are also significant regional variations.

CMACE is to be congratulated for their meticulous and painstaking work in collating and analysing the enormous amount of data required for this informative report. It continues to be the primary source of ongoing data on the impact on perinatal mortality of important risk factors such as ethnicity and obesity and on the variations between providers of maternity services. The new classification system for perinatal deaths CMACE introduced in 2008 has identified new areas for enquiry. Their work remains as one of the key platforms required for further reducing perinatal mortality in the future.

I recommend commissioners and providers of maternity and neonatal services to consider the impact of the report’s findings and recommendations for the populations they serve and take the actions required to address the issues raised.

Baroness Julia Cumberlege CBE DL

Executive Summary and Recommendations

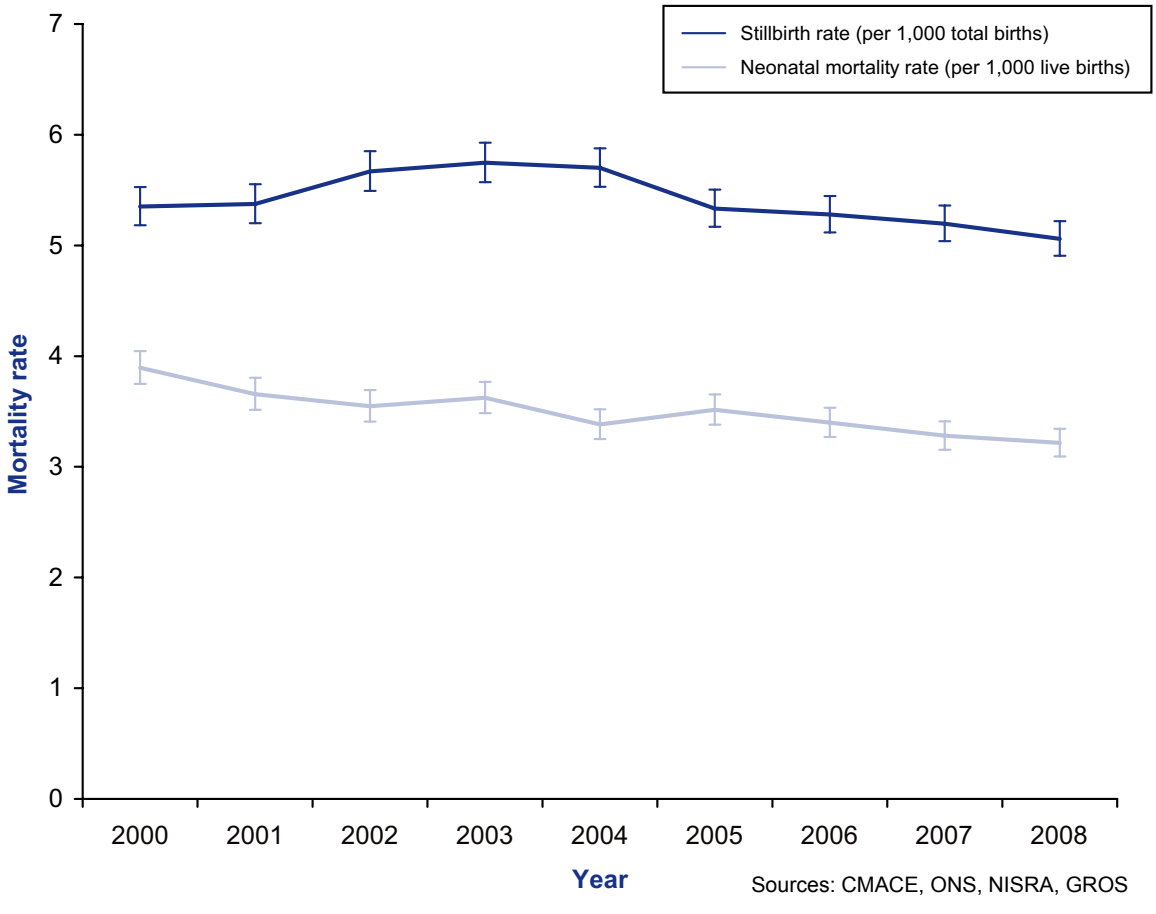
CMACE provides information on perinatal deaths at local, regional and national level for health care providers, commissioners and policy makers. This UK report complements the perinatal mortality reports which CMACE produces for the UK nations separately, Strategic Health Authorities (SHAs) in England and maternity providers.

Key Finding 1

Statistically significant reduction in perinatal mortality rate

Since 2000, there has been a statistically significant downward trend ($p<0.001$) in the perinatal mortality rate in the United Kingdom, from 8.3 per 1,000 total births in 2000 to 7.5 per 1,000 total births in 2008. This is due to both, a statistically significant decrease ($p<0.001$) in the early neonatal mortality rate (from 2.9 in 2000 to 2.5 in 2008 per 1,000 live births) and, for the 2nd year running, a statistically significant decrease ($p<0.001$) in the stillbirth rate (from 5.4 in 2000 to 5.1 in 2008 per 1,000 total births). (Pages 9 and 10)

Figure 1: Overall stillbirth and neonatal mortality rates; United Kingdom: 2000-2008



Key Finding 2

Statistically significant reduction in stillbirth and neonatal mortality rates for twin births

There has also been a statistically significant downward trend ($p<0.001$) in the perinatal mortality rate for twin births in the United Kingdom since 2000. The stillbirth rate for twin births has also shown a statistically significant downward trend ($p<0.001$) from 16.7 per 1,000 total births in 2000 to 11.2 per 1,000 total births in 2008, and the neonatal mortality rate for twin births has shown a statistically significant downward trend ($p<0.001$) from 21.5 per 1,000 live births in 2000 to 17.0 per 1,000 live births. (Pages 10 and 12)

Key Finding 3

Regional variations in stillbirth and neonatal mortality rates

There is wide variation in the adjusted mortality rates between Strategic Health Authorities (SHAs) in England. For stillbirths, East of England has the lowest adjusted mortality rate (3.8 per 1,000 total births, 95% CI: 3.4, 4.3) and North East has the highest (5.4 per 1,000 total births, 95% CI: 4.6, 6.3). For neonatal deaths, South East Coast has the lowest adjusted mortality rate (2.4 per 1,000 live births, 95% CI: 2.0, 2.8) and West Midlands has the highest (3.7 per 1,000 live births, 95% CI: 3.2, 4.1). Over the last 3 years East Midland's stillbirth rates, London's perinatal mortality rates and London's and Yorkshire and the Humber's neonatal mortality rates have shown a statistically significant decrease. Potential explanations of these differences, including chance variation are discussed further in section 4.1 of the report. (Pages 16-22)

Key Finding 4

Regional variations in stillbirths and neonatal deaths due to congenital anomalies

There is also variation in the proportion of stillbirths and neonatal deaths with a major congenital anomaly as the primary cause of death (after removing terminations of pregnancy and babies born at less than 22 weeks' gestation) between the SHAs in England. For stillbirths, South East Coast has the lowest proportion of major congenital anomalies (5.0%, 95% CI: 2.1, 7.9) and West Midlands has the highest proportion (13.9%, 95% CI: 10.4, 17.4). For neonatal deaths, there is an even wider gap between South East Coast, who have the lowest proportion of congenital anomalies (13.1%, 95% CI: 7.1, 19.1), and North East, who have the highest proportion (27.5%, 95% CI: 18.3, 36.7). Potential explanations of these differences, including chance variation are discussed further in section 4.1 of the report. (Pages 16-22)

Key Finding 5

Variations in stillbirth and neonatal mortality rates between Primary Care Trusts (PCTs)

In 2008, the mean number of births in PCTs in England is between 4000 and 5000 total births per year. Within this range, there is a 4.2 [95% CI: 2.0, 9.1] fold difference between the lowest stillbirth rate and highest stillbirth rate and a 3.1 [1.3, 7.1] fold difference between the lowest neonatal mortality rate and the highest. With 152 PCTs being compared it is likely that much of this variation can be explained by chance. (Pages 23-25)

Key Finding 6

Impact of ethnicity

Mothers of black ethnic origin are 2.3 [95% CI: 2.1, 2.6] times more likely to have a stillbirth and 2.3 [2.0, 2.7] times more likely to have a neonatal death than mothers of white ethnic origin. Mothers of Asian ethnic origin are 1.8 [1.6, 1.9] times more likely to have a stillbirth and 1.7 [1.5, 1.9] times more likely to have a neonatal death than mothers of white ethnic origin. These differences are comparable to those seen over the last three years. (Pages 37 and 38)

Key Finding 7

Improved explanations of stillbirths and neonatal deaths

For 2008, CMACE introduced a new methodology for the classification of causal and associated factors for perinatal mortality. The classification has reduced the proportion of unexplained stillbirths from around 50%, using the Wigglesworth and Obstetric (Aberdeen) classifications, to 23% by collecting greater detail on factors associated with death such as intra-uterine growth restriction (10.2%), specific placental conditions (9.3%) and specific fetal conditions (4.8%). The classification also allows us to break down the proportion of neonatal deaths due to immaturity (previously around 45%, using the Wigglesworth classification), to 9% extreme prematurity (under 22 weeks' gestation) and 38% due to respiratory disorders. (Pages 46-61)

In addition to this UK-wide report, CMACE provided the UK nations, SHAs in England and maternity providers with specific reports showing their own data with regional and national comparators. On request, reports are also provided to Neonatal Networks, PCTs and LSCBs. CMACE knows that many organisations use these locally specific reports for comparative and monitoring purposes. This acts as a prompt to maternity providers to review deaths occurring within their service and to make changes to procedures and processes felt to be necessary. Some organisations seek independent review and ask CMACE to facilitate. Some examples of Providers that have taken action as a result of the information in their Provider-specific reports can be found in Appendix F.

Recommendations and CMACE recommendation policy

On this page are detailed three recommendations based on the results of this report. These are proposals made by CMACE for an appropriate course of action to be taken by external organisations and/or individuals in relation to a specific area of health care. These comply with the CMACE recommendation policy which aims to ensure a consistent and transparent approach to the development of recommendations, enabling stakeholders and users of CMACE reports to have a full understanding of, and confidence in, the process by which recommendations have been made. A copy of this policy is available from CMACE – www.cmace.org.uk/Publications.aspx

Recommendation 1 Neonatal Deaths of Babies below 22 weeks' gestation

As agreed by a multidisciplinary expert working party, at the present time, babies born before 22 weeks' gestation are very rarely resuscitated and can therefore be considered pre-viable.[1] Nonetheless, many are reported to CMACE as neonatal deaths after showing signs of life. Data matching with ONS confirms that this is also reflected in death registration. Practice however varies greatly across the country, perhaps either due to differences in assessment at birth or in how these findings are recorded/classified. In the North East 4.8% of early neonatal deaths are recorded as pre-viable, whereas in the North West 19.4% are recorded as pre-viable. There are significant implications involved in registering the delivery of a pre-viable fetus as a neonatal death. Clearly this will impact on infant mortality data but it also has implications for parents, hospitals, registration offices, coroners and local safeguarding authorities. **CMACE recommends that guidelines be developed to ensure greater consistency in practice on this matter.**

(Data and further information regarding this matter are presented on pages 19 and 20 of this report.)

Recommendation 2 Perinatal Mortality outliers

There can be many reasons why a maternity provider appears as a mortality outlier. This may, for example reflect case mix or simply random fluctuation between one year and another, and because of these issues, should certainly not be construed as reflecting clinical practice for that provider. **Nonetheless, CMACE recommends that all providers of maternity services identified as a perinatal mortality outlier, review their data locally to ensure that they understand the reasons and take any actions that may be required.**

(Data on this issue are presented on pages 34-36 of this report.)

Recommendation 3 Intrapartum Stillbirths

As seen in previous CEMACH Perinatal Mortality reports, there are some 500 intrapartum deaths each year. Previous national confidential enquiries have identified that a high proportion of the deaths where a major congenital anomaly was not a factor were associated with avoidable factors that may have affected the outcome. The National Patient Safety Agency (NPSA) has recently developed a pro forma for reviewing intrapartum related perinatal deaths.[2] **CMACE recommends that all term intrapartum deaths with no sign of a major congenital anomaly be fully investigated locally with a view to identifying whether there were any avoidable factors and to ensure that lessons are learned.**

(Data on this issue are presented on pages 50 and 51 of this report.)

Chapter 1 Context

The Confidential Enquiry into Maternal and Child Health (CEMACH) became an independent charity on 1st July 2009 with the new name Centre for Maternal and Child Enquiries (CMACE). The independent status and new name reflect significant developments since 2003. CMACE will continue to be committed to work for mothers and babies but also aims to develop and expand work on child health. The organisation has also broadened its range of activities beyond its core national confidential enquiry activity. Local reviews, clinical audits and research collaborations represent increasingly important parts of its work. These all support its wider mission to improve the health of mothers, babies and children.

A key part of CMACE's work is the perinatal mortality surveillance system. Data on all stillbirths and neonatal deaths that occur in England, Wales, Northern Ireland and the Crown Dependencies of the Channel Islands and the Isle of Man are collected, validated, analysed and reported on. Collaboration with NHS Quality Improvement Scotland enables CMACE to produce UK-wide mortality rates.

This report includes trends in mortality rates in the UK, mortality rates comparing the four nations and the Crown Dependencies, Strategic Health Authorities (SHAs), Primary Care Trusts (PCTs), Neonatal Networks, Providers including Hospital Trusts, maternal socio-demographic factors, clinical characteristics of mothers and babies, causes of death and post mortem uptake.

In addition to this UK-wide report, CMACE also provide the UK nations, SHAs in England and maternity providers with specific reports showing their own data with regional and national comparators. On request, reports are also provided to Neonatal Networks, PCTs and Local Safeguarding Children Boards (LSCBs). These reports include crude mortality rates and mortality rates adjusted for terminations of pregnancy, major congenital anomalies, babies born at less than 22 weeks' gestation and babies born weighing less than 500g. Comparisons to the national mortality rates, information about transfers, maternal characteristics, obstetric factors, post mortem uptake, cause of death and comparison of rates against similar organisations are also included.

This system of multi-level reporting provides valuable information to health care providers, commissioners and policy makers. It ensures all parts of the health care delivery system are aware of perinatal mortality rates nationally, regionally, locally and comparatively. Many organisations use these reports for comparative monitoring purposes. This acts as a trigger to conducting more detailed review of the deaths occurring within their service, where variations exist, and to make changes to procedures and processes if felt to be necessary.

Chapter 2 Methodology

2.1 Data sources

CMACE collects epidemiological and clinical data on all stillbirths and neonatal deaths in England, Wales, Northern Ireland, the Crown Dependencies of the Channel Islands and the Isle of Man.

These data are collected by a network of local health professionals coordinated by the CMACE local offices. In 2008 there were four CMACE offices including one operating as part of the central team in London. In the North East, West Midlands and South West local activity is subcontracted to third parties. Northern Ireland, and the states of Jersey, Guernsey and Isle of Man contract with CMACE and the All Wales Perinatal Survey (AWPS) is affiliated with CMACE to provide perinatal mortality data. Every maternity unit within England, Wales, Northern Ireland and the Crown Dependencies has a CMACE coordinator who notifies CMACE of each perinatal death that occurs in their unit. Notification is carried out by completing a paper Perinatal Death Notification form, an example of which can be seen in Appendix A. Completed forms are sent to the relevant Regional Office.

In addition, CMACE has in recent years established a collaboration with NHS Quality Improvement Scotland. Through this alliance, information on Scottish stillbirths and neonatal deaths can be included, which allowed for provision of UK-wide perinatal mortality.

In 2008, the PDN form was changed to a much more comprehensive form with many more data variables. Additions include employment status, smoking status, previous pregnancy problems, pre-existing medical history, condition of neonatal deaths after birth and the new cause of death classification. Where possible, variables and definitions are used to make perinatal mortality data consistent with other forms of maternity related national data such as the severe maternal morbidity data collected by UKOSS.

This data collection is supplemented by additional reporting of deaths to CMACE from pathologists, coroners, child health systems and local congenital anomaly registers. This multiple source reporting leads to a very high level of ascertainment of deaths.

2.2 Data reporting and analysis

2.2.1 Reporting

Perinatal mortality data are presented using birth cohorts based on a date of delivery in 2008. Denominator data on the number of live births at individual Providers is provided directly by the Provider. Population based denominator data on maternities and live births used to calculate national, Strategic Health Authority and Primary Care Trust rates are obtained from the ONS for England and Wales, General Register Office for Scotland (GROS), the Northern Ireland Statistics and Research Agency (NISRA) and the Northern Ireland Child Health Systems (NI CHS). Additional data sources are referenced throughout the report.

There are two sources of data for Northern Ireland, NISRA and NI CHS. The NISRA provide CMACE with the total live birth figure whereas the NI CHS provide live births and maternities broken down by a number of variables (e.g. multiplicity, maternal age, gestation). The total live births differ between the two sources but the NISRA figure is more widely reported and so the NISRA figure has been used when a total number is required (e.g. calculation of UK rates) and the NI CHS figures have been used when the number of live births needs to be broken down by another variable.

2.2.2 Data validation and cleaning

Data are compiled centrally and cross-matched with statutory registration data on stillbirths and neonatal deaths from the Office for National Statistics (ONS). Any cases that have been identified by ONS but not by CMACE are established and investigated to ascertain whether they meet the inclusion criteria for surveillance. Where a new case is identified, the normal procedure is to collect the required minimum data set by sending out a PDN form to the relevant Provider.

CMACE has a bespoke database which performs logical consistency and range checks as an on-screen summary on the completion of a record. There is also an on-screen list of possible duplicate matches within a region or across regions on the completion of a record. CMACE local offices send out missing information reports to Providers that have notified a case with any outstanding missing information or errors in the data supplied.

Throughout the year the CMACE local offices also send out lists, to each Provider, of the cases that have been notified; this is to help identify any cases that have been incorrectly assigned to a Provider and any cases that have not been notified.

In preparing this report, CMACE has assessed the risk of breach of confidentiality posed by the inclusion of small numbers in tables. Application of the guidance published by ONS indicated a low risk due to the high level of aggregation of most data. Nonetheless a number of tables have been subject to disclosure control to ensure the maintenance of confidentiality.

2.2.3 Data analysis

Statistical analysis was carried out using STATA (version 8).[3] Stillbirth and perinatal mortality rates are presented per 1,000 total births and neonatal mortality rates are per 1,000 live births. Where appropriate 95% confidence intervals are provided with mortality rates, these are calculated using the Poisson distribution. Similarities and differences between mortality rates over a number of years is explored using a test for trend, with statistical significance set at p=0.05. Rate ratios are calculated with 95% confidence intervals to show any similarities and difference between two groups within a given year.

2.2.3.1 Small for gestational age (SGA) & Intra-uterine growth restriction (IUGR)

SGA has been calculated using gender, gestational age and birth weight by comparing the CMACE dataset to a table of expected values from a British population in 1990.[4] A baby whose birth weight is less than the 10th centile for gestation is considered small for gestational age. The term IUGR is used in this report where a fetus or newborn has been clinically recognised as having poor intra-uterine growth. This is a situation where growth is good initially in pregnancy but then drops later in pregnancy (e.g. a fetus on the 97th centile dropping to the 50th centile). Whilst a group of small for gestational age babies will contain such infants, a large proportion will have been small throughout pregnancy, such as due to a genetic syndrome or constitutionally small.

2.2.3.2 Maternal deprivation

Classification of deprivation was derived from the Index of Multiple Deprivation (IMD) score 2004[5] and uses the overall indicator. This is based on the postcode of residence and the corresponding Super Output Area (SOA) as defined by ONS and is based on the entire population of England. These IMD scores were ranked and quintiles of deprivation derived for the national population. Cases were then allocated to the appropriate quintile of deprivation. These scores were based on the mothers, not babies, and for multiple pregnancies only first born babies were assigned a deprivation score, to avoid double counting.

2.2.3.3 Classification for cause of death

Our data collection form (Appendix A) asks notifiers to identify all conditions that arose during pregnancy, that caused or were associated with the death and to specify which condition was the main condition causing or associated with the death. CMACE regional managers will then use this information plus any post mortem and placental histology reports to classify the one primary cause or associated factor and up to three other causes or associated factors. In Chapter 6 the primary cause or associated factor for stillbirths using the maternal and fetal classification and the primary cause or associated factor for neonatal deaths using both the maternal and fetal classification and the neonatal classification will be presented.

2.2.3.4 Major congenital anomaly as primary cause of death

There are a number of tables in this report where data for major congenital anomalies as primary cause of death are presented. For data from England, Wales, Northern Ireland and the Crown Dependencies the process described above in section 2.2.3.3 is used. Any stillbirth coded with a major congenital anomaly as the primary cause of death using the CMACE maternal and fetal classification (see page 71) or a neonatal death using the CMACE neonatal classification (see page 72) are within this group. Scotland uses a different classification for coding the stillbirths and neonatal deaths. Any stillbirth or neonatal death coded with a congenital anomaly using the Paediatric classification[6] are within this group.

2.3 Funnel plots

There are a number of funnel plots presented for Providers, Neonatal Networks and Primary Care Trusts. Each plot shows the adjusted mortality rates for each organisation plotted against the number of births in that organisation. The overall mortality rate is indicated by the solid line, the 95% confidence limits are delineated by the narrower dotted lines and the 99% confidence limits are the wider dotted lines. The 95% and 99% confidence limits are calculated using the Binomial distribution.[7] Organisations whose mortality rates lies outside these confidence intervals are statistically significantly different from the overall rate. As there are multiple comparisons, chance is very likely to explain being outside the 95% confidence interval so the 99% confidence interval is considered a more robust cut-off for identifying potential data outliers.

The adjustments made to the mortality rates are by removing terminations of pregnancy and babies born at less than 22 weeks' gestation from both the numerator and the denominator.

CMACE is currently developing a policy in relation to potential data outliers. This will be available on the website (www.cmace.org.uk) when finalised.

Chapter 3 Overview of perinatal and neonatal mortality in the UK

This chapter gives a summary of the numbers and mortality rates of stillbirths, perinatal and neonatal deaths in 2008. The trends in mortality rates from 2000 to 2008 are presented. Also shown are numbers, mortality rates and trends of stillbirths, perinatal and neonatal deaths among singleton, twin and triplet and higher order multiple deliveries.

3.1 Summary of 2008 mortality rates

In 2008, there were 4,043 stillbirths, 6,025 perinatal deaths and 2,557 neonatal deaths. There were 1,982 early neonatal deaths and 575 late neonatal deaths. These 6,600 notifications were reported to CMACE and SSBID Survey, ISD Scotland by maternity units in England, Northern Ireland, Scotland and Wales. There were 19 notifications from the Crown Dependencies which will be included in the analysis in all other chapters. There were 795,004 live births and 799,047 total births in the UK in 2008 (Table 3.1).

The stillbirth rate for the UK in 2008 was 5.1 per 1,000 total births, the perinatal mortality rate was 7.5 per 1,000 total births and the neonatal mortality rate was 3.2 per 1,000 live births (Table 3.1).

The numerator used to calculate these mortality rates is all deaths occurring in the UK and the denominator is all births registered in the UK. The denominators are provided by ONS for England and Wales, NISRA for Northern Ireland and GROS for Scotland.

Table 3.1
Summary of mortality rates; United Kingdom: 2008

	Number	Rate
Live births	**795,004**	**..**
Total births	**799,047**	**..**
Total notifications[a]	6,600	..
Stillbirths	4,043	5.1 [4.9, 5.2][b]
Perinatal deaths	6,025	7.5 [7.4, 7.7][b]
Neonatal deaths	2,557	3.2 [3.1, 3.3][c]
Early neonatal deaths	1,982	2.5 [2.4, 2.6][c]
Late neonatal deaths	575	0.7 [0.7, 0.8][c]

[a]Includes stillbirths and neonatal deaths
[b]Rate per 1,000 total births
[c]Rate per 1,000 live births

Sources: CMACE, ONS, NISRA, GROS and SSBID Survey

Between the years 2000 and 2008, the perinatal mortality rate shows a statistically significant downward trend ($p<0.001$) from 8.3 per 1,000 total births in 2000 to 7.5 per 1,000 total births in 2008. This decrease is due to a statistically significant decrease in the stillbirth rate ($p<0.001$) from 5.4 per 1,000 total births to 5.1 per 1,000 total births and a statistically significant decrease in the early neonatal mortality rate ($p<0.001$) from 2.9 per 1,000 live births to 2.5 per 1,000 live births. This is the second year running that the stillbirth rate has shown a statistically significant decrease. CMACE will keep monitoring this, annually, to see if the decline continues.

