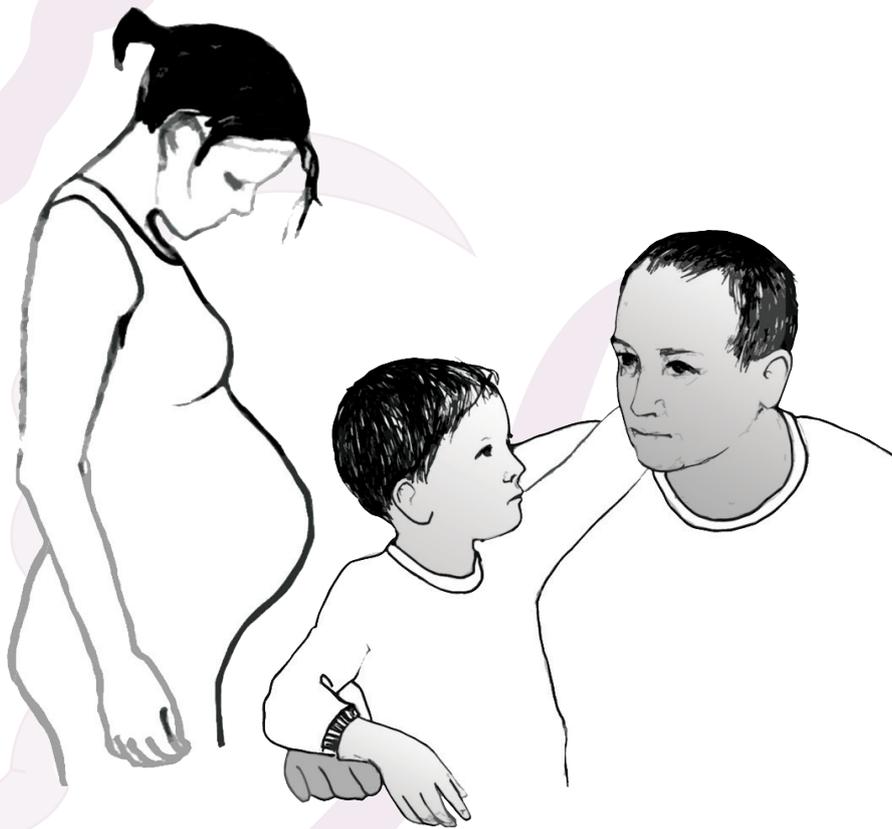


Maternal, Newborn and
Infant Clinical Outcome
Review Programme



MBRRACE-UK Perinatal Mortality Surveillance Report

UK Perinatal Deaths for Births from
January to December 2016



June 2018



Funding

The Healthcare Quality Improvement Partnership (HQIP) is led by a consortium of the Academy of Medical Royal Colleges, the Royal College of Nursing and National Voices. Its aim is to promote quality improvement in patient outcomes and, in particular, to increase the impact that clinical audit, outcome review programmes and registries have on healthcare quality in England and Wales. HQIP holds the contract to commission, manage and develop the National Clinical Audit and Patient Outcomes Programme (NCAPOP), comprising around 40 projects covering care provided to people with a wide range of medical, surgical and mental health conditions. The programme is funded by NHS England, the Welsh Government and, with some individual projects, other devolved administrations and crown dependencies.

More details can be found at: www.hqip.org.uk/national-programmes.

Design by: Andy Kirk, Frances Mielewczyk, and Sarah Chamberlain

Cover Artist: Tana West

This report should be cited as:

Draper ES, Gallimore ID, Kurinczuk JJ, Smith PW, Boby T, Smith LK, Manktelow BN, on behalf of the MBRRACE-UK Collaboration. MBRRACE-UK Perinatal Mortality Surveillance Report, UK Perinatal Deaths for Births from January to December 2016. Leicester: The Infant Mortality and Morbidity Studies, Department of Health Sciences, University of Leicester. 2018.

ISBN: 978-0-9935059-8-0

Published by: The Infant Mortality and Morbidity Studies

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Foreword

In this, the publication of the fourth year of MBRRACE-UK perinatal mortality surveillance data, I am pleased that alongside presenting the data for deaths in 2016, we are now able to report further information about time trends. However, before reflecting on the statistics it's important that we remember that each number in this report represents the tragic death of a much wanted baby, two bereaved parents, other grieving family members, and a future life full of promise never realised.

At first sight the headline figures appear a little disappointing with the overall national extended perinatal mortality rate in 2016 being essentially unchanged from 2015. However, taking the long view, we can see that over the past four years, since we began reporting MBRRACE-UK data, the rate has decreased overall such that things are generally moving in the right direction. We must also remember that these overall national rates do not take into account the increasing clinical and social complexity of the women and babies for whom our maternity and neonatal services provide care. Furthermore, national initiatives, for example, the Saving Babies' Lives Stillbirth Care Bundle in England, was only launched in 2016 and therefore we cannot expect to see an impact of this initiative in the 2016 data reported here.

Nevertheless, we must not be complacent. We know from the findings of the MBRRACE-UK confidential enquiry into term intrapartum deaths (published in November last year) that improvements in care which may have made a difference to the outcome were evident in about 80% of the deaths reviewed, and from the earlier enquiry into term antepartum stillbirths that potential improvements were identified in 60% of the deaths. These findings suggest that with improvements to the organisation and systems of care provided to mothers and their babies, a decrease in the mortality rate of babies reaching term is indeed possible.

The figures in this report also highlight that in order to make substantial inroads into the overall perinatal mortality rate and meet the various national ambitions, stretch aims and aspirations, there will need to be a greater focus on preterm mortality. About 70% of all extended perinatal deaths occur before term and nearly 40% occur extremely preterm at less than 28 weeks' gestation. Compared with babies who die at term, the circumstances of care and the train of events prior to death are likely to be different for the majority of deaths preterm. So whilst the improvements in care designed to prevent deaths at term are likely to have some an impact on preterm deaths, other strategies will also be required to prevent births and deaths earlier in pregnancy.

Importantly, we also need to acknowledge the contribution of congenital anomalies at 1 in 6 of all extended perinatal deaths, recognising that for the majority of babies with anomalies who die, their deaths are likely to be inevitable. Furthermore, we need to remember that for some Trusts and Health Boards, particularly the tertiary centres with neonatal surgical provision, and in Northern Ireland where termination of pregnancy is only legal in exceptional circumstances, the proportion of their deaths associated with congenital anomalies will be much higher than 1 in 6 and this will be reflected in higher neonatal mortality rates in particular. The best that maternity and neonatal services can provide in these circumstances is high quality compassionate and empathic care.

It's well established that babies who are conceived as one of a multiple pregnancy are at greater risk of perinatal death than their singleton counterparts. As such it is heartening to see that since 2014 there has been nearly a halving in the rate of stillbirths in twins and although the reduction in neonatal deaths is smaller at 30% both represent a statistically significant decrease, indicating this is unlikely to be a chance finding. Multiple births will be the subject of the next MBRRACE-UK confidential enquiry which will start shortly and be published in 2019, thereby enabling us to identify service improvements to further narrow the gap in mortality between multiples and singletons.

There is no single solution to reducing the number of babies dying. A complex series of service quality improvements will be required to ensure that every potentially preventable death is indeed prevented. At the same time these solutions must also ensure that this does not result in an unacceptably high rate of intervention across the maternity population, which would bring its own set of unwanted outcomes and complications. To

maximise the number of potentially preventable deaths which we actually prevent will require a clear understanding of where improvements in care can be made and for some areas we do require further research.

The national MBRRACE-UK confidential enquiries and the Each Baby Counts reports provide valuable learning and point us in the direction of general service improvements. However, the identification of areas of local service improvement and implementation of the actions needed to achieve these improvements can only come from the learning resulting from robust local reviews of the circumstances, cause and the care provided when a baby has died. We know from both the MBRRACE-UK enquiries and review of local reviews carried out by Each Baby Counts that the quality of many local reviews themselves would benefit from improvement. The development and launch of the national Perinatal Mortality Review Tool (PMRT) earlier this year is designed to support high quality, multidisciplinary local review of the care provided at all stages of the maternity and neonatal pathway on the basis of “review once, review well”.

It's important to recognise however, that the PMRT is only a tool and the reports and actions resulting from reviews conducted using the tool will only be as good as the effort and resources put into the review process. Conducting high quality reviews using the PMRT will require a multidisciplinary group with sufficient time set to carry out the reviews, and with sufficient support ahead of the review meeting to gather the necessary information about the care provided in order to enable robust discussions at the meeting. Crucially the PMRT enables the inclusion of the parents' perspectives and any concerns about the care they received so that these can be considered as part of the review process; obtaining these perspectives will require empathic conversations with parents which will also take time and cannot be rushed.

I am delighted to say that at the time of writing, all but one of the Trusts and Health Boards across England, Scotland and Wales have registered to use the PMRT and that 90% have started using the tool to review their deaths. This is a welcome development alongside all the other initiatives underway across the four nations designed to prevent avoidable perinatal deaths and to care for parents whose baby has died.



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Definitions used in this report

Late fetal loss	A baby delivered between 22 ⁺⁰ and 23 ⁺⁶ weeks gestational age showing no signs of life, irrespective of when the death occurred.
Stillbirth	A baby delivered at or after 24 ⁺⁰ weeks gestational age showing no signs of life, irrespective of when the death occurred.
<i>Antepartum stillbirth</i>	A baby delivered at or after 24 ⁺⁰ weeks gestational age showing no signs of life and known to have died before the onset of care in labour.
<i>Intrapartum stillbirth</i>	A baby delivered at or after 24 ⁺⁰ weeks gestational age showing no signs of life and known to have been alive at the onset of care in labour.
Neonatal death	A liveborn baby (born at 20 ⁺⁰ weeks gestational age or later, or with a birthweight of 400g or more where an accurate estimate of gestation is not available), who died before 28 completed days after birth.
<i>Early neonatal death</i>	A liveborn baby (born at 20 ⁺⁰ weeks gestational age or later, or with a birthweight of 400g or more where an accurate estimate of gestation is not available) who died before 7 completed days after birth.
<i>Late neonatal death</i>	A liveborn baby (born at 20 ⁺⁰ weeks gestational age or later, or with a birthweight of 400g or more where an accurate estimate of gestation is not available) who died after 7 completed days but before 28 completed days after birth.
Perinatal death	A stillbirth or early neonatal death.
Extended perinatal death	A stillbirth or neonatal death.
Termination of pregnancy	The deliberate ending of a pregnancy, normally carried out before the embryo or fetus is capable of independent life.



Executive Summary

Background

This is the fourth MBRRACE-UK Perinatal Mortality Surveillance Report and provides information on extended perinatal deaths in the UK and Crown Dependencies arising from births during 2016. MBRRACE-UK are commissioned by the Healthcare Quality Improvement Partnership (HQIP) to undertake the Maternal, Newborn and Infant Clinical Outcome Review Programme (MNI-CORP) on behalf of NHS England, the Welsh Government, the Scottish Government Health and Social Care Directorate, the Northern Ireland Department of Health, the States of Guernsey, the States of Jersey, and the Isle of Man Government.

The aims of the MNI-CORP are to collect, analyse and report national surveillance data and conduct national confidential enquiries in order to stimulate and evaluate improvements in health care for mothers and babies.

As in the surveillance reports for 2013 to 2015, the main report summarised here focuses on the surveillance of all late fetal losses (22⁺⁰ to 23⁺⁶ weeks gestational age), stillbirths, and neonatal deaths, with data presented by country, by geographical area (commissioners and individual Sustainability and Transformation Partnerships (STPs) or country of residence), by health care provider (Trusts or Health Boards and Neonatal Networks) and by Local Authority.

The availability of four years of data from across the UK (a cohort of well over two million births) and improving quality of the data submitted to MBRRACE-UK has permitted, in addition, an exploration of:

- time trends in the offer and consent for post-mortems for stillbirths and neonatal deaths;
- a review of referrals to the coroner and procurator fiscal by Neonatal Network;
- time trends in stillbirth, neonatal, and extended perinatal mortality rates for the UK and each of the constituent countries;
- improvements in data quality over time.

Methods

Deaths to be reported to MBRRACE-UK since 1 January 2013 through the secure online reporting system are:

- late fetal losses: a baby delivered between 22⁺⁰ and 23⁺⁶ weeks gestational age showing no signs of life, irrespective of when the death occurred;
- stillbirths: a baby delivered at or after 24⁺⁰ weeks gestational age showing no signs of life, irrespective of when the death occurred;
- neonatal deaths: a liveborn baby (born at 20⁺⁰ weeks gestational age or later, or with a birthweight of 400g or more where an accurate estimate of gestation is not available) who died before 28 completed days after birth.

Individual level information on all births in the UK is obtained in order to generate mortality rates adjusted for maternal, baby, and socio-demographic risk factors. This information is acquired through the collaboration of the following organisations: Patient Demographic Service (PDS) and Office for National Statistics (ONS) birth registration data (for England, Wales, and the Isle of Man); National Records Scotland (NRS) and Information Services Division (ISD) (for Scotland); Northern Ireland Maternity System (NIMATS) (for Northern Ireland); the Health and Social Services Department (for the Bailiwick of Guernsey); and Health Intelligence Unit (for the Bailiwick of Jersey). The data is amalgamated to give a single dataset of births for the whole of the UK and the Crown Dependencies. This data is then amalgamated with the information about the deaths to obtain the final data for analysis.

Analysis

The main findings of the report are represented in a combination of maps and tables showing both the crude and the stabilised & adjusted mortality rates for stillbirths, neonatal deaths, and extended perinatal deaths (stillbirths and neonatal deaths combined). Stabilisation is designed to take account of some of the random variation inherent in this type of data and adjustment takes account of some of the factors known to affect perinatal mortality rates in particular populations, e.g. the level of social deprivation.

In order to ensure comparability of mortality rates, data is shown after excluding births occurring at less than 24⁺⁰ weeks gestational age and terminations of pregnancy. Analysis of data for countries, commissioning organisations, Local Authorities, and populations covered by STPs is based on mother's postcode at the time of birth. Analysis of data for Trusts and Health Boards as well as Neonatal Networks is based on the place of birth. For comparison purposes, the mortality rates for individual organisations are presented compared to the UK average, except for Trusts and Health Boards where the average mortality in organisations providing similar levels of services is used.

This year's report contains for the first time national gestation specific numbers and mortality rates for babies born at 22⁺⁰ to 23⁺⁶ weeks gestational age.

Key findings

1. There has been little change in the rate of extended perinatal mortality in the UK in 2016: 5.64 per 1,000 total births for babies born at 24⁺⁰ weeks gestational age or later compared with 5.61 in 2015. However this represents an overall fall from 6.04 deaths per 1,000 total births in 2013.
2. The stillbirth rate for the UK in 2016 has remained fairly static at 3.93 per 1,000 total births. This follows a three year period of reduction from 4.20 to 3.87 stillbirths per 1,000 total births (2013 to 2015).
3. The rate of neonatal mortality in the UK has shown a slow but steady decline over the period 2013 to 2016 from 1.84 to 1.72 deaths per 1,000 live births.
4. The timing of the reporting of deaths to MBRRACE-UK in 2016 shows a wide variation across the four countries of the UK. Data entry was started within 6 months of a death for 95.1% of cases in Wales, 86.7% in England, 71.7% in Northern Ireland and 64.0% in Scotland.
5. All stabilised & adjusted stillbirth rates for commissioning groups, Trusts and Health Boards, Neonatal Networks and Local Authorities now fall within 10% of the UK or their comparator average. Wider variation is seen for neonatal mortality rates.
6. For the Trusts and Health Boards which care for the most complex pregnancies and deliveries, the reported neonatal mortality rates show a wide variation, with rates of between 1.78 and 3.52 per 1,000 live births in those with level 3 Neonatal Intensive Care Units (NICUs) and surgical provision and significantly lower rates in the small units delivering less than 2,000 births per annum (0.97 to 1.18). This variation reflects both the high risk case-mix in the Trusts and Health Boards with level 3 NICUs and surgical provision which cannot be fully accounted for by stabilisation & adjustment as well as any variation in the quality of care provision.
7. The marked regional variation in crude rates of neonatal mortality for STPs is clear. However, the variation in the stabilised & adjusted rates of neonatal mortality has reduced in 2016, with rates ranging from 1.44 to 2.05 deaths per 1,000 live births.
8. Significant variation in the rates of extended perinatal mortality across the UK persists, even after taking into account the effects of chance and the case-mix differences we are able to account for, with stabilised & adjusted extended perinatal mortality rates for commissioning organisations ranging from 5.32 to 6.29 deaths per 1,000 total births.

9. There has been a small increase in the rate of consent for post-mortem for stillbirth from 47.2% to 49.4% (2014 to 2016) and a small decrease for neonatal deaths from 29.1% to 28.6% over the same period. However, the offer of a post-mortem to parents was reported in almost all stillbirths (97.8%) and for 81.3% of neonatal deaths.
10. There has been a small but non-significant improvement in the percentage of stillbirths in the UK for which placental histology is carried out: 89.9% in 2016 compared to 88.8% in 2015.
11. Relative to singletons there has been a significant reduction in both the stillbirth and neonatal death rate ratios associated with twin pregnancies over the period 2014 to 2016, reducing from 2.8 (95% CI, 2.47 to 3.17) to 1.6 (95% CI, 1.36 to 1.88) for stillbirths and from 4.91 (95% CI, 4.20 to 5.73) to 3.33 (95% CI, 2.80 to 3.98) for neonatal deaths.
12. There is a steady improvement in data quality overall, although there continues to be a problem with the completion of some maternal data especially carbon monoxide exposure monitoring (43.1% complete).

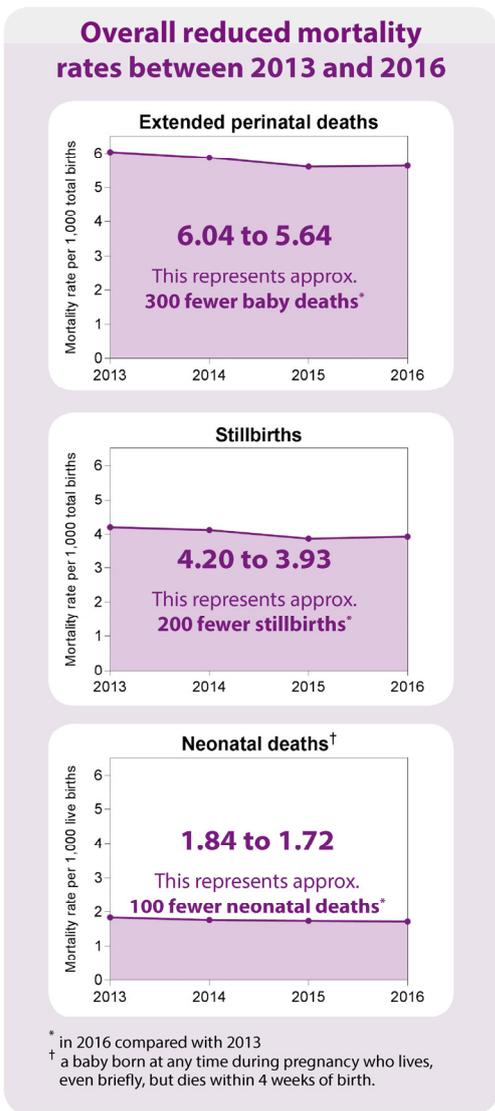
Recommendations

1. In order to achieve the various UK Governments' ambitions renewed efforts need to be focused on reducing stillbirths and continuing the slow but steady decline in neonatal mortality rates observed since 2013.
2. In order to facilitate the close working between MBRRACE-UK and the Perinatal Mortality Review Tool (PMRT), within Trusts and Health Boards all stillbirths and neonatal deaths should be notified to MBRRACE-UK via the joint web-based system as soon as possible following the death.
3. Commissioning organisations should review both their crude and their stabilised & adjusted mortality rates to facilitate the identification of high risk populations and to target interventions for known inequalities.
4. Trusts and Health Boards with a stabilised & adjusted stillbirth, neonatal mortality or extended perinatal mortality rate that falls into the red or amber band should carry out an initial investigation of their data quality and possible contributing local factors.
5. Irrespective of where they fall in the spectrum of national performance all Trusts and Health Boards should use the national PMRT to review all their stillbirths and neonatal deaths.
6. Trusts and Health Boards should ensure that the data provided to MBRRACE-UK is of the highest quality. This is of particular importance for those providing the most complex care to particularly high-risk mothers and babies as this will permit more appropriate sub-analyses and comparisons.
7. A national forum should be established by NHS England, the Scottish government, NHS Wales, and the Northern Ireland Department of Health, in conjunction with professional bodies and national healthcare advisors responsible for clinical standards in relevant specialties, to agree an appropriate benchmark against which stillbirth and neonatal mortality rates should be monitored across the UK. This process should be facilitated by HQIP.
8. Public health initiatives should continue to be developed to reduce the impact of known risk factors for stillbirth and neonatal death; for example, smoking and obesity.
9. Trust and Health Board Perinatal Review groups should focus on the quality of cause of death coding.
10. All parents of babies who die should be provided with unbiased counselling for post-mortem to enable them to make an informed decision.
11. Placental histology should be undertaken for all stillbirths and if possible all anticipated neonatal deaths, preferably by a perinatal pathologist.

12. All Trusts and Health Boards should endeavour to improve the quality and completeness of data reported to MBRRACE-UK and for routine inpatient, and birth and death registration purposes. Children's hospitals should continue to develop and embed systems that allow for consistent liaison with birth hospitals to facilitate the collection of maternal information.

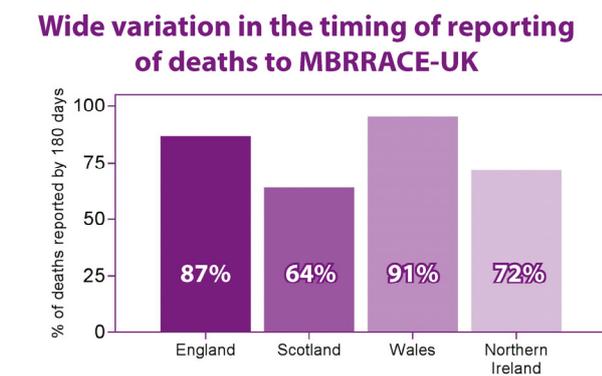
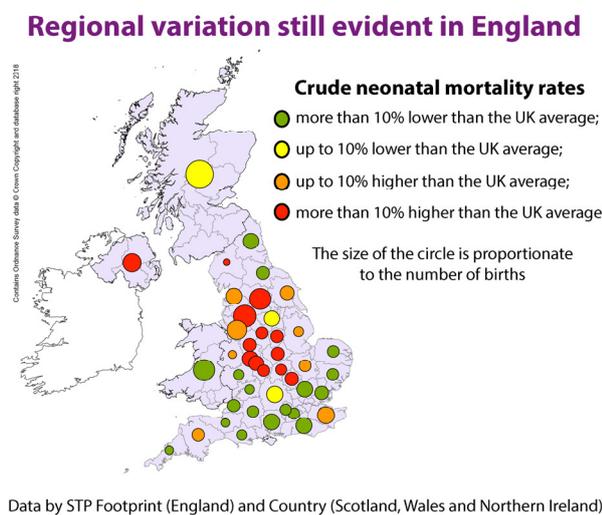
Baby deaths in the UK – the national picture for 2016

780,043 births
of babies delivered from 24 weeks of pregnancy, excluding terminations of pregnancy



Improved survival for twins

The stillbirth rate in twins has reduced by **almost half** since 2014
Neonatal deaths in twins have reduced by **almost a third** during the same period



Post-mortem examination continues to vary between stillbirths and neonatal deaths

Almost all parents of stillborn babies were offered a post-mortem

Of these parents, **1 in 2** consented to a post-mortem

8 out of 10 parents of babies who died neonatally were offered a post-mortem

Of these parents, **1 in 3** consented to a post-mortem

Placental histology was carried out for:

9 out of 10 stillbirths but for only **7 out of 10** neonatal deaths which occurred on day 1, or were related to problems during delivery



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Abbreviations

BMI	Body Mass Index
CCG	Clinical Commissioning Group
CHI	Community Health Index (Scotland)
CI	Confidence Interval
CNST	Clinical Negligence Scheme for Trusts
CODAC	Cause Of Death & Associated Conditions
EDD	Estimated Date of Delivery
FAQ	Frequently Asked Questions
GSS	Government Statistical Service
HQIP	Healthcare Quality Improvement Partnership
HSIB	Healthcare Safety Investigation Branch
ISD	Information Services Division (Scotland)
MBRRACE-UK	Mothers and Babies: Reducing Risk through Audits and Confidential Enquiries across the UK
MNI-CORP	Maternal, Newborn and Infant Clinical Outcome Review Programme
NBCP	National Bereavement Care Pathway
NICU	Neonatal Intensive Care Unit
NIMACH	Northern Ireland Maternal and Child Health
NIMATS	Northern Ireland Maternity System
NISRA	Northern Ireland Statistics and Research Agency
NRS	National Records of Scotland
ONS	Office for National Statistics
PDS	Personal Demographics Service
PMRT	Perinatal Mortality Review Tool
RCOG	Royal College of Obstetricians and Gynaecologists
SMR	Standardised Mortality Ratio
SMR02	Maternity Inpatient and Day Case Dataset (Scotland)
STP	Sustainability and Transformation Partnership



Acknowledgements

It is with grateful thanks that the MBRRACE-UK collaboration would like to acknowledge the contribution of the many healthcare professionals and staff from the health service and other organisations who were involved in the reporting of perinatal deaths in the UK. It is only through this generous contribution of their time and expertise that it has been possible to conduct this national perinatal mortality surveillance and to continue the UK tradition of national self-audit to improve care for mothers, babies and their families.

We would particularly like to thank all MBRRACE-UK Lead Reporters and other staff in NHS Trusts, Health Boards and Health and Social Care Trusts across the UK, and those from the Crown Dependencies, whose contribution made it possible to carry out this surveillance. Due to the large number of individuals involved all Lead Reporters are acknowledged and listed in Appendix A2.

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NHS Digital

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1. Introduction / background

This is the fourth MBRRACE-UK Perinatal Mortality Surveillance Report and provides information on extended perinatal deaths in the UK and Crown Dependencies arising from births during 2016.

MBRRACE-UK are commissioned by the Healthcare Quality Improvement Partnership (HQIP) to undertake the Maternal, Newborn and Infant Clinical Outcome Review Programme (MNI-CORP). The aims of the MNI-CORP are to collect, analyse and report national surveillance data and conduct national confidential enquiries in order to stimulate and evaluate improvements in health care for mothers and babies (Box 1). This report focuses on **the surveillance of all late fetal losses (22⁺⁰ to 23⁺⁶ weeks gestational age), stillbirths, and neonatal deaths.**

Box 1: Scope of the Maternal, Newborn and Infant Clinical Outcome Review Programme

- Surveillance and confidential enquiries of all maternal deaths – that is, deaths of women who are pregnant or who die up to 1 year after their pregnancy ends.
- Confidential enquiries of an annual rolling programme of topic-specific, serious maternal morbidity.
- Surveillance of all late fetal losses (22⁺⁰ to 23⁺⁶ weeks gestational age), stillbirths, and neonatal deaths.
- A biennial programme of topic-specific confidential enquiries into aspects of stillbirth and infant death or serious infant morbidity.

Perinatal mortality surveillance involves the identification and notification of all eligible deaths and the timely collection of a limited and tightly defined demographic and clinical dataset. The goal is to receive notification of every death and to collect high-quality data about each one. This information allows the calculation of 'stabilised & adjusted' mortality rates which take into account the effects of chance variation and also allow for key factors known to increase the risk of perinatal mortality (see Chapter 2 for further explanation). This information is presented in order to assist clinicians, commissioners, managers, parents, and the public in raising standards of obstetric and neonatal care in order to reduce perinatal mortality across the UK.

1.1 Overview of this report and changes from previous reports

This report is divided into eight chapters, with additional information provided in the Appendices.

In Chapter 2 the MBRRACE-UK data collection process is described, together with the methods used for reporting mortality. The national mortality rates for stillbirth, neonatal mortality, and extended perinatal mortality rates for babies born at 24⁺⁰ weeks gestational age or later (excluding terminations of pregnancy) are presented in Chapter 3. For the first time national mortality rates for babies born at 22⁺⁰-23⁺⁶ weeks are also presented. In addition, this chapter also includes national trends in perinatal mortality for the period 2013-2016. In Chapter 4 crude and stabilised & adjusted mortality rates are presented for babies born at 24⁺⁰ weeks gestational age or later (excluding terminations of pregnancy) by the organisation responsible for population-based care commissioning (based on mother's postcode at time of delivery). Mortality rates are also reported in this chapter by Sustainability and Transformation Partnership (STP) areas in England. Mortality rates by service delivery organisation based on place of birth are reported in Chapter 5, firstly for Trusts and Health Boards and then aggregated by Neonatal Network. Chapter 6 provides mortality rates by Local Authority of the mother's residence.

Chapter 7 presents trends in the reported causes of death (known and unknown) by local teams using the Cause of Death & Associated Conditions (CODAC) categorisation of cause of death. Referrals to the Coroner or Procurator Fiscal are presented by Neonatal Network.

In the final chapter (Chapter 8), trends in the mortality rates for those mothers and babies who are considered to have significant risk factors are shown and issues of data completeness are discussed.

This year the full version of this report will only be available as a downloadable document, available from the MBRRACE-UK website (www.npeu.ox.ac.uk/mbrpace-uk/reports).

1.2 Perinatal mortality in the UK – policy and initiative overview

Data from statutory birth and death registrations in 2016 show that stillbirth rates for the UK as a whole have remained static since 2015 at 4.4 per 1,000 total births (Appendix A1). However, once again this is not reflected in the UK neonatal mortality figures where the rate has shown a small increase from 2.7 to 2.8 per 1,000 live births (in 2015 and 2016 respectively). As such, rates of stillbirth and neonatal death continue to remain high compared with other, similar, high income countries.

Findings from the MBRRACE-UK Confidential Enquiry into term, intrapartum stillbirth and intrapartum-related neonatal death [4] confirmed the continuing need for the Saving Babies Lives [3] initiative in terms of risk factor assessment and management of reduced fetal movements, as well as screening for growth disorders and smoking during pregnancy. This report also highlighted the increasing complexity of the pregnant population, capacity issues in maternity services and the need for improvement in the quality of reviews.

In 2017, a collaboration led by MBRRACE-UK was commissioned by HQIP to develop, implement and maintain a national standardised Perinatal Mortality Review Tool (PMRT) building on the work of the Department of Health / Sands Perinatal Mortality Review 'Task and Finish Group'. The national PMRT (which currently includes England, Scotland and Wales) has been designed with user and parent involvement to support high quality standardised local perinatal reviews on the principle of 'review once, review well'. As part of NHS Resolution's incentive to support the delivery of best practices in maternity and neonatal care in England, use of the PMRT has been identified as one of ten actions agreed by the National Maternity Safety Champions. Trusts who can demonstrate compliance with all ten criteria are entitled to a reduction in their Clinical Negligence Scheme for Trusts (CNST) maternity contribution of at least 10%. More information about the PMRT, including support for implementation and information for bereaved parents, is available at: www.npeu.ox.ac.uk/pmrt. Close working between MBRRACE-UK, the PMRT, the newly established Healthcare Safety Investigation Branch (HSIB) and the other UK devolved nations will ensure efficient use of resources and national improvement in the quality of reviews.

Pilot testing of the National Bereavement Care Pathway (NBCP) began in October 2017 in preparation for rollout across England and Scotland in late 2018. Developed by Sands in collaboration with other charities and professional bodies, the NBCP aims to support professionals to deliver high quality, parent-centred bereavement care to parents when their baby dies.

England

Since the launch of the Secretary of State's target for England, in November 2015, to reduce stillbirth, neonatal death, maternal death and brain injuries sustained around the time of birth by half by 2030 with a reduction of 20% by 2020, maternity services have been working hard to achieve this goal. To facilitate this process, in October 2016 the Department of Health published "Safer Maternity Care – Next steps towards the national maternity ambition" [1] setting out an action plan on how to achieve this national ambition. Five key drivers were identified to deliver safer maternity care: leadership, learning and best practice, team working, improving data quality and innovation. In November 2017, the updated "Safer Maternity Care" report [2] indicated that England was currently on track to meet the early target of reducing stillbirths, neonatal deaths and maternal deaths by 20% by 2020. A resetting of the National Maternity Safety Ambition to halve these rates by 2025 was therefore announced by the Secretary of State for Health in November 2017, at the launch of the MBRRACE-UK Confidential Enquiry report into term, intrapartum stillbirths and intrapartum-related neonatal deaths at the Royal College of Obstetricians and Gynaecologists (RCOG).

A three-year programme, The Maternal and Neonatal Health Safety Collaborative, was launched by NHS Improvement's Patient Safety team in February 2017. The aim is to focus on system-level improvements to

maternal and neonatal health by supporting 134 Trusts to create, develop and share skills, resources and data. Nominated leads at each Trust will attend nine days of learning, sharing their experiences with Trusts in subsequent waves of implementation. An additional NHS Improvement initiative aims to reduce harm leading to avoidable admissions to neonatal units of term babies by providing Trusts with resources, staffing models and examples of good practice in four areas identified as causing significant harm to babies.

Work continues to provide more support for better, safer care including the development of Maternity Safety Champions, help with the implementation of the Saving Babies Lives Care Bundle [3] and e-learning programmes to help health professionals improve outcomes for mother and baby. There is also a major emphasis on improving the quality of reviews, with the launch of the national PMRT and investigations of the Each Baby Counts eligible babies by HSIB as well as consideration of coroners' investigation into term stillbirths.

Scotland

Following a mid-term review of the Maternity and Children Quality Improvement Collaborative (MCQIC) programme at the end of 2017, the overall aim in Scotland was revised to *“reduce the incidence of avoidable harm and acute maternal morbidity in women and babies by 30% by March 2019”*. Two of the sub-aims are focused on reducing perinatal mortality: (i) to reduce stillbirths by 35% and (ii) to reduce neonatal mortality by 15%. MCQIC are supporting improvement activity in maternity and neonatal care to help deliver these aims.

Wales

Safer Pregnancy Wales, a year-long campaign developed by the Wales Maternity Network in collaboration with 1000 Lives Improvement, is now active. The campaign aims to reduce the risk of stillbirth by helping mothers make healthy lifestyle choices to keep them and their babies safe, and highlighting key areas mothers should discuss with their midwife and other health professionals (full details are available at: www.1000livesplus.wales.nhs.uk/safer-pregnancy).

Northern Ireland

The Northern Ireland Baby Report 2018 [5], produced by Bliss and TinyLife, was published in February 2018. Presenting the results of a survey of all neonatal units operating in Northern Ireland in 2016/17, this report highlighted the key issues and challenges currently faced by the country's neonatal services, with capacity, funding and resources being of particular concern.



2. MBRRACE-UK methods for reporting perinatal mortality rates

2.1 Deaths reported to MBRRACE-UK

Deaths reported to MBRRACE-UK since 1 January 2013 are:

- *late fetal losses*: a baby delivered between 22⁺⁰ and 23⁺⁶ weeks gestational age showing no signs of life, irrespective of when the death occurred;
- *stillbirths*: a baby delivered at or after 24⁺⁰ weeks gestational age showing no signs of life, irrespective of when the death occurred;
- *neonatal deaths*: a liveborn baby (born at 20⁺⁰ weeks gestational age or later, or with a birthweight of 400g or more where an accurate estimate of gestation is not available) who died before 28 completed days after birth.

These definitions also include any late fetal loss, stillbirth, or neonatal death resulting from a termination of pregnancy.

In an effort to ensure complete data collection and to facilitate international comparisons, the eligibility criteria for MBRRACE-UK are based on gestational age at delivery irrespective of when the death occurred. Therefore, all births delivered from 22⁺⁰ weeks gestational age showing no signs of life must be reported, irrespective of when the death occurred; the date of delivery and date of confirmation of death are both reported for these deaths.

MBRRACE-UK has established a secure online reporting system which can be accessed by all UK Trusts and Health Boards. Responsibility for reporting a death and for the completeness and the quality of the data reported to MBRRACE-UK lies with the Trust or Health Board where the death occurred. Each Trust and Health Board has identified a small number of MBRRACE-UK Lead Reporters who act as key points of contact between their organisation and MBRRACE-UK. A comprehensive network of more than 500 Lead Reporters has been established across all UK delivery sites (see Appendix A2). In order to check for any relevant deaths that have not been reported to MBRRACE-UK, details of statutorily registered deaths are obtained from the Office for National Statistics (ONS) (England and Wales), National Records of Scotland (NRS) (Scotland), Northern Ireland Maternity System (NIMATS) and Northern Ireland Statistics and Research Agency (NISRA) (Northern Ireland), Health Intelligence Unit (Bailiwick of Jersey) and Health and Social Services Department (Bailiwick of Guernsey). More details of the MBRRACE-UK reporting system are given in Appendix A4.

2.2 Information collected by MBRRACE-UK

Comprehensive information about each death is requested by MBRRACE-UK in order to allow detailed examination of the risk factors for perinatal mortality in the UK. Data items are collected with the aims of, first, offering more appropriate adjustment of the crude mortality rates than had previously been possible and, second, providing a clearer insight into the health, social and lifestyle factors most commonly associated with stillbirth or neonatal death. The data relating to each death consists of information about the following:

- mother's and baby's identifying information (to permit the cross-checking of each death against other national databases and to facilitate the identification of duplicate records);
- mother's health, lifestyle and previous pregnancy history;
- mother's antenatal care;
- labour and delivery;
- cause of death and post-mortem examination.

Details of the data requested for each late fetal loss, stillbirth and neonatal death can be found in Appendix A3. Approvals have been obtained from all relevant authorities in order for identifiable data to be collected without consent and to access statutory birth and death information (Appendix A4.1).

Details of the completeness of key variables reported by Trusts and Health Boards in relation to deaths of babies born in 2016 are given in Appendix A5. In order to help reporters, a 'traffic light' system has also been developed within the MBRRACE-UK reporting system to highlight the completeness of data collection in the various sections of the case record form.

2.3 The 2016 birth cohort

In this report, rates of stillbirth, neonatal death and extended perinatal death are presented for births from 1 January 2016 to 31 December 2016; thus, neonatal deaths of December 2016 births which occurred in January 2017 are included. The reporting of mortality for a birth cohort is in contrast to statutory publications, which are based on deaths in a calendar year. This method of reporting allows more accurate estimates of mortality rates to be produced as appropriate denominators are available.

Individual level information on all births in the UK and Crown Dependencies is obtained in order to generate mortality rates adjusted for maternal, baby, and socio-demographic risk factors. Information for England, Wales and the Isle of Man (Personal Demographics Service (PDS) and ONS birth registration data), Scotland (NRS and Information Services Division; ISD), Northern Ireland (NIMATS), Bailiwick of Guernsey (Health and Social Services Department) and the Bailiwick of Jersey (Health Intelligence Unit) were combined to give a single dataset of births for the whole UK and Crown Dependencies. This data was then combined with the information on the deaths to obtain the final data for analysis. Details of the generation of the births dataset are provided in Appendix A4.

It is important to note that, since 29 April 2016, NHS Digital removes certain patient records from data provided for England where a patient has requested an opt-out. The NHS Constitution states *"You have the right to request that your confidential information is not used beyond your own care and treatment and to have your objections considered"*. To support those NHS constitutional rights, patients within England are able to opt out from their personal confidential information being shared by NHS Digital for purposes other than their own direct care, this is known as the 'Type 2 opt-out'. Patients are able to register the opt-out at their GP practice. There were 19,800 Type 2 opt-outs relating to births in 2016. These do not appear to be distributed randomly across the country, suggesting external influences are playing a role in some opt-outs. As a result of the opt-outs, there are considerably higher numbers of births with missing information about gestational age and ethnicity in this report for England, since the data from NHS Digital is the only source of this information for all births.

2.4 Deaths included in reported mortality rates

In order to facilitate the comparability of mortality rates between organisations, with the exception of Table 3 and Table 4 in Chapter 3, which include data from 22 and 23 week births, **births less than 24⁺⁰ weeks gestational age and terminations of pregnancy have been excluded from the mortality rates reported in the main maps and tables**. This avoids the influence of the wide disparity in the classification of babies born before 24⁺⁰ weeks gestational age as a neonatal death or a fetal loss as well as the known variation in the rate of termination of pregnancy for congenital anomaly across the UK. The mortality rates reported in the main maps and tables include all eligible deaths, including deaths due to congenital anomalies.

The number of deaths of babies born in 2016 in the UK reported here will differ from that of statutorily registered deaths published by ONS (England and Wales), NRS (Scotland), and NIMATS and NISRA (Northern Ireland) because of the exclusion criteria used in this report to ensure comparability of mortality rates. It is important to recognise that data sources from statutorily registered births and deaths include both birth and death registrations following termination of pregnancy from 24⁺⁰ weeks gestational age and variable inclusion of births at 23⁺⁶ weeks gestational age and below, depending on whether they were reported as being liveborn or not. MBRRACE-UK received stillbirth and neonatal death registrations from statutory sources for babies born in 2016. These data were matched to the detailed MBRRACE-UK death notifications. Of these registered deaths,

neonatal deaths were excluded if delivery was before 24⁺⁰ weeks gestational age or they were a termination of pregnancy (deaths were classified as resulting from a termination of pregnancy based on the detailed MBRRACE-UK data).

In addition to registered deaths obtained from ONS, ISD and Northern Ireland Maternal and Child Health (NIMACH), additional deaths are reported to MBRRACE-UK for:

- the small number of deaths statutorily registered with ONS, ISD or NIMACH only after considerable delay, most often because an inquest was being held;
- late fetal losses delivered at 22⁺⁰ to 23⁺⁶ weeks gestational age which are not subject to statutory registration;
- stillbirths delivered at 24⁺⁰ weeks gestational age or greater where the death was confirmed before 24⁺⁰ weeks gestational age; these are not routinely registered as stillbirths, as recommended by RCOG guidance and agreed with the Department of Health [6, 7].

2.5 Organisations for which mortality rates are reported

Rates of stillbirth, neonatal death, and extended perinatal death are reported for four groups of clinical and administrative organisations:

1. **Organisations responsible for population-based care commissioning based on postcode of mother's residence at time of delivery:**
 - England: Clinical Commissioning Groups (CCGs); STP areas;
 - Scotland: National and Health Boards;
 - Wales: National and Health Boards;
 - Northern Ireland: National and Local Commissioning Groups;
 - Crown Dependencies: Isle of Man, Bailiwick of Guernsey, and Bailiwick of Jersey.
2. **Service delivery organisations based on place of birth:**
 - England: NHS Trusts;
 - Scotland: Health Boards;
 - Wales: Health Boards;
 - Northern Ireland: Health and Social Care Trusts;
 - Crown Dependencies: Isle of Man, Bailiwick of Guernsey, and Bailiwick of Jersey.
3. **UK Neonatal networks based on place of birth.**
4. **Local government areas based on postcode of mother's residence at time of delivery:**
 - England: Single tier authorities, upper tier authorities and London boroughs;
 - Scotland: Unitary authorities;
 - Wales: Local authorities;
 - Northern Ireland: Local government districts;
 - Crown Dependencies: Isle of Man, Bailiwick of Guernsey, and Bailiwick of Jersey.

2.6 Analysis of mortality rates

Three mortality outcomes are reported for each organisation: stillbirth, neonatal death, and extended perinatal death. These mortality rates are presented in two different ways: as a 'crude' mortality rate and as a 'stabilised & adjusted' mortality rate.

The **crude mortality rate** is the number of deaths divided by the number of total births (or live births in the case of neonatal mortality) for 2016 and provides an annual snapshot of the mortality in an organisation.

While the crude rate is informative, in that it describes exactly what happened for the organisation, it can be potentially misleading when trying to highlight organisations where the mortality rate is higher than expected due to variation in the quality of care. First, the number of perinatal deaths for many organisations is likely to be small, as these deaths are rare, and there will be more deaths in some years than in others just by chance. This can lead to large fluctuations in the annual crude mortality rate, especially for organisations that have a very small number of births. Second, some organisations have more women at high risk of experiencing a stillbirth or neonatal death; for example, due to areas of high socio-economic deprivation, and thus the case-mix of the population served can influence mortality rates even when high quality maternity and neonatal care is provided.

In order to be able to compare organisations more fairly, **stabilised & adjusted mortality rates** have been calculated and presented alongside the crude mortality rates. Where there is only a small number of births in an organisation it is difficult in any one year to be sure that any extreme value seen for the crude mortality rate is real and not just a chance finding. A **stabilised** rate allows for the effects of chance variation due to small numbers. For this reason, the stabilised & adjusted mortality rate will tend to be closer to the average mortality rate than will the crude mortality rate, especially for organisations with a small number of births.

The mortality rates are also **adjusted** to account for key factors which are known to increase the risk of perinatal mortality. The extent of the adjustment is limited to only those factors that are collected for all births across the whole of the UK: mother's age; socio-economic deprivation based on the mother's residence; baby's ethnicity; baby's sex; whether they are from a multiple birth; and gestational age at birth (neonatal deaths only). Therefore, some factors that might be associated with poor perinatal outcomes could not be taken into account in the adjustment because they are not universally collected on all births; for example, maternal smoking and body mass index (BMI). (See Appendix A5 for more details.)

It is important to remember that the mortality rates reported are not definitive measures of the quality of care received by any individual or group. Some of the variation in mortality rates shown in this report might be the result of differences in the proportion of high-risk pregnancies that cannot be accounted for in the analyses due to a lack of routinely collected detailed clinical information for all births (as described above). However, given the information that is available, the rates reported here are robust and make an important contribution in highlighting those organisations where extra investigations should be targeted in order to improve the quality of perinatal and neonatal care in the UK.

2.7 Identifying potentially high and low rates of death

The crude and the stabilised & adjusted mortality rates are presented as both tables and maps. In the maps, each organisation has been colour coded based on the extent to which their particular mortality rate is above or below the 'average' mortality rate. For the organisations based on the postcodes of the mothers' residences at time of delivery, and for Neonatal Networks, this average is the overall observed mortality rate for the whole of the UK and the Crown Dependencies.

However, it is known that service delivery organisations based on the place of birth vary widely in the risk profile of pregnancies referred to their service and, therefore, it is reasonable to anticipate variation in their expected mortality rates. To help account for the variation due to the risk profile, all Trusts and Health Boards have been classified hierarchically into five mutually exclusive comparator groups based on their level of service provision and are compared to the average mortality rate within their comparator group. The five comparator groups are:

1. Level 3 Neonatal Intensive Care Unit (NICU) and neonatal surgery.
2. Level 3 NICU.
3. 4,000 or more births per annum at 22 weeks or later.
4. 2,000-3,999 births per annum at 22 weeks or later.
5. Under 2,000 births per annum at 22 weeks or later.

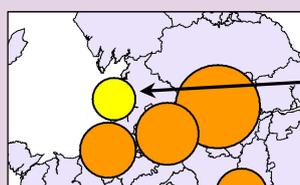
The colour coding used in the maps and tables is:

- Green: more than 10% lower than the average.
- Yellow: up to 10% lower than the average.
- Amber: up to 10% higher than the average.
- Red: more than 10% higher than the average.

The size of the circles on each map represents the number of births in the population covered by the particular organisation, although there is a minimum size in order that the colour can be adequately seen.

The accompanying tables show both the crude and the stabilised & adjusted rate for stillbirth, neonatal death, and extended perinatal death for each organisation. In order to avoid the effect of any local policy decisions regarding the classification of live and stillbirth at the extremes of viability, particular emphasis is given to the extended perinatal mortality rate and each organisation has been colour coded based on their stabilised & adjusted extended perinatal mortality rate in an identical manner to the maps.

Figure 1: Example of the presentation of the mortality rates in this report



Stabilised & adjusted extended perinatal mortality rate up to 10% lower than the UK average

Neonatal Network	Total births [§]	Rate per 1,000 births [§]						
		Stillbirth [†]		Neonatal [‡]		Extended perinatal [†]		
		Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI) [#]	
North West (Cheshire and Merseyside)	29,259	3.11	3.75 (3.27 to 4.30)	2.34	2.10 (1.65 to 2.77)	5.43	5.92 (5.50 to 7.21)	●
North West (Greater Manchester)	38,221	4.08	3.88 (3.46 to 4.40)	2.19	1.84 (1.50 to 2.30)	6.25	5.74 (5.48 to 6.86)	●
North West (Lancashire and South Cumbria)	17,420	4.31	4.03 (3.54 to 4.61)	1.73	1.57 (1.21 to 2.06)	6.03	5.55 (5.14 to 6.70)	●

2.8 Suppression of rates calculated when there are few deaths

In order to avoid disclosure of information which could potentially identify individuals, crude mortality rates based on a very small number of deaths have not been included, in line with guidance from ONS [8] and the Government Statistical Service (GSS) [9]. Suppressed mortality rates are shown as a white dot (○) on the maps and in the tables, where appropriate.



3. Perinatal mortality rates in the UK: 2016

The data in this chapter mainly relates to the information available for the UK about the rates of stillbirth, neonatal death, and extended perinatal death (stillbirth and neonatal deaths combined) for births that occurred in 2016 at 24⁺⁰ weeks gestational age or later (excluding terminations of pregnancy). However, this year we have also included national mortality rates for the late fetal losses and neonatal deaths of 22 and 23 weeks gestational age in the tables where the numbers and rates of stillbirths, neonatal deaths and extended perinatal mortality are presented by gestational age band (Table 3 and Table 4).

This year all mortality numbers and rates for stillbirths, neonatal deaths and extended perinatal deaths are presented across several chapters in the main MBRRACE-UK report in order to make the information by the various organisations more straightforward to find. In this chapter we have included data for the UK as a whole and individually for the four countries of the UK and for the Crown Dependencies for 2016 alone and then, presented in both tabular and graphical format, that showing the trends in mortality rates over the four years of MBRRACE-UK (2013 to 2016).

Mortality rates for the various commissioning organisations (CCGs and STPs) across the UK, based on the postcode of the mother's place of residence at time of delivery, are presented in Chapter 4. In Chapter 5 mortality rates are given both for Trusts and Health Boards across the UK that provide perinatal care and also by Neonatal Network, where deaths have been allocated based on the Trust or Health Board in which the baby was born. Chapter 6 presents mortality rates by the Local Authority of the mother's place of residence.

3.1 Mortality rates for the UK as a whole, the four countries of the UK, and the Crown Dependencies

The data shown in Table 1 and Table 2 below is derived from a number of sources in addition to the information submitted via the MBRRACE-UK reporting system: ONS, PDS, NRS, ISD, NISRA, Health and Social Services Department (Bailiwick of Guernsey), and the Health Intelligence Unit (Bailiwick of Jersey).

The data shown in these tables this year has been revised from previous reports. Here, the UK total is based on all births for the UK (irrespective of country of residence) whereas the number of births for each individual UK country and the Crown Dependencies is based on those births for which the country of residence of the mother was known.

Using the UK total of births irrespective of country of mother's residence, the total number of births at 24⁺⁰ weeks or greater gestational age (excluding terminations of pregnancy) in 2016 was slightly lower than in 2015: (780,043 versus 783,144 births, respectively). However, there was a small increase in the total number of stillbirths (3,065 in 2016 compared with 3,032 in 2015) alongside a small decrease in the number of neonatal deaths (1,337 in 2016 compared with 1,360 in 2015). These combined changes led to a very small increase in the reported mortality rates for 2016 across the UK as a whole; the crude extended perinatal mortality rate was 5.64 per 1,000 total births (5.61 in 2015), comprising 3.93 stillbirths per 1,000 total births (3.87 in 2015) and 1.72 neonatal deaths per 1,000 live births (1.74 in 2015).

In addition to the UK totals, in Table 1 the number of births, stillbirths, neonatal deaths and extended perinatal deaths are shown separately for the four countries of the UK and the Crown Dependencies, based on the mother's country of residence. The associated mortality rates are shown in Table 2. Overall rates of stillbirth and type of stillbirth showed no significant variation between countries. However, in 2016 the rate of stillbirth was highest for Wales at 4.4 per 1,000 total births compared with the other UK countries. Despite the lowest rate of stillbirth being in Scotland (3.67 per 1,000 total births), this was a small increase on their stillbirth rate in 2015 (3.47 per 1,000 total births). Conversely, Wales had the lowest rate of neonatal mortality in 2016 at 1.43

per 1,000 live births, with the highest neonatal mortality rate being in Northern Ireland (2.20 per 1,000 live births). It is important to note that stillbirth and neonatal mortality rates in Northern Ireland are affected by differences in the law relating to termination of pregnancy, with more babies affected by major congenital anomalies being carried into the later stages of pregnancy and resulting in early neonatal deaths (see Chapter 6). The number of babies born in the Crown Dependencies is too few to permit reliable comparison with the four countries of the UK.