Table 3.2
Overall stillbirth, perinatal and neonatal mortality rates; United Kingdom: 2000-2008

Year	Live births	Stillbirth rate[a]	Perinatal mortality rate[a]	Neonatal mortality rate[b]		
				Early (<7 days)	Late (7-27 days)	Total
2000	678,718	5.4 [5.2, 5.5]	8.3 [8.1, 8.5]	2.9 [2.8, 3.1]	0.9 [0.9, 1.0]	3.9 [3.7, 4.0]
2001	668,849	5.4 [5.2, 5.6]	8.1 [7.9, 8.3]	2.8 [2.6, 2.9]	0.9 [0.8, 1.0]	3.7 [3.5, 3.8]
2002	668,569	5.7 [5.5, 5.9]	8.4 [8.2, 8.6]	2.7 [2.6, 2.9]	0.8 [0.8, 0.9]	3.5 [3.4, 3.7]
2003	695,331	5.7 [5.6, 5.9]	8.5 [8.3, 8.8]	2.8 [2.7, 2.9]	0.8 [0.7, 0.9]	3.6 [3.5, 3.8]
2004	715,996	5.7 [5.5, 5.9]	8.3 [8.1, 8.5]	2.6 [2.5, 2.8]	0.7 [0.7, 0.8]	3.4 [3.3, 3.5]
2005	723,094	5.3 [5.2, 5.5]	8.0 [7.8, 8.2]	2.7 [2.6, 2.8]	0.8 [0.8, 0.9]	3.5 [3.4, 3.7]
2006	749,056	5.3 [5.1, 5.4]	7.9 [7.7, 8.1]	2.6 [2.5, 2.7]	0.8 [0.7, 0.9]	3.4 [3.3, 3.5]
2007	772,815	5.2 [5.0, 5.4]	7.7 [7.6, 7.9]	2.6 [2.5, 2.7]	0.7 [0.7, 0.8]	3.3 [3.2, 3.4]
2008	795,004	5.1 [4.9, 5.2]	7.5 [7.4, 7.7]	2.5 [2.4, 2.6]	0.7 [0.7, 0.8]	3.2 [3.1, 3.3]

[a]Rate per 1,000 total births
[b]Rate per 1,000 live births

Sources: CMACE, ONS, NISRA, GROS and SSBID Survey

3.2 Mortality in singleton and multiple births

It has long been noted that the infants of multiple births have higher perinatal mortality rates than those of singletons.[8 9] Related to this, preterm birth[8] and other morbidities are more prevalent among multiples, and more NHS resources are used for multiple pregnancies, antenatally, during labour and delivery, and postnatally for both mother and baby.[10-12] For example, in a modelling study of the cost to the NHS of singleton versus multiple births after IVF treatment (all costs of fertility treatment were excluded), the total direct cost of maternity and neonatal care for a family of twins (two infants and one mother) was 2.75 times the cost of a singleton family, while the cost of care for a family of triplets was 9.76 times that of a singleton family.[10]

In 2008, 98.45% of maternities were singleton, 1.53% were twins and 0.02% were triplet and higher order multiples. This shows no change from 2007.[13]

Since 2000 there has been a statistically significant downward trend ($p<0.001$) in the stillbirth rate for twin births, from 16.7 per 1,000 total births in 2000 to 11.2 per 1,000 total births in 2008. In 2008, the stillbirth rate for twin births is 2.4 times higher than the stillbirth rate for singleton births (Table 3.5). Probably due to small numbers, the stillbirth rate for triplet and higher order multiple births does not show a trend ($p=0.08$) over the nine year period shown in Table 3.3. In 2008, the stillbirth rate for triplet and higher order multiple births is 5.9 times higher than the stillbirth rate for singleton births (Table 3.5). Data used to create the rates are included in Appendix B.

Table 3.3
Stillbirth trends by multiplicity; United Kingdom: 2000-2008

Year	Stillbirth rates[a] [95% CI]		
	Singletons	Twins	Triplets and higher order multiples
2000	5.0 [4.8, 5.2]	16.7 [15.0, 18.7]	23.8 [15.5, 36.5]
2001	5.0 [4.8, 5.2]	17.4 [15.6, 19.4]	40.3 [28.2, 57.7]
2002	5.2 [5.1, 5.4]	17.8 [16.0, 19.8]	51.0 [35.9, 72.5]
2003	5.3 [5.1, 5.5]	19.1 [17.3, 21.1]	62.2 [42.7, 90.7]
2004	5.3 [5.2, 5.5]	16.1 [14.5, 18.0]	47.6 [31.9, 71.0]
2005	5.0 [4.8, 5.2]	13.1 [11.7, 14.8]	32.8 [20.1, 53.5]
2006	4.9 [4.7, 5.0]	12.2 [10.8, 13.7]	19.0 [9.9, 36.6]
2007	4.9 [4.8, 5.1]	12.2 [10.9, 13.7]	15.2 [7.2, 31.9]
2008	4.8 [4.6, 4.9]	11.2 [9.9, 12.6]	27.9 [17.1, 45.5]

[a]Rate per 1,000 total births

Sources: CMACE, ONS, NI CHS, GROS and SSBID Survey

The perinatal mortality rate for singleton births was 6.8 per 1,000 total births, twin births was 24.5 per 1,000 total births and triplets and higher order multiples was 74.9 per 1,000 total births. The rate for twins was 3.6 [95% CI: 3.3, 3.9] times higher and triplet and higher order multiples was 11.0 [8.3, 14.7] times higher than for singletons.

There was also a statistically significant downward trend ($p<0.001$) in the neonatal mortality rates for twins in the nine years shown in Table 3.4, from 21.5 per 1,000 live births in 2000 to 17.0 per 1,000 live births in 2008. The rate for twin births in 2008 was 6.5 times higher than for singleton births (Table 3.5). There was again no statistically significant trend ($p=0.77$) in the neonatal mortality rates for triplet and higher order multiple births. In 2008, the neonatal mortality rate for triplet and higher order multiple births was 20.4 times higher than for singleton births (Table 3.5).

Table 3.4
Neonatal mortality trends by multiplicity; United Kingdom: 2000-2008

Year	Neonatal mortality rates[a] [95% CI]		
	Singletons	Twins	Triplets and higher order multiples
2000	3.3 [3.2, 3.4]	21.5 [19.5, 23.7]	58.1 [44.0, 76.6]
2001	3.1 [2.9, 3.2]	22.4 [20.3, 24.6]	53.2 [38.7, 73.1]
2002	3.0 [2.9, 3.1]	19.8 [17.9, 21.9]	34.7 [22.4, 53.7]
2003	3.0 [2.9, 3.2]	19.9 [18.1, 22.0]	93.4 [67.9, 128.3]
2004	2.8 [2.7, 3.0]	18.8 [17.1, 20.8]	68.8 [48.9, 96.7]
2005	2.9 [2.8, 3.0]	20.6 [18.8, 22.7]	63.6 [44.4, 90.9]
2006	2.6 [2.5, 2.7]	18.7 [17.0, 20.6]	79.7 [57.8, 110.1]
2007	2.7 [2.6, 2.8]	18.0 [16.3, 19.8]	39.6 [25.0, 62.9]
2008	2.6 [2.5, 2.7]	17.0 [15.4, 18.8]	53.8 [37.6, 76.9]

[a]Rate per 1,000 live births

Sources: CMACE, ONS, NI CHS, GROS and SSBID Survey

Table 3.5
Rate ratios for stillbirths and neonatal mortality trends by multiplicity; United Kingdom: 2000-2008

Year	Rate ratios[a] [95% CI]			
	Stillbirths		Neonatal deaths	
	Twins	Triplets and higher order multiples	Twins	Triplets and higher order multiples
2000	3.4 [3.0, 3.8]	4.8 [3.1, 7.3]	6.5 [5.8, 7.2]	17.6 [13.4, 23.1]
2001	3.5 [3.1, 3.9]	8.1 [5.7, 11.5]	7.3 [6.6, 8.1]	17.4 [12.7, 23.8]
2002	3.4 [3.0, 3.8]	9.7 [6.9, 13.7]	6.6 [5.9, 7.4]	11.5 [7.5, 17.7]
2003	3.6 [3.3, 4.0]	11.8 [8.2, 17.0]	6.6 [5.9, 7.3]	30.7 [22.6, 41.7]
2004	3.0 [2.7, 3.4]	8.9 [6.0, 13.2]	6.6 [5.9, 7.4]	24.2 [17.4, 33.7]
2005	2.6 [2.3, 3.0]	6.6 [4.0, 10.6]	7.1 [6.4, 7.9]	21.9 [15.4, 31.0]
2006	2.5 [2.2, 2.8]	3.9 [2.0, 7.5]	7.2 [6.5, 8.0]	30.6 [22.4, 41.8]
2007	2.5 [2.2, 2.8]	3.1 [1.5, 6.4]	6.7 [6.0, 7.5]	14.8 [9.4, 23.3]
2008	2.4 [2.1, 2.7]	5.9 [3.6, 9.5]	6.5 [5.8, 7.2]	20.4 [14.4, 29.0]

[a]Rate ratios are calculated using singletons as the reference group

Sources: CMACE, ONS, NI CHS, GROS and SSBID Survey

3.3 Mortality in UK nations and Crown Dependencies

Table 3.6 shows the adjusted stillbirth, perinatal and neonatal mortality rates for England, Northern Ireland, Scotland, Wales and the Crown Dependencies. The data used to create these rates are shown in Appendix C.

The numerator used to calculate these mortality rates is all resident deaths occurring in the UK removing terminations of pregnancy and babies born at less than 22 weeks' gestation and the denominator is the resident births registered in the UK removing terminations of pregnancy and babies born at less than 22 weeks' gestation. The denominators are provided by ONS for England and Wales, NISRA for Northern Ireland, GROS for Scotland and the individual Islands for the Crown Dependencies.

There is no statistically significant difference between the mortality rates of the nations. However, the slight variation that can be seen in these rates may reflect differences in the population and so should not be seen as an indicator of quality of care. As can be seen in Table 3.6 and Figure 3.1, the adjusted stillbirth rate in Scotland is significantly higher than in England. There is, however no difference in the crude rates, so this appears to be due to issues in respect of the identification and removal of terminations of pregnancy from the Scotland cohort for the adjusted analysis.

Table 3.6
Adjusted stillbirth, perinatal and neonatal mortality rates by nation: 2008

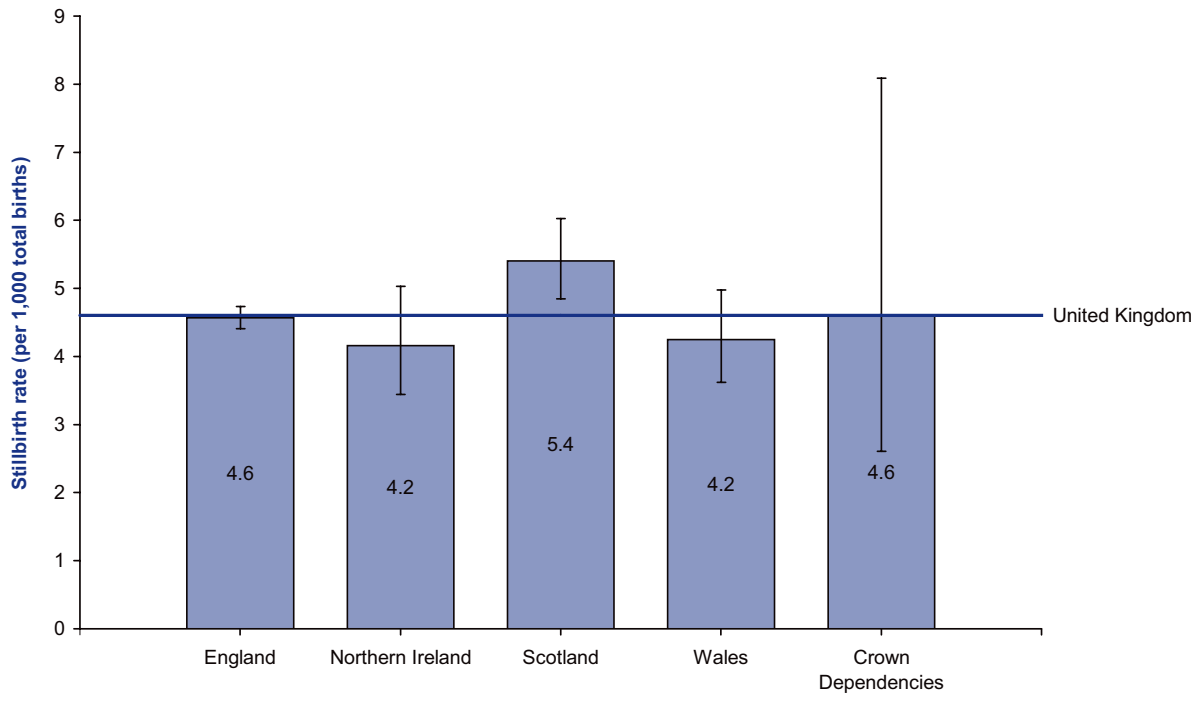
	Stillbirth rate[a,b]	Perinatal mortality rate[a,b]	Neonatal mortality rate[a,c]
UK[d]	4.6 [4.5, 4.8]	6.7 [6.5, 6.9]	2.8 [2.7, 2.9]
England	4.6 [4.4, 4.7]	6.7 [6.5, 6.9]	2.8 [2.7, 2.9]
Northern Ireland	4.2 [3.4, 5.0]	6.4 [5.5, 7.5]	3.0 [2.4, 3.8]
Scotland[e]	5.4 [4.8, 6.0]	7.2 [6.6, 7.9]	2.6 [2.2, 3.0]
Wales	4.2 [3.6, 5.0]	6.3 [5.5, 7.2]	3.0 [2.5, 3.6]
Crown Dependencies	4.6 [2.6, 8.1]	7.7 [4.9, 11.9]	3.1 [1.5, 6.2]

[a]Adjusted by removing terminations of pregnancy and babies born at less than 22 weeks' gestation
[b]Rate per 1,000 total births
[c]Rate per 1,000 live births
[d]Includes the Crown Dependencies
[e]The data from Scotland may include some terminations of pregnancy. The Scottish data collection form does not ask if the case was a termination of pregnancy so these cases cannot be removed.

Sources: CMACE, ONS, NISRA, GROS and SSBID Survey

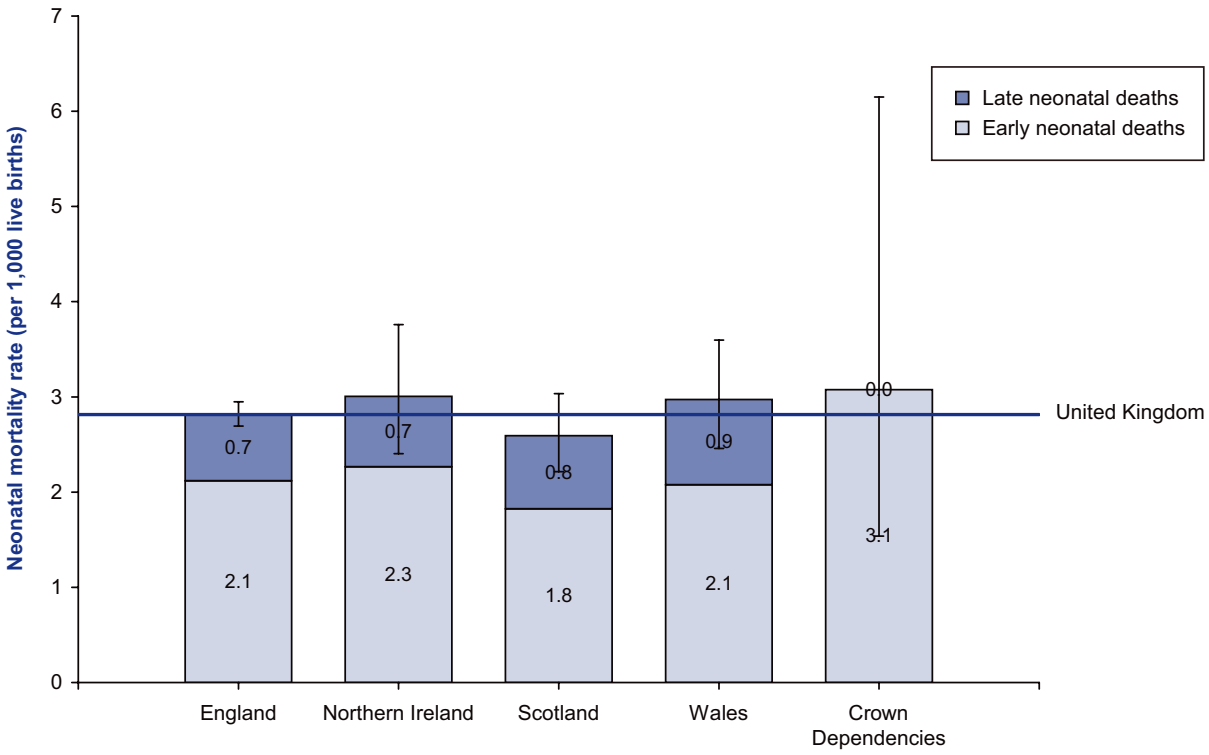
The adjusted stillbirth rates and associated 95% confidence intervals for each UK nation and the Crown Dependencies are shown in Figure 3.1. The adjusted neonatal mortality rates and associated 95% confidence intervals for each UK nation and the Crown Dependencies are shown in Figure 3.2.

Figure 3.1
Adjusted[a] stillbirth rates by nation with associated 95% confidence intervals: 2008



[a]Adjusted by removing terminations of pregnancy and babies born at less than 22 weeks' gestation

Figure 3.2
Adjusted[a] neonatal mortality rates by nation with associated 95% confidence intervals: 2008



[a]Adjusted by removing terminations of pregnancy and babies born at less than 22 weeks' gestation

In past years, adjusted mortality rates have been calculated by excluding births at very high risk of death. Unlike terminations of pregnancy and babies born at less than 22 weeks' gestation which are still removed, infants with some factors have been left in the analysis in this report. These factors are shown in Tables 3.6 and 3.7 and the frequency of these occurring in the 2008 population is also shown for information. This is due to concerns over the completeness of the data used for adjusting, for example congenital anomalies were excluded before analysis in previous reports despite concerns that not all of these deaths were due to lethal anomalies. As no data was available for anomalies in surviving babies these analyses will now be presented only in locality based reports from 2009. Similarly there will have been some infants weighing under 500g at birth who have survived and therefore remained in the denominator. Further work is planned to obtain more data on surviving infants to improve this adjustment methodology.

Table 3.7
Number of stillborn infants with major congenital anomaly as primary cause of death and <500g birth weight by nation: 2008

	n (%)		
	Major congenital anomaly as primary cause of death[a,b]	**<500g birth weight[a]**	**Number of stillbirths after these exclusions**
UK[c]	334 (9.1)	282 (7.7)	3,090 (83.9)
England	274 (8.9)	246 (8.0)	2,589 (83.9)
Northern Ireland	13 (12.1)	3 (2.8)	91 (85.0)
Scotland	35 (10.8)	21 (6.5)	268 (82.5)
Wales	11 (7.2)	12 (7.9)	131 (86.2)
Crown Dependencies	*	*	11 (91.7)

[a]Some stillbirths are counted in more than one category
[b]CMACE's maternal and fetal classification for England, Northern Ireland, Wales and Crown Dependencies and Paediatric classification[6] for Scotland. Please see the methodology for further details.
[c]Includes the Crown Dependencies
* Suppression of low cell count

Sources: CMACE and SSBID Survey

Table 3.8
Number of neonatal deaths with major congenital anomaly as primary cause of death and <500g birth weight by nation: 2008

	n (%)		
	Major congenital anomaly as primary cause of death[a,b]	**<500g birth weight[a]**	**Number of neonatal deaths after these exclusions**
UK[c]	482 (21.5)	171 (7.6)	1,588 (70.9)
England	396 (20.9)	145 (7.7)	1,361 (71.8)
Northern Ireland	23 (29.9)	11 (14.3)	43 (55.8)
Scotland	39 (25.2)	11 (7.1)	98 (63.2)
Wales	23 (21.7)	3 (2.8)	80 (75.5)
Crown Dependencies	*	*	6 (75.0)

[a]Some neonatal deaths are counted in more than one category
[b]CMACE's neonatal classification for England, Northern Ireland, Wales and Crown Dependencies and Paediatric classification[6] for Scotland. Please see the methodology for further details.
[c]Includes the Crown Dependencies
* Suppression of low cell count"

Sources: CMACE and SSBID Survey

Chapter 4 Perinatal and neonatal mortality in Strategic Health Authorities, Primary Care Trusts, Neonatal Networks and Providers

This chapter gives a summary of the stillbirth, perinatal and neonatal mortality rates in Strategic Health Authorities (SHAs), Primary Care Trusts (PCTs) and Neonatal Networks in England, and Providers including Hospital Trusts in England, Wales, Northern Ireland and the Crown Dependencies.

CMACE produces annual reports for SHAs in England and maternity providers showing their own data with regional and national comparators. On request, reports are also provided to Neonatal Networks, PCTs and Local Safeguarding Children Boards (LSCBs). These reports compare mortality rates against the national rates, and for all organisations apart from Providers, it compares the mortality rates of the constituent Providers within them.

4.1: Strategic Health Authorities (England)

Strategic Health Authorities (SHAs) were introduced in 2002 to manage the NHS locally. The original 28 SHAs were reduced to 10 on 1st July 2006. Their regional oversight role includes ensuring that local health services are of high quality and are performing well.

Table 4.1 shows the adjusted stillbirth, perinatal and neonatal mortality rates for each SHA for 2006-2008. Data used to create the rates are included in Appendix D.

Deaths are assigned to an SHA using the mother's postcode of residence. Variations in mortality rates between SHAs may reflect socio-demographic differences between the local maternity populations and should not necessarily be used as a measure of the quality of maternity care provided.

SHA specific reports are provided to every SHA in England. These reports include crude and adjusted mortality rates and comparisons to the national mortality rates, information about transfers, maternal characteristics, obstetric factors, post mortem uptake, cause of death, comparisons to other SHAs, mortality rates of the Providers within the SHA and comparisons to all other Providers.

There has been a statistically significant decrease in the stillbirth rates for East Midlands ($p=0.01$), the perinatal mortality rates for London ($p=0.001$) and neonatal mortality rates for London ($p<0.001$) and Yorkshire and the Humber ($p=0.01$) between 2006 and 2008. There was no statistically significant difference seen in any other SHA.

Table 4.1
Adjusted stillbirth, perinatal and neonatal mortality rates by SHA; England: 2006-2008

	Stillbirth rate[a,b]			Perinatal mortality rate[a,b]			Neonatal mortality rate[a,c]		
	2006	2007	2008	2006	2007	2008	2006	2007	2008
England	4.8	4.6	4.6	7.1	6.8	6.7	3.1	2.9	2.8
East Midlands	5.1	4.0	4.1	7.5	6.5	6.6	3.5	3.2	3.4
East of England	3.9	3.9	3.8	5.8	6.0	5.6	2.5	2.5	2.4
London	5.4	5.2	4.9	7.9	7.3	6.8	3.2	2.9	2.5
North East	5.3	4.4	5.4	7.8	6.7	7.4	3.4	2.8	3.0
North West	4.7	4.8	4.6	7.2	6.8	6.8	3.2	2.8	3.0
South Central	4.5	4.1	4.1	6.6	5.9	6.2	2.6	2.3	2.6
South East Coast	4.0	4.1	4.2	5.5	5.8	6.0	2.2	2.3	2.4
South West	4.1	3.9	4.1	6.2	5.6	6.0	2.8	2.4	2.5
West Midlands	5.2	5.0	5.2	8.1	8.2	8.1	3.8	3.9	3.7
Yorkshire and the Humber	4.9	5.1	5.1	7.9	7.7	7.2	3.8	3.5	3.0

[a]Adjusted by removing terminations of pregnancy and babies born at less than 22 weeks' gestation
[b]Rate per 1,000 total births
[c]Rate per 1,000 live births

Sources: CMACE, ONS

In past years, adjusted mortality rates have been calculated by excluding births at very high risk of death. Unlike terminations of pregnancy and babies born at less than 22 weeks' gestation which are still removed, infants with some factors have been left in the analysis in this report. These factors are shown in Tables 4.2 and 4.3 and the frequency of these occurring in the 2008 population is shown for information. This is due to concerns over the completeness of the data used for adjusting, for example congenital anomalies were excluded before analysis in previous reports despite concerns that not all of these deaths were due to lethal anomalies. As no data was available for anomalies in surviving babies these analyses will now be presented only in locality based reports from 2009. Similarly there will have been some infants weighing under 500g at birth who have survived and therefore remained in the denominator. Further work is planned to obtain more data on surviving infants to improve this adjustment methodology.

Reports detailing SHA, Network and Provider based populations will also include analyses after excluding infants with these factors in order to demonstrate whether there is an explanation identifiable using the data. In a similar way analyses by location of birth and booking are also carried out to examine if excess mortality is due to the transfer of high risk antenatal or postnatal infants.

Tables 4.2 and 4.3 show the proportions of congenital anomalies among stillbirths and neonatal deaths within the SHAs in England. South East Coast has the smallest proportion (5.0%, 95% CI: 2.1, 7.9) of stillbirths whose primary cause of death is a major congenital anomaly after removing terminations of pregnancy and babies born at less than 22 weeks' gestation and West Midlands has the highest proportion (13.9%, 95% CI: 10.4, 17.4), both of them are statistically significantly different to the proportion for England as a whole (8.9% 95% CI: 7.9, 9.9). South East Coast also has the smallest proportion (13.1%, 95% CI: 7.1, 19.1) of neonatal deaths whose primary cause of death is a major congenital anomaly after removing termination of pregnancy and babies born at less than 22 weeks' gestation and North East has the highest proportion (27.5%, 95% CI: 18.3, 36.7). Neither of these are statistically different to the proportion for England as a whole (20.9%, 95% CI: 19.1, 22.7). As well as chance, there are a number of potential explanations for these variations including a true variation in anomaly rates or screening accuracy, differences in data collection or classification, or differences in the frequency of termination of pregnancy for anomaly. Further data is needed to determine the contribution of these and other reasons.