Table 1: Number of births, stillbirths, neonatal deaths, and extended perinatal deaths by country of residence: United Kingdom and Crown Dependencies, for births in 2016

Number [§]	UK [^]	England	Scotland	Wales	Northern Ireland [°]	Crown Dep.
Total births	780,043	665,533	54,705	33,077	24,170	2,381
Live births	776,978	662,922	54,504	32,930	24,074	2,373
Stillbirths	3,065	2,611	201	147	96	8
Antepartum	2,692	2,289	179	128	86	8
Intrapartum	265	229	17	13	6	0
Unknown timing	108	93	5	6	4	0
Neonatal deaths	1,337	1,141	92	47	53	3
Early neonatal deaths	930	789	62	37	38	3
Late neonatal deaths	407	352	30	10	15	0
Perinatal deaths	3,995	3,400	263	184	134	11
Extended perinatal deaths	4,402	3,752	293	194	149	11

[§] excluding terminations of pregnancy and births <24⁺⁰ weeks gestational age

[^] including the Crown Dependencies

[°] different laws exist in Northern Ireland for the termination of pregnancy

Data sources: MBRRACE-UK, ONS, PDS, NRS, ISD, NIMATS, States of Guernsey, States of Jersey

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Table 2: Stillbirth, neonatal, and extended perinatal mortality rates (95% confidence intervals (CIs)) by country of residence: United Kingdom and Crown Dependencies, for births in 2016

Rate per 1,000 births [§]	UK [^]	England	Scotland	Wales	Northern Ireland [°]	Crown Dep.
Stillbirths[†]	3.93	3.92	3.67	4.44	3.97	3.36
	(3.79 to 4.07)	(3.77 to 4.07)	(3.17 to 4.18)	(3.73 to 5.16)	(3.18 to 4.76)	(1.04 to 5.68)
Antepartum [†]	3.45	3.44	3.27	3.87	3.56	3.36
	(3.32 to 3.58)	(3.30 to 3.58)	(2.79 to 3.75)	(3.20 to 4.54)	(2.81 to 4.31)	(1.04 to 5.68)
Intrapartum [†]	0.34	0.34	0.31	0.39	0.25	0.00
	(0.30 to 0.38)	(0.30 to 0.39)	(0.16 to 0.46)	(0.18 to 0.61)	(0.05 to 0.45)	(0.00 to 0.00)
Unknown timing [†]	0.14	0.14	0.09	0.18	0.17	0.00
	(0.11 to 0.16)	(0.11 to 0.17)	(0.01 to 0.17)	(0.04 to 0.33)	(0.00 to 0.33)	(0.00 to 0.00)
Neonatal deaths[‡]	1.72	1.72	1.69	1.43	2.20	1.26
	(1.63 to 1.81)	(1.62 to 1.82)	(1.34 to 2.03)	(1.02 to 1.84)	(1.61 to 2.79)	(0.00 to 2.69)
Early neonatal deaths [‡]	1.20	1.19	1.14	1.12	1.58	1.26
	(1.12 to 1.27)	(1.11 to 1.27)	(0.85 to 1.42)	(0.76 to 1.49)	(1.08 to 2.08)	(0.00 to 2.69)
Late neonatal deaths [‡]	0.52	0.53	0.55	0.30	0.62	0.00
	(0.47 to 0.57)	(0.48 to 0.59)	(0.35 to 0.75)	(0.12 to 0.49)	(0.31 to 0.94)	(0.00 to 0.00)
Perinatal deaths[†]	5.12	5.11	4.81	5.56	5.54	4.62
	(4.96 to 5.28)	(4.94 to 5.28)	(4.23 to 5.39)	(4.76 to 6.36)	(4.61 to 6.48)	(1.90 to 7.34)
Extended perinatal deaths[†]	5.64	5.64	5.36	5.87	6.16	4.62
	(5.48 to 5.81)	(5.46 to 5.82)	(4.74 to 5.97)	(5.04 to 6.69)	(5.18 to 7.15)	(1.90 to 7.34)

[†] per 1,000 total births

[‡] per 1,000 live births

[§] excluding terminations of pregnancy and births <24⁺⁰ weeks gestational age

[°] different laws exist in Northern Ireland for the termination of pregnancy

[^] including the Crown Dependencies

Data sources: MBRRACE-UK, PDS, ONS, NRS, ISD, NIMATS, States of Guernsey, States of Jersey

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In Table 3 and Table 4 the various categories of stillbirth and neonatal death are shown based on the whole UK data and subdivided by gestational age at birth. This year the details for late fetal losses and neonatal deaths of babies born at 22 and 23 weeks gestational age are also included. Once again this data illustrates the marked impact of preterm birth in relation to both stillbirth and neonatal death rates in the UK, with almost two-thirds of both stillbirths and neonatal deaths being born before 37 weeks gestational age. Of these, around a third of registrable stillbirths (≥ 24 weeks gestational age) occurred in babies who were very preterm (<28 weeks gestational age) and just under half of neonatal deaths were babies born very preterm, illustrating the size of this problem in the UK. Including babies born at 22⁺⁰ to 23⁺⁶ weeks gestation increases the percentage of deaths occurring among babies born preterm to nearly 50% of stillbirths and late fetal losses and 55% of neonatal deaths. Government initiatives to reduce stillbirth and neonatal death rates, if they are to succeed, will need to focus on ways of reducing the number of preterm births.

Table 3: Number of births, stillbirths, neonatal deaths, and extended perinatal deaths by gestational age at birth: United Kingdom and Crown Dependencies, for births in 2016

Number [§]	Gestational age at birth (weeks)					
	22 ⁺⁰ -23 ⁺⁶	24 ⁺⁰ -27 ⁺⁶	28 ⁺⁰ -31 ⁺⁶	32 ⁺⁰ -36 ⁺⁶	37 ⁺⁰ -41 ⁺⁶ °	≥42 ⁺⁰
Total births	1,040	3,269	6,620	50,371	678,093	18,277
Live births	511	2,552	6,108	49,585	677,062	18,258
Stillbirths	529	717	512	786	1,031	19
Antepartum	299	594	468	715	905	10
Intrapartum	171	88	32	46	91	8
Unknown timing	59	35	12	25	35	1
Neonatal deaths	360	404	177	275	468	9
Early neonatal deaths	320	274	133	198	312	9
Late neonatal deaths	40	130	44	77	156	0
Perinatal deaths	849	991	645	984	1,343	28
Extended perinatal deaths	889	1,121	689	1,061	1,499	28

[§] excluding terminations of pregnancy

[°] births with missing information for gestational ages were excluded (n=23,413)

Data sources: MBRRACE-UK, ONS, PDS, NRS, ISD, NIMATS, States of Guernsey, States of Jersey

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Table 4: Stillbirth, neonatal, and extended perinatal mortality rates (95% CIs) by gestational age at birth: United Kingdom and Crown Dependencies, for births in 2016

Rate per 1,000 births [§]	Gestational age at birth (weeks)					
	22 ⁺⁰ -23 ⁺⁶	24 ⁺⁰ -27 ⁺⁶	28 ⁺⁰ -31 ⁺⁶	32 ⁺⁰ -36 ⁺⁶	37 ⁺⁰ -41 ⁺⁶ °	≥42 ⁺⁰
Stillbirths[†]	508.65	219.33	77.34	15.60	1.52	1.04
	(478.3 to 539.0)	(205.2 to 233.5)	(70.9 to 83.8)	(14.5 to 16.7)	(1.4 to 1.6)	(0.6 to 1.5)
Antepartum [†]	287.50	181.71	70.69	14.19	1.33	0.55
	(260.0 to 315.0)	(168.5 to 194.9)	(64.5 to 76.9)	(13.2 to 15.2)	(1.3 to 1.4)	(0.2 to 0.9)
Intrapartum [†]	164.42	26.92	4.83	0.91	0.13	0.44
	(141.9 to 187.0)	(21.4 to 32.5)	(3.2 to 6.5)	(0.7 to 1.2)	(0.1 to 0.2)	(0.1 to 0.7)
Unknown timing [†]	56.73	10.71	1.81	0.50	0.05	0.05
	(42.7 to 70.8)	(7.2 to 14.2)	(0.8 to 2.8)	(0.3 to 0.7)	(0.0 to 0.1)	(0.00 to 0.2)
Neonatal deaths[‡]	704.50	158.31	28.98	5.55	0.69	0.49
	(664.9 to 744.0)	(144.1 to 172.5)	(24.8 to 33.2)	(4.9 to 6.2)	(0.6 to 0.8)	(0.2 to 0.8)
Early neonatal deaths [‡]	626.22	107.37	21.77	3.99	0.46	0.49
	(587.3 to 668.1)	(95.4 to 119.4)	(18.1 to 25.4)	(3.4 to 4.6)	(0.4 to 0.5)	(0.2 to 0.8)
Late neonatal deaths [‡]	78.28	50.94	7.20	1.55	0.23	0.00
	(55.0 to 101.6)	(42.4 to 59.5)	(5.1 to 9.3)	(1.2 to 1.9)	(0.2 to 0.3)	(0.0 to 0.0)
Perinatal deaths[†]	816.35	303.15	97.43	19.54	1.98	1.53
	(792.8 to 839.8)	(287.4 to 318.9)	(90.3 to 104.6)	(18.3 to 20.7)	(1.9 to 2.1)	(1.0 to 2.1)
Extended perinatal deaths[†]	854.81	342.92	104.08	21.06	2.21	1.53
	(833.4 to 876.2)	(326.7 to 359.2)	(96.7 to 111.4)	(19.8 to 22.3)	(2.1 to 2.3)	(1.0 to 2.1)

[§] excluding terminations of pregnancy, births

[°] births with missing information for gestational ages were excluded (n=23,413)

[†] per 1,000 total births

[‡] per 1,000 live births

Data sources: MBRRACE-UK, PDS, ONS, NRS, ISD, NIMATS, States of Guernsey, States of Jersey

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3.2 Time trends

The data shown in Figure 2 and Table 5 shows the trends in the various mortality rates for the UK and the devolved nations over the four years of the MBRRACE-UK programme: 2013 to 2016. The data is equivalent to that included in Table 1, where the UK total is based on all births for the UK (irrespective of country of residence) and the number of births for each individual UK country and the Crown Dependencies is based on those births for which the country of residence of the mother was known. The smaller devolved nations are most affected by short term variations and so the data for the larger population of the UK as a whole is probably the most informative. There has been a very small increase in the extended perinatal mortality in the UK in 2016 in contrast to the declining trend shown over the first three years of the MBRRACE-UK programme. This is due to a small increase in the rate of stillbirth in 2016 with the rate of neonatal mortality remaining largely unchanged.

Figure 2: Stillbirth, neonatal, and extended perinatal mortality rates for the UK and by country of residence: United Kingdom, for births in 2016



† per 1,000 total births

‡ per 1,000 live births

Excluding terminations of pregnancy and births <24⁺⁰ weeks gestational age

Different laws exist in Northern Ireland for the termination of pregnancy

Data sources: MBRRACE-UK, PDS, ONS, NRS, ISD, NIMATS, States of Guernsey, States of Jersey

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Table 5: Stillbirth, neonatal, and extended perinatal mortality rates for the UK and by country of residence: United Kingdom, for births from 2013 to 2016

Rate per 1,000 births [§]	UK [^]	England	Scotland	Wales	Northern Ireland [°]	Crown Dep.
Stillbirths[†]						
2013	4.20 (4.06 to 4.35)	4.26 (4.10 to 4.42)	3.78 (3.30 to 4.32)	3.78 (3.18 to 4.50)	4.33 (3.58 to 5.24)	3.25 (1.65 to 6.40)
2014	4.12 (3.98 to 4.326)	4.19 (4.04 to 4.35)	3.69 (3.19 to 4.19)	4.71 (3.98 to 5.44)	3.76 (2.99 to 4.52)	1.24 (0.00 to 2.64)
2015	3.87 (3.73 to 4.01)	3.93 (3.78 to 4.08)	3.47 (2.98 to 3.96)	4.10 (3.41 to 4.78)	3.24 (2.53 to 3.95)	1.67 (0.03 to 3.3)
2016	3.93 (3.79 to 4.07)	3.92 (3.77 to 4.07)	3.67 (3.17 to 4.18)	4.44 (3.73 to 5.16)	3.97 (3.18 to 4.76)	3.36 (1.04 to 5.68)
Neonatal deaths[‡]						
2013	1.84 (1.75 to 1.94)	1.83 (1.73 to 1.94)	1.66 (1.36 to 2.04)	1.90 (1.49 to 2.42)	2.44 (1.89 to 3.15)	1.22 (0.42 to 3.59)
2014	1.76 (1.67 to 1.86)	1.73 (1.63 to 1.83)	1.86 (1.51 to 2.22)	1.67 (1.23 to 2.10)	2.99 (2.31 to 3.68)	1.24 (0.00 to 2.65)
2015	1.74 (1.65 to 1.84)	1.71 (1.62 to 1.81)	1.26 (0.96 to 1.55)	2.10 (1.61 to 2.59)	3.21 (2.5 to 3.92)	1.25 (0.00 to 2.67)
2016	1.72 (1.63 to 1.81)	1.72 (1.62 to 1.82)	1.69 (1.34 to 2.03)	1.43 (1.02 to 1.84)	2.2 (1.61 to 2.79)	1.26 (0 to 2.69)
Extended perinatal deaths[‡]						
2013	6.04 (5.87 to 6.21)	6.09 (5.90 to 6.28)	5.43 (4.86 to 6.08)	5.68 (4.93 to 6.53)	6.76 (5.81 to 7.87)	4.47 (2.50 to 7.98)
2014	5.88 (5.71 to 6.04)	5.91 (5.73 to 6.10)	5.55 (4.93 to 6.16)	6.37 (5.52 to 7.22)	6.74 (5.71 to 7.76)	2.48 (0.50 to 4.46)
2015	5.61 (5.44 to 5.77)	5.64 (5.46 to 5.81)	4.72 (4.15 to 5.29)	6.19 (5.35 to 7.03)	6.44 (5.44 to 7.44)	2.92 (0.76 to 5.08)
2016	5.64 (5.48 to 5.281)	5.64 (5.46 to 5.82)	5.36 (4.74 to 5.97)	5.87 (5.04 to 6.69)	6.16 (5.18 to 67.15)	4.62 (1.90 to 7.34)

[§] excluding terminations of pregnancy and births <24⁺⁰ weeks gestational age

[^] including the Crown Dependencies

[°] different laws exist in Northern Ireland for the termination of pregnancy

[†] per 1,000 total births

[‡] per 1,000 live births

Data sources: MBRRACE-UK, PDS, ONS, NRS, ISD, NIMATS, States of Guernsey, States of Jersey

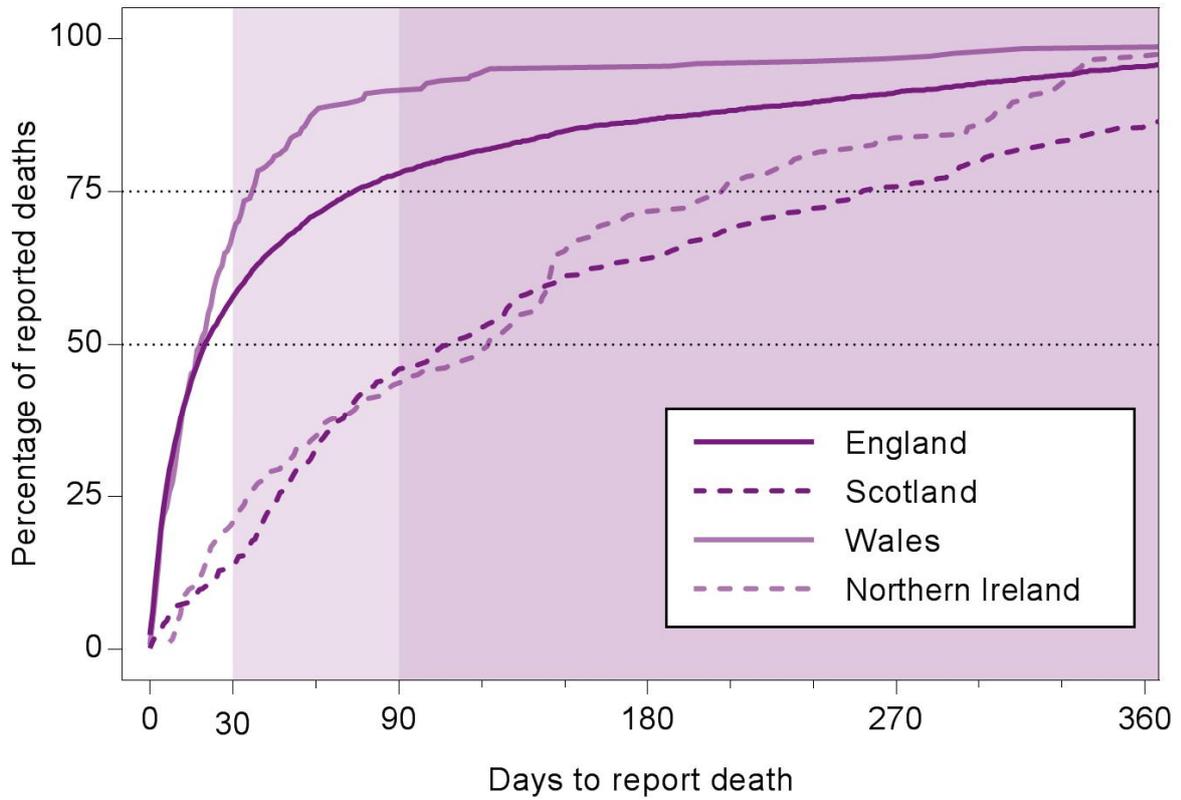
MBRRACE-UK Recommendation

In order to achieve the various UK Governments' ambitions renewed efforts need to be focused on reducing stillbirths and continuing the slow but steady decline in neonatal mortality rates observed since 2013.

3.3 Timing of reporting

Over the past year the Perinatal Mortality Review Tool (see Section 1.2) has been developed and launched for use across the UK. The web-based system used for MBRRACE-UK and the PMRT are linked to allow for the sharing of data between these two programmes and to prevent the need for any duplicate data entry. In order to maximise the efficiency of this shared data the PMRT is reliant on timely data entry onto the MBRRACE-UK system. Analysis of the timing of the reporting of deaths on the MBRRACE-UK system for 2016 shows a wide variation across the four countries of the UK (Figure 3, below). Whilst in both England and Wales data entry for half of their cases is started within 20 days of the occurrence of the death, in Scotland and Northern Ireland cases are started significantly later, with half of the cases only having been started by 108 and 123 days, respectively. By the 180th day following a death, data entry has started for 95.1% cases in Wales, 86.7% in England, 71.7% in Northern Ireland and 64.0% in Scotland. Data entry is carried out centrally in Northern Ireland by the NIMACH office which accounts in part for their delayed reporting.

Figure 3: Timing of reporting of late fetal losses, stillbirths and neonatal deaths via the MBRRACE-UK web-based system in days since death: 2016



Data source: MBRRACE-UK

MBRRACE-UK Recommendation

In order to facilitate the close working between MBRRACE-UK and the Perinatal Mortality Review Tool, within Trusts and Health Boards all stillbirths and neonatal deaths should be notified to MBRRACE-UK via the joint web-based system as soon as possible following the death.



4. Mortality rates by geographical area

This report presents mortality rates across the UK for different stakeholder groups. Data are presented as both crude mortality rates and stabilised & adjusted rates. The process of stabilisation and adjustment has a major effect in terms of smoothing apparently extreme (very high or very low) crude mortality rates by taking into account the size of the population, known influences on stillbirth and neonatal mortality, allowing us to make direct comparisons between geographical areas and different organisations (e.g. those treating women identified as low risk versus those providing high risk care).

This chapter focuses on the geographical distribution of stillbirth, neonatal, and extended perinatal mortality rates for organisations responsible for the commissioning of health care and maintaining its quality. A pair of maps is provided for each mortality outcome: one presents the crude rate and the other the stabilised & adjusted rate. The colour coding for each organisation represents the extent to which it is above or below the UK average mortality rate based on the approach described in Section 2.7. The first set of maps and tables in Section 4.1 of this chapter presents the mortality rates by CCG (England), Health Board (Scotland and Wales), Local Commissioning Group (Northern Ireland), and Crown Dependency. The maps are followed by Table 6, in which the numerical values of the crude and the stabilised & adjusted rates for each of the relevant organisations are provided. There are some organisations where mortality rates increase as a result of the stabilisation and adjustment. While some of these will be organisations with low crude mortality rates just by chance, some will be organisations where rates are relatively low but where the characteristics of their population are such that rates should be even lower, e.g. they serve a comparatively low risk population.

Stabilised & adjusted rates of stillbirth, neonatal mortality and extended perinatal mortality (Table 6) ranged from 3.65 to 4.19 per 1,000 total births, from 1.52 to 2.21 per 1,000 live births and from 5.32 to 6.29 per 1,000 total births respectively, across the commissioning organisations for the UK. No commissioning groups fell into the red category (more than 10% higher than the overall UK average) for stillbirths, with ten CCGs and one CCG falling into the red category for neonatal and extended perinatal mortality respectively. Five commissioning organisations fell into the green category (more than 10% lower than the UK average) for neonatal deaths.

In Section 4.2 a similar set of maps and tables to those outlined above are presented for the STPs in England and each devolved nation.

Commissioning organisations will need to work with their relevant care providers to try to understand more fully the factors underlying their particular mortality rates in the context of their data quality, population characteristics and quality of care provision. In last year's report we highlighted the impact of congenital anomalies and the deaths of babies born before 24 weeks gestational age on the various mortality rates. It seems clear that these births are responsible for significant variation in the rates of death observed and therefore local factors and policies affecting the number of deaths in these categories should also be considered as part of any review.

4.1 Mortality rates by Clinical Commissioning Group (England), Health Board (Scotland and Wales), Local Commissioning Group (Northern Ireland), and Crown Dependency



Figure 4: Crude stillbirth rates by Clinical Commissioning Group (England), Health Board (Scotland and Wales), Local Commissioning Group (Northern Ireland), and Crown Dependency based on postcode of mother's residence at time of delivery: United Kingdom and Crown Dependencies, for births in 2016

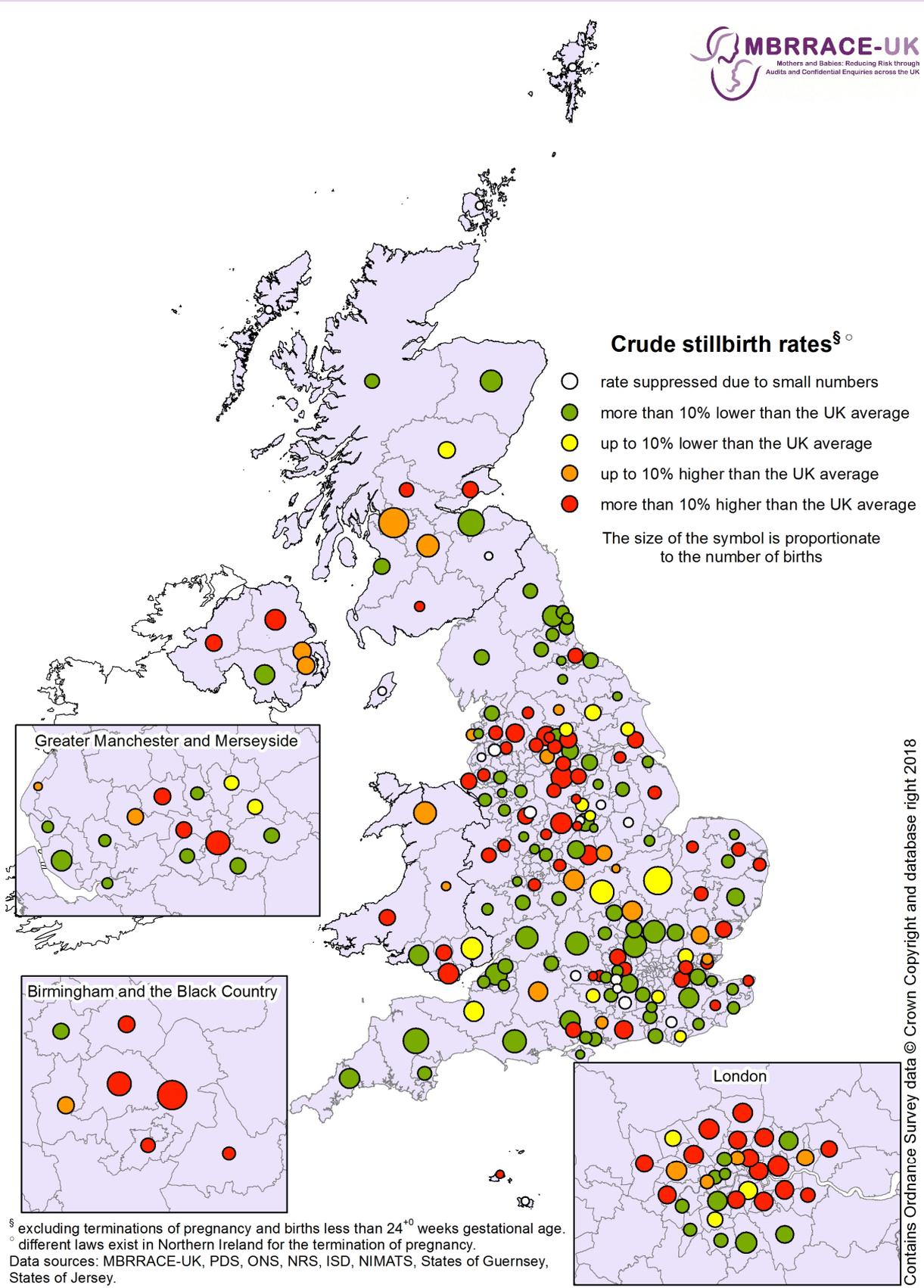


Figure 5: Stabilised & adjusted stillbirth rates by Clinical Commissioning Group (England), Health Board (Scotland and Wales), Local Commissioning Group (Northern Ireland), and Crown Dependency based on postcode of mother's residence at time of delivery: United Kingdom and Crown Dependencies, for births in 2016

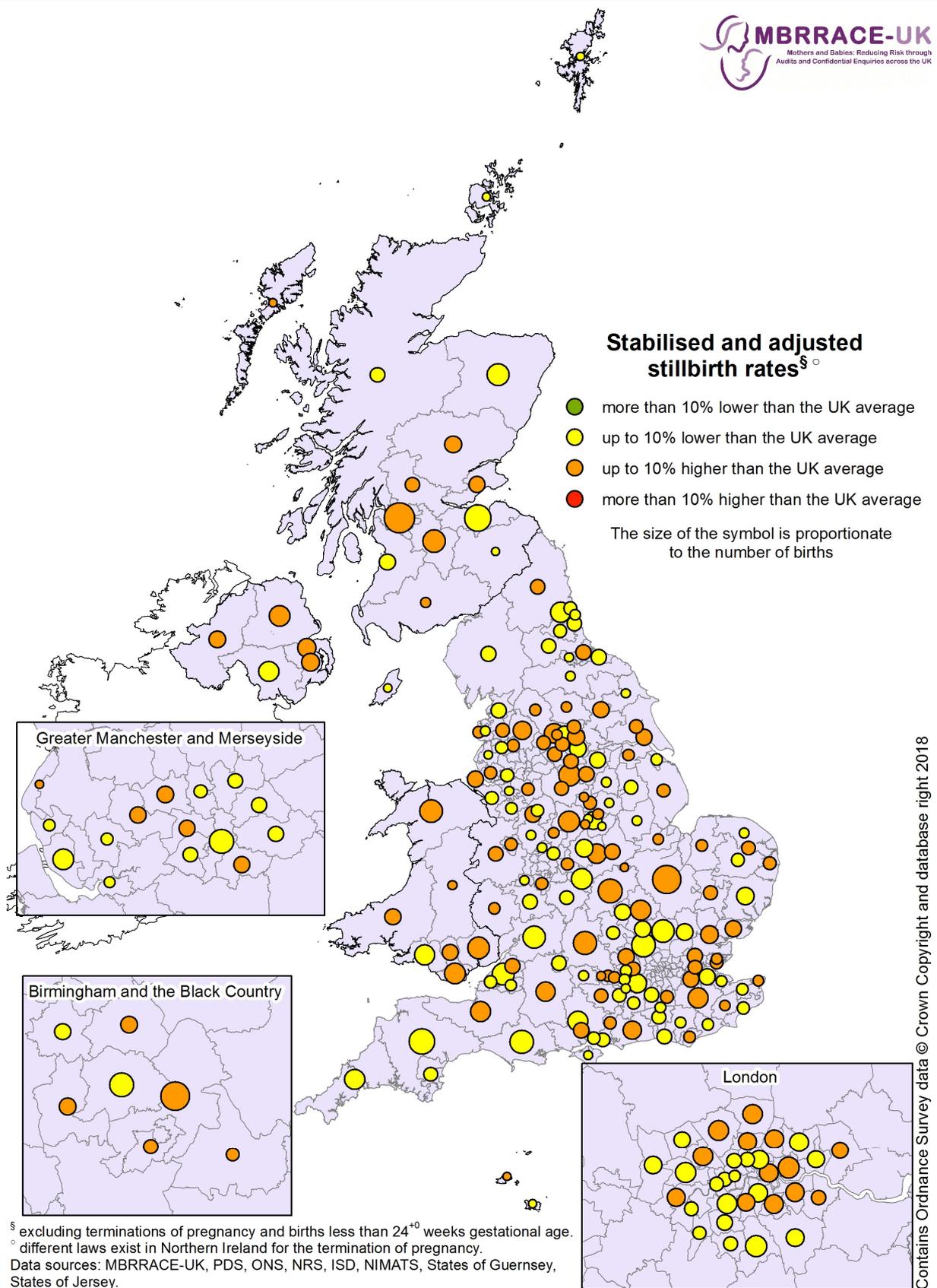


Figure 6: Crude neonatal mortality rates by Clinical Commissioning Group (England), Health Board (Scotland and Wales), Local Commissioning Group (Northern Ireland), and Crown Dependency based on postcode of mother's residence: United Kingdom and Crown Dependencies, for births in 2016