Table 4.2
Number of stillborn infants with major congenital anomaly as primary cause of death and <500g birth weight by SHA; England: 2008

	n (%)		
	Major congenital anomaly as primary cause of death[a,b]	**<500g birth weight[a]**	**Number of stillbirths after these exclusions**
England	274 (8.9)	246 (8.0)	2,589 (83.9)
East Midlands	13 (5.9)	21 (9.5)	189 (85.1)
East of England	24 (8.7)	18 (6.5)	234 (85.1)
London	61 (9.7)	53 (8.4)	518 (82.5)
North East	17 (10.4)	12 (7.3)	135 (82.3)
North West	32 (7.9)	28 (6.9)	350 (86.2)
South Central	21 (9.7)	15 (6.9)	183 (84.3)
South East Coast	11 (5.0)	17 (7.8)	191 (87.6)
South West	17 (7.0)	20 (8.2)	207 (85.2)
West Midlands	52 (13.9)	34 (9.1)	292 (78.3)
Yorkshire and the Humber	26 (7.6)	28 (8.2)	290 (85.0)

[a]Some stillbirths are counted in more than one category
[b]CMACE's maternal and fetal classification. Please see the methodology for further details.

Source: CMACE

Table 4.3
Number of neonatal deaths with major congenital anomaly as primary cause of death and <500g birth weight by SHA; England: 2008

	n (%)		
	Major congenital anomaly as primary cause of death[a,b]	**<500g birth weight[a]**	**Number of neonatal deaths after these exclusions**
England	396 (20.9)	145 (7.7)	1,361 (71.8)
East Midlands	31 (16.9)	16 (8.7)	137 (74.9)
East of England	33 (19.0)	14 (8.0)	127 (73.0)
London	84 (26.3)	25 (7.8)	214 (66.9)
North East	25 (27.5)	3 (3.3)	63 (69.2)
North West	47 (17.7)	23 (8.7)	195 (73.6)
South Central	22 (16.4)	13 (9.7)	99 (73.9)
South East Coast	16 (13.1)	9 (7.4)	97 (79.5)
South West	26 (17.9)	13 (9.0)	107 (73.8)
West Midlands	67 (25.6)	19 (7.3)	177 (67.6)
Yorkshire and the Humber	45 (22.6)	10 (5.0)	145 (72.9)

[a]Some neonatal deaths are counted in more than one category
[b]CMACE's neonatal classification. Please see the methodology for further details

Source: CMACE

Table 4.4 shows the numbers and proportions of early neonatal deaths born at less than 22 weeks' gestation by SHA in England. At the present time; pre-22 week fetuses ex utero are incapable of sustaining a separate existence and must be considered pre-viable. This is supported by a large population study (EPICure) undertaken in the UK which found that there were no survivors within a cohort delivered before 22 weeks' gestation.[14] After birth a pre-viable fetus may exhibit signs of activity which are reflex and physiological, including limb movements, cardiac and respiratory activity. It can also be argued that despite these, a pre-viable fetus is unable to sustain separate existence. Uncertainty about whether to classify the case as a neonatal death or a fetal loss may account for the variation in the numbers of neonatal deaths, even at a regional level. For example, North East has the smallest apparent proportion (4.8%, 95% CI: 0.0, 10.0) of early neonatal deaths born at less than 22 weeks' gestation and North West has the highest (19.4%, 95% CI: 14.4, 24.3). North East is statistically significantly lower than the proportion for England (14.6%, 95% CI: 12.9, 16.3) but North West is not statistically significantly different.

In total, 248 such deaths were reported to us in 2008. The data matching carried out with ONS indicates that this is reflected in death registrations. There are significant implications for all parties concerned, and for infant mortality data. The development of a consistent approach would clearly require sensitivity and care.

Table 4.4
Early neonatal deaths born at less than 22 weeks' gestation by SHA; England: 2008

	Number	Percentage (%)
England	248	14.6
East Midlands	19	11.9
East of England	31	19.3
London	29	10.4
North East	3	4.8
North West	48	19.4
South Central	15	12.1
South East Coast	14	13.0
South West	12	9.4
West Midlands	48	18.6
Yorkshire and the Humber	29	17.3

Source: CMACE

Table 4.5 shows where mothers booked and the stillbirth occurred according to the SHA of residence. Overall, 89% of stillbirths booked and died within the SHA they were resident in, 1% booked outside the SHA of residence but were transferred back into the SHA before the stillbirth, 1% transferred outside the SHA they were resident in and 2% were cared for outside the SHA they were resident in.

Table 4.5
Location of booking and death for stillbirths according to maternal residence; England: 2008

SHA of residence	Proportions (%)					
	Booked and died	Transferred into the SHA	Transferred out of the SHA	Cared for outside the SHA	Place of booking or death is other[a]	Place of booking or death is not known
East Midlands	89.0	-	1.6	5.9	3.1	0.4
East of England	83.8	1.0	1.0	6.5	6.5	1.3
London	88.5	0.6	0.3	0.4	4.3	5.9
North East	96.6	-	0.6	0.6	2.2	-
North West	93.4	0.9	0.2	0.9	3.3	1.3
South Central	83.5	1.3	2.1	6.8	3.8	2.5
South East Coast	77.4	2.9	0.8	3.3	5.3	10.3
South West	88.3	1.5	-	-	9.4	0.8
West Midlands	90.0	0.3	0.8	1.0	5.3	2.8
Yorkshire and the Humber	93.4	0.3	1.1	0.6	2.5	2.2

[a]Place of booking and/or death other includes unbooked, home, in transit, a non maternity hospital and outside the UK

Source: CMACE

Table 4.6 shows where mothers booked and the neonatal death occurred according to the SHA of residence. Overall, 79% of neonatal deaths booked and died within the SHA they were resident in, 4% transferred into the SHA they were resident in before the death, 1% transferred outside the SHA they were resident in and 2% were cared for outside SHA they were resident in. Table 4.5 and 4.6 are intended to provide information on where care is delivered in SHAs.

Table 4.6
Location of booking and death for all neonatal deaths according to maternal residence; England: 2008

SHA of residence	Proportions (%)					
	Booked and died	Transferred into the SHA	Transferred out of the SHA	Cared for outside the SHA	Place of booking or death is other[a]	Place of booking or death is not known
East Midlands	78.4	7.4	1.5	6.9	3.9	2.0
East of England	77.3	5.8	1.4	4.3	7.7	3.4
London	74.6	2.5	1.1	0.6	9.9	11.3
North East	94.7	-	1.1	-	4.3	-
North West	83.2	3.2	0.6	0.6	7.6	4.7
South Central	75.2	4.6	-	4.6	6.5	9.2
South East Coast	69.3	8.0	-	3.6	9.5	9.5
South West	84.4	5.6	-	0.6	6.9	2.5
West Midlands	80.2	3.5	-	0.6	11.5	4.2
Yorkshire and the Humber	81.7	3.5	-	1.3	7.0	6.5

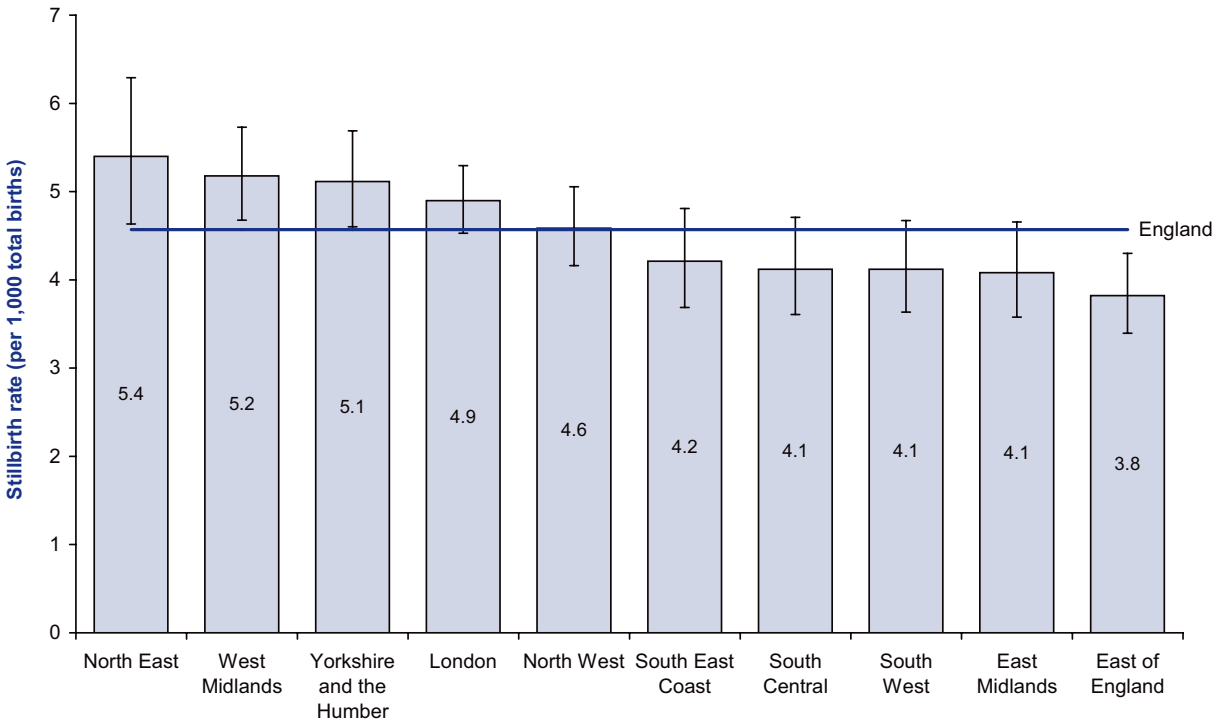
[a]Place of booking and/or death other includes unbooked, home, in transit, a non maternity hospital and outside the UK

Source: CMACE

The adjusted stillbirth rates and associated 95% confidence intervals for each SHA are shown in Figure 4.1. East of England has the lowest stillbirth rate of 3.8 per 1,000 total births and North East has the highest stillbirth rate of 5.4 per 1,000 total births. North East, West Midlands and Yorkshire and the Humber's stillbirth rates are all statistically significantly higher than the rate for England, and East of England's stillbirth rate is statistically significantly lower than the rate for England.

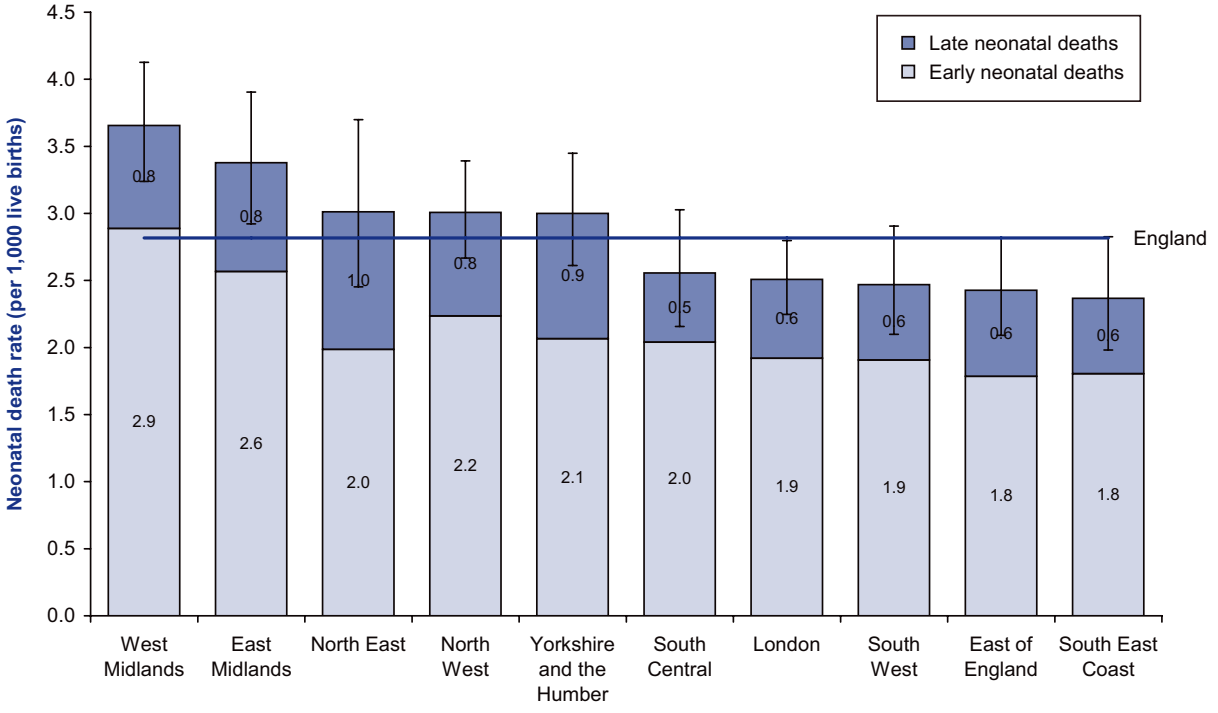
The adjusted neonatal mortality rates and associated 95% confidence intervals for each SHA are shown in Figure 4.2. South East Coast has the lowest neonatal mortality rate of 2.4 per 1,000 live births and West Midlands has the highest neonatal mortality rate of 3.7 per 1,000 live births. West Midlands and East Midlands' neonatal mortality rates are statistically significantly higher than the rate for England, and London and East of England's neonatal mortality rates are statistically significantly lower than the rate for England.

Figure 4.1
Adjusted[a] stillbirth rates by SHA and associated 95% confidence intervals; England: 2008



[a]Adjusted by removing terminations of pregnancy and babies born at less than 22 weeks' gestation

Figure 4.2
Adjusted[a] neonatal mortality rates by SHA and associated 95% confidence intervals; England: 2008



[a]Adjusted by removing terminations of pregnancy and babies born at less than 22 weeks' gestation

4.2. Primary Care Trusts (England)

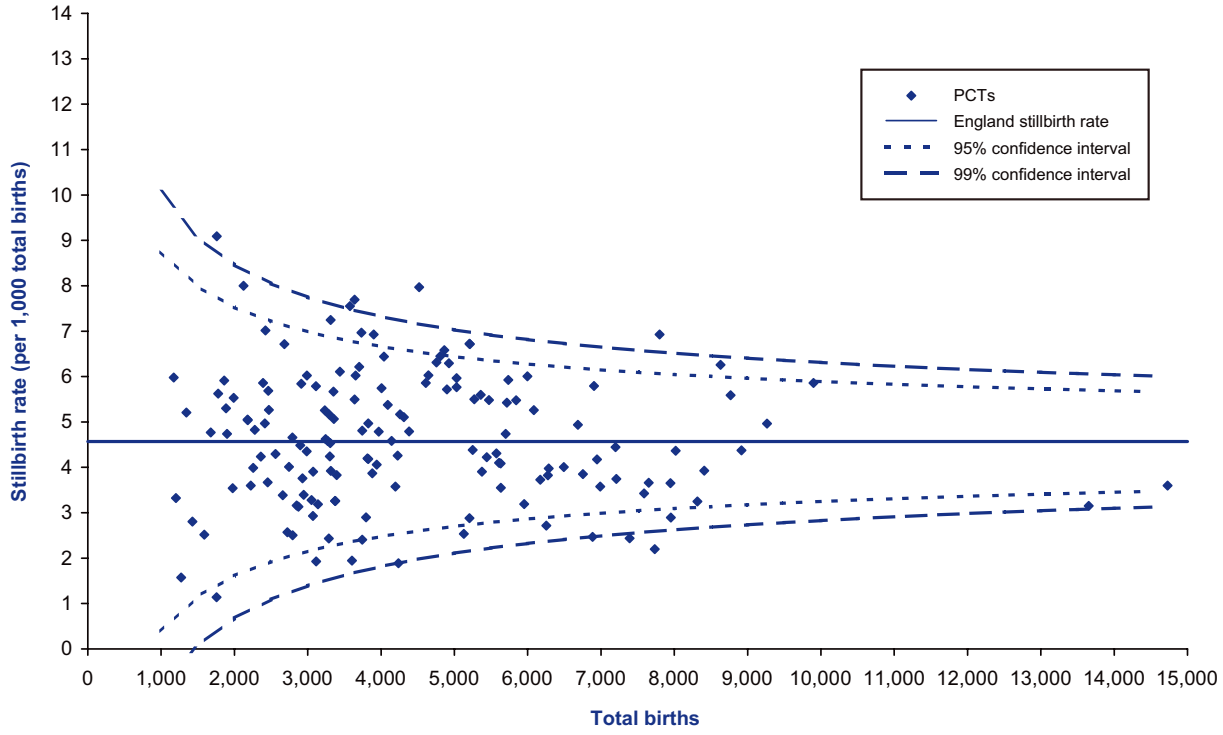
Primary Care Trusts (PCTs) decide what health services a local community needs and they are responsible for ensuring that they are provided. They must ensure that there are enough services for people within their local area and that the services are accessible. PCTs make decisions about the type of services that hospitals provide and are responsible for making sure that the quality of services is high enough. They also control funding for hospitals. There are 152 PCTs in England.

Figures 4.3-4.5 show the adjusted stillbirth, perinatal and neonatal mortality rates for each PCT for 2008. Deaths are assigned to a PCT using the mother's postcode of residence. Variations in mortality rates between PCTs may be a chance finding or reflect socio-demographic differences of the local maternity populations, and should not necessarily be used as a measure of the quality of maternity care provided. By chance alone, 2.5% of PCTs may be expected to be above and 2.5% of PCTs below the 95% confidence limit. This may result in a large number of PCTs being flagged as a possible problem, so in this report a 99% confidence limit is also presented. PCTs outside this range may need to consider their population risk factors and quality of care especially if this has occurred for more than one year.

In 2008, the average size of a PCT (after removing terminations of pregnancy and babies born at less than 22 weeks' gestation) in England was 4,445 total births per year. For PCTs with total births 500 either side of the average, stillbirth rates ranged from 1.9 to 8.0 per 1,000 total births and the neonatal death rates range from 1.6 to 4.9 per 1,000 live births. When looking at the stillbirth rates for all PCTs the highest rate is 8.0 times larger [95% CI: 1.8, 34.6] than the lowest and for neonatal mortality rates the highest rate is 14.4 times larger [1.9, 107.4] than the lowest. As can be seen by the confidence intervals around these estimates, these findings are likely to have occurred by chance. Other possible explanations for the variations seen in the mortality rates include reporting differences, variation in the risk factor profiles of women and babies cared for by PCTs and the socio-demographic characteristics of the local maternity population. For example, in a prognostic model to predict differences in perinatal and infant mortality rates between PCTs in England, it was found that high rates of birth associated with black ethnicity and higher deprivation significantly increased the perinatal mortality rate (PMR), while high proportions of mothers over the age of 35 significantly lowered the PMR. High birth rates associated with Pakistani ethnicity slightly, though still significantly, increased the PMR.[15]

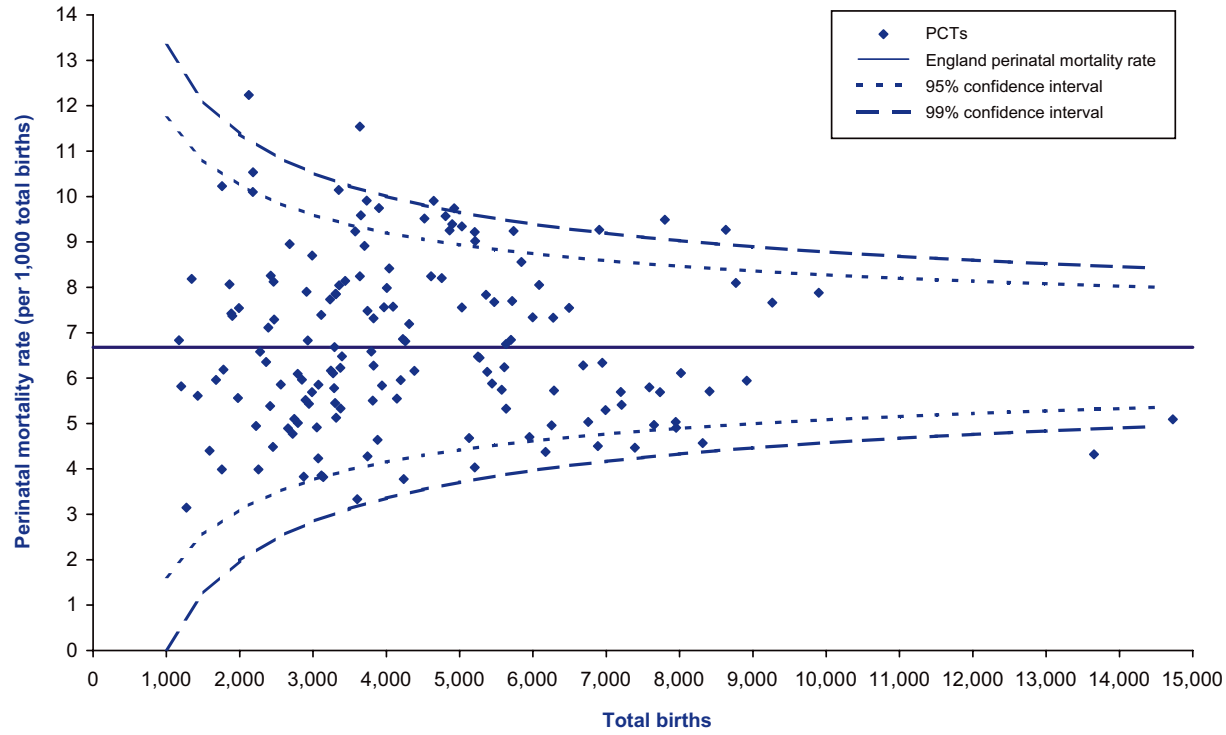
PCT specific reports can be obtained from CMACE. These reports include crude and adjusted mortality rates and comparisons to region and national mortality rates, information about transfers, maternal characteristics, obstetric factors, post mortem uptake, cause of death, comparisons to other PCTs, mortality rates of the Providers within the PCT and comparisons to all other Providers.

Figure 4.3
Adjusted[a] PCT stillbirth rates compared to the England stillbirth rate and associated 95% and 99% confidence intervals: England, 2008



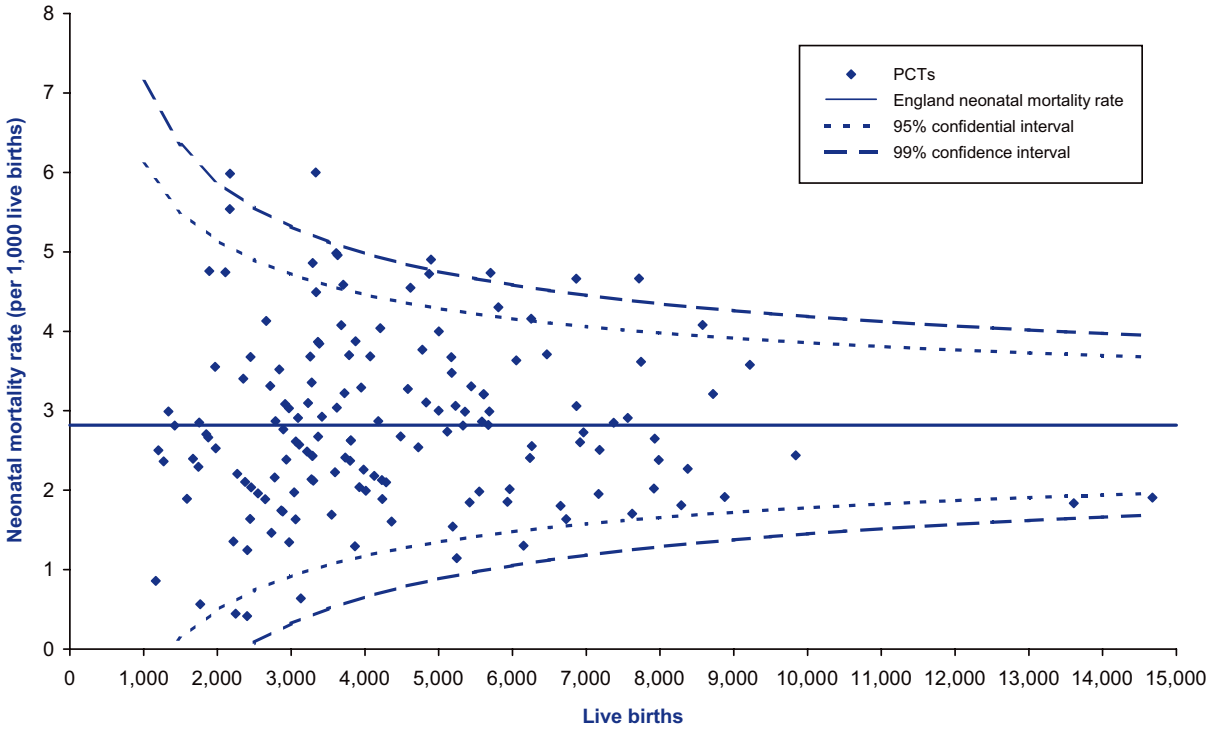
[a]Adjusted by removing terminations of pregnancy and babies born at less than 22 weeks' gestation

Figure 4.4
Adjusted[a] PCT perinatal mortality rates compared to the England perinatal mortality rate and associated 95% and 99% confidence intervals: England, 2008



[a]Adjusted by removing terminations of pregnancy and babies born at less than 22 weeks' gestation

Figure 4.5
Adjusted[a] PCT neonatal mortality rates compared to the England neonatal mortality rate and associated 95% and 99% confidence intervals: England, 2008



[a]Adjusted by removing terminations of pregnancy and babies born at less than 22 weeks' gestation

4.3: Neonatal Networks (England)

There are 24 Neonatal Networks in England. They were developed as a result of recommendations from the Department of Health's 'National Strategy for Improvement' published in 2003. Networks aim to provide families with access to appropriate care, resources and skilled staff as close to home as possible, whilst reducing unnecessary transfers to units further away from home.