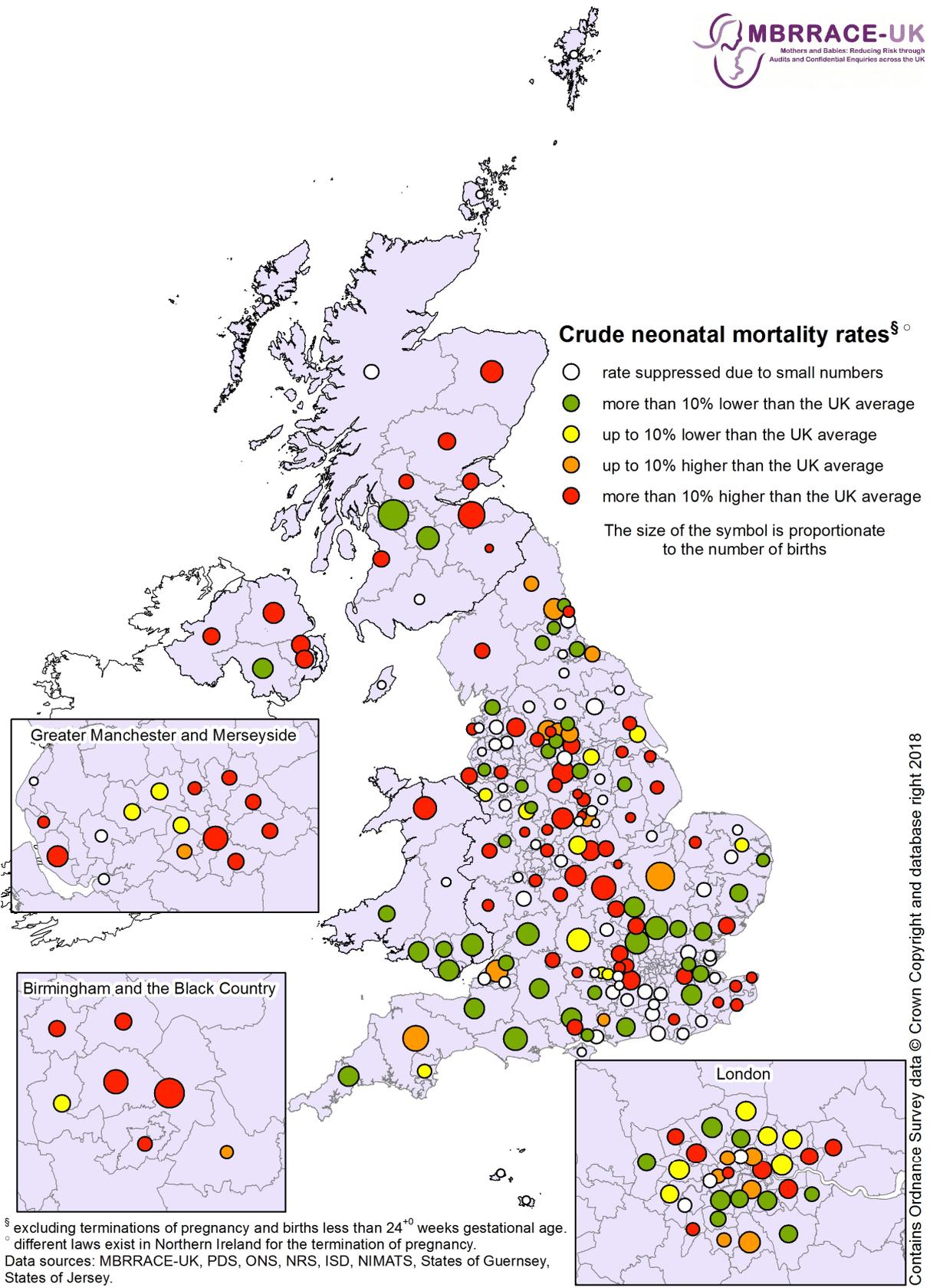
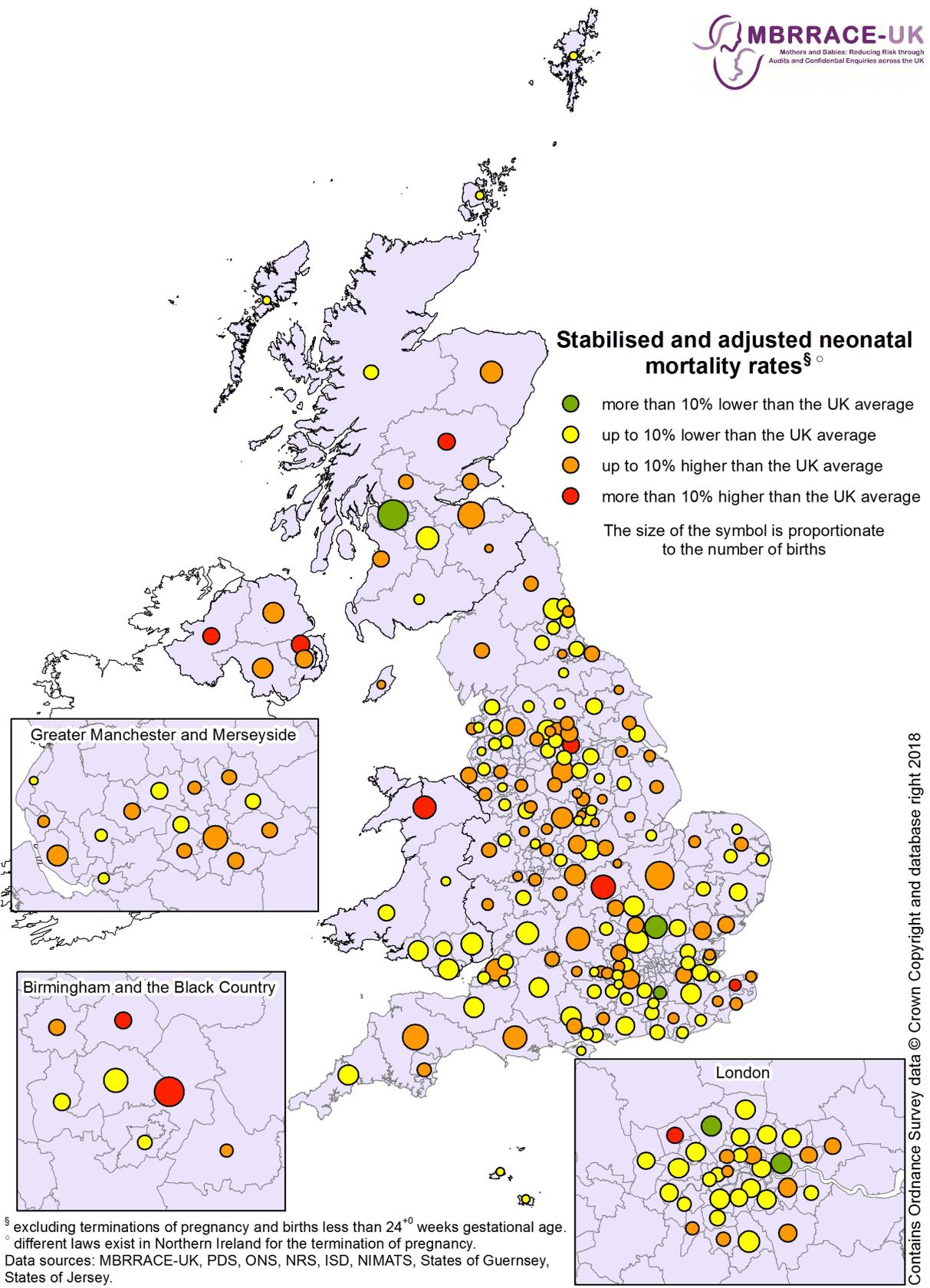


Figure 7: Stabilised & adjusted neonatal mortality rates by Clinical Commissioning Group (England), Health Board (Scotland and Wales), Local Commissioning Group (Northern Ireland), and Crown Dependency based on mother's residence: United Kingdom and Crown Dependencies, for births in 2016



[§] excluding terminations of pregnancy and births less than 24⁺⁰ weeks gestational age.
[°] different laws exist in Northern Ireland for the termination of pregnancy.
 Data sources: MBRRACE-UK, PDS, ONS, NRS, ISD, NIMATS, States of Guernsey, States of Jersey.
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Figure 8: Crude extended perinatal mortality rates by Clinical Commissioning Group (England), Health Board (Scotland and Wales), Local Commissioning Group (Northern Ireland), and Crown Dependency based on mother's residence: United Kingdom and Crown Dependencies, for births in 2016

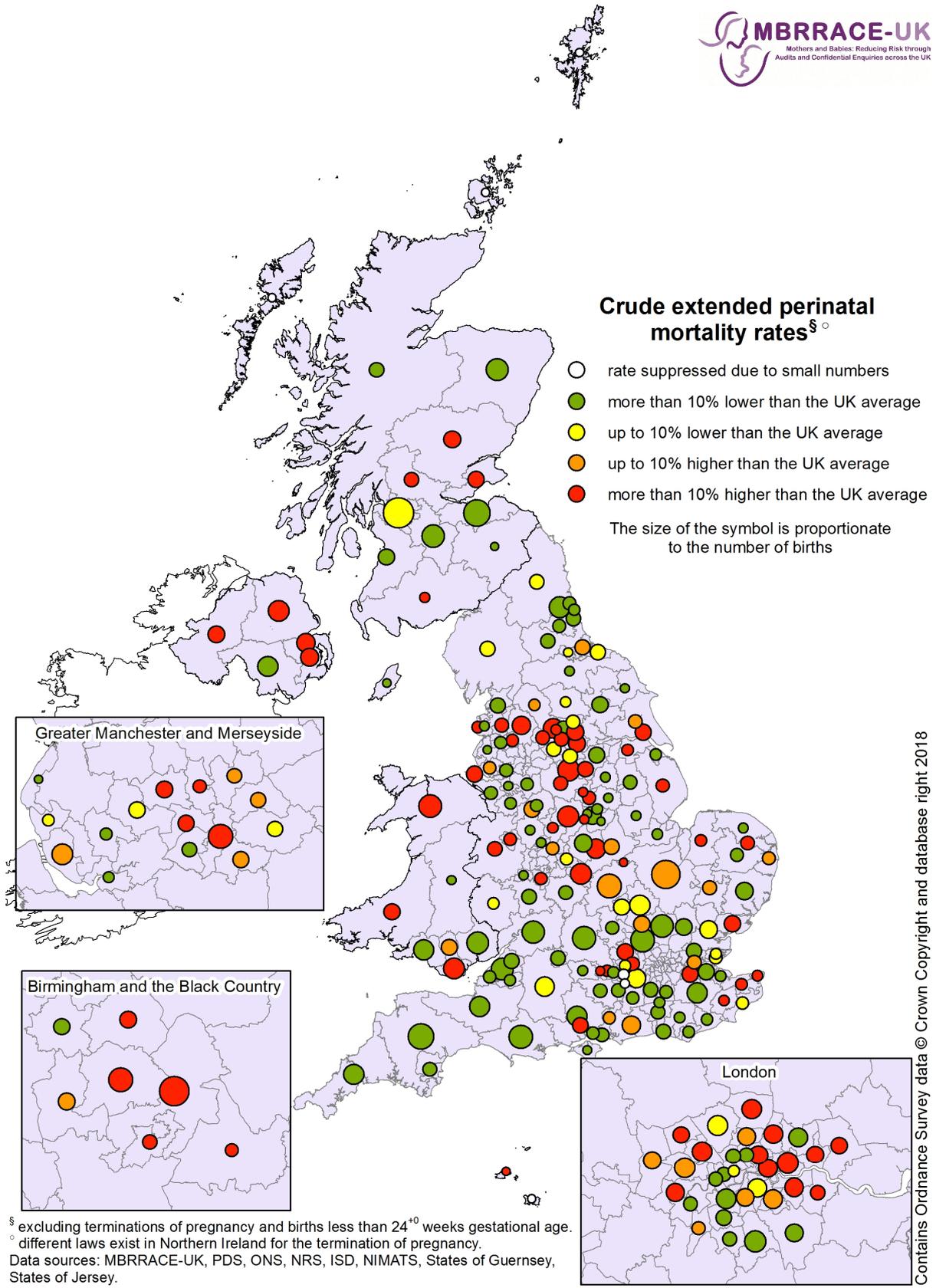


Figure 9: Stabilised & adjusted extended perinatal mortality rates by Clinical Commissioning Group (England), Health Board (Scotland and Wales), Local Commissioning Group (Northern Ireland), and Crown Dependency based on mother's residence: United Kingdom and Crown Dependencies, for births in 2016

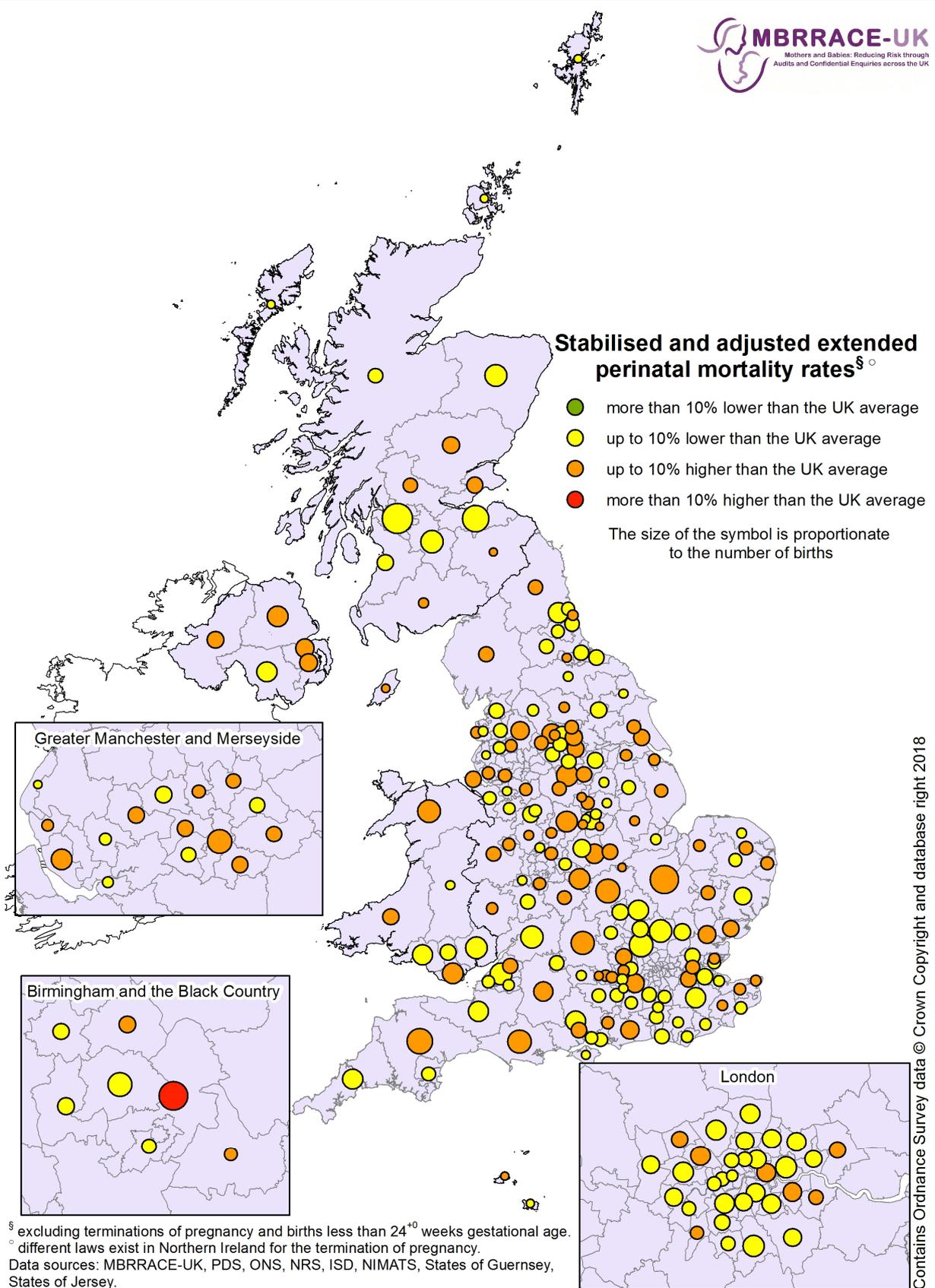


Table 6: Crude and stabilised & adjusted stillbirth, neonatal, and extended perinatal mortality rates by Clinical Commissioning Group (England), Health Board (Scotland and Wales), Local Commissioning Group (Northern Ireland), and Crown Dependency based on postcode of mother's residence at time of delivery: United Kingdom and Crown Dependencies, for births in 2015

Organisation	Total births [§]	Rate per 1,000 births [§]						
		Stillbirth [†]		Neonatal [†]		Extended perinatal [†]		
		Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI) [#]	
ENGLAND								
Airedale, Wharfedale and Craven	1,730	*	3.96 (3.31 to 4.81)	*	1.68 (1.21 to 2.28)	5.78	5.64 (5.16 to 6.95)	●
Ashford	1,566	4.47	3.96 (3.32 to 4.79)	1.92	1.76 (1.31 to 2.43)	6.39	5.72 (5.18 to 7.06)	●
Aylesbury Vale	2,438	*	3.89 (3.20 to 4.59)	*	1.63 (1.16 to 2.15)	3.28	5.51 (4.96 to 6.65)	●
Barking and Dagenham	3,937	4.06	3.81 (3.12 to 4.53)	2.30	1.74 (1.29 to 2.28)	6.35	5.55 (5.06 to 6.84)	●
Barnet	5,356	5.04	4.05 (3.42 to 4.97)	0.56	1.54 (1.10 to 2.16)	5.60	5.58 (5.12 to 7.00)	●
Barnsley	2,841	*	4.01 (3.35 to 4.85)	*	1.63 (1.19 to 2.18)	5.63	5.64 (5.11 to 6.98)	●
Basildon and Brentwood	3,322	*	3.96 (3.31 to 4.84)	*	1.62 (1.19 to 2.22)	4.52	5.57 (5.04 to 6.87)	●
Bassetlaw	1,277	*	3.92 (3.27 to 4.67)	*	1.72 (1.21 to 2.33)	4.70	5.63 (5.10 to 6.95)	●
Bath and North East Somerset	1,811	*	3.91 (3.28 to 4.63)	*	1.65 (1.21 to 2.26)	3.31	5.55 (5.08 to 6.83)	●
Bedfordshire	5,492	4.01	3.98 (3.37 to 4.76)	1.28	1.62 (1.23 to 2.13)	5.28	5.57 (5.14 to 6.79)	●
Bexley	3,058	5.23	4.01 (3.37 to 5.00)	0.99	1.64 (1.22 to 2.19)	6.21	5.65 (5.10 to 7.02)	●
Birmingham CrossCity	11,500	5.57	4.07 (3.49 to 4.78)	3.59	2.21 (1.57 to 3.04)	9.13	6.29 (5.69 to 7.74)	●
Birmingham South and Central	3,031	5.28	3.96 (3.38 to 4.78)	1.99	1.66 (1.23 to 2.14)	7.26	5.60 (5.12 to 6.73)	●
Blackburn with Darwen	2,174	*	4.06 (3.44 to 5.01)	*	1.61 (1.16 to 2.18)	8.28	5.64 (5.23 to 7.14)	●
Blackpool	1,698	4.12	3.94 (3.27 to 4.71)	3.55	1.84 (1.33 to 2.53)	7.66	5.79 (5.16 to 7.20)	●
Bolton	3,842	5.73	4.04 (3.51 to 4.84)	1.57	1.63 (1.22 to 2.15)	7.29	5.64 (5.17 to 6.93)	●
Bracknell and Ascot	1,504	*	3.85 (3.16 to 4.57)	*	1.64 (1.20 to 2.22)	*	5.49 (4.89 to 6.71)	●
Bradford City	1,672	5.98	3.94 (3.30 to 4.67)	4.81	1.80 (1.35 to 2.45)	10.77	5.75 (5.18 to 7.09)	●
Bradford Districts	4,958	6.86	4.17 (3.49 to 5.44)	1.83	1.70 (1.26 to 2.25)	8.67	5.85 (5.38 to 7.55)	●
Brent	5,217	6.33	4.07 (3.50 to 5.03)	1.93	1.70 (1.29 to 2.18)	8.24	5.76 (5.33 to 7.24)	●
Brighton and Hove	2,869	*	3.92 (3.29 to 4.72)	*	1.61 (1.15 to 2.24)	3.83	5.53 (5.01 to 6.90)	●
Bristol	6,481	3.24	3.81 (3.17 to 4.46)	1.86	1.83 (1.38 to 2.54)	5.09	5.62 (5.10 to 6.84)	●
Bromley	4,281	3.04	3.86 (3.17 to 4.65)	1.41	1.72 (1.30 to 2.34)	4.44	5.57 (4.98 to 6.83)	●
Bury	2,359	3.39	3.90 (3.27 to 4.68)	2.98	1.86 (1.36 to 2.68)	6.36	5.75 (5.21 to 7.10)	●
Calderdale	2,492	5.62	4.03 (3.40 to 4.92)	3.23	1.81 (1.39 to 2.40)	8.83	5.84 (5.32 to 7.20)	●

Organisation	Total births [§]	Rate per 1,000 births [§]						
		Stillbirth [†]		Neonatal [‡]		Extended perinatal [†]		
		Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI) [#]	
Cambridgeshire and Peterborough	10,755	3.91	3.99 (3.43 to 4.65)	1.77	1.78 (1.36 to 2.38)	5.67	5.77 (5.31 to 7.00)	●
Camden	2,790	2.87	3.83 (3.14 to 4.58)	1.80	1.73 (1.32 to 2.31)	4.66	5.55 (5.02 to 6.79)	●
Cannock Chase	1,449	*	3.88 (3.20 to 4.60)	*	1.67 (1.20 to 2.27)	2.76	5.54 (4.98 to 6.73)	●
Canterbury and Coastal	1,806	2.77	3.89 (3.18 to 4.51)	4.44	1.91 (1.41 to 2.68)	7.20	5.83 (5.25 to 7.32)	●
Castle Point and Rochford	1,629	*	3.97 (3.35 to 4.78)	*	1.72 (1.26 to 2.34)	5.52	5.69 (5.19 to 6.99)	●
Central London (Westminster)	1,919	3.13	3.88 (3.23 to 4.62)	2.09	1.76 (1.32 to 2.36)	5.21	5.63 (5.11 to 6.84)	●
Chiltern	3,677	4.35	3.98 (3.39 to 4.78)	2.46	1.85 (1.40 to 2.53)	6.80	5.82 (5.31 to 7.22)	●
Chorley and South Ribble	1,957	*	3.82 (2.99 to 4.46)	*	1.68 (1.21 to 2.27)	2.04	5.49 (4.81 to 6.71)	●
City and Hackney	4,596	4.57	3.87 (3.29 to 4.61)	1.75	1.72 (1.29 to 2.31)	6.31	5.59 (5.20 to 6.80)	●
Coastal West Sussex	4,677	4.70	4.08 (3.46 to 5.19)	1.29	1.69 (1.25 to 2.25)	5.99	5.75 (5.21 to 7.22)	●
Corby	1,000	4.00	3.94 (3.28 to 4.67)	3.01	1.79 (1.31 to 2.51)	7.00	5.72 (5.21 to 6.98)	●
Coventry and Rugby	5,762	3.99	3.90 (3.25 to 4.54)	2.79	1.86 (1.41 to 2.52)	6.77	5.77 (5.27 to 6.98)	●
Crawley	1,583	*	3.87 (3.22 to 4.56)	*	1.68 (1.23 to 2.30)	3.79	5.54 (5.01 to 6.79)	●
Croydon	5,780	2.77	3.66 (2.81 to 4.46)	1.73	1.66 (1.25 to 2.11)	4.50	5.32 (4.61 to 6.53)	●
Darlington	1,156	*	3.92 (3.25 to 4.73)	*	1.73 (1.29 to 2.35)	5.19	5.65 (5.09 to 7.01)	●
Dartford, Gravesham and Swanley	3,446	5.22	4.04 (3.50 to 4.90)	2.04	1.75 (1.32 to 2.39)	7.25	5.78 (5.28 to 7.14)	●
Doncaster	3,547	3.38	3.90 (3.25 to 4.62)	1.70	1.70 (1.28 to 2.22)	5.07	5.59 (5.09 to 6.82)	●
Dorset	7,174	3.35	3.92 (3.26 to 4.55)	1.54	1.76 (1.32 to 2.36)	4.88	5.67 (5.17 to 6.87)	●
Dudley	3,809	4.20	3.95 (3.31 to 4.69)	1.58	1.69 (1.25 to 2.25)	5.78	5.63 (5.14 to 6.81)	●
Durham Dales, Easington and Sedgfield	2,862	2.80	3.87 (3.22 to 4.50)	1.40	1.68 (1.26 to 2.24)	4.19	5.54 (4.96 to 6.71)	●
Ealing	5,333	4.31	3.85 (3.21 to 4.59)	1.69	1.67 (1.22 to 2.24)	6.00	5.51 (4.99 to 6.74)	●
East Lancashire	4,680	5.13	4.04 (3.40 to 4.94)	3.22	1.87 (1.42 to 2.49)	8.33	5.93 (5.39 to 7.38)	●
East Leicestershire and Rutland	3,305	3.93	3.97 (3.34 to 4.78)	2.13	1.81 (1.37 to 2.41)	6.05	5.78 (5.24 to 7.11)	●
East Riding of Yorkshire	2,723	3.67	3.95 (3.37 to 4.76)	2.21	1.79 (1.33 to 2.38)	5.88	5.74 (5.26 to 7.13)	●
East Staffordshire	1,542	5.84	4.01 (3.35 to 4.89)	3.26	1.82 (1.33 to 2.51)	9.08	5.83 (5.27 to 7.20)	●
East Surrey	2,298	*	3.96 (3.30 to 4.78)	*	1.56 (1.08 to 2.12)	3.92	5.48 (4.97 to 6.80)	●
East and North Hertfordshire	6,745	2.97	3.84 (3.18 to 4.47)	0.89	1.56 (1.14 to 2.12)	3.85	5.39 (4.90 to 6.53)	●
Eastbourne, Hailsham and Seaford	1,812	*	3.94 (3.30 to 4.73)	*	1.60 (1.14 to 2.17)	3.86	5.53 (4.93 to 6.81)	●
Eastern Cheshire	1,987	3.52	3.95 (3.35 to 4.81)	1.52	1.73 (1.29 to 2.41)	5.03	5.68 (5.24 to 7.03)	●

Organisation	Total births [§]	Rate per 1,000 births [§]						
		Stillbirth [†]		Neonatal [†]		Extended perinatal [†]		
		Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI) [#]	
Enfield	4,981	5.02	3.95 (3.33 to 4.62)	1.61	1.67 (1.31 to 2.25)	6.63	5.62 (5.15 to 6.89)	●
Erewash	1,092	*	4.06 (3.34 to 5.07)	*	1.68 (1.20 to 2.33)	9.16	5.72 (5.15 to 7.18)	●
Fareham and Gosport	1,964	2.55	3.89 (3.19 to 4.59)	1.53	1.70 (1.28 to 2.22)	4.07	5.59 (5.05 to 6.74)	●
Fylde & Wyre	1,431	*	3.88 (3.21 to 4.56)	*	1.68 (1.24 to 2.31)	3.49	5.56 (5.03 to 7.02)	●
Gloucestershire	6,730	2.97	3.86 (3.26 to 4.51)	1.04	1.60 (1.17 to 2.14)	4.01	5.44 (4.97 to 6.65)	●
Great Yarmouth and Waveney	2,257	4.87	3.99 (3.36 to 4.76)	1.34	1.68 (1.27 to 2.30)	6.20	5.66 (5.18 to 7.00)	●
Greater Huddersfield	2,842	4.22	3.93 (3.27 to 4.64)	1.41	1.70 (1.26 to 2.31)	5.63	5.62 (5.08 to 6.90)	●
Greater Preston	2,526	*	4.03 (3.39 to 4.90)	*	1.62 (1.15 to 2.24)	6.33	5.62 (5.13 to 6.98)	●
Greenwich	4,628	5.62	4.02 (3.39 to 4.92)	1.96	1.75 (1.30 to 2.37)	7.56	5.77 (5.25 to 7.20)	●
Guildford and Waverley	2,106	*	3.81 (2.97 to 4.49)	*	1.66 (1.19 to 2.26)	1.42	5.47 (4.84 to 6.69)	●
Halton	1,508	*	3.92 (3.22 to 4.70)	*	1.71 (1.25 to 2.40)	4.64	5.62 (5.05 to 7.02)	●
Hambleton, Richmondshire and Whitby	1,396	*	3.89 (3.22 to 4.63)	*	1.65 (1.13 to 2.27)	2.15	5.54 (5.03 to 6.76)	●
Hammersmith and Fulham	2,605	*	3.92 (3.30 to 4.62)	*	1.65 (1.19 to 2.22)	4.99	5.57 (5.05 to 6.81)	●
Hardwick	1,192	8.39	4.08 (3.43 to 5.10)	3.38	1.79 (1.30 to 2.43)	11.74	5.86 (5.23 to 7.30)	●
Haringey	4,127	4.60	3.94 (3.27 to 4.56)	1.46	1.65 (1.23 to 2.24)	6.06	5.58 (5.04 to 6.69)	●
Harrogate and Rural District	1,489	*	3.96 (3.31 to 4.73)	*	1.71 (1.25 to 2.33)	5.37	5.66 (5.15 to 6.99)	●
Harrow	3,618	3.87	3.86 (3.24 to 4.56)	4.44	2.09 (1.48 to 2.98)	8.29	5.95 (5.35 to 7.35)	●
Hartlepool and Stockton-on-Tees	3,353	4.47	3.98 (3.30 to 4.65)	1.20	1.65 (1.21 to 2.24)	5.67	5.62 (5.09 to 6.80)	●
Hastings and Rother	1,871	*	3.85 (3.04 to 4.61)	*	1.64 (1.15 to 2.27)	2.67	5.49 (4.94 to 6.81)	●
Havering	3,405	4.70	3.98 (3.40 to 4.74)	2.36	1.88 (1.40 to 2.59)	7.05	5.84 (5.32 to 7.14)	●
Herefordshire	1,775	3.38	3.93 (3.27 to 4.70)	2.26	1.78 (1.30 to 2.47)	5.63	5.71 (5.24 to 7.03)	●
Herts Valleys	7,538	3.05	3.84 (3.14 to 4.46)	1.20	1.66 (1.22 to 2.26)	4.25	5.49 (4.97 to 6.65)	●
Heywood, Middleton and Rochdale	3,066	3.91	3.90 (3.28 to 4.51)	2.29	1.76 (1.33 to 2.40)	6.20	5.66 (5.11 to 6.95)	●
High Weald Lewes Havens	1,534	*	3.85 (3.00 to 4.54)	*	1.76 (1.30 to 2.40)	3.26	5.61 (4.97 to 6.92)	●
Hillingdon	4,471	4.70	3.92 (3.28 to 4.67)	1.35	1.66 (1.22 to 2.20)	6.04	5.57 (5.02 to 6.75)	●
Horsham and Mid Sussex	2,535	*	3.81 (3.04 to 4.44)	*	1.59 (1.14 to 2.20)	1.18	5.39 (4.67 to 6.65)	●
Hounslow	4,395	5.23	3.95 (3.36 to 4.66)	1.60	1.69 (1.27 to 2.25)	6.83	5.63 (5.12 to 6.81)	●
Hull	3,576	5.87	4.10 (3.39 to 5.11)	1.69	1.69 (1.26 to 2.29)	7.55	5.77 (5.21 to 7.27)	●
Ipswich and East Suffolk	4,149	3.13	3.89 (3.21 to 4.60)	0.97	1.65 (1.20 to 2.23)	4.10	5.54 (5.01 to 6.79)	●

Organisation	Total births [§]	Rate per 1,000 births [§]						
		Stillbirth [†]		Neonatal [†]		Extended perinatal [†]		
		Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI) [#]	
Isle of Wight	1,145	*	3.90 (3.08 to 4.66)	*	1.71 (1.27 to 2.31)	4.37	5.60 (5.02 to 6.95)	●
Islington	3,013	*	3.89 (3.23 to 4.60)	*	1.58 (1.18 to 2.13)	4.65	5.46 (4.94 to 6.71)	●
Kernow	5,323	3.38	3.92 (3.30 to 4.71)	1.32	1.71 (1.26 to 2.32)	4.70	5.63 (5.13 to 6.89)	●
Kingston	2,234	3.13	3.89 (3.22 to 4.60)	2.69	1.84 (1.36 to 2.50)	5.82	5.72 (5.12 to 7.07)	●
Knowsley	1,939	4.64	3.97 (3.36 to 4.76)	1.55	1.70 (1.25 to 2.26)	6.19	5.66 (5.19 to 6.94)	●
Lambeth	4,351	5.06	3.94 (3.31 to 4.59)	0.92	1.59 (1.16 to 2.12)	5.98	5.54 (5.04 to 6.70)	●
Leeds North	2,594	3.86	3.93 (3.35 to 4.64)	1.55	1.73 (1.29 to 2.31)	5.40	5.65 (5.17 to 6.82)	●
Leeds South and East	3,787	7.39	4.18 (3.42 to 5.37)	1.86	1.75 (1.30 to 2.34)	9.24	5.92 (5.37 to 7.53)	●
Leeds West	3,956	2.78	3.84 (3.18 to 4.49)	1.77	1.76 (1.32 to 2.40)	4.55	5.59 (5.06 to 6.80)	●
Leicester City	5,185	5.98	4.03 (3.38 to 4.85)	2.13	1.67 (1.29 to 2.18)	8.10	5.68 (5.26 to 6.95)	●
Lewisham	4,758	5.04	3.96 (3.39 to 4.61)	1.06	1.58 (1.13 to 2.11)	6.09	5.53 (5.10 to 6.67)	●
Lincolnshire East	2,196	5.46	4.03 (3.40 to 4.93)	2.75	1.82 (1.37 to 2.59)	8.20	5.85 (5.29 to 7.32)	●
Lincolnshire West	2,591	2.32	3.86 (3.07 to 4.52)	1.16	1.69 (1.24 to 2.29)	3.47	5.54 (4.93 to 6.74)	●
Liverpool	6,057	3.30	3.84 (3.24 to 4.45)	2.82	1.87 (1.45 to 2.51)	6.11	5.73 (5.27 to 7.03)	●
Luton	3,625	2.76	3.73 (2.93 to 4.47)	3.04	1.82 (1.37 to 2.46)	5.79	5.55 (4.88 to 6.88)	●
Manchester	8,023	4.49	3.84 (3.25 to 4.38)	2.38	1.84 (1.40 to 2.48)	6.86	5.67 (5.22 to 6.94)	●
Mansfield and Ashfield	2,311	3.89	3.94 (3.30 to 4.68)	2.61	1.84 (1.32 to 2.69)	6.49	5.77 (5.16 to 7.20)	●
Medway	3,635	1.65	3.74 (2.92 to 4.47)	1.10	1.64 (1.17 to 2.17)	2.75	5.38 (4.68 to 6.62)	●
Merton	3,279	3.66	3.89 (3.23 to 4.66)	1.22	1.67 (1.26 to 2.22)	4.88	5.56 (5.01 to 6.85)	●
Mid Essex	4,288	4.20	4.02 (3.40 to 4.79)	1.17	1.74 (1.28 to 2.35)	5.36	5.75 (5.22 to 6.99)	●
Milton Keynes	3,726	3.22	3.84 (3.17 to 4.54)	2.15	1.79 (1.35 to 2.40)	5.37	5.63 (5.13 to 6.79)	●
Morecambe Bay	3,313	3.02	3.90 (3.23 to 4.68)	1.21	1.66 (1.23 to 2.21)	4.23	5.56 (5.04 to 6.83)	●
Nene	7,984	3.88	3.96 (3.38 to 4.75)	2.26	1.92 (1.43 to 2.65)	6.14	5.88 (5.44 to 7.22)	●
Newark & Sherwood	1,199	*	3.87 (3.18 to 4.64)	*	1.73 (1.27 to 2.43)	3.34	5.60 (4.96 to 6.94)	●
Newbury and District	1,259	*	3.87 (3.12 to 4.60)	*	1.76 (1.28 to 2.45)	3.97	5.64 (4.99 to 6.97)	●
Newcastle Gateshead	5,710	2.98	3.80 (3.03 to 4.42)	1.76	1.72 (1.33 to 2.29)	4.73	5.51 (4.83 to 6.75)	●
Newham	6,113	6.05	3.99 (3.39 to 4.70)	1.65	1.54 (1.14 to 1.99)	7.69	5.50 (5.02 to 6.71)	●
North & West Reading	1,177	*	4.05 (3.44 to 5.17)	*	1.71 (1.22 to 2.43)	8.50	5.76 (5.17 to 7.35)	●
North Cumbria	3,094	2.59	3.87 (3.12 to 4.54)	2.92	1.85 (1.38 to 2.57)	5.49	5.74 (5.07 to 7.24)	●

Organisation	Total births [§]	Rate per 1,000 births [§]						
		Stillbirth [†]		Neonatal [‡]		Extended perinatal [†]		
		Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI) [#]	
North Derbyshire	2,498	4.80	4.02 (3.41 to 4.82)	2.41	1.83 (1.35 to 2.58)	7.21	5.84 (5.36 to 7.22)	●
North Durham	2,443	3.27	3.92 (3.11 to 4.74)	1.23	1.67 (1.24 to 2.26)	4.50	5.58 (4.96 to 6.93)	●
North East Essex	3,498	4.57	4.01 (3.41 to 4.95)	2.30	1.81 (1.37 to 2.49)	6.86	5.82 (5.29 to 7.17)	●
North East Hampshire and Farnham	2,546	*	3.89 (3.17 to 4.60)	*	1.66 (1.21 to 2.27)	3.53	5.55 (5.01 to 6.68)	●
North East Lincolnshire	1,863	1.61	3.83 (3.10 to 4.46)	3.23	1.83 (1.33 to 2.55)	4.83	5.66 (5.04 to 7.06)	●
North Hampshire	2,627	3.81	3.96 (3.37 to 4.79)	1.15	1.66 (1.23 to 2.20)	4.95	5.59 (5.06 to 6.93)	●
North Kirklees	2,580	6.20	4.02 (3.45 to 4.87)	1.17	1.62 (1.17 to 2.12)	7.36	5.61 (5.08 to 6.88)	●
North Lincolnshire	1,779	5.06	3.99 (3.39 to 4.84)	2.82	1.76 (1.32 to 2.37)	7.87	5.75 (5.22 to 7.20)	●
North Norfolk	1,367	*	3.89 (3.23 to 4.65)	*	1.64 (1.19 to 2.18)	2.19	5.52 (5.00 to 6.71)	●
North Somerset	2,180	*	3.87 (3.08 to 4.53)	*	1.68 (1.27 to 2.26)	3.21	5.55 (4.96 to 6.78)	●
North Staffordshire	1,972	*	3.76 (2.94 to 4.56)	*	1.72 (1.27 to 2.34)	1.52	5.48 (4.77 to 6.79)	●
North Tyneside	2,267	2.65	3.88 (3.18 to 4.65)	1.33	1.72 (1.29 to 2.31)	3.97	5.59 (5.04 to 6.84)	●
North West Surrey	4,485	3.57	3.93 (3.28 to 4.69)	2.01	1.82 (1.39 to 2.48)	5.57	5.74 (5.24 to 7.16)	●
Northern, Eastern and Western Devon	8,684	2.88	3.83 (3.21 to 4.50)	1.85	1.83 (1.43 to 2.39)	4.72	5.66 (5.21 to 6.88)	●
Northumberland	2,831	3.53	3.93 (3.32 to 4.82)	1.77	1.76 (1.29 to 2.42)	5.30	5.69 (5.16 to 7.04)	●
Norwich	2,519	4.76	4.00 (3.35 to 4.83)	1.60	1.75 (1.32 to 2.39)	6.35	5.74 (5.18 to 7.13)	●
Nottingham City	4,340	3.23	3.78 (3.04 to 4.56)	1.85	1.69 (1.25 to 2.20)	5.07	5.46 (4.83 to 6.75)	●
Nottingham North and East	1,669	*	3.93 (3.27 to 4.75)	*	1.70 (1.24 to 2.33)	4.79	5.63 (5.10 to 6.89)	●
Nottingham West	1,196	*	3.87 (3.20 to 4.67)	*	1.77 (1.34 to 2.44)	4.18	5.64 (5.11 to 6.96)	●
Oldham	3,338	3.59	3.86 (3.21 to 4.62)	2.10	1.66 (1.25 to 2.17)	5.69	5.50 (5.01 to 6.70)	●
Oxfordshire	7,577	3.43	3.93 (3.33 to 4.71)	1.59	1.75 (1.35 to 2.31)	5.02	5.68 (5.21 to 6.89)	●
Portsmouth	2,607	*	3.91 (3.28 to 4.60)	*	1.63 (1.20 to 2.15)	4.22	5.52 (4.98 to 6.73)	●
Redbridge	4,696	2.56	3.66 (2.78 to 4.62)	1.71	1.68 (1.28 to 2.26)	4.26	5.33 (4.59 to 6.67)	●
Redditch and Bromsgrove	2,015	5.96	4.06 (3.43 to 5.02)	2.00	1.75 (1.30 to 2.39)	7.94	5.80 (5.26 to 7.19)	●
Richmond	2,536	*	3.89 (3.23 to 4.54)	*	1.63 (1.16 to 2.25)	3.15	5.52 (4.99 to 6.63)	●
Rotherham	3,109	5.47	4.05 (3.43 to 4.95)	0.97	1.62 (1.18 to 2.19)	6.43	5.65 (5.14 to 7.00)	●
Rushcliffe	1,046	*	3.92 (3.28 to 4.70)	*	1.75 (1.27 to 2.38)	4.78	5.66 (5.12 to 6.96)	●
Salford	3,711	5.93	4.10 (3.49 to 5.12)	1.63	1.67 (1.26 to 2.25)	7.55	5.74 (5.23 to 7.16)	●
Sandwell and West Birmingham	7,745	4.91	3.86 (3.29 to 4.53)	2.34	1.70 (1.33 to 2.21)	7.23	5.55 (5.10 to 6.65)	●

Organisation	Total births [§]	Rate per 1,000 births [§]						
		Stillbirth [†]		Neonatal [‡]		Extended perinatal [†]		
		Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI) [#]	
Scarborough and Ryedale	1,128	*	3.90 (3.23 to 4.64)	*	1.74 (1.28 to 2.45)	4.43	5.64 (5.15 to 6.95)	●
Sheffield	6,554	4.58	3.99 (3.36 to 4.75)	2.15	1.84 (1.37 to 2.38)	6.71	5.83 (5.31 to 7.00)	●
Shropshire	2,944	4.42	4.01 (3.37 to 4.82)	2.05	1.81 (1.36 to 2.58)	6.45	5.81 (5.29 to 7.24)	●
Slough	2,630	5.70	3.95 (3.31 to 4.79)	1.91	1.67 (1.26 to 2.15)	7.60	5.62 (5.14 to 6.94)	●
Solihull	2,324	4.73	3.99 (3.35 to 4.76)	1.73	1.73 (1.29 to 2.34)	6.45	5.71 (5.17 to 7.01)	●
Somerset	5,487	3.64	3.97 (3.36 to 4.72)	1.10	1.67 (1.25 to 2.27)	4.74	5.63 (5.15 to 6.99)	●
South Cheshire	1,849	*	3.92 (3.23 to 4.63)	*	1.64 (1.21 to 2.29)	3.79	5.55 (4.96 to 6.92)	●
South Devon and Torbay	2,529	2.37	3.86 (3.17 to 4.60)	1.59	1.74 (1.27 to 2.35)	3.95	5.59 (4.98 to 6.83)	●
South East Staffordshire and Seisdon Peninsula	2,231	3.14	3.92 (3.27 to 4.72)	2.70	1.83 (1.38 to 2.51)	5.83	5.74 (5.20 to 7.08)	●
South Eastern Hampshire	2,140	4.21	3.97 (3.39 to 4.82)	1.88	1.73 (1.29 to 2.30)	6.07	5.69 (5.22 to 7.10)	●
South Gloucestershire	3,086	3.56	3.95 (3.28 to 4.77)	0.98	1.71 (1.26 to 2.35)	4.54	5.66 (5.11 to 7.04)	●
South Kent Coast	2,108	3.32	3.91 (3.21 to 4.62)	1.90	1.72 (1.28 to 2.31)	5.22	5.63 (5.05 to 6.90)	●
South Lincolnshire	1,458	*	3.93 (3.36 to 4.71)	*	1.72 (1.25 to 2.33)	4.80	5.64 (5.15 to 7.09)	●
South Norfolk	2,311	*	3.89 (3.21 to 4.61)	*	1.66 (1.24 to 2.31)	3.46	5.54 (4.90 to 6.77)	●
South Reading	1,843	5.43	3.97 (3.41 to 4.80)	1.64	1.72 (1.28 to 2.38)	7.05	5.69 (5.29 to 7.04)	●
South Sefton	1,848	2.71	3.89 (3.20 to 4.66)	2.71	1.84 (1.34 to 2.65)	5.41	5.71 (5.14 to 6.98)	●
South Tees	3,364	3.57	3.89 (3.22 to 4.49)	1.79	1.73 (1.30 to 2.32)	5.35	5.61 (5.09 to 6.71)	●
South Tyneside	1,682	1.78	3.85 (3.14 to 4.54)	2.98	1.83 (1.36 to 2.54)	4.76	5.66 (5.08 to 7.02)	●
South Warwickshire	2,550	2.75	3.90 (3.24 to 4.60)	1.97	1.80 (1.31 to 2.53)	4.71	5.69 (5.15 to 6.96)	●
South West Lincolnshire	1,248	*	3.87 (3.20 to 4.46)	*	1.79 (1.34 to 2.58)	4.01	5.65 (5.06 to 7.04)	●
South Worcestershire	2,956	*	3.85 (3.12 to 4.63)	*	1.60 (1.16 to 2.21)	3.04	5.44 (4.87 to 6.74)	●
Southampton	3,201	5.00	4.01 (3.38 to 4.87)	2.20	1.77 (1.35 to 2.33)	7.19	5.78 (5.23 to 7.15)	●
Southend	2,263	*	3.96 (3.36 to 4.81)	*	1.64 (1.21 to 2.21)	5.30	5.59 (5.12 to 6.86)	●
Southern Derbyshire	6,048	4.79	4.07 (3.46 to 5.01)	2.82	1.86 (1.42 to 2.45)	7.61	5.94 (5.37 to 7.31)	●
Southport and Formby	965	*	3.95 (3.26 to 4.71)	*	1.66 (1.19 to 2.26)	4.15	5.60 (5.03 to 6.90)	●
Southwark	4,650	3.66	3.79 (3.10 to 4.53)	1.73	1.71 (1.31 to 2.26)	5.38	5.49 (4.95 to 6.75)	●
St Helens	1,996	*	3.88 (3.19 to 4.60)	*	1.64 (1.22 to 2.28)	3.01	5.51 (5.01 to 6.85)	●
Stafford and Surrounds	1,425	2.81	3.91 (3.21 to 4.67)	2.11	1.77 (1.28 to 2.42)	4.91	5.67 (5.08 to 6.90)	●
Stockport	3,430	3.50	3.93 (3.26 to 4.64)	2.34	1.80 (1.36 to 2.47)	5.83	5.74 (5.15 to 7.09)	●

Organisation	Total births [§]	Rate per 1,000 births [§]						
		Stillbirth [†]		Neonatal [†]		Extended perinatal [†]		
		Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI) [#]	
Stoke on Trent	3,568	4.48	3.96 (3.36 to 4.70)	1.69	1.70 (1.29 to 2.24)	6.17	5.64 (5.17 to 6.81)	●
Sunderland	2,990	*	3.83 (3.15 to 4.53)	*	1.57 (1.11 to 2.06)	2.68	5.38 (4.81 to 6.63)	●
Surrey Downs	2,982	*	3.89 (3.24 to 4.67)	*	1.64 (1.18 to 2.24)	3.35	5.52 (4.93 to 6.87)	●
Surrey Heath	1,059	*	3.87 (3.18 to 4.60)	*	1.66 (1.24 to 2.23)	*	5.52 (4.99 to 6.72)	●
Sutton	2,711	2.95	3.87 (3.24 to 4.52)	1.85	1.75 (1.32 to 2.41)	4.80	5.62 (5.11 to 6.87)	●
Swale	1,505	*	3.89 (3.21 to 4.53)	*	1.71 (1.24 to 2.28)	3.99	5.60 (5.02 to 6.72)	●
Swindon	2,967	2.70	3.86 (3.08 to 4.57)	2.03	1.75 (1.34 to 2.38)	4.72	5.61 (5.06 to 6.87)	●
Tameside and Glossop	3,232	3.09	3.88 (3.23 to 4.55)	2.17	1.80 (1.35 to 2.47)	5.26	5.67 (5.16 to 6.96)	●
Telford and Wrekin	2,092	5.26	4.00 (3.34 to 4.89)	1.44	1.71 (1.29 to 2.32)	6.69	5.70 (5.16 to 7.06)	●
Thanet	1,564	5.12	3.98 (3.30 to 5.00)	3.21	1.81 (1.33 to 2.59)	8.31	5.79 (5.19 to 7.34)	●
Thurrock	2,485	4.83	3.97 (3.36 to 4.82)	1.21	1.69 (1.25 to 2.30)	6.04	5.65 (5.16 to 7.05)	●
Tower Hamlets	4,691	7.67	4.16 (3.45 to 5.19)	1.93	1.69 (1.24 to 2.21)	9.59	5.84 (5.21 to 7.29)	●
Trafford	2,817	2.48	3.85 (3.20 to 4.47)	1.78	1.72 (1.26 to 2.29)	4.26	5.57 (5.04 to 6.78)	●
Vale Royal	1,147	*	3.91 (3.20 to 4.77)	*	1.71 (1.26 to 2.33)	4.36	5.61 (5.01 to 7.09)	●
Vale of York	3,405	*	3.98 (3.37 to 4.78)	*	1.60 (1.15 to 2.17)	4.41	5.56 (5.06 to 6.84)	●
Wakefield	4,077	3.43	3.90 (3.27 to 4.64)	2.95	1.90 (1.44 to 2.70)	6.38	5.81 (5.29 to 7.31)	●
Walsall	3,768	5.57	4.03 (3.36 to 4.84)	4.00	1.96 (1.47 to 2.72)	9.55	6.02 (5.44 to 7.54)	●
Waltham Forest	4,757	4.83	3.93 (3.31 to 4.65)	1.69	1.71 (1.29 to 2.30)	6.52	5.63 (5.17 to 6.82)	●
Wandsworth	4,965	3.42	3.86 (3.19 to 4.53)	1.01	1.62 (1.16 to 2.14)	4.43	5.47 (4.86 to 6.66)	●
Warrington	2,303	1.74	3.84 (3.11 to 4.53)	2.61	1.82 (1.34 to 2.54)	4.34	5.65 (5.06 to 6.99)	●
Warwickshire North	2,184	*	3.98 (3.44 to 4.91)	*	1.67 (1.23 to 2.31)	5.49	5.64 (5.18 to 6.99)	●
West Cheshire	2,439	1.23	3.80 (2.99 to 4.53)	1.64	1.75 (1.28 to 2.38)	2.87	5.55 (4.93 to 6.93)	●
West Essex	3,793	3.16	3.90 (3.25 to 4.67)	0.79	1.59 (1.17 to 2.16)	3.95	5.48 (4.93 to 6.71)	●
West Hampshire	5,532	2.89	3.89 (3.26 to 4.53)	0.91	1.63 (1.23 to 2.20)	3.80	5.51 (5.06 to 6.74)	●
West Kent	5,396	3.34	3.93 (3.29 to 4.66)	1.12	1.67 (1.27 to 2.32)	4.45	5.60 (5.12 to 6.84)	●
West Lancashire	1,009	*	3.89 (3.16 to 4.67)	*	1.71 (1.25 to 2.44)	2.97	5.60 (5.03 to 6.95)	●
West Leicestershire	4,123	2.67	3.86 (3.18 to 4.49)	1.70	1.73 (1.29 to 2.29)	4.37	5.59 (5.01 to 6.76)	●
West London	2,716	2.95	3.84 (3.11 to 4.55)	1.85	1.71 (1.28 to 2.37)	4.79	5.55 (4.96 to 6.81)	●
West Norfolk	1,799	4.45	3.97 (3.30 to 4.82)	2.23	1.76 (1.30 to 2.42)	6.67	5.73 (5.16 to 7.15)	●