To achieve this, within each Network different hospitals provide a mix and range of levels of care as agreed by that Network. Except for one Network in England, at least one hospital in each Network provides neonatal intensive care (level 3) facilities, offering a wide range of specialist expertise and experience for the sickest infants. The level 3 neonatal intensive care unit(s) work closely with their network special care (level 1) and neonatal (level 2) units. The exceptional Network is geographically very closely aligned to two other Networks and has chosen to commission intensive care (level 3) services from these two adjoining Networks.

Following the recently published Department of Health's Toolkit for High-Quality Neonatal Services[16] these categories will change to special care units (level 1), local neonatal units (level 2) units and neonatal intensive care units (level 3) according to network designation.

Network specific reports can be purchased from CMACE. These reports include crude and adjusted mortality rates and comparisons to national mortality rates, information about transfers, maternal characteristics, obstetric factors, post mortem uptake, cause of death, comparisons to other Networks, mortality rates of the Providers within the Network and comparisons to all other Providers.

Table 4.7 shows the adjusted stillbirth, perinatal and neonatal mortality rates for each Network for 2006-2008. Data used to create the rates are included in Appendix E.

In past years, adjusted mortality rates have been calculated by excluding births at very high risk of death. Unlike terminations of pregnancy and babies born at less than 22 weeks' gestation which are still removed, infants with some factors have been left in the analysis in this report. These factors are shown in Tables 4.8 and 4.9 and the frequency of these occurring in the 2008 population is shown for information. This is due to concerns over the completeness of the data used for adjusting, for example congenital anomalies were excluded before analysis in previous reports despite concerns that not all of these deaths were due to lethal anomalies. As no data was available for anomalies in surviving babies these analyses will now be presented only in locality based reports from 2009. Similarly there will have been some infants weighing under 500g at birth who have survived and therefore remained in the denominator. Further work is planned to obtain more data on surviving infants to improve this adjustment methodology.

Table 4.7
Adjusted stillbirth, perinatal and neonatal mortality rates by Neonatal Network; England: 2006-2008

Neonatal Network	Stillbirth rate[a,b]			Perinatal mortality rate[a,b]			Neonatal mortality rate[a,c]		
	2006	2007	2008	2006	2007	2008	2006	2007	2008
England	4.8	4.6	4.6	7.1	6.8	6.7	3.1	2.9	2.8
Beds and Herts	4.2	4.3	3.9	5.5	6.3	5.8	1.3	2.1	2.1
Central	5.2	4.2	4.8	7.3	6.7	7.2	3.0	3.3	2.9
Central South Coast	4.0	3.5	3.7	5.9	5.2	5.6	2.3	2.0	2.3
Cheshire and Merseyside	4.8	4.5	4.1	7.5	6.4	6.5	3.3	2.6	3.2
Essex	3.9	3.5	3.7	5.3	4.9	5.2	1.7	1.4	1.7
Greater Manchester	4.6	5.2	4.8	7.3	7.6	7.1	3.6	3.1	3.1
Kent and Medway	4.4	4.5	4.9	5.8	6.4	7.0	1.7	2.3	2.9
Lancashire and South Cumbria	4.9	4.7	4.9	6.2	6.4	6.7	1.8	2.3	2.3
Norfolk, Suffolk and Cambridgeshire	3.8	3.8	3.5	5.9	6.1	5.3	2.8	2.9	2.5
North Central London	4.6	3.4	3.4	6.6	5.3	5.3	2.4	2.3	2.0
North East London and North Middlesex	5.8	5.9	5.1	8.2	8.1	6.6	3.3	3.0	1.9
North Trent	4.5	4.9	4.3	7.1	7.4	5.9	3.3	3.1	2.7
North West London	5.7	5.2	4.8	8.2	7.4	6.8	3.5	3.2	3.1
Northern	4.9	4.4	5.2	7.4	6.8	7.3	3.1	3.0	3.2
South Central North	4.4	4.8	4.3	6.7	6.9	6.5	2.8	2.6	2.7
South East London	5.7	6.7	5.7	8.6	9.6	8.6	4.0	4.3	3.8
South West London	5.1	3.7	4.7	7.6	5.6	6.0	2.9	2.1	1.4
South West Peninsula	4.0	4.6	4.5	6.0	6.3	6.2	2.4	2.2	2.2
Southern West Midlands	6.3	5.7	5.3	9.9	9.0	8.1	4.2	3.6	3.4
Staffordshire, Shropshire and Black Country	5.2	4.9	5.3	8.0	8.2	7.9	3.6	4.0	3.1
Surrey and Sussex	4.0	3.8	3.8	5.5	5.1	5.2	2.0	1.6	1.9
Trent	4.8	4.0	3.8	7.3	6.2	6.8	3.7	2.8	3.7
Western	3.9	3.7	4.0	6.2	5.2	5.9	3.1	2.3	2.4
Yorkshire	5.0	5.2	5.5	7.9	7.5	7.7	3.8	3.3	3.0

[a]Adjusted by removing terminations of pregnancy and babies born at less than 22 weeks' gestation
[b]Rate per 1,000 total births
[c]Rate per 1,000 live births

Source: CMACE

The number of infants with major congenital anomalies and babies born weighing less than 500g for stillbirths and neonatal deaths are shown in Table 4.8 and Table 4.9 respectively.

Table 4.8
Number of stillborn infants with major congenital anomaly as primary cause of death and <500g birth weight by Neonatal Network; England: 2006-2008

Network of death	n (%)		
	Major congenital anomaly as primary cause of death[a,b]	<500g birth weight[a]	Number of stillbirths after these exclusions
England	270 (8.8)	246 (8.0)	2,577 (83.9)
Beds and Herts	5 (6.4)	7 (9.0)	66 (84.6)
Central	12 (7.4)	13 (8.0)	138 (84.7)
Central South Coast	6 (5.2)	10 (8.6)	101 (87.1)
Cheshire and Merseyside	7 (5.6)	13 (10.4)	106 (84.8)
Essex	5 (6.7)	*	69 (92.0)
Greater Manchester	16 (8.6)	15 (8.0)	159 (85.0)
Kent and Medway	*	11 (11.0)	89 (89.0)
Lancashire and South Cumbria	7 (7.9)	-	82 (92.1)
Norfolk, Suffolk and Cambridgeshire	10 (9.6)	6 (5.8)	89 (85.6)
North Central London	9 (14.8)	*	50 (82.0)
North East London and North Middlesex	16 (8.7)	19 (10.4)	149 (81.4)
North Trent	4 (3.6)	8 (7.2)	99 (89.2)
North West London	11 (7.4)	8 (5.4)	130 (87.8)
Northern	19 (10.9)	13 (7.4)	144 (82.3)
South Central North	15 (11.7)	10 (7.8)	104 (81.3)
South East London	18 (11.5)	17 (10.9)	121 (77.6)
South West London	11 (11.5)	10 (10.4)	77 (80.2)
South West Peninsula	9 (11.3)	5 (6.3)	66 (82.5)
Southern West Midlands	27 (15.6)	18 (10.4)	129 (74.6)
Staffordshire, Shropshire and Black Country	21 (15.3)	13 (9.5)	107 (78.1)
Surrey and Sussex	7 (6.2)	6 (5.3)	100 (88.5)
Trent	5 (5.2)	10 (10.3)	83 (85.6)
Western	8 (6.1)	11 (8.4)	113 (86.3)
Yorkshire	21 (8.6)	20 (8.2)	206 (84.1)

[a]Some stillbirths are counted in more than one category
[b]CMACE's maternal and fetal classification. Please see the methodology for further details
* Suppression of low cell count

Source: CMACE

Table 4.9
Number of neonatal deaths with major congenital anomaly as primary cause of death and <500g birth weight by Neonatal Network; England: 2008

Network of death	n (%)		
	Major congenital anomaly as primary cause of death[a,b]	<500g birth weight[a]	Number of neonatal deaths after these exclusions
England	346 (19.1)	143 (7.9)	1,327 (73.3)
Beds and Herts	5 (11.9)	4 (9.5)	33 (78.6)
Central	14 (14.1)	10 (10.1)	75 (75.8)
Central South Coast	13 (18.6)	11 (15.7)	47 (67.1)
Cheshire and Merseyside	18 (18.8)	10 (10.4)	68 (70.8)
Essex	7 (20.0)	6 (17.1)	22 (62.9)
Greater Manchester	18 (15.0)	10 (8.3)	92 (76.7)
Kent and Medway	4 (6.8)	3 (5.1)	52 (88.1)
Lancashire and South Cumbria	5 (12.2)	*	34 (82.9)
Norfolk, Suffolk and Cambridgeshire	12 (16.4)	4 (5.5)	57 (78.1)
North Central London	8 (22.2)	6 (16.7)	22 (61.1)
North East London and North Middlesex	16 (23.2)	5 (7.2)	49 (71.0)
North Trent	13 (18.3)	5 (7.0)	54 (76.1)
North West London	24 (25.3)	3 (3.2)	69 (72.6)
Northern	26 (24.3)	5 (4.7)	76 (71.0)
South Central North	12 (15.0)	6 (7.5)	62 (77.5)
South East London	32 (31.4)	8 (7.8)	62 (60.8)
South West London	6 (21.4)	*	21 (75.0)
South West Peninsula	3 (7.7)	4 (10.3)	32 (82.1)
Southern West Midlands	28 (25.7)	5 (4.6)	77 (70.6)
Staffordshire, Shropshire and Black Country	13 (16.3)	6 (7.5)	61 (76.3)
Surrey and Sussex	*	7 (12.7)	47 (85.5)
Trent	20 (21.5)	11 (11.8)	63 (67.7)
Western	15 (19.0)	5 (6.3)	59 (74.7)
Yorkshire	33 (25.0)	6 (4.5)	93 (70.5)

[a]Some neonatal deaths are counted in more than one category
[b]CMACE's neonatal classification. Please see the methodology for further details
* Suppression of low cell count

Source: CMACE

Table 4.10 details where mothers booked according to the Network where the stillbirth occurred. Overall, 90% of stillbirths booked and died within the same Network, 2% transferred into another Network during pregnancy and 2% were unbooked before dying within a Network.

Table 4.11 details where mothers booked and babies were born according to the Network in which the neonatal death occurred. Overall, 80% of neonatal deaths booked, delivered and died within the same Network, 5% transferred into another Network during pregnancy, 4% transferred into another Network after birth and 2% were unbooked before dying within a Network.

There is a wide variation of mothers/babies transferring into the Networks; this may impact the stillbirth and neonatal mortality rates.

Table 4.10
Network of booking and death for all stillbirths; England: 2008

Network of death	Proportions (%)				
	Booked, delivered and died	Transferred into the network during pregnancy	Unbooked and died in the network	Booking other[a]	Booking not known
Beds and Herts	91.8	2.4	2.4	2.4	1.2
Central	92.4	3.3	1.6	0.5	2.2
Central South Coast	80.0	4.8	0.8	11.2	3.2
Cheshire and Merseyside	93.7	2.1	0.7	3.5	-
Essex	86.7	4.8	2.4	4.8	1.2
Greater Manchester	93.8	1.4	1.9	1.4	1.4
Kent and Medway	75.4	3.5	1.8	6.1	13.2
Lancashire and South Cumbria	89.6	2.1	1.0	2.1	5.2
Norfolk, Suffolk and Cambridgeshire	92.2	1.7	2.6	3.5	-
North Central London	90.0	2.5	1.3	3.8	2.5
North East London and North Middlesex	84.5	3.1	2.1	1.5	8.8
North Trent	93.5	2.4	2.4	0.8	0.8
North West London	81.5	2.2	2.8	4.5	9.0
Northern	97.4	0.5	1.6	0.5	-
South Central North	95.9	1.4	-	1.4	1.4
South East London	80.3	6.4	5.9	0.5	6.9
South West London	96.3	-	2.8	0.9	-
South West Peninsula	92.8	-	4.8	2.4	-
Southern West Midlands	91.1	2.6	2.6	1.6	2.1
Staffordshire, Shropshire and Black Country	95.0	-	1.4	0.7	2.8
Surrey and Sussex	90.2	1.6	-	1.6	6.6
Trent	91.7	3.7	3.7	0.9	-
Western	86.5	1.4	1.4	10.1	0.7
Yorkshire	93.4	1.2	1.6	1.2	2.7

[a]Other includes home, in transit, a hospital without neonatal services and outside of England

Source: CMACE

Table 4.11
Network of booking, delivery and death for all neonatal deaths; England: 2008

Network of death	Proportions (%)					
	Booked, delivered and died	Transferred into the network during pregnancy	Transferred into the network after birth	Unbooked and died in the network	Booking and/or delivery other[a]	Booking and/or delivery not known
Beds and Herts	85.5	7.3	1.8	1.8	1.8	1.8
Central	85.1	2.5	2.5	1.7	1.7	6.6
Central South Coast	84.3	2.4	-	2.4	2.4	8.4
Cheshire and Merseyside	77.6	9.6	4.8	0.8	4.8	2.4
Essex	78.0	4.9	2.4	7.3	4.9	2.4
Greater Manchester	78.8	4.5	4.5	2.3	3.0	6.8
Kent and Medway	65.6	8.2	8.2	-	3.3	14.8
Lancashire and South Cumbria	78.4	2.0	2.0	3.9	5.9	7.8
Norfolk, Suffolk and Cambridgeshire	83.7	7.0	5.8	-	3.5	-
North Central London	65.9	4.9	4.9	9.8	7.3	7.3
North East London and North Middlesex	72.2	13.9	4.2	1.4	1.4	6.9
North Trent	74.7	8.4	8.4	3.6	1.2	3.6
North West London	70.0	7.0	11.0	3.0	4.0	5.0
Northern	90.9	1.8	3.6	0.9	0.9	1.8
South Central North	86.7	1.1	-	1.1	4.4	6.7
South East London	57.3	6.8	6.8	0.9	5.1	23.1
South West London	80.0	11.4	2.9	2.9	-	2.9
South West Peninsula	77.8	6.7	-	2.2	13.3	-
Southern West Midlands	87.0	3.6	3.6	2.9	0.7	2.2
Staffordshire, Shropshire and Black Country	90.3	4.3	2.2	1.1	1.1	1.1
Surrey and Sussex	73.8	1.5	7.7	9.2	4.6	3.1
Trent	83.8	3.0	1.0	2.0	8.1	2.0
Western	85.2	4.5	3.4	1.1	3.4	2.3
Yorkshire	84.3	2.6	1.3	2.6	2.0	7.2

[a]Other includes home, in transit, a hospital without neonatal services and outside of England

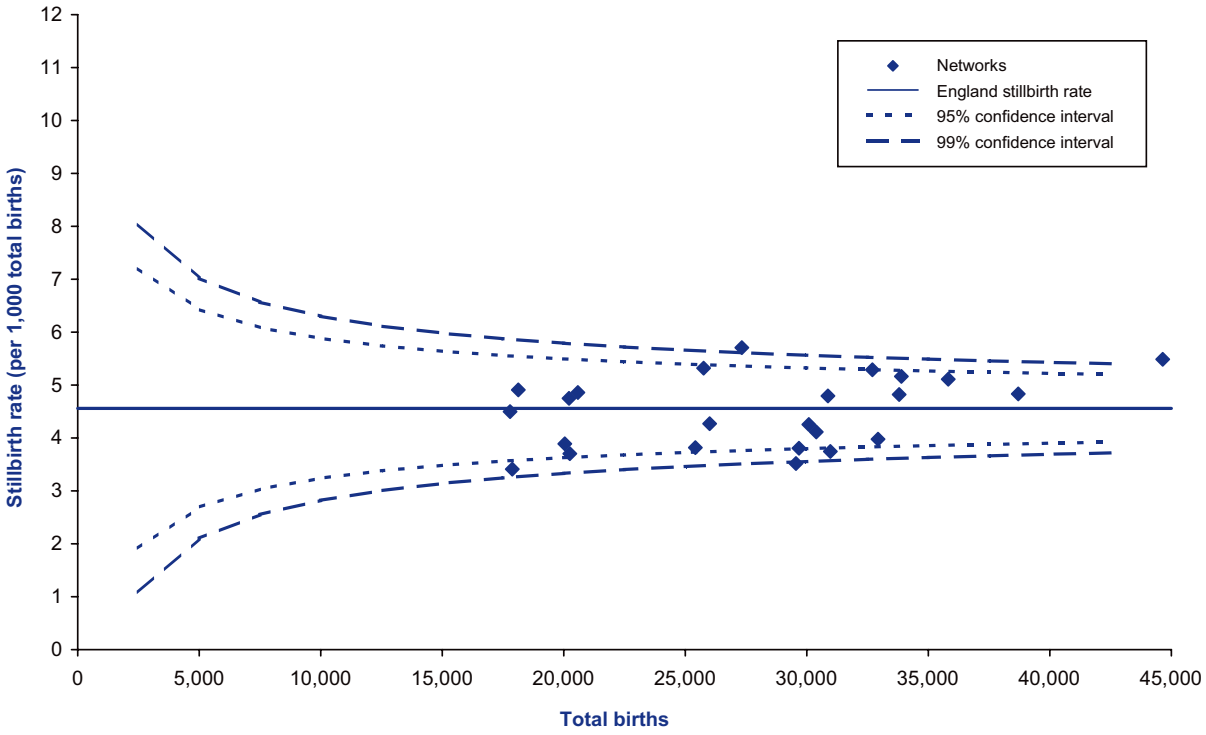
Source: CMACE

For neonatal deaths, North East London and North Middlesex Perinatal Network and South West London Neonatal Network have the largest proportion of transfers into the Network during pregnancy and North West London Perinatal Network has the largest proportion of transfers into the Network after birth. All the babies transferring into these Networks come in from the surrounding Networks and into the larger units within the receiving Network.

Differences in the risk factor profiles of women and babies cared for by Networks and the socio-demographic characteristics of the local maternity population may be reasons for the variations seen in the mortality rates. Chance findings are once again an important consideration as by definition 2.5% of Networks will be above the 95% confidence limit and 2.5% of Networks will be below by chance alone.

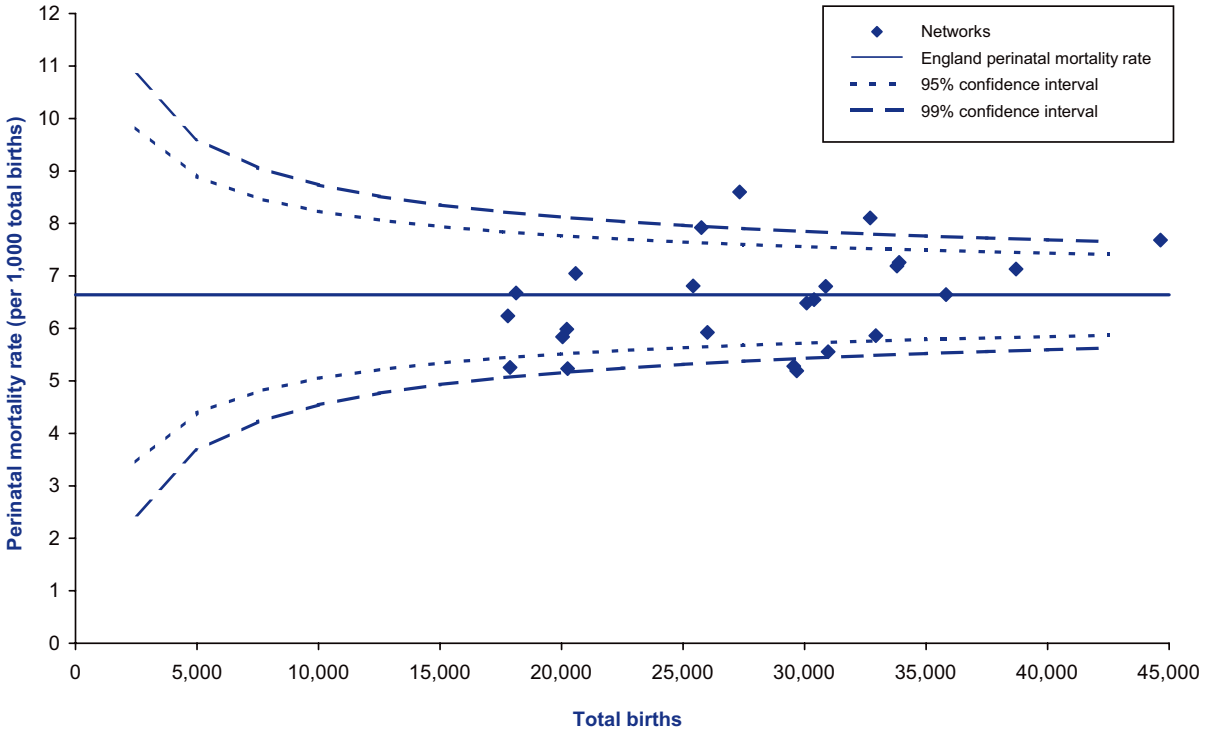
Figure 4.6

Adjusted[a] Network stillbirth rates compared to the England stillbirth rate and associated 95% and 99% confidence intervals: England, 2008



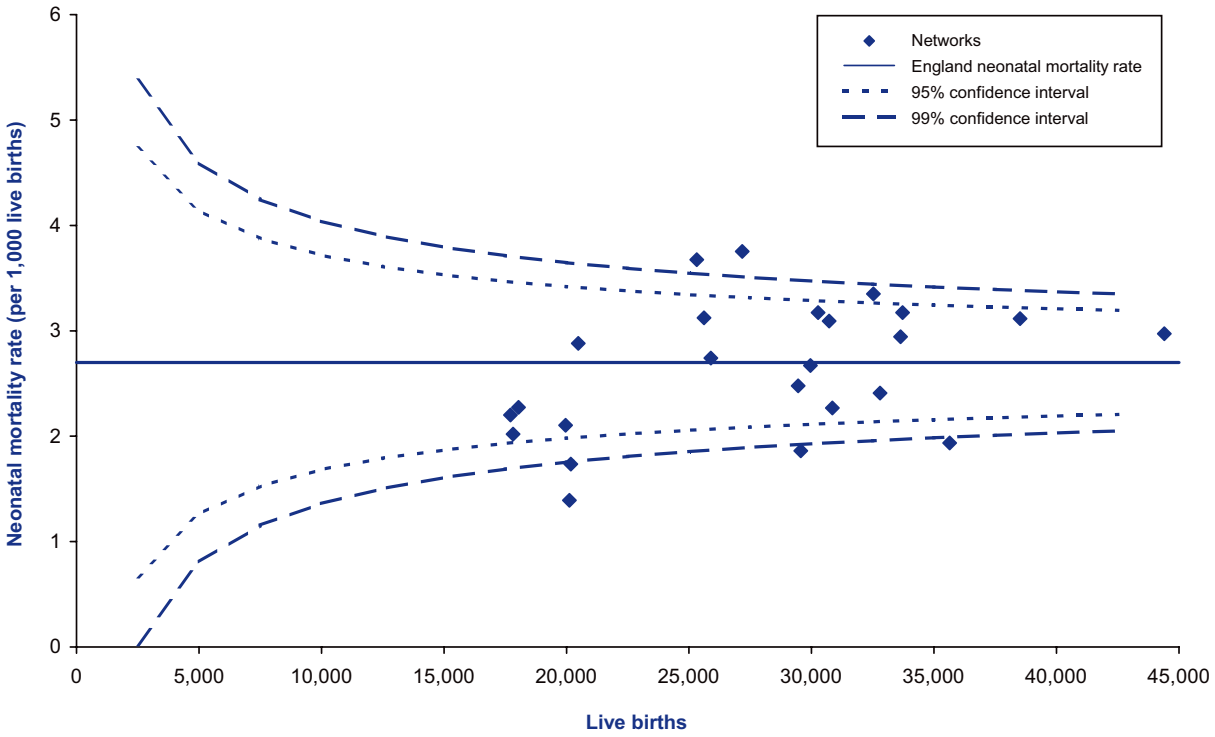
[a]Adjusted by removing terminations of pregnancy and babies born at less than 22 weeks' gestation

Figure 4.7
Adjusted[a] Network perinatal mortality rates compared to the England perinatal mortality rate and associated 95% and 99% confidence intervals: England, 2008



[a]Adjusted by removing terminations of pregnancy and babies born at less than 22 weeks' gestation

Figure 4.8
Adjusted[a] Network neonatal mortality rate compared to the England neonatal mortality rate and associated 95% and 99% confidence intervals: England, 2008



[a]Adjusted by removing terminations of pregnancy and babies born at less than 22 weeks' gestation

4.4: Providers including Hospital Trusts

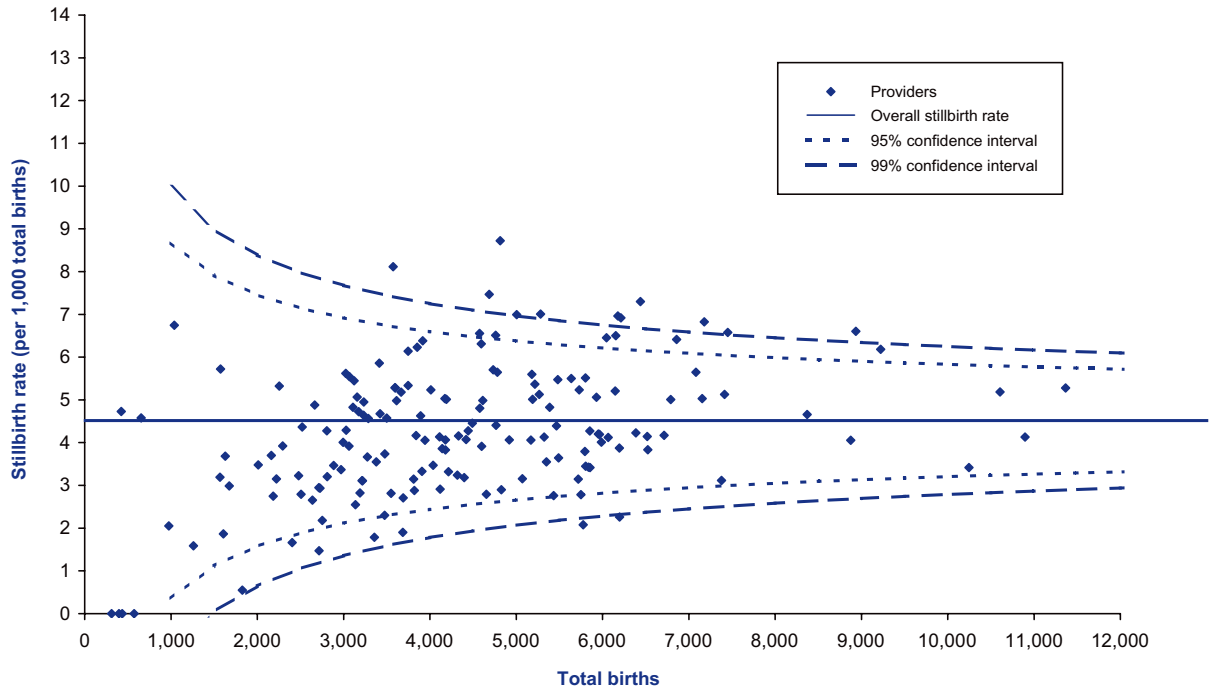
Figures 4.9-4.11 shows the adjusted stillbirth, perinatal and neonatal mortality rates for each Provider for 2008.

In 2008, the average size of a Provider in England, Wales, Northern Ireland and the Crown Dependencies was 4,445 total births per year. For Providers with total births 500 either side of the average, stillbirth rates ranged from 2.8 to 8.7 per 1,000 total births and the neonatal death rates range from 0.5 to 5.9 per 1,000 live births.

Differences in the risk factor profiles of women and babies cared for by Providers and the socio-demographic characteristics of the local maternity population may be reasons for the variations seen in the mortality rates. Chance is once again likely to be an important explanation as by definition 2.5% of Providers will be above the 95% confidence limit and 2.5% of Providers will be below by chance alone. This may result in a large number of Providers being flagged as a possible problem so in this report a 99% confidence limit is also presented. Providers outside this range may need to consider their population risk factors and quality of care especially if this occurs for more than one year. As a previous study has shown that level 3 units have higher rates of neonatal death,[13] Figure 4.11 shows the adjusted mortality rates for level 1 and 2 units, whilst level 3 units are shown separately in Figure 4.12.

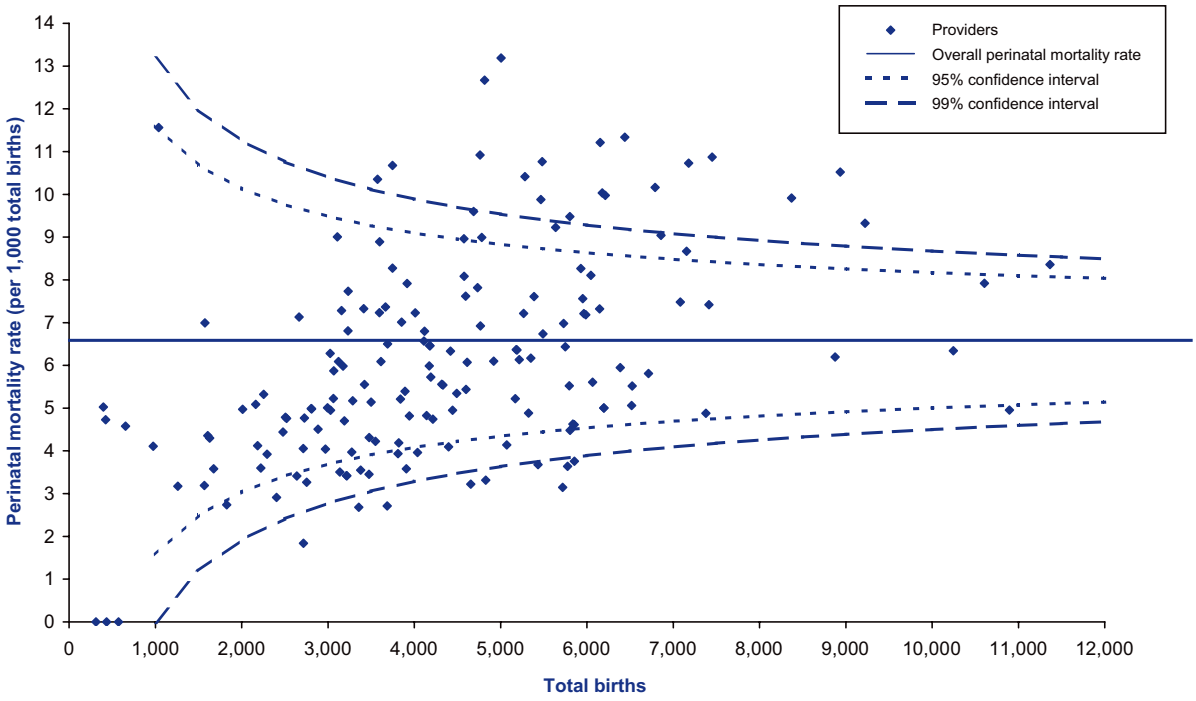
Provider specific reports are given to every provider of maternity services in England, Wales, Northern Ireland and the Crown Dependencies. These reports show crude mortality rates as well as the adjusted rates, and information about transfers, maternal characteristics, obstetric factors, post mortem uptake, cause of death and comparisons to other Providers.

Figure 4.9
Adjusted[a] Provider stillbirth rates compared to the overall stillbirth rate and associated 95% and 99% confidence intervals: England, Wales, Northern Ireland and the Crown Dependencies, 2008



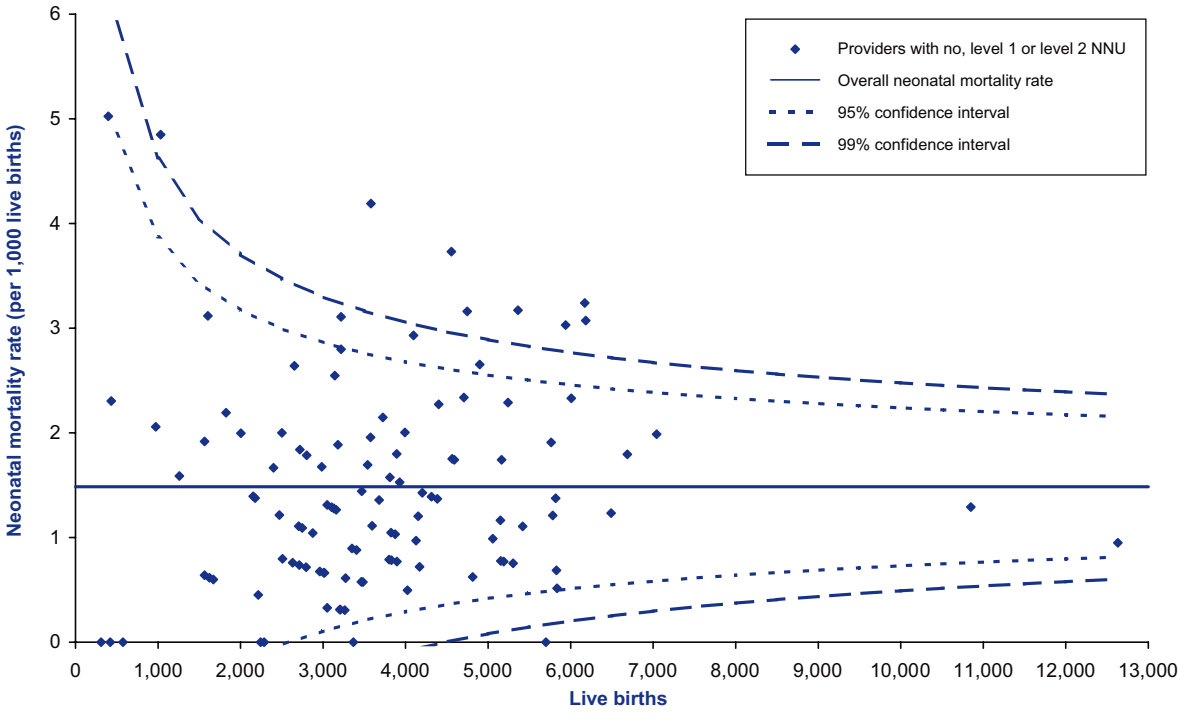
[a]Adjusted by removing terminations of pregnancy and babies born at less than 22 weeks' gestation

Figure 4.10
Adjusted[a] Provider perinatal mortality rates compared to the overall perinatal mortality rate and associated 95% and 99% confidence intervals: England, Wales, Northern Ireland and the Crown Dependencies, 2008



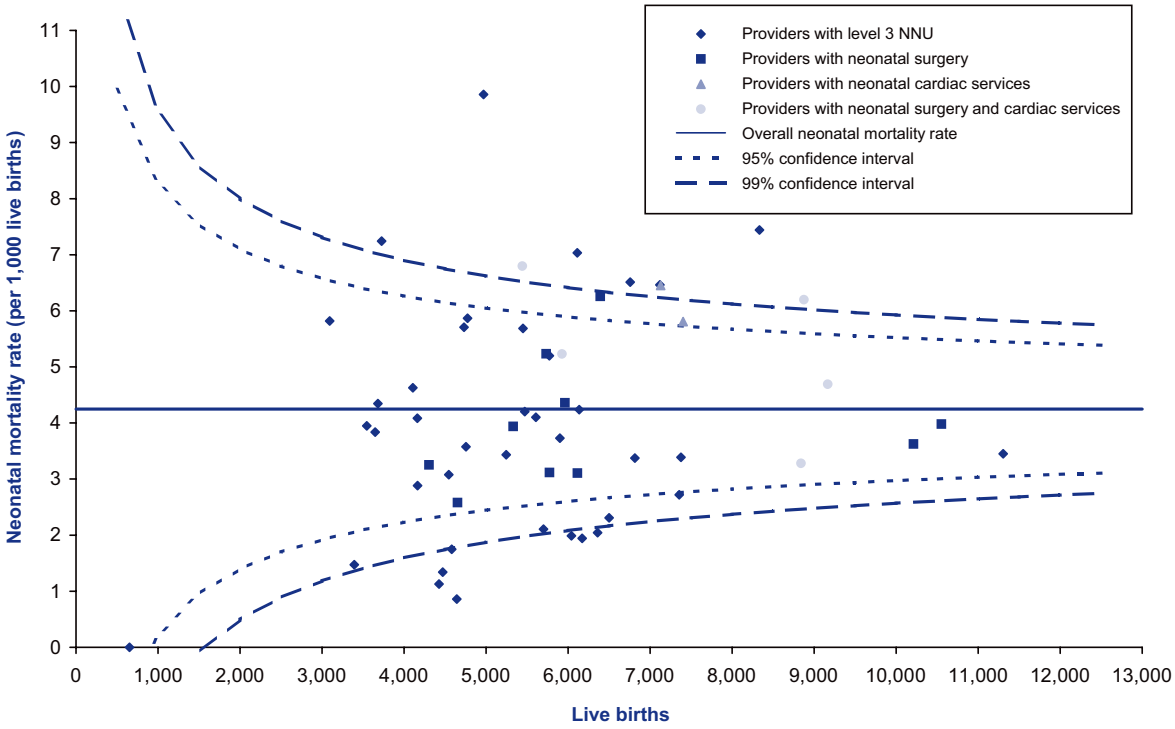
[a]Adjusted by removing terminations of pregnancy and babies born at less than 22 weeks' gestation

Figure 4.11
Adjusted[a] level 1 and level 2 Provider neonatal mortality rates compared to the overall level 1 and level 2 neonatal mortality rate and associated 95% and 99% confidence intervals: England, Wales, Northern Ireland and the Crown Dependencies, 2008



[a]Adjusted by removing terminations of pregnancy and babies born at less than 22 weeks' gestation

Figure 4.12
Adjusted[a] level 3 Provider neonatal mortality rates compared to the overall level 3 neonatal mortality rate and associated 95% and 99% confidence intervals: England, Wales, Northern Ireland and the Crown Dependencies, 2008



[a]Adjusted by removing terminations of pregnancy and babies born at less than 22 weeks' gestation

It is not intended that the results of these reports are considered as demonstrating poor performance in any specific instance but rather that they are taken as suggesting that further exploration is needed at a local level. The spotlights in Appendix F therefore demonstrate two different approaches to local review. The spotlights are included to show how two Trusts have responded to the report. They have been written by the NHS organisations involved and as such remain the views of the spotlight author and not that of CMACE or its advisors. They are included to demonstrate how Trusts might respond, but are not intended to demonstrate ideal responses. It is clear that in different settings there are likely to be different explanations for results outside the expected range.

Chapter 5 Socio-demographic and clinical factors

This chapter gives a summary of the socio-demographic characteristics of the mothers, the clinical characteristics of the mothers and the characteristics of the babies. Where possible the data from the general maternity population are shown as a comparator.

5.1 Socio-demographic characteristics of the mothers

Table 5.1 shows the socio-demographic characteristics of the mothers that have stillbirths and neonatal deaths compared to the general maternity population.

The distribution of maternal age among the mothers having stillbirths and neonatal deaths is statistically significantly different to the general maternity population. Mothers having stillbirths and neonatal deaths are more likely to be younger (<25 years old) and older (40+ years old). The youngest (<20 years old) mothers are 1.3 [95% CI: 1.1, 1.5] times more likely to have a stillbirth or a neonatal death than mothers of 25-29. The older (40+ years old) mothers are 1.8 [1.5, 2.1] and 1.3 [1.0, 1.6] times more likely to have a stillbirth or neonatal death respectively.

When comparing mothers having stillbirths and neonatal deaths to the general maternity population the distribution of deprivation is also statistically significantly different. The mothers in the most deprived areas of England are much more likely to have a stillbirth or neonatal death compared to the mothers from the least deprived areas. They are 1.7 [95% CI: 1.5, 1.9] times more likely to have a stillbirth and 2.1 [1.8, 2.5] times more likely to have a neonatal death.

Fifty-seven percent of mothers who have stillbirths are in employment at the time of booking as are 55% of mothers who have neonatal deaths. Maternal employment status for the general maternity population is not currently published, so the figures cannot be compared and rates cannot be calculated.

Mothers having stillbirths and neonatal deaths have a statistically significantly different ethnic distribution to the general maternity population. Mothers from ethnic minority groups are more likely to have stillbirths and neonatal deaths. Mothers of black ethnic origin are 2.3 [95% CI: 2.1, 2.6] times more likely to have a stillbirth and 2.3 [2.0, 2.7] times more likely to have a neonatal death than mothers of white ethnic origin. Similarly, mothers of Asian ethnic origin are 1.8 [1.6, 1.9] times more likely to have a stillbirth and 1.7 [1.5, 1.9] times more likely to have a neonatal death than mothers of white ethnic origin. Apparent racial differences may reflect confounding variables and further examination of the importance of race, age, employment status and deprivation are planned in future reports.

Table 5.1
Socio-demographic characteristics of the mothers; England, Wales, Northern Ireland and the Crown Dependencies: 2008

	General maternity population	Stillbirths[a]		Neonatal deaths[a]	
	%	Number (%)[b]	Rate [95% CI][c]	Number (%)[b]	Rate [95% CI][c]
Maternal age					
<20	6.3	257 (7.1)	5.6 [4.9, 6.3]	171 (7.9)	3.7 [3.2, 4.3]
20-24	19.2	733 (20.3)	5.2 [4.9, 5.6]	458 (21)	3.3 [3.0, 3.6]
25-29	27.3	867 (24.1)	4.4 [4.1, 4.7]	584 (26.8)	2.9 [2.7, 3.2]
30-34	27.2	903 (25.1)	4.6 [4.3, 4.9]	520 (23.9)	2.6 [2.4, 2.9]
35-39	16.3	631 (17.5)	5.3 [4.9, 5.7]	343 (15.7)	2.9 [2.6, 3.2]
40+	3.7	211 (5.9)	7.8 [6.8, 9.0]	102 (4.7)	3.8 [3.1, 4.6]
Not known	..	86	..	111	..
Deprivation (England)					
1 (least deprived)	15.7	404 (12.0)	3.9 [3.5, 4.3]	196 (10.1)	1.9 [1.6, 2.2]
2	16.3	419 (12.5)	3.9 [3.5, 4.2]	266 (13.7)	2.4 [2.2, 2.8]
3	18.3	570 (17.0)	4.7 [4.3, 5.1]	302 (15.6)	2.5 [2.2, 2.8]
4	22.0	773 (23.0)	5.3 [4.9, 5.7]	448 (23.1)	3.1 [2.8, 3.4]
5 (most deprived)	27.6	1,194 (35.5)	6.5 [6.1, 6.9]	728 (37.5)	4.0 [3.7, 4.3]
Not known	..	27	..	25	..
Employment status					
Employed		1,969 (57.1)		1,106 (55.4)	
Not employed		1,479 (42.9)		892 (44.6)	
Not known		240		291	
Ethnicity (England)					
White	79.5	2,239 (68.2)	4.2 [4.1, 4.4]	1,290 (69.6)	2.4 [2.3, 2.6]
Black	5.5	362 (11.0)	9.9 [8.9, 10.9]	210 (11.3)	5.7 [5.0, 6.6]
Asian	10.1	498 (15.2)	7.4 [6.8, 8.1]	273 (14.7)	4.1 [3.6, 4.6]
Chinese	0.6	18 (0.5)	4.3 [2.7, 6.8]	6 (0.3)	1.4 [0.6, 3.2]
Mixed	1.5	54 (1.6)	5.4 [4.1, 7.1]	37 (2.0)	3.7 [2.7, 5.1]
Other	2.8	110 (3.4)	5.9 [4.9, 7.1]	37 (2.0)	2.0 [1.4, 2.8]
Not known	..	106	..	112	..

[a]Second and subsequent deaths from pregnancies with multiple losses are excluded
[b]Percentages are calculated after removing not knowns
[c]Rate per 1,000 maternities

Sources: CMACE, ONS, NI CHS, HES

5.2 Clinical characteristics

Table 5.2 shows the clinical characteristics of the mothers having stillbirths and neonatal deaths.

In 2008, 24% of mothers who have stillbirths and 23% of mothers whose babies go on to die in the neonatal period have a BMI of 30 or more (obese). Currently there are no data available for the general maternity population but for England, 24.9% of all women are obese in 2008.[17] Later in 2010, CMACE is publishing data on the prevalence of Obesity in Pregnancy in the UK. This data will be used next year to look at how it compares to the mothers of stillbirths and neonatal deaths.

Within the Department of Health's 'Maternity Matters' Report (April 2007),[18] it states that women should book for antenatal care by 10-12 weeks' gestation. Fifty-four percent of mothers who had a stillbirth and 57% of mothers whose babies go on to die in the neonatal period book before 12 weeks. This compares to the proportion (56%) seen in the National Perinatal Epidemiology Unit (NPEU) Recorded Delivery Report[19] looking at a sample of live births in England in 2006.

Twenty-two percent of mothers who have stillbirths and 23% of mothers whose babies go on to die in the neonatal period smoked during pregnancy. This compares to 15% of women in the general maternity population in England in 2007/08.[20]

There appears to be very little difference in the parity of mothers having stillbirths and neonatal deaths. Forty-nine percent of stillbirths and 48% of neonatal death are nulliparous.

The majority of stillbirths and neonatal deaths are vertex presentation at delivery (77% and 66% respectively). Twenty percent of stillbirths and 28% of neonatal deaths are breech presentation, of these 88% of stillbirths and 73% of neonatal deaths are delivered vaginally. It should be noted that presentation is unlikely to be causally related to death.

Table 5.2
Clinical characteristics of the mothers; England, Wales, Northern Ireland and the Crown Dependencies: 2008

	Stillbirths		Neonatal deaths	
	Number	Percentage (%)[a]	Number	Percentage (%)[a]
Body Mass Index (BMI)[b]				
<18.5	106	3.2	63	3.4
18.5-24.9	1,414	42.8	838	45.6
25-29.9	978	29.6	516	28.1
30-34.9	478	14.5	263	14.3
35+	328	9.9	159	8.6
Not booked	75	..	45	..
Not known	309	..	405	..
Booking for antenatal care[b]				
< 12^{+0} weeks	1,892	54.0	1,122	57.0
12^{+0} to 19^{+6} weeks	1,194	34.1	655	33.3
≥ 20^{+0} weeks	323	9.2	134	6.8
Unbooked	92	2.6	58	2.9
Not known	187	..	320	..
Smoking status[b]				
Never	2,325	66.8	1,329	65.4
Gave up prior to pregnancy	264	7.6	153	7.5
Gave up in pregnancy	139	4.0	91	4.5
Current	754	21.7	458	22.6
Not known	206	..	258	..
Parity[b]				
Nulliparous	1,745	48.9	1,023	47.8
Multiparous	1,821	51.1	1,115	52.2
Not known	122	..	151	..
Presentation at delivery				
Vertex	2,719	77.2	1,422	66.1
Breech	688	19.5	611	28.4
Vaginal	*602*	*17.1*	*447*	*20.8*
Caesarean section	*80*	*2.3*	*160*	*7.4*
Not known	*6*	*0.2*	*4*	*0.2*
Compound	81	2.3	69	3.2
Brow	3	0.1	12	0.6
Face	29	0.8	37	1.7
Not known	210	..	245	..

[a]Percentages are calculated after removing not knowns
[b]Second and subsequent deaths from pregnancies with multiple losses are excluded

Sources: CMACE

Mode of delivery of intrapartum stillbirths is not statistically significantly different from the mode of delivery of total births, however, the difference is statistically significant for neonatal deaths. The neonatal mortality rate for spontaneous vaginal deliveries is 3.2 per 1,000 live births compared to 0.7 per 1,000 live births for ventouse deliveries, 1.5 per 1,000 live births for forceps deliveries and 3.8 per 1,000 live births for caesarean sections.

Table 5.3
Mode of delivery of the babies; England, Wales, Northern Ireland and the Crown Dependencies: 2008

Mode of delivery	General maternity population	Intrapartum stillbirths		Neonatal deaths	
	%	Number (%)[a]	Rate [95% CI][b]	Number (%)[a]	Rate [95% CI][c]
Spontaneous vaginal	65.1	191 (65.6)	0.4 [0.4, 0.5]	1,470 (65.2)	3.2 [3.0, 3.4]
Ventouse	6.9	12 (4.1)	0.2 [0.1, 0.4]	32 (1.4)	0.7 [0.5, 0.9]
Forceps	5.8	16 (5.5)	0.4 [0.2, 0.6]	60 (2.7)	1.5 [1.1, 1.9]
Caesarean section	25.8	72 (24.7)	0.4 [0.3, 0.5]	691 (30.7)	3.8 [3.5, 4.1]
Not known	..	2	..	143	..

[a]Percentages are calculated after removing not knowns
[b]Rate per 1,000 total births
[c]Rate per 1,000 live births

Sources: CMACE, HES, NI CHS

Table 5.4 shows the numbers and proportions of previous pregnancy problems and pre-existing medical problems in mothers having stillbirths and neonatal deaths.

For mothers having stillbirths, 64% had previous pregnancies and 36% of those had a previous pregnancy problem. The most common problems the mothers have are preterm birth or mid trimester loss (6% of all multiparous mothers that had a stillbirth), pre-eclampsia (6%) and three or more miscarriages (4%). Twenty-seven percent of all mothers having stillbirths were recorded as having a pre-existing medical problem. Just over 4% had psychiatric disorders, 3% had diabetes and 2% had endocrine disorders.

For mothers whose babies go on to die in the neonatal period, 66% had previous pregnancies and 39% of those had a previous pregnancy problem. The most common problems the mothers have are preterm birth or mid trimester loss (12%), three or more miscarriages (5%) and a previous neonatal death (4%). Twenty-eight percent of all mothers whose infant(s) died in the neonatal period were recorded as having a pre-existing medical problem. The most common problems were the same as for mothers having stillbirths, psychiatric disorders (5%), endocrine disorders (2%) and diabetes (2%).