Organisation	Total births [§]	Rate per 1,000 births [§]						
		Stillbirth [†]		Neonatal [†]		Extended perinatal [†]		
		Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI) [#]	
West Suffolk	2,557	*	4.07 (3.43 to 5.10)	*	1.64 (1.18 to 2.26)	5.87	5.71 (5.15 to 7.24)	●
Wigan Borough	3,549	3.94	3.97 (3.38 to 4.80)	1.70	1.75 (1.32 to 2.41)	5.64	5.71 (5.24 to 6.94)	●
Wiltshire	5,123	4.10	4.02 (3.38 to 4.84)	1.18	1.67 (1.23 to 2.25)	5.27	5.68 (5.21 to 6.94)	●
Windsor, Ascot and Maidenhead	1,703	2.35	3.88 (3.17 to 4.54)	2.94	1.78 (1.35 to 2.45)	5.28	5.67 (5.09 to 6.97)	●
Wirral	3,437	4.36	3.99 (3.47 to 4.80)	2.05	1.76 (1.33 to 2.41)	6.40	5.74 (5.26 to 7.15)	●
Wokingham	1,814	3.31	3.93 (3.36 to 4.61)	1.66	1.73 (1.28 to 2.33)	4.96	5.66 (5.13 to 6.97)	●
Wolverhampton	3,469	2.02	3.72 (2.84 to 4.41)	2.89	1.82 (1.37 to 2.53)	4.90	5.54 (4.81 to 6.83)	●
Wyre Forest	1,103	*	3.91 (3.20 to 4.70)	*	1.73 (1.29 to 2.44)	4.53	5.63 (5.05 to 7.00)	●
SCOTLAND								
Ayrshire and Arran	3,489	2.87	3.87 (3.21 to 4.56)	2.01	1.76 (1.31 to 2.37)	4.87	5.63 (5.14 to 6.82)	●
Borders	1,017	*	3.89 (3.20 to 4.56)	*	1.77 (1.28 to 2.41)	4.92	5.67 (5.01 to 6.95)	●
Dumfries and Galloway	1,323	*	4.04 (3.39 to 4.93)	*	1.71 (1.28 to 2.36)	8.31	5.74 (5.25 to 7.25)	●
Fife	3,711	4.85	4.04 (3.38 to 4.98)	2.17	1.82 (1.33 to 2.53)	7.01	5.86 (5.31 to 7.32)	●
Forth Valley	2,916	7.20	4.20 (3.41 to 5.54)	2.07	1.74 (1.30 to 2.32)	9.26	5.90 (5.20 to 7.59)	●
Grampian	6,275	2.23	3.76 (3.09 to 4.45)	1.92	1.86 (1.41 to 2.58)	4.14	5.61 (5.04 to 6.89)	●
Greater Glasgow and Clyde	12,194	4.26	4.07 (3.47 to 4.89)	0.99	1.52 (1.17 to 2.03)	5.25	5.58 (5.09 to 6.78)	●
Highland	2,843	*	3.87 (3.15 to 4.61)	*	1.63 (1.20 to 2.20)	3.17	5.49 (4.96 to 6.69)	●
Lanarkshire	6,847	3.94	4.01 (3.42 to 4.75)	1.17	1.61 (1.20 to 2.14)	5.11	5.59 (5.11 to 6.81)	●
Lothian	9,444	2.65	3.75 (3.04 to 4.55)	1.91	1.84 (1.40 to 2.45)	4.55	5.59 (5.02 to 6.88)	●
Orkney	186	*	3.91 (3.18 to 4.74)	*	1.71 (1.24 to 2.37)	*	5.62 (5.01 to 6.96)	●
Shetland	261	*	3.91 (3.17 to 4.70)	*	1.71 (1.24 to 2.38)	*	5.61 (4.94 to 6.95)	●
Tayside	3,956	3.79	3.95 (3.26 to 4.79)	3.55	2.02 (1.44 to 2.96)	7.33	6.00 (5.35 to 7.60)	●
Western Isles	241	*	3.94 (3.25 to 4.67)	*	1.70 (1.29 to 2.30)	*	5.63 (5.06 to 6.93)	●
WALES								
Abertawe Bro Morgannwg University Health Board	5,520	3.44	3.90 (3.28 to 4.54)	0.91	1.59 (1.16 to 2.15)	4.35	5.48 (4.91 to 6.53)	●
Aneurin Bevan University Health Board	6,397	3.75	3.93 (3.36 to 4.65)	1.10	1.61 (1.18 to 2.17)	4.85	5.53 (5.04 to 6.79)	●
Betsi Cadwaladr University Health Board	7,025	3.99	4.00 (3.42 to 4.80)	3.29	2.07 (1.45 to 2.96)	7.26	6.12 (5.47 to 7.75)	●
Cardiff and Vale University Health Board	5,812	5.68	4.16 (3.47 to 5.16)	0.69	1.60 (1.16 to 2.19)	6.37	5.77 (5.21 to 7.31)	●

Organisation	Total births [§]	Rate per 1,000 births [§]						
		Stillbirth [†]		Neonatal [‡]		Extended perinatal [†]		
		Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI) [#]	
Cwm Taf University Health Board	3,504	4.57	4.00 (3.45 to 4.83)	1.15	1.63 (1.22 to 2.19)	5.71	5.62 (5.12 to 6.96)	●
Hywel Dda University Health Board	3,635	6.05	4.16 (3.49 to 5.40)	0.83	1.64 (1.19 to 2.29)	6.88	5.78 (5.21 to 7.51)	●
Powys Teaching Health Board	1,184	*	3.96 (3.38 to 4.76)	*	1.68 (1.21 to 2.30)	5.07	5.63 (5.12 to 6.96)	●
NORTHERN IRELAND[°]								
Belfast	4,654	4.08	3.96 (3.39 to 4.69)	2.80	1.95 (1.41 to 2.79)	6.88	5.91 (5.39 to 7.31)	●
Northern	5,727	5.24	4.18 (3.48 to 5.38)	1.93	1.84 (1.36 to 2.56)	7.16	6.01 (5.41 to 7.69)	●
South Eastern	4,301	3.95	3.98 (3.33 to 4.82)	2.57	1.87 (1.40 to 2.64)	6.51	5.87 (5.35 to 7.26)	●
Southern	5,518	2.17	3.77 (3.01 to 4.43)	1.45	1.76 (1.29 to 2.30)	3.62	5.52 (4.85 to 6.65)	●
Western	3,968	4.54	4.02 (3.39 to 4.87)	2.53	1.90 (1.39 to 2.61)	7.06	5.90 (5.37 to 7.30)	●
CROWN DEPENDENCIES								
Bailiwick of Guernsey	608	*	4.03 (3.34 to 5.11)	*	1.71 (1.26 to 2.36)	11.51	5.72 (5.13 to 7.21)	●
Bailiwick of Jersey	754	*	3.89 (3.23 to 4.57)	*	1.75 (1.33 to 2.54)	3.98	5.65 (5.11 to 7.17)	●
Isle of Man	1,019	*	3.87 (3.18 to 4.53)	*	1.68 (1.20 to 2.38)	*	5.55 (4.94 to 6.85)	●

[§] excluding terminations of pregnancy and births <24⁺⁰ weeks gestational age

[†] per 1,000 total births

[‡] per 1,000 live births

[#] colours represent variation from comparator group average extended perinatal mortality rate

[°] different laws exist in Northern Ireland for the termination of pregnancy

* entry suppressed because of small number of deaths

Data sources: MBRRACE-UK, PDS, ONS, NRS, ISD, NIMATS, States of Guernsey, States of Jersey

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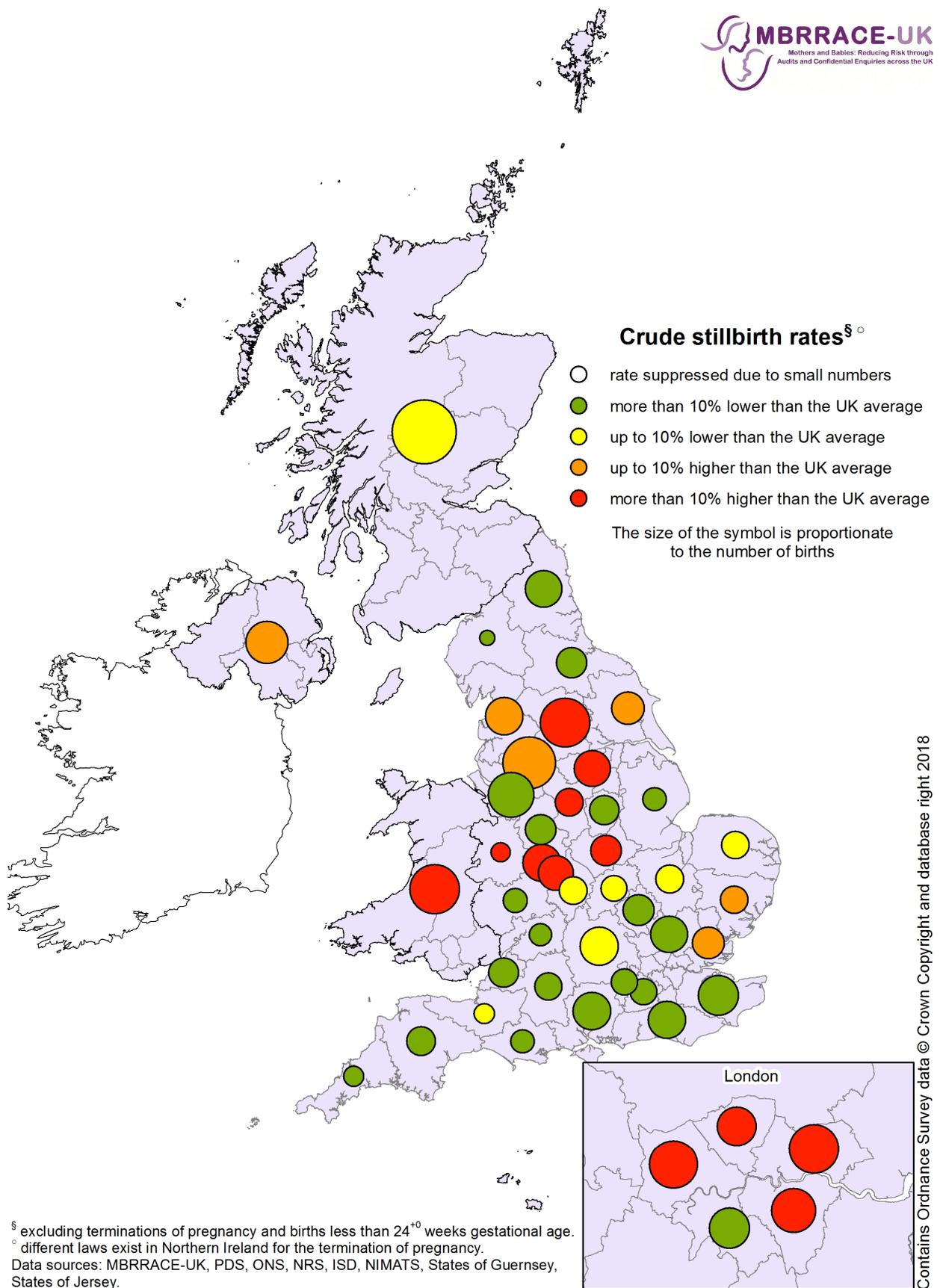
MBRRACE-UK Recommendation

Commissioning organisations should review both their crude, and stabilised & adjusted mortality rates to facilitate the identification of high risk populations and to target interventions for inequalities.

4.2 Mortality rates by Sustainability and Transformation Partnerships (England), or country of residence

As part of NHS England's Five Year Forward View [10] every health and care system in England has been asked to create their own place-based plan for five years – Sustainability and Transformation Partnerships (STPs). These are local partnerships between care providers and organisations providing the funding for care, loosely based on groups of CCGs. Similar work is being carried out in the devolved nations at national government level. In this section mortality rates are provided by STP for England and for each devolved nation. The relevant maps and tables are presented in Figures 10 to 15 and Table 7.

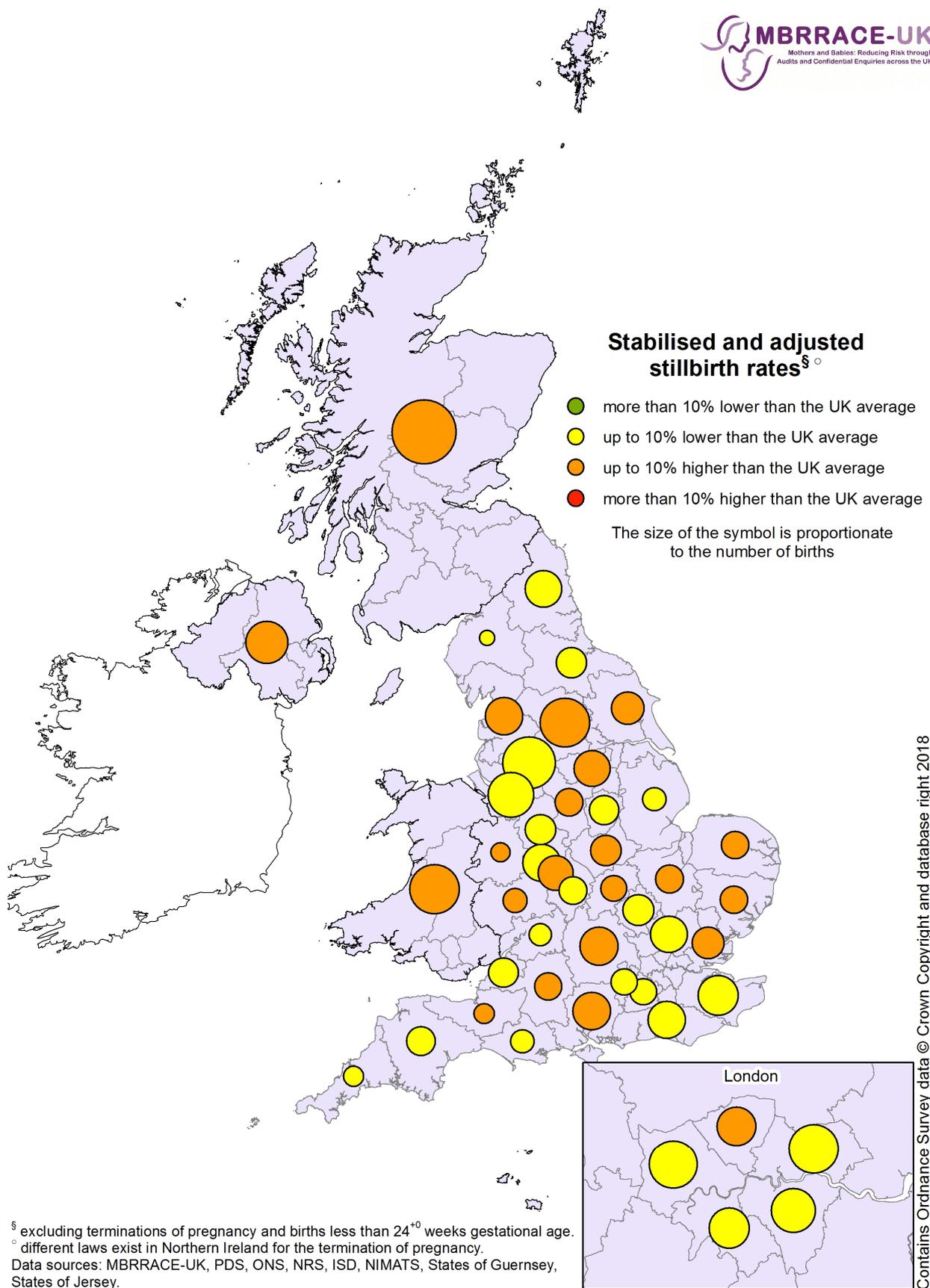
Figure 10: Crude stillbirth rates by Sustainability and Transformation Partnership (England) and country of residence (Scotland, Wales and Northern Ireland) based on postcode of mother's residence at time of delivery: United Kingdom, for births in 2016



[§] excluding terminations of pregnancy and births less than 24⁺ weeks gestational age.
[°] different laws exist in Northern Ireland for the termination of pregnancy.
 Data sources: MBRRACE-UK, PDS, ONS, NRS, ISD, NIMATS, States of Guernsey, States of Jersey.
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Figure 11: Stabilised & adjusted stillbirth rates by Sustainability and Transformation Partnership (England) and country of residence (Scotland, Wales and Northern Ireland) based on postcode of mother's residence at time of delivery: United Kingdom, for births in 2016



[§] excluding terminations of pregnancy and births less than 24⁺ weeks gestational age.
[°] different laws exist in Northern Ireland for the termination of pregnancy.
 Data sources: MBRRACE-UK, PDS, ONS, NRS, ISD, NIMATS, States of Guernsey, States of Jersey.
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Figure 12: Crude neonatal mortality rates by Sustainability and Transformation Partnership (England) and country of residence (Scotland, Wales and Northern Ireland) based on postcode of mother's residence at time of delivery: United Kingdom, for births in 2016

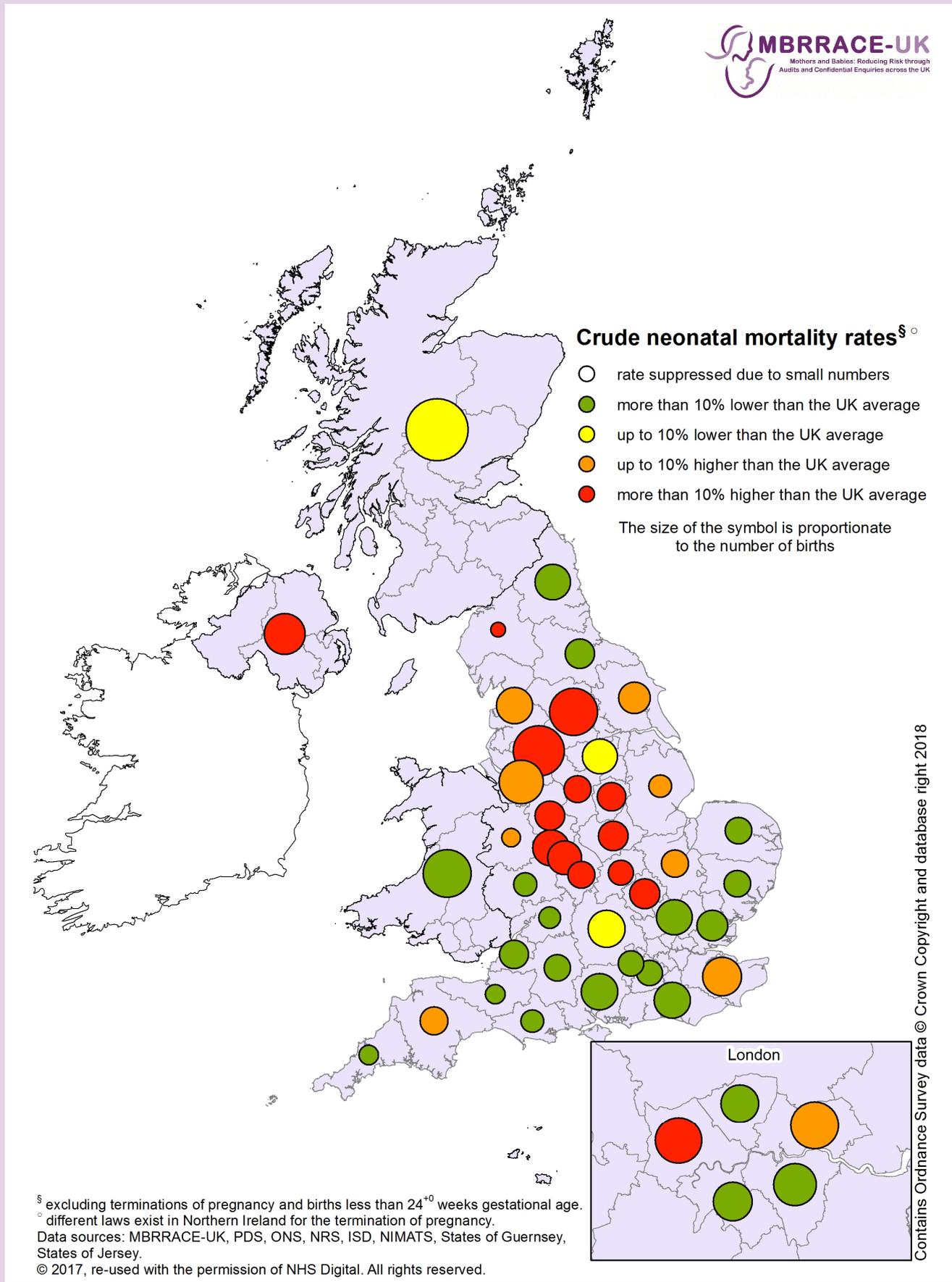


Figure 13: Stabilised & adjusted neonatal mortality rates by Sustainability and Transformation Partnership (England) and country of residence (Scotland, Wales and Northern Ireland) based on postcode of mother's residence at time of delivery: United Kingdom, for births in 2016

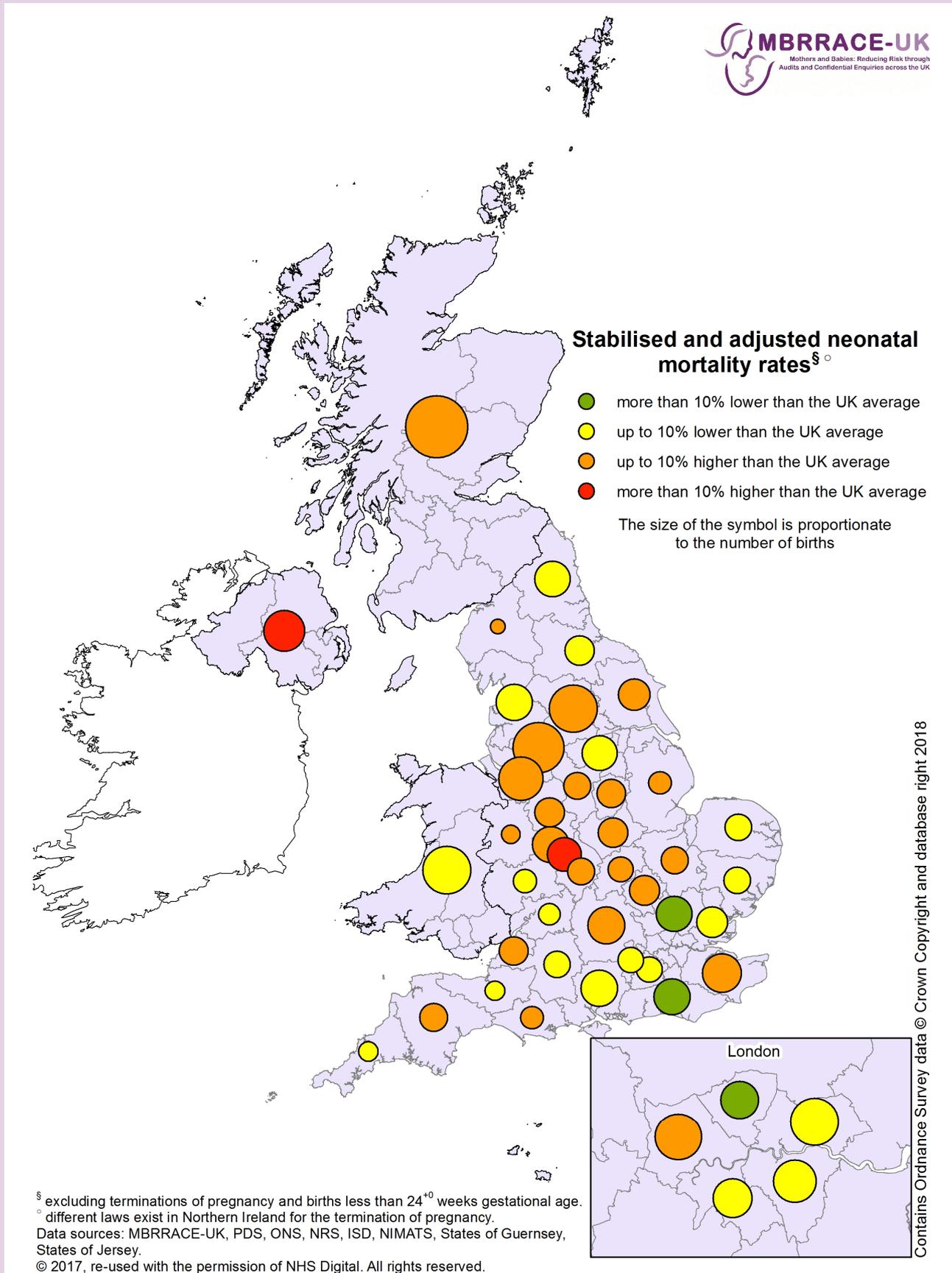
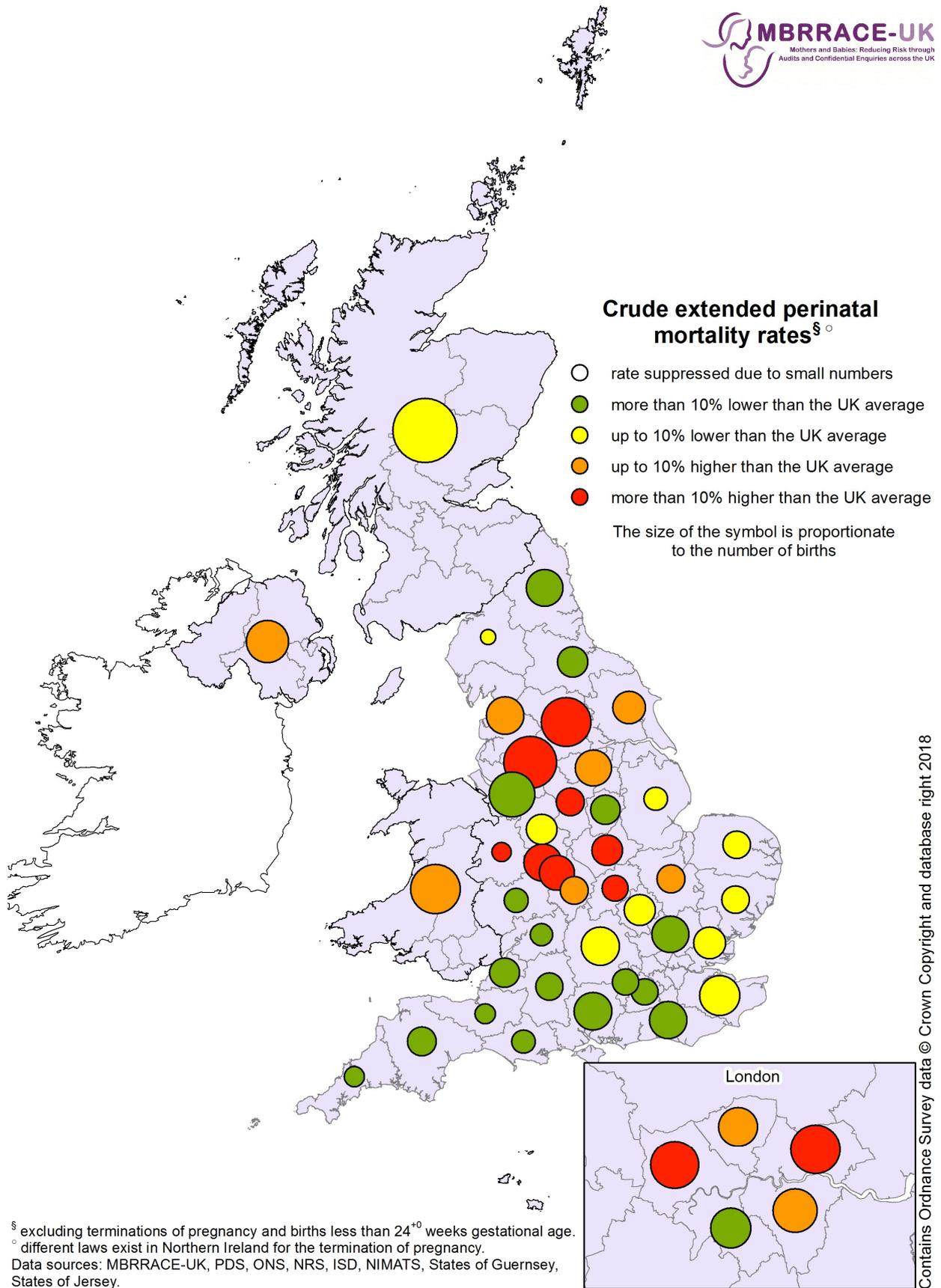


Figure 14: Crude extended perinatal mortality rates by Sustainability and Transformation Partnership (England) and country of residence (Scotland, Wales and Northern Ireland) based on postcode of mother's residence at time of delivery: United Kingdom, for births in 2016



[§] excluding terminations of pregnancy and births less than 24⁺ weeks gestational age.
[°] different laws exist in Northern Ireland for the termination of pregnancy.
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Figure 15: Stabilised & adjusted extended perinatal mortality rates by Sustainability and Transformation Partnership (England) and country of residence (Scotland, Wales and Northern Ireland) based on postcode of mother's residence at time of delivery: United Kingdom, for births in 2016

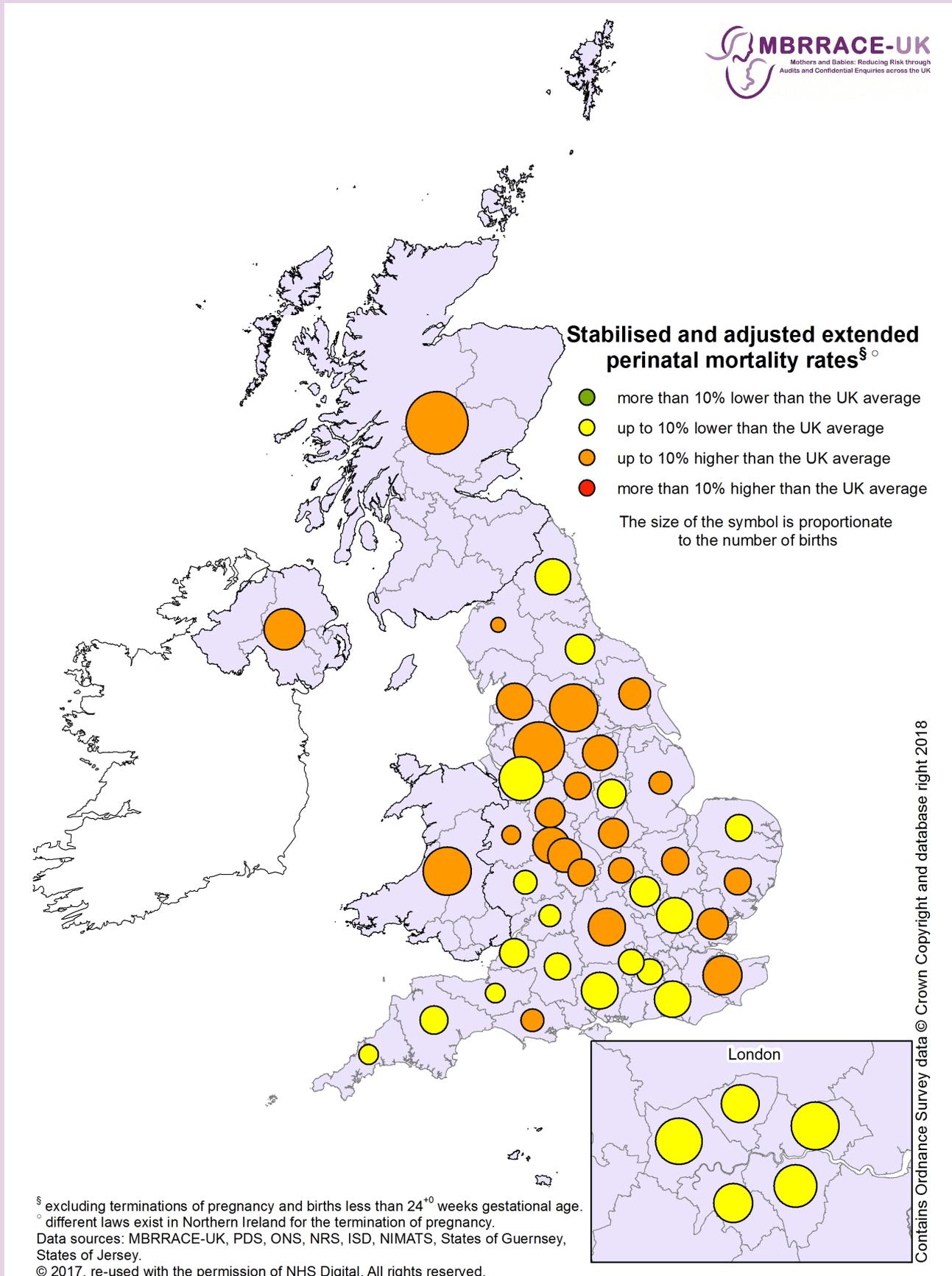


Table 7: Crude and stabilised & adjusted stillbirth, neonatal, extended perinatal mortality rates by Sustainability and Transformation Partnership (England) and country of residence (Scotland, Wales, Northern Ireland) based on postcode of mother's residence at time of delivery: United Kingdom, for births in 2016

Organisation	Total births [§]	Rate per 1,000 births [§]						
		Stillbirth [†]		Neonatal [‡]		Extended perinatal [†]		
		Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI) [#]	
ENGLAND								
Bath, Swindon and Wiltshire	9,901	3.43	3.93 (3.43 to 4.51)	1.32	1.67 (1.29 to 2.10)	4.75	5.59 (5.21 to 6.63)	●
Birmingham and Solihull	16,855	5.40	4.08 (3.53 to 4.75)	3.04	1.98 (1.49 to 2.65)	8.42	6.07 (5.58 to 7.48)	●
Bristol, North Somerset and South Gloucestershire	11,747	3.15	3.83 (3.25 to 4.36)	1.45	1.76 (1.39 to 2.27)	4.60	5.57 (5.13 to 6.56)	●
Buckinghamshire, Oxfordshire and Berkshire West	19,785	3.84	4.00 (3.47 to 4.55)	1.62	1.77 (1.44 to 2.23)	5.46	5.75 (5.42 to 6.80)	●
Cambridgeshire and Peterborough	10,755	3.91	3.98 (3.45 to 4.60)	1.77	1.76 (1.39 to 2.24)	5.67	5.73 (5.37 to 6.75)	●
Cheshire and Merseyside	27,475	3.13	3.78 (3.23 to 4.30)	1.86	1.79 (1.44 to 2.22)	4.99	5.58 (5.22 to 6.57)	●
Cornwall and the Isles of Scilly	5,323	3.38	3.93 (3.34 to 4.61)	1.32	1.71 (1.29 to 2.18)	4.70	5.63 (5.20 to 6.77)	●
Coventry and Warwickshire	10,496	3.81	3.92 (3.45 to 4.52)	2.20	1.82 (1.44 to 2.34)	6.00	5.74 (5.38 to 6.79)	●
Derbyshire	10,830	5.54	4.26 (3.52 to 5.42)	2.60	1.87 (1.49 to 2.44)	8.13	6.12 (5.55 to 7.72)	●
Devon	11,213	2.76	3.82 (3.24 to 4.34)	1.79	1.80 (1.43 to 2.27)	4.55	5.61 (5.15 to 6.69)	●
Dorset	7,174	3.35	3.92 (3.44 to 4.46)	1.54	1.74 (1.36 to 2.20)	4.88	5.66 (5.26 to 6.68)	●
Durham, Darlington, Teesside, Hambleton, Richmondshire and Whitby	12,131	3.46	3.87 (3.35 to 4.43)	1.32	1.64 (1.26 to 2.10)	4.78	5.50 (5.13 to 6.54)	●
Frimley Health	9,442	3.07	3.80 (3.19 to 4.36)	1.27	1.62 (1.24 to 2.06)	4.34	5.42 (4.94 to 6.46)	●
Gloucestershire	6,730	2.97	3.88 (3.34 to 4.50)	1.04	1.64 (1.20 to 2.13)	4.01	5.50 (5.02 to 6.60)	●
Greater Manchester	37,367	4.15	3.91 (3.51 to 4.39)	2.10	1.80 (1.49 to 2.20)	6.24	5.71 (5.42 to 6.62)	●
Hampshire and the Isle of Wight	19,216	3.54	3.95 (3.49 to 4.48)	1.36	1.61 (1.29 to 2.03)	4.89	5.54 (5.22 to 6.54)	●
Herefordshire and Worcestershire	7,849	3.57	3.95 (3.43 to 4.57)	1.53	1.70 (1.34 to 2.16)	5.10	5.64 (5.30 to 6.73)	●
Hertfordshire and West Essex	18,076	3.04	3.80 (3.24 to 4.34)	1.00	1.54 (1.14 to 2.00)	4.04	5.32 (4.88 to 6.37)	●
Humber, Coast and Vale	14,474	4.08	4.04 (3.51 to 4.74)	1.87	1.75 (1.42 to 2.19)	5.94	5.79 (5.39 to 6.83)	●
Kent and Medway	21,026	3.47	3.88 (3.42 to 4.32)	1.86	1.80 (1.44 to 2.21)	5.33	5.67 (5.33 to 6.57)	●
Lancashire and South Cumbria	18,788	4.15	4.01 (3.53 to 4.59)	1.82	1.68 (1.38 to 2.09)	5.96	5.68 (5.36 to 6.70)	●
Leicester, Leicestershire and Rutland	12,613	4.36	3.98 (3.49 to 4.55)	1.99	1.74 (1.38 to 2.19)	6.34	5.70 (5.31 to 6.74)	●
Lincolnshire	7,493	3.34	3.91 (3.37 to 4.50)	1.87	1.79 (1.41 to 2.33)	5.20	5.70 (5.34 to 6.85)	●

Organisation	Total births [§]	Rate per 1,000 births [§]						
		Stillbirth [†]		Neonatal [‡]		Extended perinatal [†]		
		Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI) [#]	
Mid and South Essex	13,987	4.29	4.07 (3.51 to 4.81)	1.01	1.62 (1.27 to 2.03)	5.29	5.69 (5.25 to 6.92)	●
Milton Keynes, Bedfordshire and Luton	12,843	3.43	3.78 (3.23 to 4.35)	2.03	1.74 (1.42 to 2.19)	5.45	5.52 (5.07 to 6.64)	●
Norfolk and Waveney	10,253	3.90	4.00 (3.50 to 4.72)	1.27	1.66 (1.28 to 2.09)	5.17	5.64 (5.22 to 6.75)	●
North Central London	20,267	4.49	3.93 (3.44 to 4.53)	1.19	1.52 (1.13 to 1.96)	5.67	5.44 (5.08 to 6.51)	●
North East London	32,195	5.00	3.88 (3.47 to 4.39)	1.87	1.66 (1.35 to 2.00)	6.86	5.53 (5.29 to 6.52)	●
North West London	30,274	4.59	3.86 (3.42 to 4.30)	1.96	1.76 (1.45 to 2.16)	6.54	5.61 (5.37 to 6.49)	●
Northamptonshire	8,984	3.90	3.96 (3.44 to 4.54)	2.35	1.88 (1.48 to 2.49)	6.23	5.84 (5.39 to 7.00)	●
Northumberland, Tyne and Wear and North Durham	17,923	2.85	3.71 (3.09 to 4.29)	1.51	1.68 (1.32 to 2.08)	4.35	5.39 (4.87 to 6.43)	●
Nottinghamshire	11,761	3.06	3.77 (3.19 to 4.39)	1.96	1.79 (1.45 to 2.25)	5.02	5.56 (5.16 to 6.63)	●
Shropshire and Telford and Wrekin	5,036	4.77	4.03 (3.54 to 4.73)	1.80	1.76 (1.37 to 2.30)	6.55	5.79 (5.40 to 7.00)	●
Somerset	5,487	3.64	3.96 (3.40 to 4.62)	1.10	1.69 (1.28 to 2.17)	4.74	5.64 (5.20 to 6.77)	●
South East London	25,726	4.59	3.92 (3.46 to 4.41)	1.37	1.58 (1.25 to 2.02)	5.95	5.50 (5.17 to 6.44)	●
South West London	21,505	3.12	3.65 (2.97 to 4.35)	1.45	1.64 (1.32 to 2.05)	4.56	5.28 (4.75 to 6.42)	●
South Yorkshire and Bassetlaw	17,328	4.44	4.06 (3.57 to 4.74)	1.57	1.68 (1.36 to 2.15)	6.00	5.73 (5.34 to 6.80)	●
Staffordshire	12,187	3.20	3.84 (3.33 to 4.36)	1.98	1.80 (1.46 to 2.29)	5.17	5.65 (5.30 to 6.69)	●
Suffolk and North East Essex	10,204	4.21	4.05 (3.55 to 4.71)	1.28	1.69 (1.29 to 2.13)	5.49	5.72 (5.31 to 6.84)	●
Surrey Heartlands	9,573	2.72	3.83 (3.24 to 4.33)	1.26	1.69 (1.33 to 2.14)	3.97	5.52 (5.07 to 6.46)	●
Sussex and East Surrey	19,179	3.18	3.84 (3.29 to 4.41)	0.68	1.43 (1.01 to 1.96)	3.86	5.26 (4.81 to 6.30)	●
The Black Country	18,791	4.36	3.84 (3.32 to 4.39)	2.62	1.83 (1.51 to 2.31)	6.97	5.68 (5.36 to 6.78)	●
West Yorkshire	32,177	5.07	4.23 (3.58 to 4.94)	2.06	1.80 (1.50 to 2.22)	7.12	6.01 (5.55 to 7.14)	●
West, North and East Cumbria	3,094	2.59	3.89 (3.33 to 4.58)	2.92	1.80 (1.38 to 2.33)	5.49	5.70 (5.20 to 6.92)	●
SCOTLAND	54,705	3.67	4.01 (3.54 to 4.54)	1.69	1.79 (1.46 to 2.19)	5.36	5.79 (5.46 to 6.73)	●
WALES	33,077	4.44	4.24 (3.54 to 5.00)	1.43	1.63 (1.30 to 1.99)	5.87	5.85 (5.41 to 6.99)	●
NORTHERN IRELAND[°]	24,170	3.97	4.08 (3.52 to 4.69)	2.20	2.05 (1.52 to 2.77)	6.16	6.13 (5.64 to 7.44)	●

§ excluding terminations of pregnancy and births <24⁺⁰ weeks gestational age

† per 1,000 total births

‡ per 1,000 live births

colours represent variation from comparator group average extended perinatal mortality rate

° different laws exist in Northern Ireland for the termination of pregnancy

* entry suppressed because of small number of deaths

Data sources: MBRRACE-UK, PDS, ONS, NRS, ISD, NIMATS, States of Guernsey, States of Jersey

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4.3 How local organisations should respond to this information

This information is intended to give local teams an insight into clinical performance based not just on crude mortality rates but also having taken account of at least some important socio-demographic factors that influence pregnancy outcomes: mother's age, socio-economic deprivation based on the mother's residence, baby's ethnicity, baby's sex, whether they are from a multiple birth, and gestational age at birth (neonatal deaths only). The red, amber, yellow and green banding facilitates the comparison of organisations' mortality rates, indicating their overall performance in comparison to the national or (for Trusts and Health Boards) peer group average (see Chapter 5).

Previous reports have highlighted the prioritisation of carrying out reviews for those organisations whose performance fall into the red and amber bands. With the launch of the PMRT there is an expectation that all Trusts and Health Boards will start to carry out reviews of all their cases, irrespective of where they fall in the spectrum of national performance. In order to ensure that Trusts in England engage with the use of the PMRT, CNST discounts will be withheld for those Trusts unable to demonstrate that they have used this resource between January and April 2018 as one of the ten required actions. However, as a first step for any commissioning organisation, Trust or Health Board whose performance falls in the red band ● a more detailed local review of their data quality and investigation of local factors should be carried out to identify if these issues explain the high rate. For example, data quality might not be sufficiently good to allow for the effect of the proportion of mothers who for legal, cultural or religious reasons choose to continue with a pregnancy affected by a severe congenital anomaly. This will clearly involve the co-operation of a range of clinical disciplines and, almost inevitably, a number of provider organisations in order to explore the whole care pathway for all babies that were included as part of the analysis. In some cases this will be limited to a small number of units but in other parts of the UK it will involve multiple delivery sites. Similarly, for those in the amber band ●, initial investigation of their data quality and local factors should be carried out.

MBRRACE-UK Recommendation

Trusts and Health Boards with a stabilised & adjusted stillbirth, neonatal mortality or extended perinatal mortality rate that falls into the red or amber band should carry out an initial investigation of their data quality and possible contributing local factors.

To facilitate full engagement with the PMRT, local delivery sites should be encouraged to notify all late fetal losses, stillbirths and neonatal deaths to the MBRRACE-UK surveillance system as soon as possible following the death, to allow for data sharing and to ensure that, going forward, we are able to provide the best possible insight into why their rates are different to the national average.

The PMRT has been designed to support the review of the care of: (i) all late fetal losses 22⁺⁰ to 23⁺⁶; (ii) all antepartum and intrapartum stillbirths; (iii) all neonatal deaths from birth to 28 days after birth; as well as (iv) all post-neonatal deaths where the baby dies after 28 days following care in a neonatal unit (although this latter category is not covered by the MBRRACE-UK programme).

Where babies received care in more than one hospital, the PMRT recommends that the care across all hospitals should be reviewed by the teams involved in the care at each hospital and that this should be carried out as a joint activity wherever possible. The Trust or Health Board where the baby died is responsible for leading the review but all units involved in the care should be part of the review group to ensure that all aspects of the care are considered. The PMRT aim is that the care of all the babies who die, as listed above, is reviewed irrespective of the colour of the banding reported here. For Trusts or Health Boards who currently conduct a very limited number of reviews this is probably unrealistic at the outset. In the first instance the PMRT recommends that the deaths of all term, intrapartum stillbirths and intrapartum-related neonatal deaths are reviewed: approximately 5% of all eligible deaths. However, once the reviewing process is established reviews should quickly expand beyond the deaths of babies born at term, bearing in mind that antepartum stillbirths account for 90% of all stillbirths and that the majority of babies who are born alive but subsequently die are born preterm.

MBRRACE-UK Recommendation

Irrespective of where they fall in the spectrum of national performance all Trusts and Health Boards should use the national PMRT to review all their stillbirths and neonatal deaths.



5. Mortality rates by healthcare provider

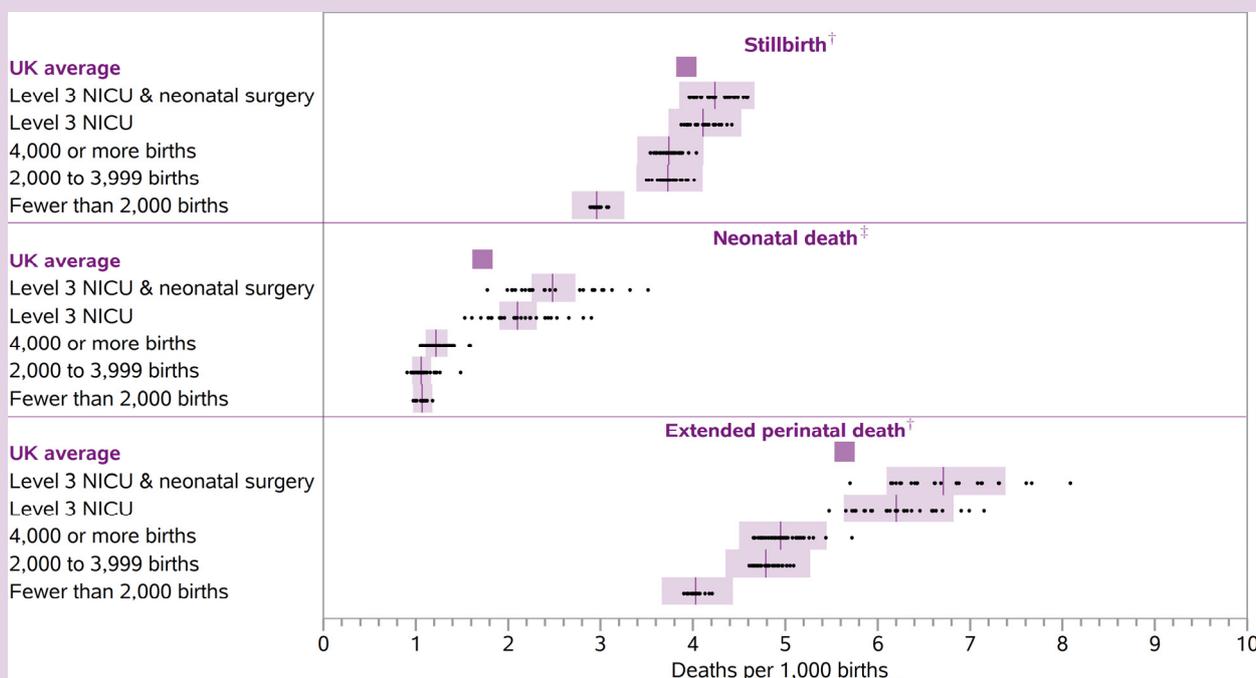
In this chapter the stillbirth, neonatal death, and extended perinatal mortality rates for individual Trusts and Health Boards as well as Neonatal Networks are summarised. Babies have been allocated based on the Trust or Health Board in which they were born irrespective of where they died. These mortality rates are presented in two different ways: as a ‘crude’ mortality rate and as a ‘stabilised & adjusted’ mortality rate (see Section 2.6).

In addition, to account for the wide variation in case-mix, Trusts and Health Boards have been classified hierarchically into five mutually exclusive comparator groups, based on their level of service provision:

1. Level 3 NICU and neonatal surgery.
2. Level 3 NICU.
3. 4,000 or more births per annum at 24 weeks or later.
4. 2,000-3,999 births per annum at 24 weeks or later.
5. Under 2,000 births per annum at 24 weeks or later.

In Figure 16, below, the extent to which this classification reflects the risk profiles of the different types of unit is demonstrated. The average mortality rate for each comparator group is shown as a vertical purple line, with a shaded box representing $\pm 10\%$ from the average.

Figure 16: Stabilised & adjusted mortality rates by NHS Trust (England), Health Board (Scotland and Wales), Health and Social Care Trust (Northern Ireland), and Crown Dependency based on place of birth: United Kingdom and Crown Dependencies, for births in 2016



This categorisation is useful as it allows units to consider their performance in relation to a comparator group of broadly similar units. However, we recognise that there are some limitations in the approach we have taken. This particularly affects units that happen to fall on the boundary between categories and, within the group that provides Level 3 neonatal intensive care and have neonatal surgical provision, i.e. those units which provide intensive care to the most high risk cases. The latter includes units that are the focus for delivery of babies known to have a major cardiac anomaly and those units with a particularly high number of births with major

congenital anomalies (e.g. Belfast). Such units will inevitably have higher rates of mortality when compared to otherwise similar services who do not provide intensive care for these types of babies. Individual detailed Trust and Health Board reports are produced to facilitate discussions of the findings from this report at Trust and Health Board level. These are uploaded onto the MBRRACE-UK web-based system and lead reporters and quality managers are notified of their availability via MBRRACE-UK reporters (see Appendix 7 for an example).

MBRRACE-UK Recommendation

Trusts and Health Boards should ensure that the data provided to MBRRACE-UK is of the highest quality. This is of particular importance for those providing the most complex care to particularly high-risk mothers and babies

Both the crude and the stabilised & adjusted stillbirth, neonatal mortality and extended perinatal mortality rates for UK Trusts and Health Boards are presented in Figures 17, 18, 19, 20, 21 and 22 and Tables 8, 9, 10, 11 and 12. Each of the tables contains data for one of the five comparator groups. The average mortality rate used in each of the five tables is that of the relevant comparator group; for example, the reported mortality rates for Trusts and Health Boards with neonatal surgical provision and level 3 NICUs have been compared to the average mortality rate derived from all of the Trusts and Health Boards providing this level of care and neonatal surgical provision. It is important to note that this is in contrast to the stabilised & adjusted data presented in the rest of the report relating to commissioning organisations, STPs, Neonatal Networks and Local Authorities, where the comparison is in relation to the UK average for births in 2016.

For babies born in the 26 Trusts and Health Boards with level 3 NICUs with surgical provision (Table 8), stabilised & adjusted rates of stillbirth, neonatal mortality and extended perinatal mortality ranged from 3.96 to 4.59 per 1,000 total births, from 1.78 to 3.52 per 1,000 live births and from 5.7 to 8.09 per 1,000 total births, respectively. Of all Trusts and Health Boards with level 3 NICUs and surgical provision all stillbirth rates fell within 10% of the comparator average and were coded either yellow or amber. For neonatal mortality and extended perinatal mortality, ten and two Trusts and Health Boards in this group, respectively, fell into the red category (more than 10% higher than the average for this comparator group). Conversely ten and one of these Trust and Health Boards, respectively, fell into the green category (more than 10% lower than the average for this comparator group) for neonatal mortality and extended perinatal mortality.

Focussing on those babies born in the 28 Trusts and Health Boards with level 3 NICUs alone (Table 9), the stabilised & adjusted rates of stillbirth, neonatal mortality and extended perinatal mortality ranged from 3.87 to 4.42 per 1,000 total births, from 1.53 to 2.90 per 1,000 live births and from 5.47 to 7.15 per 1,000 total births, respectively. Stabilised & adjusted stillbirth rates for all of these Trusts and Health Boards fell within 10% of the comparator average and were therefore coded as yellow or amber. Eight and three fell into the red category (more than 10% higher than the average for this comparator group) for neonatal mortality and extended perinatal mortality, respectively, and seven and one fell into the green category (more than 10% lower than the average for this comparator group) for neonatal deaths and extended perinatal deaths, respectively.

Considering babies born in Trusts and Health Boards with 4,000 or more births (n=47) (Table 10) stabilised & adjusted rates of stillbirth, neonatal mortality and extended perinatal mortality ranged from 3.54 to 4.04 per 1,000 total births, from 1.05 to 1.59 per 1,000 live births and from 4.66 to 5.72 per 1,000 total births, respectively. Of these Trusts and Health Boards ten and one fell into the red category (more than 10% higher than the average for this comparator group) for neonatal mortality and extended perinatal mortality, respectively, and seven fell into the green category (more than 10% lower than the average for this comparator group) for neonatal mortality alone.