Table 5.4
Previous pregnancy problems and pre-existing medical problems among mothers who have stillbirths and neonatal deaths; England, Wales, Northern Ireland and the Crown Dependencies: 2008

	Number (%)	
	Stillbirths[a]	**Neonatal deaths[a]**
Previous pregnancy problems	819 (35.8)	559 (39.2)
Three or more miscarriage	97 (4.2)	76 (5.3)
Preterm birth or mid trimester loss	142 (6.2)	174 (12.2)
Stillbirth	68 (3.0)	44 (3.1)
Neonatal death	35 (1.5)	66 (4.6)
Baby with congenital anomaly	71 (3.1)	57 (4.0)
Infant requiring intensive care	59 (2.6)	44 (3.1)
Placenta praevia	10 (0.4)	6 (0.4)
Placental abruption	21 (0.9)	20 (1.4)
Pre-eclampsia	138 (6.0)	41 (2.9)
Post partum haemorrhage requiring transfusion	41 (1.8)	22 (1.5)
Other	372 (16.3)	221 (15.5)
Pre-existing medical problems	994 (27.0)	649 (28.4)
Cardiac disease	42 (1.1)	32 (1.4)
Epilepsy	43 (1.2)	29 (1.3)
Endocrine disorders	73 (2.0)	50 (2.2)
Renal disease	26 (0.7)	19 (0.8)
Haematological disorders	37 (1.0)	23 (1.0)
Psychiatric disorders	152 (4.1)	124 (5.4)
Inflammatory disorders	31 (0.8)	19 (0.8)
Drug or substance abuse	69 (1.9)	37 (1.6)
Diabetes	96 (2.6)	44 (1.9)
Other	621 (16.8)	414 (18.1)

[a]Second and subsequent deaths from pregnancies with multiple losses are excluded

Source: CMACE

5.3 Characteristics of the babies

Table 5.5 shows the gestation-specific and sex-specific mortality rates for stillbirths and neonatal deaths. For both stillbirths and neonatal death the mortality rates decrease as the gestation increases. Babies born preterm have a much higher risk of mortality than babies born at term. There is no statistically significant difference between the mortality rates for male and female babies that are stillborn, but there is a statistically significantly higher neonatal mortality rate among males (1.2 times, 95% CI: 1.1, 1.3) than females.

Table 5.5
Characteristics of stillbirths and neonatal deaths; England, Wales, Northern Ireland and the Crown Dependencies: 2008

	Stillbirths		Neonatal deaths	
	Number	Rate [95% CI][a]	Number	Rate [95% CI][b]
Gestational age (completed weeks)				
<24	..	..	695	849.1 [788.3, 914.7]
24-27	914	247.1 [231.6, 263.6]	537	192.8 [177.2, 209.8]
28-31	640	89.1 [82.5, 96.3]	236	36.1 [31.7, 41.0]
32-36	892	19.2 [18.0, 20.5]	257	5.6 [5.0, 6.4]
37-41	1,242	1.9 [1.8, 2.0]	529	0.8 [0.7, 0.9]
42+	26	0.8 [0.6, 1.2]	23	0.7 [0.5, 1.1]
Not known	16	..	119	..
Sex (England, Wales and Northern Ireland)				
Male	1,910	5.1 [4.8, 5.3]	1,246	3.3 [3.1, 3.5]
Female	1,755	4.9 [4.7, 5.1]	966	2.7 [2.5, 2.9]
Indeterminate	32	..	32	..
Not known	3	..	5	..

[a]Rate per 1,000 total births
[b]Rate per 1,000 live births

Sources: CMACE, ONS, NI CHS, NISRA

Twenty-four percent of stillbirths and 11% of neonatal deaths are less than the 3rd birth weight centile and 35% of stillbirths and 20% of neonatal deaths are less than the 10th birth weight centile (Table 5.6). These are higher than expected (3% and 10% respectively) in a normal population distribution.

Table 5.6
Birth weight centiles for stillbirths and neonatal deaths; England, Wales, Northern Ireland and the Crown Dependencies: 2008

Centile	Stillbirths		Neonatal deaths	
	Number	Percentage (%)[a]	Number	Percentage (%)[a]
<3rd	865	23.7	211	11.4
3rd-9th	444	12.1	161	8.7
10th-49th	1,199	32.8	726	39.1
50th-90th	822	22.5	592	31.9
91st-97th	137	3.7	82	4.4
>97th	188	5.1	83	4.5
Not known	75	..	541*	..

[a]Percentages are calculated after removing not knowns
* For 256 cases a centile was not able to be calculated as gestation was ≤22 weeks

Source: CMACE

Table 5.7 shows the condition of babies, shortly after delivery, who died in the neonatal period, whether they were admitted to a neonatal unit and whether they were transferred to another hospital (removing those that were terminations of pregnancy or born at less than 22 weeks' gestation). Seventy-five percent of babies who died in the neonatal period had absent or ineffective respiratory activity at 5 mins and 31% had a heart rate that was persistently less than 100. Sixty-eight percent of babies who died in the neonatal period get admitted to a neonatal unit and 81% stay within the unit of delivery for the rest of their care. Thirty-two percent of neonatal deaths occur outside of the neonatal unit without admission to the neonatal unit.

Table 5.7
Condition and transfer of neonatal deaths; England, Wales, Northern Ireland and the Crown Dependencies: 2008

	Neonatal deaths[a]	
	Number	**Percentage (%)[b]**
Absent or ineffective respiratory activity at 5 mins		
Yes	1,432	75.4
No	466	24.6
Not known	206	..
Admitted to a neonatal unit		
Yes	1,180	67.9
No	558	32.1
Not known	366	..
Heart rate persistently <100		
Yes	583	31.2
No	1,286	68.8
Not known	235	..
Transferred to another hospital after birth		
Yes	387	19.3
No	1,615	80.7
Not known	102	

[a]Excluding terminations of pregnancy and babies born at less than 22 weeks' gestation
[b]Percentages are calculated after removing not knowns

Sources: CMACE

Table 5.8 describes those neonatal deaths that were transferred to at least one more location of care after the primary admission. Most transfers were to a higher level of care although a few were not including 37 between level 3 Providers.

Table 5.8
Neonatal deaths and level of care for transferred patients; England, Wales, Northern Ireland and the Crown Dependencies: 2008

Admitted to a neonatal unit and transferred into another hospital	Number
Level 1 to Level 2	3
Level 1 to Level 3	82
Level 1 to Children's Hospital	5
Level 2 to Level 2	1
Level 2 to Level 3	121
Level 2 to Children's Hospital	19
Level 3 to Level 1	2
Level 3 to Level 2	4
Level 3 to Level 3	37
Level 3 to Children's Hospital	20

All other cases delivered at unit with no NNU and transferred into level 2 units, level 3 units or children's hospitals

Source: CMACE

Chapter 6 Cause of death

The aim of this chapter is to look at the impact of the new CMACE classification for the cause of stillbirths and neonatal deaths. It was recognised that a new system of classification was needed as the previous system resulted in many cases being classified as unexplained. This was clearly a problem when attempting to recognise patterns in causes of death or identifying preventable cases. There is also an increased focus on placental pathology and it is hoped that this and increased reporting of placental histology results will also improve classification. The uptake of post mortem examinations and the numbers of placentas being examined by histopathologists are therefore also presented.

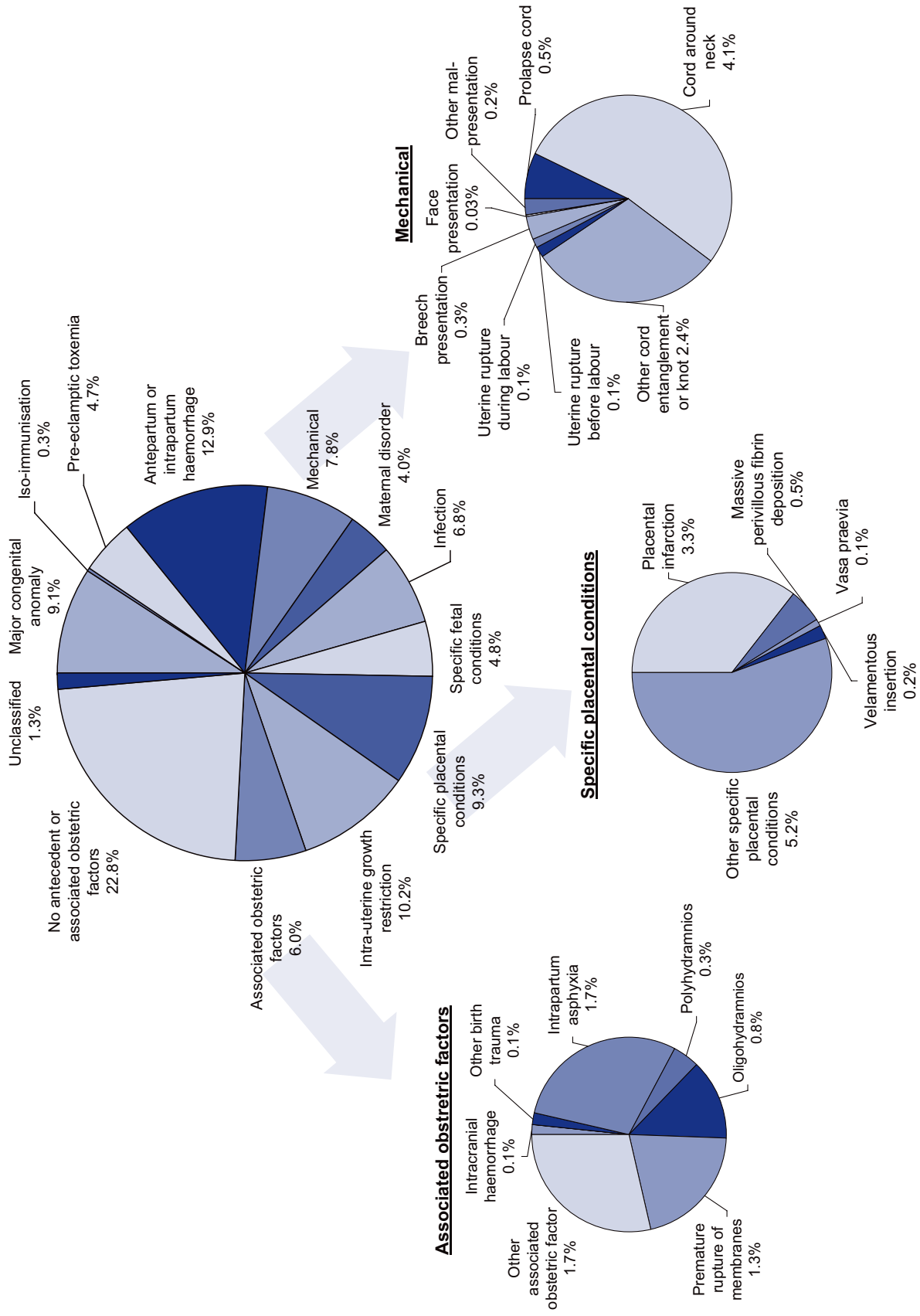
Our data collection form (Appendix A) asks notifiers to identify all conditions that arose during pregnancy, either causing directly or associated with the death and specify which condition was the main condition causing or associated with the death. CMACE regional managers then use this information plus any post mortem and placental histology reports to classify the one primary cause or associated factor and up to three other causes or associated factors. It is intended that this approach of picking the main cause/associated factor reflects local clinical opinion of those involved in the case. It is recognised that it is very difficult to be certain about whether a factor caused or is associated with the death[21] and an attempt is not made to delineate this clearly. This chapter presents the primary cause or associated factor for stillbirths using the maternal and fetal classification and the primary cause or associated factor for neonatal deaths using both the maternal and fetal classification and the neonatal classification.

6.1 Causes of stillbirths

Figure 6.1 shows the primary cause/association for stillbirths in 2008. This classification has helped in reducing the number of cases that were previously classified and unexplained using the Wigglesworth and Aberdeen (Obstetric) classifications. Twenty-three percent of stillbirths are now unexplained (no antecedent or associated obstetric factors) compared to around 50% in the last few reports. The biggest causes/associated factors for stillbirths are antepartum or intrapartum haemorrhage (13%), intra-uterine growth restriction (IUGR) (10%) and specific placental conditions (9%).

As described in Chapter 2 in more detail, the term IUGR is used in this report to indicate when a fetus or newborn has been clinically recognised as having poor intra-uterine growth. This is not the same as being less than a certain weight centile for gestational age known as small for gestational age.

Figure 6.1
Primary cause/associated factor for stillbirths using the CMACE maternal and fetal classification; England, Wales, Northern Ireland and the Crown Dependencies: 2008 (excluding terminations of pregnancy)



6.1.1 Associated obstetric factors

Table 6.1 shows a further exploration of the factors that may be related to stillbirth where an associated obstetric factor was given as the primary cause/association. Six percent of stillbirths died with a recognised associated obstetric factor. With 1.7% being due to intrapartum asphyxia, 1.3% being due to premature rupture of membranes and 0.8% being due to oligohydramnios (Figure 6.1). This category also covers polyhydramnios, intracranial haemorrhage and other birth traumas.

Table 6.1 shows the gestational age distribution among the categories within the associated obstetric factors group. The majority of cases that die from intrapartum asphyxia (52.6%) and other associated obstetric factors (53.6%) are born at term (37+ weeks). Whereas, the majority of cases that die in association with premature rupture of membranes occur at very low gestations (24-27 weeks).

Table 6.1
Proportion of infants in gestational age groups according to primary cause/association for death (obstetric factors); England, Wales, Northern Ireland and the Crown Dependencies: 2008

Primary cause/ associated factor	Gestation Proportion of primary cause/associated factor (%)[a]				
	n	<27 weeks	27-31 weeks	32-36 weeks	37+ weeks
Intracranial haemorrhage	3	33.3	33.3	-	33.3
Other birth trauma	4	25.0	-	75.0	-
Intrapartum asphyxia	57	14.0	21.1	12.3	52.6
Polyhydramnios	9	-	44.4	33.3	22.2
Oligohydramnios	26	19.2	30.8	23.1	26.9
Premature rupture of membranes	41	53.7	31.7	9.8	4.9
Other associated obstetric factor	56	17.9	10.7	17.9	53.6

[a]Percentages are calculated after removing not knowns

Source: CMACE

6.1.2 Intra-uterine growth restriction

Twenty percent of stillbirths are associated with intra-uterine growth restriction (IUGR). Table 6.2 shows further investigation of the cases associated with IUGR.

Gestational hypertension was seen in nearly 13% of mothers with a stillbirth associated with IUGR. This is statistically significantly different to the proportion for all stillbirths (7.2%). Of the stillbirths associated with IUGR, 23.0% smoked during pregnancy and 4.6% gave up during pregnancy. This is not statistically significantly different to the proportions seen in all stillbirths (21.7% and 4.0% respectively).

There is a statistically significant trend for mothers having stillbirths associated with IUGR being younger than those mothers having stillbirths not associated with IUGR. The distribution of ethnicity for mothers having stillbirths associated with IUGR is not statistically significantly different to the distribution of all stillbirths. Another study has shown that, often, minority ethnic groups have higher rates of perinatal mortality, but the growth restriction is not necessarily related to or the cause of the mortality.[22]

There was no difference between the two groups in this cohort regarding smoking levels; in Froen,[23] smoking prevalence was higher among mothers whose pregnancy resulted in a growth-restricted stillbirth than in stillbirths of normal size. Wilcox[22] argues that small babies of mothers who smoke are at higher risk of perinatal mortality, but this can be masked if one compares absolute weights rather than relative weights.

There was also no difference between the two groups with regards to BMI. Twenty-three percent of mothers having stillbirths associated with IUGR are obese compared to 24% of all stillbirths.

Table 6.2
Association of factors with stillbirths due to IUGR; England, Wales, Northern Ireland and the Crown Dependencies: 2008

	Proportion of all stillbirths	Stillbirths with IUGR as primary cause/ associated factor		P-value
		Number[a]	Percentage[b]	
Gestational hypertension (including pre-eclampsia)				
Yes	7.2	86	12.8	<0.001
No	92.8	588	87.2	
Smoking status				
Never	66.8	426	65.3	0.4
Gave up prior to pregnancy	7.6	46	7.1	
Gave up in pregnancy	4.0	30	4.6	
Current	21.7	150	23.0	
Not known	..	22	..	
Maternal age				
<20	7.1	47	7.0	0.03
20-24	20.3	143	21.2	
25-29	24.1	193	28.7	
30-34	25.1	150	22.3	
35-39	17.5	106	15.8	
40+	5.9	34	5.1	
Not known		1	..	
Ethnicity				
White	68.2	448	67.5	0.2
Black	11.0	72	10.8	
Asian	15.2	113	17.0	
Chinese	0.5	-	-	
Mixed	1.6	15	2.3	
Other	3.4	16	2.4	
Not known	..	10	..	
Body Mass Index (BMI)				
<18.5	3.2	19	3.1	0.7
18.5-24.9	42.8	275	44.2	
25-29.9	29.6	188	30.2	
30-34.9	14.5	80	12.9	
35+	9.9	60	9.6	
Not known		52	..	

[a]Second and subsequent deaths from pregnancies with multiple losses are excluded
[b]Percentages are calculated after removing not knowns

Source: CMACE

6.1.3 Intrapartum stillbirths

For 2008, to assess whether stillbirths died in the antepartum or intrapartum period CMACE asked if the baby was alive at onset of care in labour. For this purpose, babies alive at onset of care in labour are identified as intrapartum stillbirths. In 2008 there were 282 intrapartum stillbirths which account for 8.8% of all stillbirths. It is hoped that this new method of identifying intrapartum stillbirths will allow further investigation as it has been suggested that these deaths are the most likely to be preventable by improving perinatal care.[24]

Table 6.3
Stillbirths alive at the onset of care in labour; England, Wales, Northern Ireland and the Crown Dependencies: 2008

	Number	Percentage (%)[a]
Baby alive at onset of care in labour	282	8.8
Baby not alive at onset of care in labour	2,656	82.6
Never in labour	277	8.6
Not known	155	

[a]Percentages are calculated after removing not knowns

Source: CMACE

Of the intrapartum stillbirths, 109 (38.7%) were delivered at term (≥37 weeks) and 242 (85.8%) had no major congenital anomaly either causing or associated with the death. There are 100 intrapartum stillbirths that delivered at term with no signs of a major congenital anomaly, amounting to 2.7% of all stillbirths. Of the intrapartum stillbirths, 78 presented in breech position, with 63 of these being born vaginally, and 13 by caesarean section. In two cases the mode of delivery is unrecorded. Of these breech intrapartum stillbirths, only 4 of the 78 were at term and none were ascribed to anoxia.

Table 6.4
Gestation, congenital anomalies, delivery details and primary cause/associated factor for death among the stillbirths alive at onset of care in labour; England, Wales, Northern Ireland and the Crown Dependencies: 2008

	Number	Percentage (%)[a]
Gestational age		
<32	142	50.4
32-36	31	11.0
37+	109	38.7
Major congenital anomaly		
Yes	40	14.2
No	242	85.8
Mode of delivery		
Spontaneous vaginal	180	64.3
Ventouse	12	4.3
Forceps	16	5.7
Caesarean section	72	25.7
Not known	2	..
Presentation at delivery		
Vertex	182	65.5
Breech	78	28.1
Compound	17	6.1
Other	1	0.4
Not known	4	..
Primary cause/associated factor		
Major congenital anomaly	32	11.6
Pre-eclampsia	12	4.3
Antepartum or intrapartum haemorrhage	56	20.2
Mechanical	25	9.0
Maternal disorder	3	1.1
Infection	44	15.9
Specific fetal conditions	9	3.2
Specific placental conditions	9	3.2
IUGR	4	1.4
Associated obstetric factors	54	19.5
No antecedent or associated obstetric factors	29	10.5
Not known	5	..

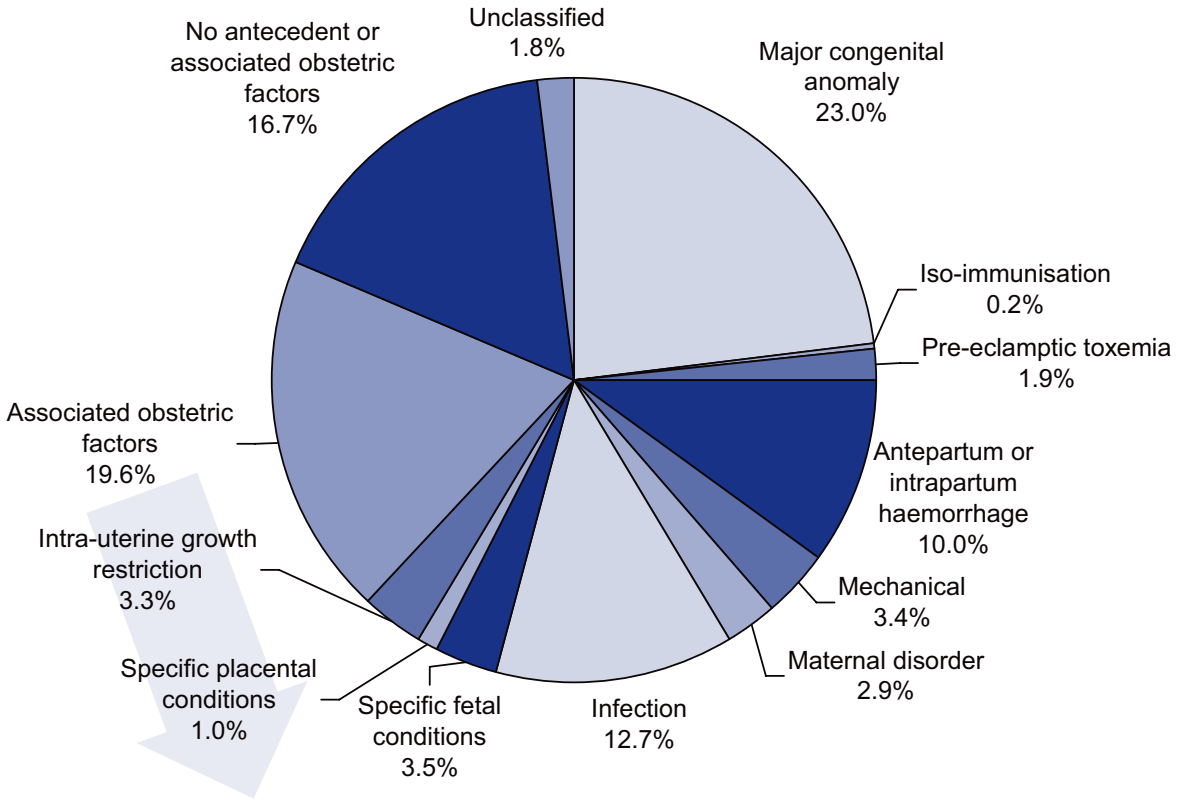
[a]Percentages are calculated after removing not knowns

Source: CMACE

6.2 Causes of neonatal deaths

Figure 6.2 shows the primary cause/associated factor for neonatal deaths using the maternal and fetal classification. The most common causes of neonatal deaths are major congenital anomalies (23%), associated obstetric factors (20%) and infection (13%).

Figure 6.2
Primary cause/associated factor of neonatal deaths using the CMACE maternal and fetal classification; England, Wales, Northern Ireland and the Crown Dependencies: 2008 (excluding terminations of pregnancy)



Associated obstetric factors

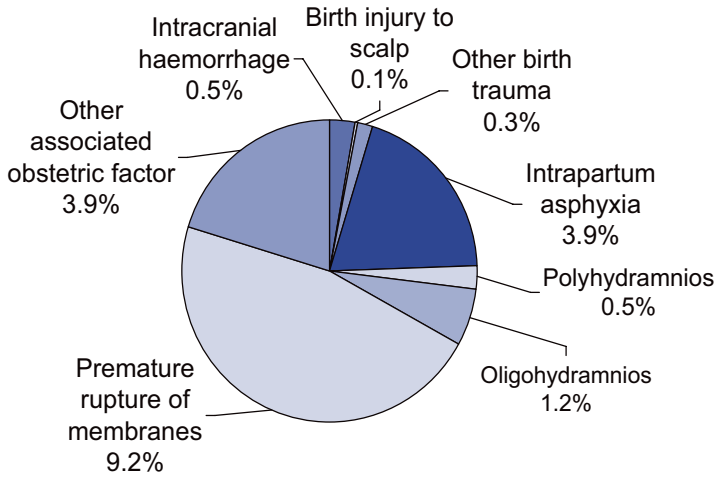


Figure 6.3 shows the primary cause/associated factor for neonatal deaths using the neonatal classification. In previous years nearly half of the neonatal deaths were due to immaturity. The CMACE classification restricts the prematurity category to only cases that are below 22 weeks' gestation. This category now has only 9.3% of the neonatal deaths. The major cause of neonatal death is now respiratory disorders, including severe pulmonary immaturity (23.8%), surfactant deficiency lung disease (3.9%), pulmonary hypoplasia (4.4%), meconium aspiration syndrome (1.9%), primary persistent pulmonary hypertension (0.7%), chronic lung disease/bronchopulmonary dysplasia (0.3%) and other respiratory disorders (3.7%). After respiratory disorders the most common causes of neonatal deaths are major congenital anomalies (21.0%) and neurological disorders (14.2%).

Figure 6.3
Primary cause of neonatal deaths using the CMACE neonatal classification; England, Wales, Northern Ireland and the Crown Dependencies: 2008 (excluding terminations of pregnancy)

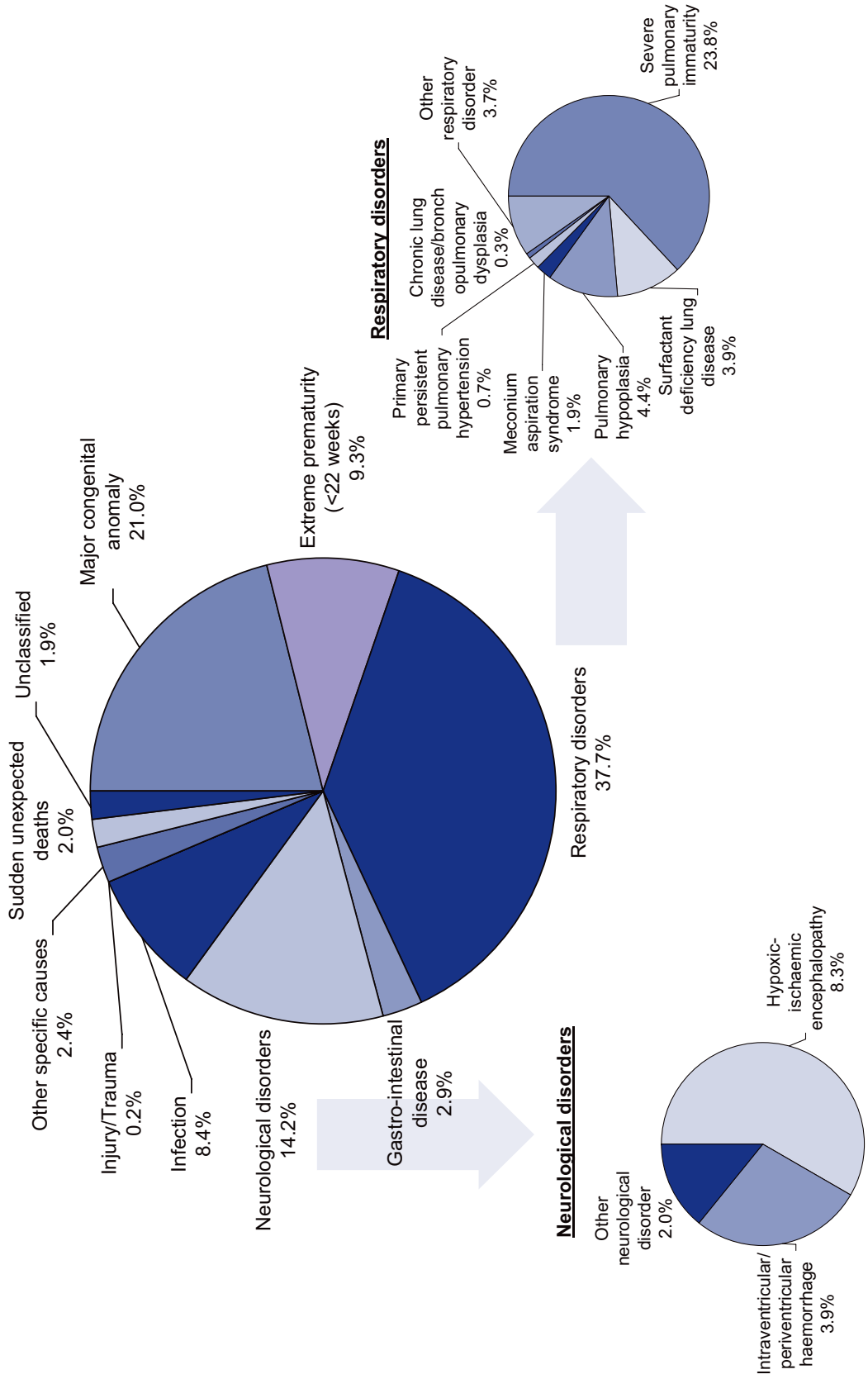


Table 6.5 shows that the most common cause/association of early neonatal deaths are respiratory disorders (41.5%), major congenital anomalies (19.5%) and neurological disorders (15.2%). For late neonatal deaths the most common cause are major congenital anomaly (26.4%), respiratory disorders (24.5%) and infection (16.6%).

Table 6.5
Neonatal deaths by primary cause of death; England, Wales, Northern Ireland and the Crown Dependencies: 2008

	Early neonatal deaths		Late neonatal deaths		Neonatal deaths	
	Number	Percentage (%)[a]	Number	Percentage (%)[a]	Number	Percentage (%)[a]
Major congenital anomaly	318	19.5	124	26.4	442	21.0
Extreme prematurity (<22 weeks)	190	11.6	5	1.1	195	9.3
Respiratory disorders	677	41.5	115	24.5	792	37.7
Gastro-intestinal disease	17	1.0	43	9.1	60	2.9
Neurological disorders	248	15.2	50	10.6	298	14.2
Infection	99	6.1	78	16.6	177	8.4
Injury/trauma	3	0.2	1	0.2	4	0.2
Other specific causes	41	2.5	10	2.1	51	2.4
Sudden unexpected deaths	12	0.7	31	6.6	43	2.0
Unclassified	26	1.6	13	2.8	39	1.9
Not known	121	..	57	..	178	..

[a]Percentages are calculated after removing not knowns

Source: CMACE

6.2.1 Neurological disorders

Table 6.6 shows possible risk factors of neonatal deaths whose primary cause of death is a neurological disorder. The gestational age distribution among the deaths from neurological disorders is statistically significantly different to all neonatal deaths. Seventy-three percent of deaths from hypoxic-ischaemic encephalopathy (HIE) were at term and 43% of deaths from other neurological disorders were at term compared to 24% of all neonatal deaths. Seventy percent of neonatal deaths from intraventricular/periventricular haemorrhage occurred in infants born less than 27 weeks' gestation compared to 50% of all neonatal deaths.

Deaths from neurological disorders are statistically significantly less likely to also have major congenital anomalies than all neonatal deaths. Four percent of deaths from HIE, 12% of deaths from intraventricular/periventricular haemorrhage and 5% of deaths from other neurological disorders also have major congenital anomalies compared with 29% of all neonatal deaths.

IUGR is less likely to occur in the deaths from neurological disorders than all neonatal deaths, however this difference is not statistically significant. Abruption is more likely to occur in deaths from neurological disorders than in all neonatal deaths. This is statistically significantly different in HIE and other neurological disorders. Abruption occurs in the mothers of 23% of neonatal deaths from HIE and 19% of deaths from other neurological disorders, where it only occurs in the mothers of 7% of all neonatal deaths.

Table 6.6
Possible risk factors of neurological disorders; England, Wales, Northern Ireland and the Crown Dependencies: 2008

	Proportion of all neonatal deaths	n (%)[a]		
		Hypoxic-ischaemic encephalopathy	Intraventricular/ periventricular haemorrhage	Other neurological disorder
Gestational age (completed weeks)				
<27	50.2	4 (2.3)	57 (70.4)	14 (33.3)
27-31	14.2	14 (8.1)	19 (23.5)	5 (11.9)
32-36	11.3	29 (16.9)	3 (3.7)	5 (11.9)
37+	24.2	125 (72.7)	2 (2.5)	18 (42.9)
Not known	..	2	1	-
Major congenital anomaly				
Yes	28.7	7 (4.0)	10 (12.2)	2 (4.8)
No	71.3	167 (96.0)	72 (87.8)	40 (95.2)
Intra-uterine growth restriction (IUGR)				
Yes	11.8	16 (9.2)	6 (7.3)	7 (16.7)
No	88.2	158 (90.8)	76 (92.7)	35 (83.3)
Abruption				
Yes	6.8	40 (23.0)	9 (11.0)	8 (19.0)
No	93.2	134 (77.0)	73 (89.0)	34 (81.0)

[a]Percentages are calculated after removing not knowns

Source: CMACE

6.2.2 Respiratory disorders

The new classification gives much more information on respiratory disorders however information on prematurity is no longer as detailed as in previous reports. The proportion of infants by gestational age for each main cause/associated factor for the neonatal death is therefore detailed in Table 6.7. A large number of these cases are due to pulmonary immaturity associated with prematurity. A relatively small number of term infants die from or have a death associated with a respiratory condition.

Table 6.7
Proportion by gestational age of infants with a respiratory condition as the main cause of neonatal death; England, Wales, Northern Ireland and the Crown Dependencies: 2008

Respiratory disorders	Proportion of primary cause n (%)[a]				
	<27	27-31	32-36	37+	Not known
Severe pulmonary immaturity	458 (92.3)	36 (7.3)	1 (0.2)	1 (0.2)	4
Surfactant deficiency lung disease	57 (69.5)	21 (25.6)	3 (3.7)	1 (1.2)	-
Pulmonary hypoplasia	19 (20.7)	44 (47.8)	15 (16.3)	14 (15.2)	-
Meconium aspiration syndrome	-	1 (5.3)	-	18 (94.7)	-
Primary persistent pulmonary hypertension	3 (20.0)	3 (20.0)	1 (6.7)	8 (53.3)	-
Chronic lung disease/bronchopulmonary dysplasia	6 (100.0)	-	-	-	-
Other (includes pulmonary haemorrhage)	40 (51.3)	28 (35.9)	4 (5.1)	6 (7.7)	-

[a]Percentages are calculated after removing not knowns

Source: CMACE

6.3 Post mortem examinations

In 2008, 45.8% of stillbirths, 38.9% of perinatal deaths and 25.1% of neonatal deaths were offered and consent was given for a post mortem to be performed. This compares to post mortems being performed for 45.0% of stillbirths and 21.1% of neonatal deaths in 2007. Details of post mortem results were received by CMACE for 42.6% of stillbirths, 35.8% of perinatal deaths and 21.6% of neonatal deaths which help in coding the cases for cause of death. Post mortems were not carried out in the remaining cases due either to them not being offered or consent not being given.

Table 6.8
Proportions of post mortem examinations among stillbirths, perinatal and neonatal deaths; England, Wales, Northern Ireland and the Crown Dependencies: 2008

	n (%)		
	Stillbirths N=3,730	**Perinatal deaths N=5,597**	**Neonatal deaths N=2,396**
PM offered and consent given for full PM	1,580 (42.4)	2,002 (35.8)	541 (22.6)
PM offered and consent given for limited PM	127 (3.4)	171 (3.1)	60 (2.5)
MRI	*8 (0.2)*	*13 (0.2)*	*7 (0.3)*
X-Ray	*52 (1.4)*	*65 (1.2)*	*15 (0.6)*
Other	*94 (2.5)*	*126 (2.3)*	*44 (1.8)*
PM offered and consent given for full PM and details received at CMACE	1,489 (39.9)	1,866 (33.3)	467 (19.5)
PM offered and consent given for limited PM and details received at CMACE	100 (2.7)	137 (2.4)	51 (2.1)
MRI	*6 (0.2)*	*10 (0.2)*	*6 (0.3)*
X-Ray	*43 (1.2)*	*55 (1.0)*	*14 (0.6)*
Other	*78 (2.1)*	*104 (1.9)*	*36 (1.5)*
PM offered and consent not given	1,693 (45.4)	2,693 (48.1)	1,223 (51.0)
PM offered and not known if consent was given	14 (0.4)	23 (0.4)	16 (0.7)
PM not offered	215 (5.8)	508 (9.1)	416 (17.4)
Not known if PM was offered	101 (2.7)	200 (3.6)	140 (5.8)

Source: CMACE

This is the first year CMACE has reported data on whether the placenta was sent for histology. If it was sent, the details of the examination are chased and when reports are received they are again used to help code the cases for cause of death. Eighty percent of stillbirths have their placenta sent for histology, 70.8% of perinatal deaths and 46.3% of neonatal deaths. Details of the placental histology were received by CMACE for 38.4% of stillbirths, 31.9% of perinatal deaths and 17.0% of neonatal deaths. Hopefully the number of histology reports CMACE receive will increase over the next few years as the contact with the histology departments improves.

Table 6.9
Proportions of placental histology among stillbirths, perinatal and neonatal deaths; England, Wales, Northern Ireland and the Crown Dependencies: 2008

	n (%)		
	Stillbirths N=3,730	**Perinatal deaths N=5,597**	**Neonatal deaths N=2,396**
Placenta sent for histology	2,998 (80.4)	3,962 (70.8)	1,110 (46.3)
Placenta sent for histology and details received at CMACE	1,432 (38.4)	1,785 (31.9)	408 (17)
Placenta not sent for histology	471 (12.6)	1135 (20.3)	936 (39.1)
Not known if placenta was sent for histology	261 (7.0)	500 (8.9)	350 (14.6)

Source: CMACE

Spotlight on CMACE's new maternal and fetal cause of death classification

by Dr Steve Gould, Consultant Perinatal Pathologist, John Radcliffe Hospital, Oxford

Since its inception in 1992, perinatal mortality surveillance had been part of the core work of the Confidential Enquiry in its various guises (CESDI, CEMACH and CMACE). Perinatal and neonatal deaths have been classified according to the underlying obstetric cause and, what is essentially the pathological cause of death, the fetal and neonatal classification. An overview has been obtained by using an extended version of the Wigglesworth classification.

Perinatal mortality classification assists the surveillance of the causes of death and comparisons both within and across populations. Strategies to prevent and reduce perinatal deaths can be targeted on the more significant factors. Differences between or across populations may allow hypotheses to be developed to explain these differences which, in turn, may suggest prevention strategies.

But there have been increasing concerns about the precision of classification especially in the context of stillbirth, an important but sometimes overlooked group. The gradual fall in perinatal mortality rate has been due mainly to a reduction in early neonatal deaths which has tended to disguise relatively static stillbirth rates.[i] More than 50% of stillbirths have been classified as unexplained. This might imply a relatively homogenous group of babies about which little is known and, of more concern, whose deaths are unpreventable. Even a relatively cursory glance at this group indicates that this is incorrect.

CEMACH started, in 2006, a process to improve its stillbirth classification with an emphasis on describing the 'unexplained' category better. There were restrictions on any change. The system must be suitable for CEMACH purposes. With limitations on resources, it was impractical to devise a system and process of classification that required more staff nor was it likely, given the numbers of cases, classification could be assigned to an individual – an option that could promote consistency. There may be some local help but classification would fall to regional managers. Further, the greater the classification system change, the greater the potential for the loss of trend data. Lastly, it was sensible that any system was cognizant of recent trends in perinatal classification so there was at least potential for comparison.

The aim of the obstetric classification used by CEMACH[ii] is to identify the condition that initiates the series of events that lead to that death. This has always been considered more important than identifying the immediate cause of death as it would allow early interventions to improve outcome. Literature review identified a large number of alternative classification systems usually with a different underlying basis for classification. For instance, 'TULIP'[iii] is a multi-layered system that emphasises the key is an understanding of pathophysiological mechanisms. Major categories or cause-of-death groups are based on pathophysiological entities rather than clinical causes. The placenta in particular attains greater focus rather than the clinical manifestations of placental dysfunction such as pre-eclampsia or abruption. Clinical entities are contributing factors, not causes. 'TULIP' seeks not only to explain what happened but why[iv] and demands a much deeper pathological understanding of mechanisms and events leading to death in individual cases.

ReCoDe,[v] in contrast, classifies stillbirths by the relevant clinical condition present at the time of death. It looks at what went wrong, not necessarily why. Identifying the underlying, initiating factor is less critical and hierarchy is based on anatomical groups with growth restriction as a major and prominent category. Further, more than one condition can be classified so that both a primary and secondary code can be assigned.

Largely to retain continuity, a decision was made to modify the currently used obstetric classification system rather than adopt a new one. Some of the changes resulted from a need to update the system but others changes took on features of other systems especially if they helped to reduce the 'unexplained' category.

The more significant changes included the removal of 'Isoimmunization' as a major category because of low numbers and a reintroduction of 'Infection' partly because ascending infection was more critical at the earlier gestational age range now subject to classification.

Two new main categories have been introduced that formerly would have been labelled unexplained. "Specific Placental Conditions" describes conditions such as placental infarction, massive perivillous fibrin deposition or fetal thrombotic vasculopathy. The previous focus on clinically recognised conditions overlooked significant placental pathology not associated with a clinically recognised syndrome such as pre-eclampsia. 'Intra-Uterine Growth Restriction' is introduced as a major category, in line with many other newer classification systems. Although it points, in most cases, to poor uteroplacental function, IUGR is clearly not a cause of death per se but its recognition can lead to alternative management and outcome.

Initial results do indicate that the new system reduces the proportion of "unexplained" stillbirths. But a new system requires more than just changing the category headings in a table. Some stillbirths have always changed category following an unexpected finding at post mortem examination but pathology is now more important. A significant proportion of growth restriction is first identified or confirmed at autopsy and many of the conditions that lead to a primary classification of "Specific Placental Pathology", result only from the pathological examination of the placenta. Good quality placental examination is needed if there is an unexplained stillbirth but no consent for autopsy.[vi]

The introduction of the new system is only the beginning. Experience may dictate further subcategory modification if it aids clarity. At present, growth restriction is primarily diagnosed at the local or regional level but it may be more consistent to identify this centrally. Gestation and birthweight are held for every case which may be sufficient to start with but other data is also held that should allow the derivation of a customised centile in time.

Finally, if classification is to be valuable, it needs to be applied as uniformly and consistently as possible. Classification is not always as objective as one would like, especially when the mere presence of a condition does not automatically imply it is *the* cause, or even a factor in a death. Standards between those classifying need to be similar, and this will require training and discussion. This has started. Further, our adoption of this system for CMACE purposes should not prevent comparisons with data obtained using other systems. Differences are sometimes as much to do with variation in definition as the different system in use[vii] so the adoption of internationally agreed criteria, when possible, is critical.[viii]

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Index of Tables

The following symbols have been used in the tables:

.. Not available/not applicable

- Nil

0.0 Negligible

Index of Figures

For Office use only: PDN CODE FOR CASE ☐☐0 8☐☐☐☐

Confidential Enquiry into Maternal and Child Health

Improving the health of mothers, babies and children

PERINATAL DEATH NOTIFICATION FORM

2008

CHOOSE Type of Case *(TICK)*

☐ **STILLBIRTH:** *A baby delivered without life **after** 23+6 weeks of pregnancy i.e. no signs of life at birth and where no heartbeat was ever detected.*

If the birth occurred unattended and there was no lung aeration seen at PM and no other circumstantial evidence of life at birth it should be assumed that the baby was stillborn.

In all cases where there is evidence that the fetus has died prior to the 24th week of pregnancy the death **should not** be notified as a stillbirth. Where there is any doubt about the gestational age at which the fetus died, the default position would be to notify as a stillbirth.

OR

☐ **EARLY NEONATAL DEATH:** *Death, following live birth at ALL GESTATIONS, of a baby before the age of 7 completed days.*

OR

☐ **LATE NEONATAL DEATH:** *Death of a baby occurring from the 7th day of life & before the age of 28 completed days.*

Brief Instructions and Guidance

1. **Fill in the form using the information available in the maternity case notes and discharge summary.**
2. **Guidance for completing Cause of Death is found on the folder enclosing this form.**
3. **There are no "not known" codes as all the information should be contained in the notes, *if you do not know the answer to a question please indicate this in Section 12.***
4. **Please complete all dates in the format DD/MM/YY, & all times using the 24hr clock e.g. 17.45.**
5. **Do NOT wait for the Post Mortem to complete and return this form.**

SECTION 1. WOMAN'S DETAILS

1.1 NHS No: ☐☐☐-☐☐☐-☐☐☐☐

1.2 Surname: _____ **First name:** _____

1.3 Hospital No: ☐☐☐☐☐☐☐☐☐☐

1.4 Usual residential address at time of delivery/birth: _____

_____

1.5 Postcode: ☐☐☐☐-☐☐☐

1.6 Date of Birth: D D / M M / Y Y **or estimated age** ☐☐

1.7 Ethnic group:

White: ☐ *British* ☐ *Irish* ☐ *Any Other White background, specify* _____

Mixed: ☐ *White & Black Caribbean* ☐ *White & Black African* ☐ *White & Asian* ☐ *Any Other mixed*

Asian or Asian British: ☐ *Indian* ☐ *Pakistani* ☐ *Bangladeshi* ☐ *Any Other Asian*

Black or Black British: ☐ *Caribbean* ☐ *African* ☐ *Any other Black background*

Other ethnic groups: ☐ *Chinese* ☐ *Any Other, specify* _____

Not stated: ☐

1.8 Was the woman in paid employment at booking? **YES** ☐ **NO** ☐

If Yes, what is her occupation (Transcribe from her notes)? _____

1.9 Was the woman's partner in paid employment at booking? **YES** ☐ **NO** ☐ **N/K** ☐

If Yes, what is his occupation (transcribe exactly what is in notes)? _____

1.10 Height at booking (cm) ☐☐☐.☐☐

1.11 Weight at booking (kg): ☐☐☐.☐☐

If weight is unavailable was the woman too heavy for hospital scales? **YES** ☐ **NO** ☐

1.12 Body Mass Index at booking (BMI): ☐☐

1.13 Smoking status: ☐ *Never* ☐ *Gave up prior to pregnancy* ☐ *Current* ☐ *Gave up in pregnancy*

SECTION 2. PREVIOUS PREGNANCIES

2.1 Did the woman have any previous pregnancies? *(if no go to Section 3)* **YES** ☐ **NO** ☐

2.2 No. of completed pregnancies beyond 24 weeks (all live & stillbirths) ☐☐

2.3 No. of pregnancies less than 24 weeks ☐☐

2.4 Were there any previous pregnancy problems? *(If yes, tick all that apply below)* **YES** ☐ **NO** ☐

☐ *3 or more miscarriages* ☐ *Pre-term birth or mid trimester loss* ☐ *Stillbirth*

☐ *Neonatal death* ☐ *Baby with congenital anomaly* ☐ *Infant requiring intensive care*

☐ *Placenta praevia* ☐ *Placental abruption* ☐ *Pre-eclampsia (hypertension & proteinuria)*

☐ *Post-partum haemorrhage requiring transfusion*

☐ *Other, specify* _____

SECTION 3: PREVIOUS MEDICAL HISTORY

3.1 Were there any pre-existing medical problems? *(If yes, tick all that apply below)* **YES** ☐ **NO** ☐

- ☐ *Cardiac Disease (congenital or acquired)*
- ☐ *Endocrine disorders e.g. hypo or hyperthyroidism*
- ☐ *Haematological disorders e.g. sickle cell disease*
- ☐ *Inflammatory Disorders e.g. inflammatory bowel disease*
- ☐ *Diabetes*
- ☐ *Epilepsy*
- ☐ *Renal Disease*
- ☐ *Psychiatric Disorders*
- ☐ *Drug or Substance Abuse*
- ☐ *Other, specify* _____

SECTION 4: THIS PREGNANCY

4.1 Final Estimated Date of Delivery (EDD). Use best estimate *(ultrasound scan or date of last menstrual period)* based in a 40 week gestation. Or the final date agreed in the notes.

D D / M M / Y Y

4.2 Was this a multiple pregnancy at the onset of pregnancy? **YES** ☐ **NO** ☐

4.3 Date of first booking appointment? D D / M M / Y Y **NOT BOOKED** ☐

4.4 Intended place of delivery at booking?
A midwifery led unit can be a free standing midwifery unit (geographically distinct from with or without links to an obstetric led unit) or a stand alongside midwifery unit (i.e. located on the same site as an obstetric led unit)

Name/unit of place _____

Obstetric Led Unit ☐ Midwifery Led Unit ☐ Home ☐ Other ☐

SECTION 5: DELIVERY

5.1 Intended place of delivery at onset of labour? Never in Labour ☐

Name/unit of place _____

Obstetric Led Unit ☐ Midwifery Led Unit ☐ Home ☐ Other ☐

5.2 Actual Place of Delivery? Name/unit of place _____

Obstetric Led Unit ☐ Midwifery Led Unit ☐ Home ☐ Other ☐

5.3 Date & time of delivery/birth D D / M M / Y Y : ☐☐☐☐

5.4 What was the FINAL Mode of Delivery

☐ *Spontaneous vaginal* ☐ *Ventouse* ☐ *Lift-out forceps* ☐ *Rotational forceps* ☐ *Other forceps*
☐ *Pre-labour caesarean section* ☐ *Caesarean section after onset of labour*

5.5 What was the presentation at *delivery*?

☐ *Face* ☐ *Brow* ☐ *Breech* ☐ *Vertex* ☐ *Compound (includes transverse and shoulder presentations)*

CAESAREANS ONLY *(non-Caesareans go to Section 6)*

5.6 Was a caesarean section . . . . . ☐ Planned *prior to labour?* or ☐ Unplanned *prior to labour?*

5.7 Was the caesarean an emergency? **YES** ☐ **NO** ☐

If YES, was the caesarean ☐ emergency *pre-labour?* or ☐ emergency *after onset of labour?*

5.8 What was the grade of urgency of the caesarean?

☐ *Immediate threat to life of woman or fetus*
☐ *Needing early delivery but no maternal or fetal compromise*
☐ *Maternal or fetal compromise not immediately life-threatening*
☐ *A time to suit the woman & maternity team*

SECTION 6: ALL BABY OUTCOMES

6.1 **Baby Surname:** _____ **First name:** _____

6.2 **Baby NHS number:** ☐☐☐-☐☐☐-☐☐☐☐

6.3 **Sex of fetus/Baby:** *Female* ☐ *Male* ☐ *Indeterminate* ☐

6.4 **Number of fetuses/babies this delivery** *(all identifiable including papyraceous)* ☐☐

6.5 **Birth order of this fetus/baby?** *(0=singleton)* ☐

6.6 **Birth weight (kg)** ☐.☐☐☐

6.7 **Gestation at delivery** ☐☐ *weeks +* ☐ *days*

6.8 **Was this a termination of pregnancy?** **YES** ☐ **NO** ☐

SECTION 7: STILLBIRTHS (if not stillbirth go to section 8)

7.1 **What gestation was death confirmed?** ☐☐ *weeks +* ☐ *days*
(confirmed by ultrasound, pathological report or when the baby born dead)

7.2 **Was the baby alive at *onset of care* in labour?** **YES** ☐ **NO** ☐ **Never in labour** ☐

SECTION 8: NEONATAL DEATHS (if not neonatal go to section 9)

8.1 **Was the baby admitted to a neonatal unit?** *(includes SCBU and ICU)* **YES** ☐ **NO** ☐

8.2 **Was there absent or ineffective respiratory activity *absent or ineffective* at 5 mins?** **YES** ☐ **NO** ☐
If a baby is receiving any artificial ventilation at 5 mins assumption is absent/ineffective activity, a 0 Apgar score indicates absent/ineffective activity spontaneous activity)

Absent or ineffective respiratory activity ☐ Spontaneous respiratory activity ☐

8.3 **Was the heart rate persistently <100? (i.e. heart rate never rose above 100 before death)**

Persistently <100 ☐ Rose above 100 ☐

8.4 **Place of death?** _____
This is where the baby actually died, e.g. 'name of unit', 'at home', 'in transit'. This includes babies who are brought to hospital, but are either declared dead on arrival or show no subsequent signs of life, despite attempted resuscitation.

8.5 **Date & time of death** **Date:** D D / M M / Y Y **Time:** H H : M M

8.6 **Was the baby transferred to another unit after birth?** **YES** ☐ **NO** ☐

8.7 **Please briefly describe the contributing obstetric and neonatal factors contributing to and associated with the death**

SECTION 9: ASSOCIATED FACTORS & CAUSE OF DEATH - STILLBIRTH and NEONATES

9.1. Please TICK ALL the maternal or fetal conditions that arose during pregnancy or were associated with death - REFER TO SEPARATE CAUSE OF DEATH GUIDANCE ON THE FOLDER.

1. MAJOR CONGENITAL ANOMALY

☐ *Central Nervous System* ☐ *Cardiovascular System* ☐ *Respiratory System* ☐ *Gastro-Intestinal System*

☐ *Musculo-Skeletal Anomalies* ☐ *Multiple Anomalies* ☐ *Chromosomal Disorders* ☐ *Metabolic Diseases*

☐ *Urinary Tract* ☐ *Other, specify* _____

2. ISO-IMMUNISATION:

☐ *Rhesus* ☐ *Other, specify* _____

3. PRE-ECLAMPTIC TOXEMIA

☐ *Gestational Hypertension (Includes Pre-eclampsia)* ☐ *HELPP syndrome* ☐ *Eclampsia*

4. ANTEPARTUM or INTRAPARTUM HAEMORRHAGE:

☐ *Praevia* ☐ *Abruption* ☐ *Uncertain*

5. MECHANICAL:

Cord Compression: ☐ *Prolapse Cord* ☐ *Cord around neck* ☐ *Other cord entanglement or knot*

Uterine Rupture: ☐ *Before labour* ☐ *During labour*

Mal-presentation: ☐ *Breech* ☐ *Face* ☐ *Compound*

☐ *Other, please specify* _____

6. MATERNAL DISORDER:

☐ *Pre-existing Hypertensive Disease* ☐ *Diabetes* ☐ *Endocrine diseases* ☐ *Primary Thrombophilias*

☐ *Cholestasis* ☐ *Drug misuse* ☐ *Uterine anomalies*

☐ *Other, please specify* _____

7. INFECTION:

Maternal infection: ☐ *Bacterial* ☐ *Syphilis* ☐ *Viral diseases* ☐ *Protozoal*

☐ *specify organism if known* _____

Ascending infection: ☐ *Chorioamnionitis* ☐ *Other, specify* _____

8. SPECIFIC FETAL CONDITIONS:

☐ *Twin-twin transfusion* ☐ *Feto-maternal haemorrhage* ☐ *Non immune hydrops* ☐ *Other, specify* _____

9. SPECIFIC PLACENTAL CONDITIONS:

☐ *Placental infarction* ☐ *Massive perivillous fibrin deposition* ☐ *Vasa praevia* ☐ *Velamentous insertion*

☐ *Other, specify* _____

10. INTRA-UTERINE GROWTH RESTRICTION: ☐

11. ASSOCIATED OBSTETRIC FACTORS

Birth Trauma: ☐ *Intracranial haemorrhage* ☐ *Birth injury to scalp* ☐ *Other, specify* _____

Intrapartum Asphyxia ☐

Other: ☐ *Polyhydramnios* ☐ *Oligohydramnios* ☐ *Premature Rupture of membranes*

☐ *Other specify* _____

12. NO ANTECEDENT OR ASSOCIATED OBSTETRIC FACTORS: ☐

13. UNCLASSIFIED *(Use this category as sparingly as possible):* ☐

9.2. Which condition/s, indicated in 9.1 as being present, was the <u>MAIN</u> condition/s causing or associated with the death? *(NB 'non-MAIN' conditions are best described as the 'Other clinically relevant maternal or fetal conditions/ factors that were associated with but not necessarily causing the death'). Please list the MAIN Condition/s:*

- _____
- _____

SECTION 10: CAUSE OF DEATH - NEONATES ONLY (Stillbirths go to Section 11)

10.1 Please TICK ALL the neonatal conditions causing and associated with death

PLEASE REFER TO SEPARATE CAUSE OF DEATH GUIDANCE ON THE ENCLOSING FOLDER

1. MAJOR CONGENITAL ANOMALY:

☐ *Central Nervous System* ☐ *Cardiovascular System* ☐ *Respiratory System* ☐ *Gastro-Intestinal System*

☐ *Urinary Tract* ☐ *Musculo-Skeletal System* ☐ *Multiple Anomalies* ☐ *Chromosomal Disorders*

☐ *Metabolic Disorders* ☐ *Other, specify* _____

2. EXTREME PREMATURITY(only less than 21+6 weeks): ☐

3. RESPIRATORY DISORDERS:

☐ *Severe Pulmonary Immaturity* ☐ *Surfactant Deficiency Lung Disease* ☐ *Pulmonary hypoplasia*

☐ *Meconium Aspiration Syndrome* ☐ *Primary Persistent Pulm Hypertension*

☐ *Chronic Lung Disease / Bronchopulmonary dysplasia (BPD)*

☐ *Other (includes pulmonary haemorrhage), specify* _____

4. GASTRO-INTESTINAL DISEASE:

☐ *Necrotising Enterocolitis (NEC)* ☐ *Other, specify* _____

5. NEUROLOGICAL DISORDER:

☐ *Hypoxic-Ischaemic Encephalopathy (HIE)* ☐ *Intraventricular / Periventricular haemorrhage*

☐ *Other, specify* _____

6. INFECTION:

☐ *Generalised (sepsis)* ☐ *Pneumonia* ☐ *Meningitis* ☐ *Other, specify* _____

7. INJURY / TRAUMA (postnatal):

Specify _____

8. OTHER SPECIFIC CAUSES:

☐ *Malignancies / Tumours* ☐ *Specific conditions* _____

9. SUDDEN UNEXPECTED DEATHS:

☐ *SIDS* ☐ *Infant Deaths – Cause Unascertained*

10. UNCLASSIFIED (Use this category as sparingly as possible): ☐

10.2 Which condition/s, that are indicated in 10.1 as being present, was the <u>MAIN</u> condition/s causing or associated with the death?

(NB 'non-MAIN' conditions are best described as the *'Other clinically relevant conditions/ factors that were associated with but not necessarily causing the death'*). Please list the MAIN Condition/s:

- _____
- _____

SECTION 11: POST MORTEM *(Please do not wait for postmortem results before sending in this form)*

11.1 Was a Post Mortem offered? **YES** ☐ **NO** ☐

11.2 Was consent given for a Post Mortem? **YES, FULL** ☐ **YES, LIMITED** ☐ **NO CONSENT** ☐

11.2.1 If PM was limited what was consent given for?

☐ *MRI* ☐ *X-Ray* ☐ *Other, specify* _____

11.3 Was the placenta sent for histology? **YES** ☐ **NO** ☐

11.4 Was this a Coroners Case? **YES** ☐ **NO** ☐

SECTION 12: ANY OTHER RELEVANT DETAILS

SECTION 13. DETAILS OF PERSON WHO COMPLETED THE FORM *(information not passed to central office)*

Name:

Positions:

Addresses:

Tel/number/email address:

Date of notification: D D / M M / Y Y

REGIONAL OFFICE USE ONLY

Please code the causes of death that were given and the clinically derived single main cause of death
(Refer to the coding sheet)

1. Cause of Death: Associated Maternal & Fetal Factors & Cause of Death - STILLBIRTH & NEONATES (section 9)

1.1 ***Single*** **Main Cause** ☐☐.☐☐

1.2 Other Cause(s) (no more than 3): ☐☐.☐☐, ☐☐.☐☐, ☐☐.☐☐

2. Cause of Death: Associated Neonatal Factors & Cause of Death – NEONATES ONLY (section 10)

2.1 ***Single*** **Main Cause** ☐☐.☐☐

2.2 Other Cause(s) (no more than 3): ☐☐.☐☐, ☐☐.☐☐, ☐☐.☐☐

3. Maternal death: YES ☐ NO ☐

4. Was a Post Mortem Performed? YES ☐ NO ☐

If yes, was it a partial PM? MRI SCAN ☐ X-RAY ☐ OTHER LIMITED ☐ NO ☐

If yes, was it a coroners PM? YES ☐ NO ☐

5. Was cause of death coding completed using a Placental Histology or Post Mortem?

PM ☐ PH ☐ NO ☐

Table B1
Live births, stillbirths and neonatal deaths by multiplicity: 2000-2008

Year	Live births			Stillbirths			Neonatal deaths		
	Singletons	Twins	Triplets and higher order multiples	Singletons	Twins	Triplets and higher order multiples	Singletons	Twins	Triplets and higher order multiples
2000	659,301	18,866	861	3,309	321	21	2,181	405	50
2001	649,508	18,901	714	3,249	335	30	1,984	423	38
2002	649,028	19,172	577	3,425	348	31	1,950	380	20
2003	675,264	19,875	407	3,583	387	27	2,054	396	38
2004	694,919	20,597	480	3,727	338	24	1,975	388	33
2005	701,285	20,792	472	3,522	277	16	2,033	429	30
2006	726,034	22,065	464	3,543	272	9	1,892	413	37
2007	748,909	22,879	454	3,705	283	7	2,006	411	18
2008	770,126	23,701	556	3,684	269	16	2,026	404	30

Sources: CMACE, ONS, NI CHS, GROS and SSBID survey

Appendix C

Table C1
Adjusted live births, total births, stillbirths and neonatal deaths by nation: 2008

	Live births[a]	Total births[a]	Stillbirths[a]	Early neonatal deaths[a]	Late neonatal deaths[a]
England	672,536	675,623	3,087	1,425	470
Northern Ireland	25,616	25,723	107	58	19
Scotland	59,799	60,124	325	109	46
Wales	35,647	35,799	152	74	32
Crown Dependencies	2,601	2,613	12	8	-

[a]Adjusted by removing terminations of pregnancy and babies born at less than 22 weeks' gestation

Sources: CMACE, ONS, NISRA, GROS and SSBID survey

Appendix D

Table D1
Adjusted live births, total births, stillbirths and neonatal deaths by SHA; England: 2008

	Live births[a]	Total births[a]	Stillbirths[a]	Early neonatal deaths[a]	Late neonatal deaths[a]
East Midlands	54,171	54,393	222	139	44
East of England	71,705	71,980	275	128	46
London	127,617	128,245	628	245	75
North East	30,214	30,378	164	60	31
North West	88,116	88,522	406	197	68
South Central	52,439	52,656	217	107	27
South East Coast	51,550	51,768	218	93	29
South West	58,727	58,970	243	112	33
West Midlands	71,675	72,048	373	207	55
Yorkshire and the Humber	66,322	66,663	341	137	137

[a]Adjusted by removing terminations of pregnancy and babies born at less than 22 weeks' gestation

Source: CMACE, ONS

Appendix E

Table E1
Adjusted live births, total births, stillbirths and neonatal deaths by Network; England: 2008

	Live births[a]	Total births[a]	Stillbirths[a]	Neonatal deaths[a]
Beds and Herts	19,966	20,044	78	42
Central	33,638	33,801	163	99
Central South Coast	30,854	30,970	116	70
Cheshire and Merseyside	30,265	30,390	125	96
Essex	20,173	20,248	75	35
Greater Manchester	38,510	38,697	187	120
Kent and Medway	20,476	20,576	100	59
Lancashire and South Cumbria	18,038	18,127	89	41
Norfolk, Suffolk and Cambridgeshire	29,453	29,557	104	73
North Central London	17,820	17,881	61	36
North East London and North Middlesex	35,635	35,818	183	69
North Trent	25,893	26,004	111	71
North West London	30,723	30,871	148	95
Northern	33,717	33,892	175	107
South Central North	29,957	30,085	128	80
South East London	27,174	27,330	156	102
South West London	20,121	20,217	96	28
South West Peninsula	17,711	17,791	80	39
Southern West Midlands	32,528	32,701	173	109
Staffordshire, Shropshire and Black Country	25,616	25,753	137	80
Surrey and Sussex	29,562	29,675	113	55
Trent	25,313	25,410	97	93
Western	32,796	32,927	131	79
Yorkshire	44,401	44,646	245	132

[a]Adjusted by removing terminations of pregnancy and babies born at less than 22 weeks' gestation.

Sources: CMACE

Appendix F Spotlights featuring local use of the report

Spotlight on Newham General Hospital – local audit

by Alpa Shah, Consultant Obstetrician and Gynaecologist

The perinatal death rate in Newham has remained consistently above both the national average and the London average rate. Multidisciplinary discussion agreed the need to further examine factors related to the high rates of stillbirth and infant mortality in the borough with the high incidence of recognized risk factors felt to be insufficient to fully explain the findings. The Trust worked collaboratively with commissioners to undertake a detailed confidential and systematic review of all stillbirths and neonatal deaths occurring during a twelve month period. The aims of the review were to improve understanding and to identify ways to improve patient care and outcome.

NPCT & NUHT jointly agreed to a confidential peer review conducted by CMACE using an internal and external multidisciplinary team targeted at initiating change. Each panel consisted of internal and external consultant obstetrician, consultant neonatologist and senior midwife. NUHT provided a set of internal panel members and also assisted by identifying cases, providing fully anonymised case notes, and a project lead to write the report. Sets of case notes were sent to panel members two weeks prior to case review meetings. A proforma was filled out for each case at the panel meeting and entered on to database for quantitative and qualitative data analysis. A draft report was written and then agreed at a plenary meeting to finalise recommendations for inclusion in the final report.

In 2007, a systematic and structured review of all stillbirths was streamlined by a consultant obstetrician and consultant midwife. This audit process re-emphasised the urgency of some of the changes identified at local perinatal meetings. The response from the relevant Trust leads has been extremely positive towards addressing identified areas of change and development. The following changes have already been implemented.

- A review of the maternity service delivery model.
- Maternity service redesign with midwifery services operating out of four sector-based Children's Centres.
- Central organisation of the antenatal referral process.
- Inclusion of maternity bookings received and processed on the maternity dashboard.
- The implementation of a team approach to midwifery.
- Establishment of a dedicated Home Birth Team.
- Review of midwifery and maternity support worker staffing establishment.
- A structured recruitment strategy.
- An increase in the number of consultants with a primary focus on obstetrics from 8 to 12 and implementation of Hot Week consultant presence on the Delivery Suite, Monday to Friday, 0800-1700 since 01/02/10.
- Appointment of two new matrons for Antenatal care & Risk and one consultant midwife for promoting normality.
- £17m to enable the maternity and newborn service to be redeveloped – this is now underway.
- Appointment of a new full time Specialist Midwife for Bereavement.
- Appointment of a new full time Specialist Midwife for Safeguarding Vulnerable Children & Young People.
- Structured reporting process for all perinatal deaths to Trust board via the Maternity and Women's Services Governance Board.

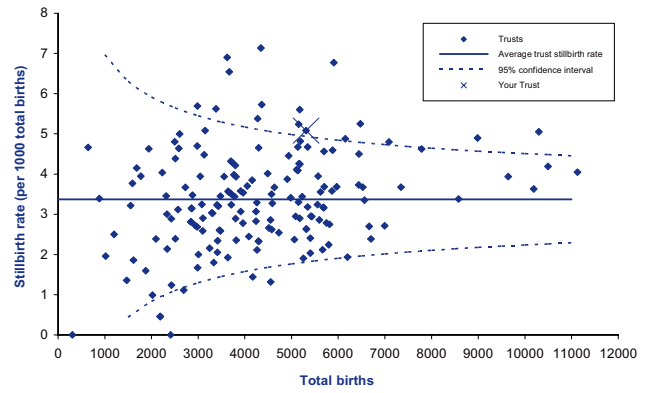
Adjusted[1] perinatal death rate for NUHT, London, and England

Year	Newham		London		National	
	SB[2]	NND[3]	SB[2]	NND[3]	SB[2]	NND[3]
2005	6.8	0.8	4.7	2.3	4.1	2.1
2006	6.5	1.0	4.7	2.4	4.1	2.3
2007	5.6	1.1	4.4	2.1	3.9	2.0
2008	4.8	0.6	4.2	1.8	3.9	2.1

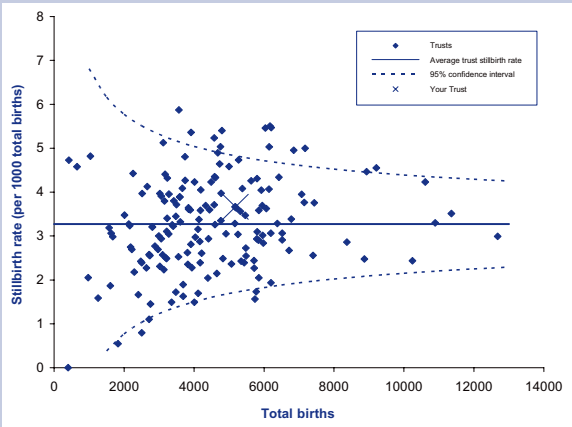
[1]Adjusted by removing terminations of pregnancy, lethal congenital anomalies, gestation <22 weeks and birth weight <500g
[2]Rate per 1,000 total births
[3]Rate per 1,000 live births

Adjusted[1] stillbirth rates compared to the average trust stillbirth rate and associated 95% confidence intervals for all cases that booked, delivered and died within the Trust; England, Wales, Northern Ireland and the Crown Dependencies:

A: 2007



B: 2008



[1]The rates have been adjusted by removing all terminations of pregnancy, all lethal congenital anomalies, all babies <22 weeks gestation and all babies <500g birth weight.

Although difficult to attribute the exact reasons for this improvement in stillbirth rates, it is suggested that the raised profile of perinatal mortality within the organisation, combined with external peer review contributed to this change. The overall impact has been an increased focus on the antenatal care provision and identification and action on risk factors.

The presence of robust local review of each case by Trust clinicians continued to highlight shortcomings to act on individually and as an organisation. The peer review audit conducted by a nationally recognised body (CMACE) helped to keep momentum going for the implementation of changes in the current climate of conflicting priority. This review also involved multidisciplinary team members from NUHT as reviewers and observers, enabling them to participate in enhanced local review to identify and constructively criticise any care or service delivery problems.

Spotlight on Homerton University Hospital - reducing infant mortality due to health inequalities

by Philippa Cox, Consultant Midwife / Supervisor of Midwives

Nearly 5,000 babies a year are born in Hackney, most with positive outcomes. Despite this ONS data for the three years 2002-2004 combined showed that the infant mortality rate in City and Hackney PCT was 6.4 [5.2, 8.0] per 1,000 live births, compared with a rate of 5.4 [5.2, 5.7] for London overall, and 5.2 [5.1, 5.3] for England and Wales.

In 2005, Team Hackney (the borough's local strategic partnership) identified Hackney's infant mortality rate as a particular concern and a multidisciplinary expert priority action team was set up to examine local and national evidence and agree targets. Priority groups identified were:

- Black African and Afro-Caribbean women who are known to have higher rates of preterm birth and be a significant contributor to infant mortality rates.
- Women who fail to make contact with maternity services until late pregnancy – often women who have newly arrived in the UK.
- Teenagers.

Initial consultation with mothers in the target groups confirmed the early research findings that barriers in accessing services included long waits in antenatal clinics, a lack of continuity of care, difficulties with language and communication and a desire for community based provision.

Team Hackney commissioned the Reducing Infant Mortality Programme (RIMP), an integrated package of targeted interventions worth a total of £2.25m to run for two years to March 2009. The project was led by a project coordinator (a consultant midwife), with services delivered by Homerton University hospital, City and Hackney PCT, Shoreditch Trust (a charitable regeneration agency) and City University.

The interventions included:

- Improving Neighbourhood services – improving continuity of care:
    - The Shoreditch Midwifery Group practice - The SMGP is based in a 'New Deal' (deprived) area and provides women with a named midwife, who will plan her care and who can be contacted throughout her pregnancy and the postnatal period. The practice consists of five midwives and five maternity support workers (MSWs), providing a 24/7 caseload midwifery service.
    - Children Centre midwives - They provide one to one care in pregnancy for the most vulnerable women, offering breast feeding support groups, baby massage courses and antenatal clinics at different locations within the community. They play an important role in reducing social isolation and ensuring a smooth transition to a range of family support systems once the midwife has completed her care in the postnatal period.
    - Joint working with the Sanctuary Practice (a GP surgery offering services to refugees, asylum seekers, homeless people and other vulnerable groups).
    - Bilingual maternity support workers who work alongside midwives in the community with approximately 12 different languages.

- Improving Access and Health awareness
  - Hackney's Woman's Health Wheel - This piece of work was commissioned as part of the information/health awareness strand of the reducing infant mortality interventions. The aims were:
    - To produce simple, accessible information about a range of women's health services in Hackney.
    - To make maternity and related services in Hackney more visible and therefore improve access to them.
    - Homerton Maternity Helpline. The maternity helpline, based at the Homerton University Hospital, opened in September 2007, staffed by experienced clinical midwives and open seven days a week from 10am to 6pm.
- Peer support to vulnerable women
  - Peer education support project – Bump buddies – volunteers to act as community messengers to encourage pregnant women to book for antenatal care earlier
  - Labour support volunteer programme – volunteers who provide support to women in labour.

Interim findings in 2008 found that the target groups were being reached and that changes in behaviour which could lead to a reduction in infant mortality were taking place. An evaluation of the two year programme is currently being undertaken. Since May 2009, all the interventions from the RIMP have been mainstreamed into maternity/PCT services.

The interim report can be viewed on the following website and click on the reducing infant mortality link in the side menu: http://www.homerton.nhs.uk/our-services/maternity-services/

The spotlights above are included to show how two Trusts have responded to the report. They have been written by the NHS organisations involved and as such remain the views of the spotlight author and not that of CMACE or its advisors. They are included to demonstrate how Trusts might respond, but are not intended to demonstrate ideal responses.

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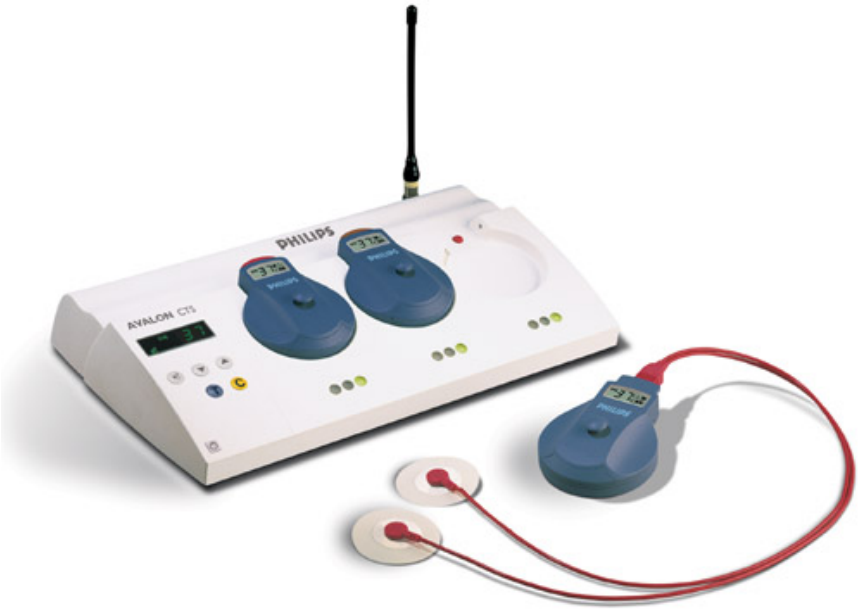

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