Rates of stabilised & adjusted stillbirth, neonatal death and extended perinatal mortality for babies born in the Trusts and Health Boards with 2,000 to 3,999 births per annum (n=40) (Table 11) ranged from 3.50 to 4.01 per 1,000 total births, from 0.91 to 1.49 per 1,000 live births and from 4.61 to 5.09 per 1,000 total births, respectively. Six of these Trusts and Health Boards fell into the red category (more than 10% higher than the average for this comparator group) and five fell into the green category (more than 10% lower than the average for this comparator group) for neonatal mortality. All stillbirth and extended perinatal mortality rates fell within 10% of the comparator average for this group, falling into the yellow and amber categories.

For the smallest Trusts and Health Boards with <2,000 births per annum (Table 12) rates of stabilised & adjusted stillbirth, neonatal death and extended perinatal mortality ranged from 2.89 to 3.09 per 1,000 total births, from 0.97 to 1.18 per 1,000 live births and from 3.90 to 4.21 per 1,000 total births, respectively. One of these Trusts and Health Boards fell into the red category (more than 10% higher than the average for this comparator group) for neonatal mortality.

Crude and stabilised & adjusted mortality rates for Neonatal Networks are presented in Figures 23, 24, 25, 26, 27 and 28 and Table 13. As indicated previously these rates are compared to the UK average for births as a whole.

MBRRACE-UK Recommendation

A national forum should be established by NHS England, the Scottish government, NHS Wales, and Health and the Northern Ireland Department of Health, in conjunction with professional bodies and national healthcare advisors responsible for clinical standards in relevant specialties, to agree an appropriate benchmark against which stillbirth and neonatal mortality rates should be monitored across the UK.

5.1 Mortality rates for individual Trusts and Health Boards

Figure 17: Crude stillbirth mortality rates by NHS Trust (England), Health Board (Scotland and Wales), Health and Social Care Trust (Northern Ireland), and Crown Dependency based on place of birth: United Kingdom and Crown Dependencies, for births in 2016

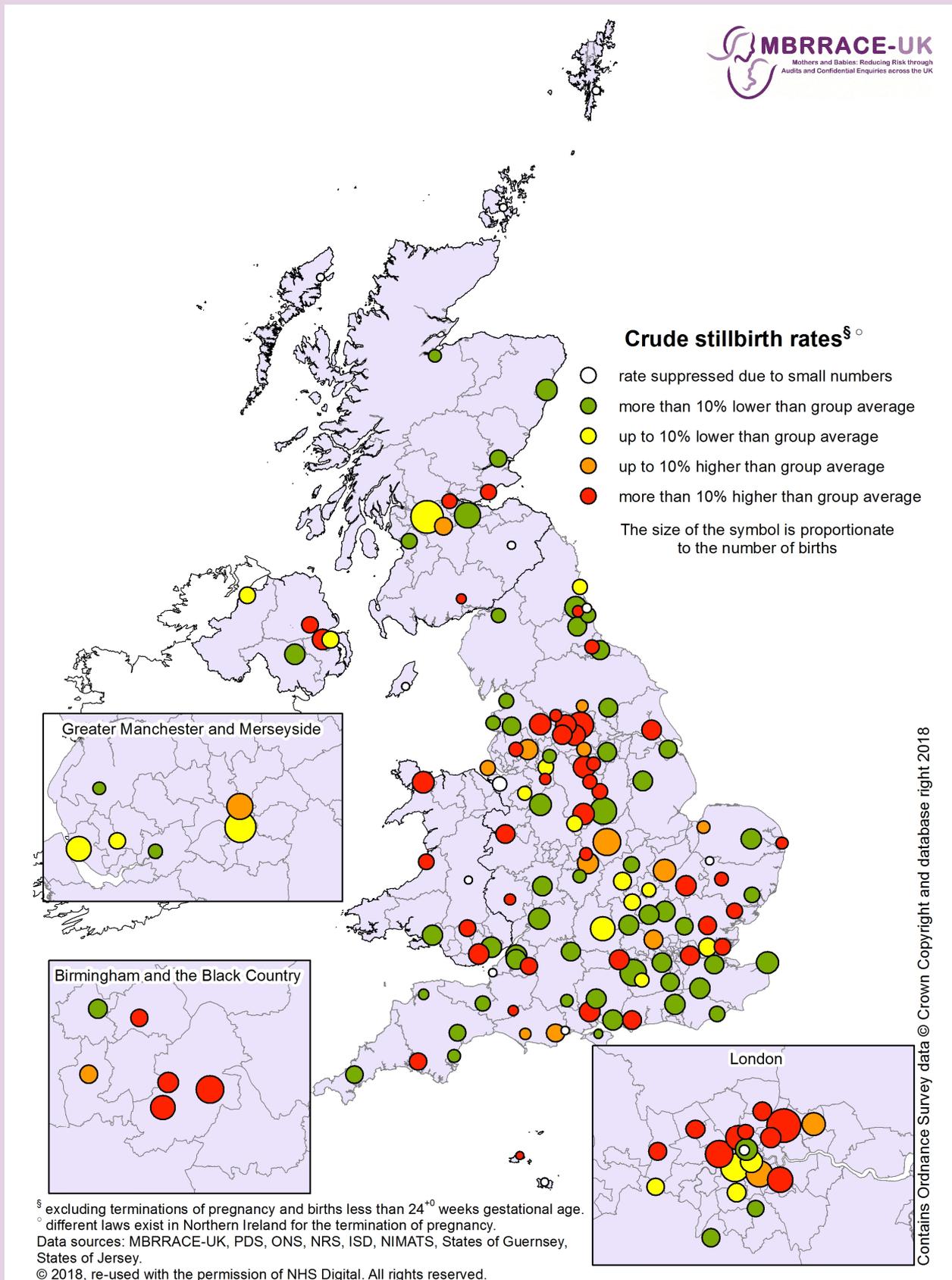


Figure 18: Stabilised & adjusted stillbirth mortality rates by NHS Trust (England), Health Board (Scotland and Wales), Health and Social Care Trust (Northern Ireland), and Crown Dependency based on place of birth: United Kingdom and Crown Dependencies, for births in 2016

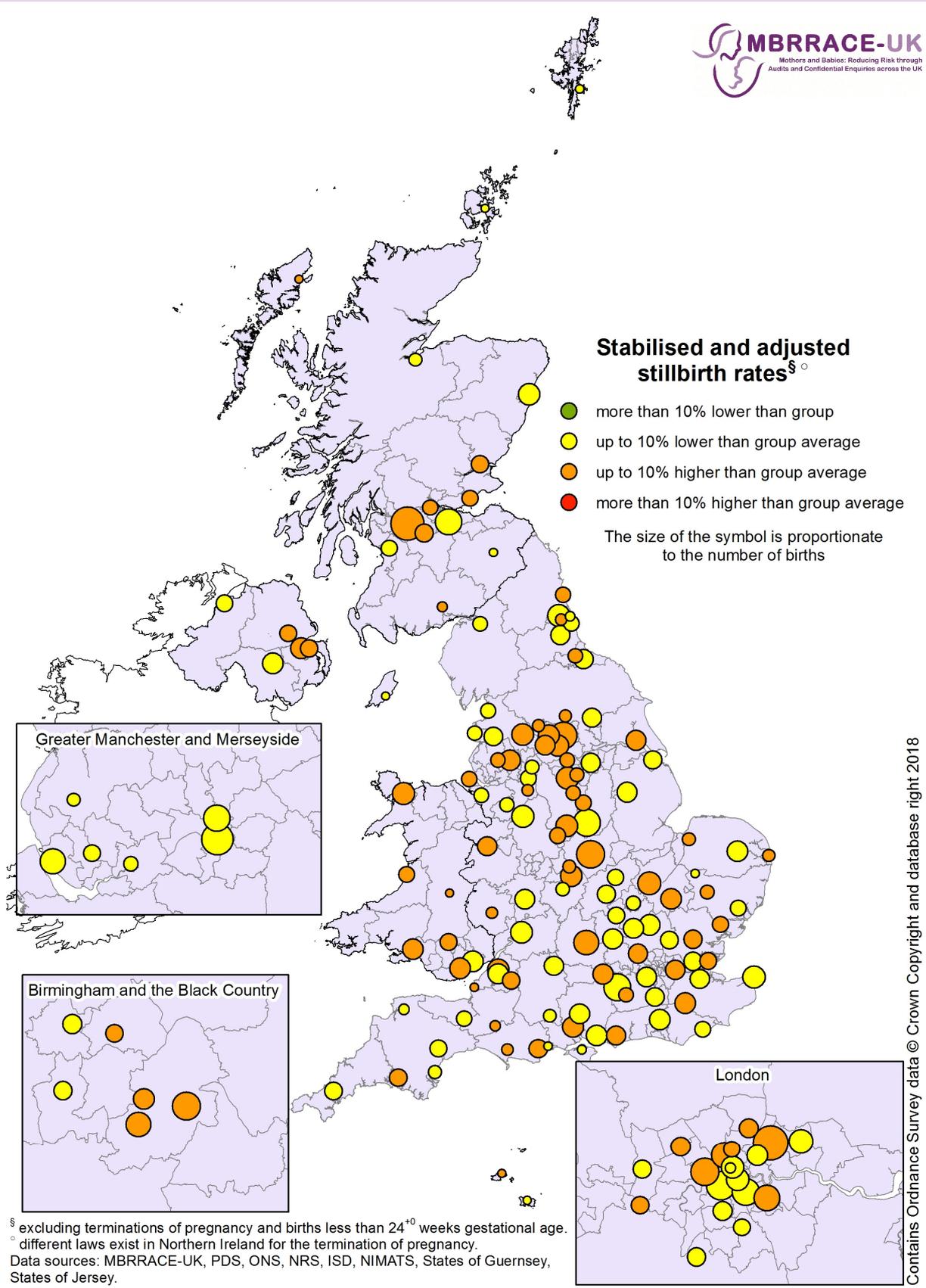


Figure 19: Crude neonatal mortality rates by NHS Trust (England), Health Board (Scotland and Wales), Health and Social Care Trust (Northern Ireland), and Crown Dependency based on place of birth: United Kingdom and Crown Dependencies, for births in 2016

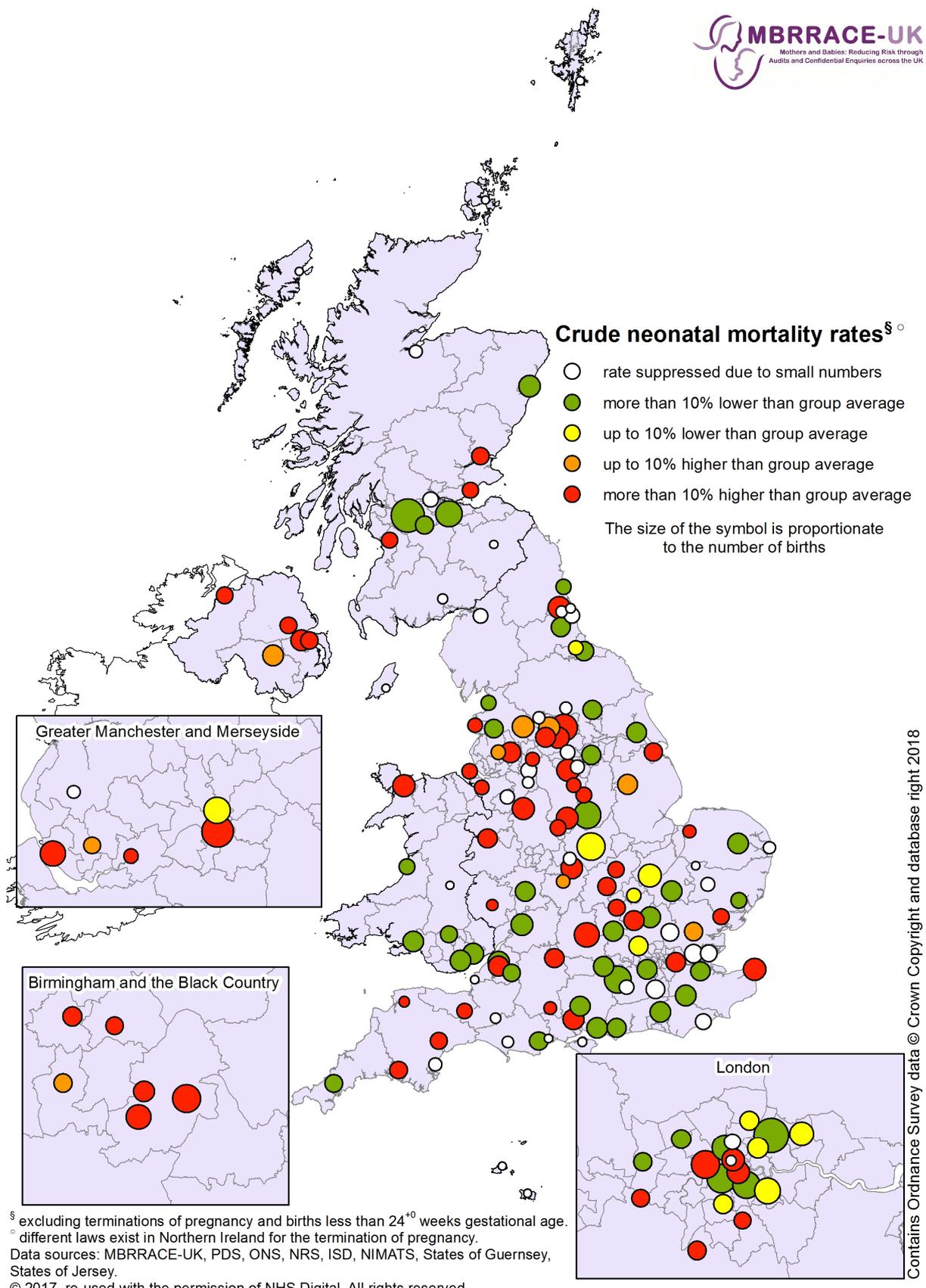


Figure 20: Stabilised & adjusted neonatal mortality rates by NHS Trust (England), Health Board (Scotland and Wales), Health and Social Care Trust (Northern Ireland), and Crown Dependency based on place of birth: United Kingdom and Crown Dependencies, for births in 2016

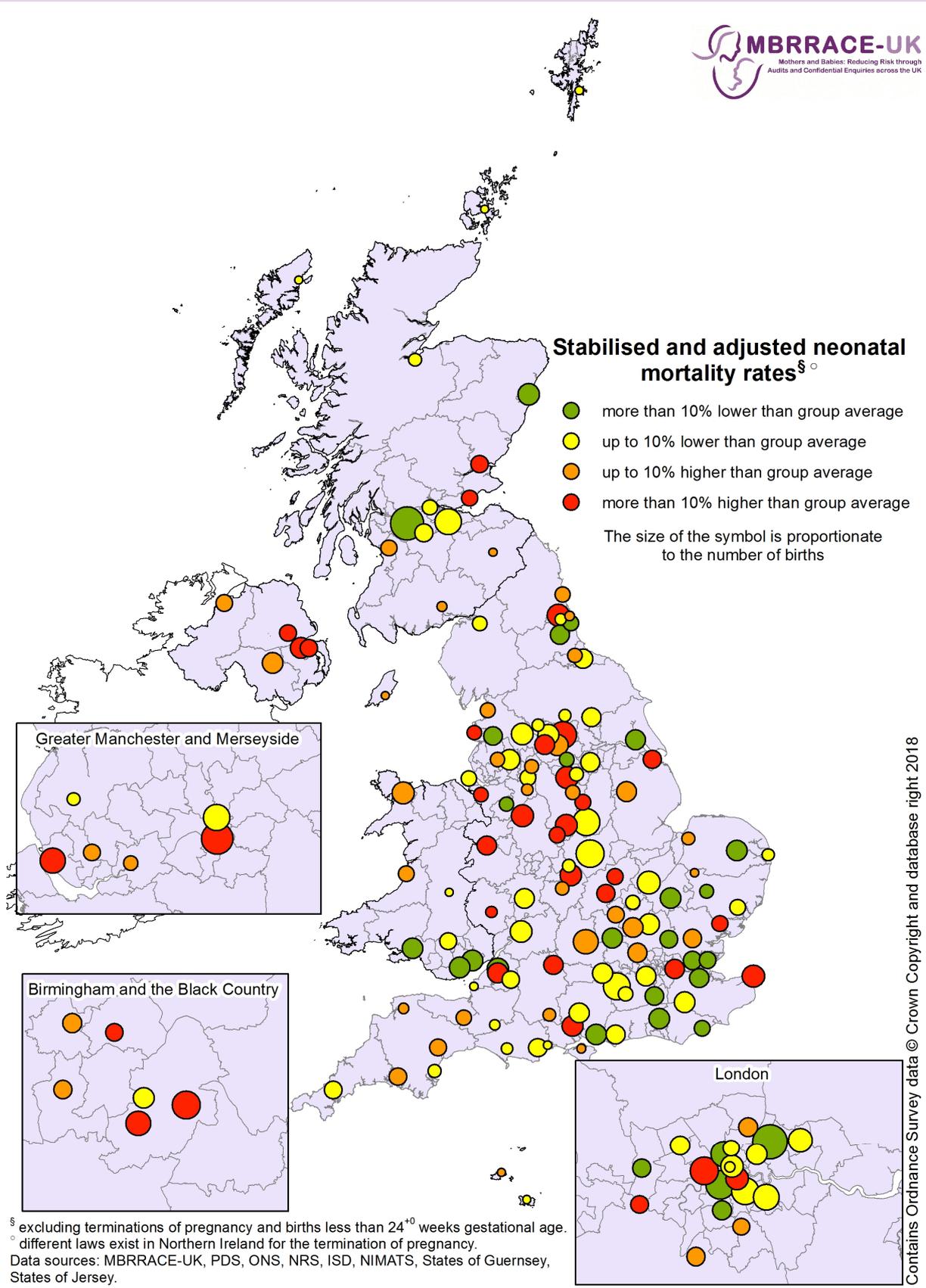


Figure 21: Crude extended perinatal mortality rates by NHS Trust (England), Health Board (Scotland and Wales), Health and Social Care Trust (Northern Ireland), and Crown Dependency based on place of birth: United Kingdom and Crown Dependencies, for births in 2016

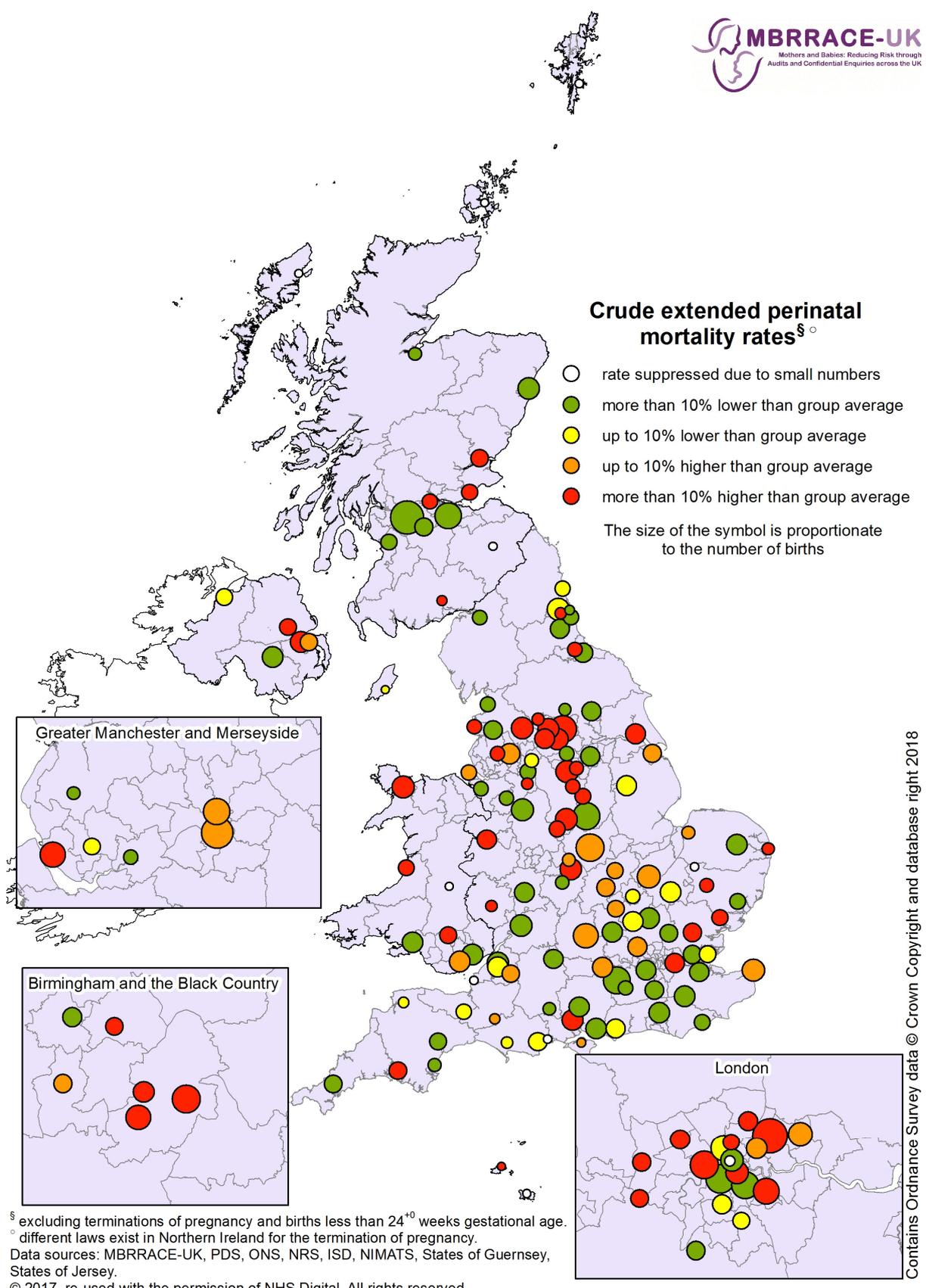
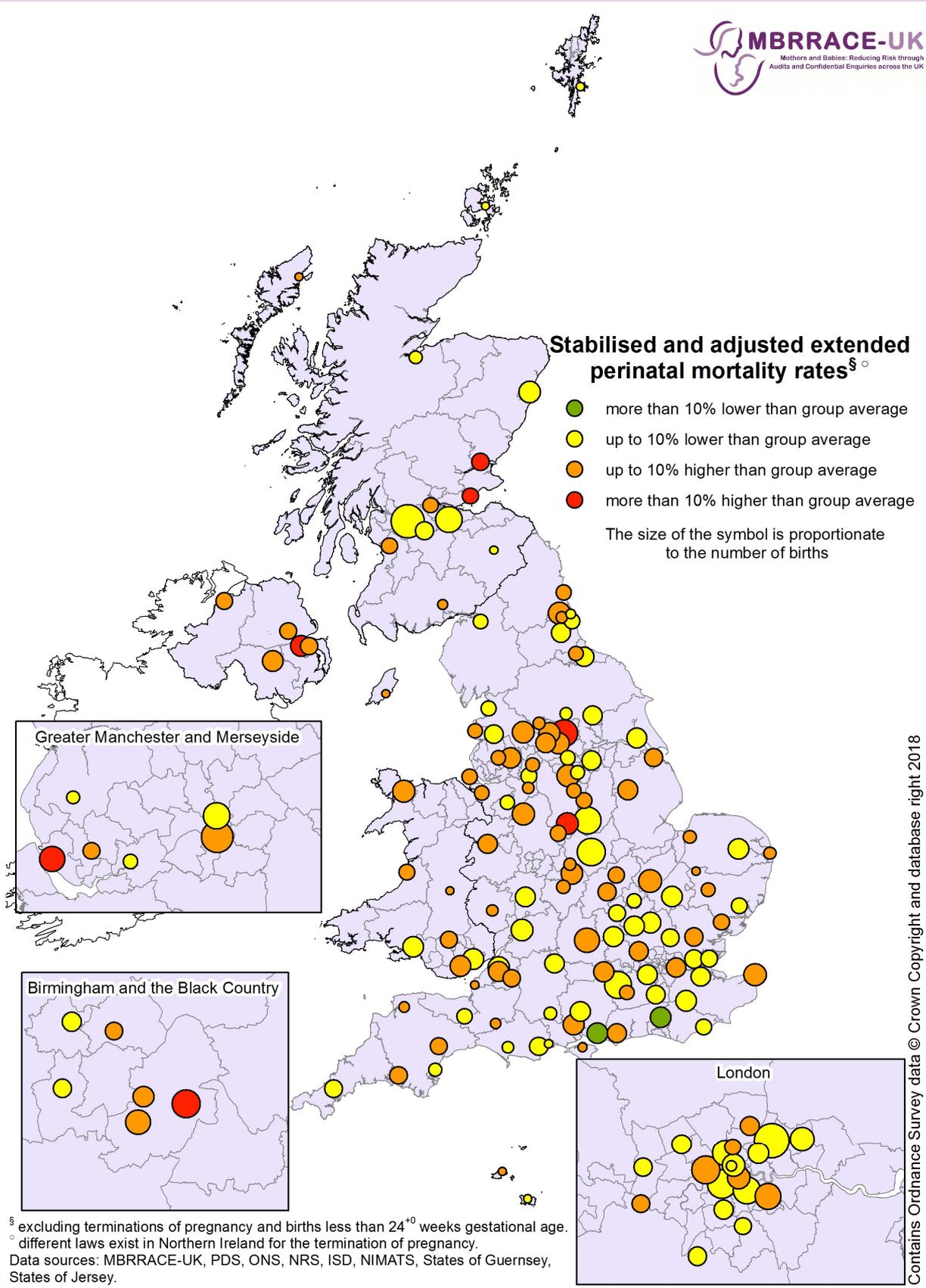


Figure 22: Stabilised & adjusted extended perinatal mortality rates by NHS Trust (England), Health Board (Scotland and Wales), Health and Social Care Trust (Northern Ireland), and Crown Dependency based on place of birth: United Kingdom and Crown Dependencies, for births in 2016



**Table 8: Crude and stabilised & adjusted stillbirth, neonatal, and extended perinatal mortality rates by NHS Trust (England), Health Board (Scotland and Wales), Health and Social Care Trust (Northern Ireland), and Crown Dependency based on place of birth: United Kingdom and Crown Dependencies, for births in 2016
FOR TRUSTS AND HEALTH BOARDS WITH NEONATAL SURGICAL PROVISION AND A LEVEL 3 NICU**

Organisation	Total births [§]	Rate per 1,000 births [§]						
		Stillbirth [†]		Neonatal [†]		Extended perinatal [†]		
		Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI) [#]	
Average for comparator group			4.24		2.48		6.71	
ENGLAND								
Barts Health NHS Trust	16,697	6.17	4.45 (3.76 to 5.41)	2.23	2.19 (1.57 to 3.02)	8.38	6.64 (6.04 to 8.29)	●
Birmingham Women's and Children's NHS Foundation Trust	8,397	5.24	4.36 (3.54 to 5.21)	3.95	2.93 (2.15 to 4.28)	9.17	7.32 (6.47 to 9.28)	●
Brighton and Sussex University Hospitals NHS Trust	5,873	2.21	4.02 (3.21 to 4.92)	0.68	1.78 (1.12 to 2.75)	2.89	5.72 (4.86 to 7.48)	●
Cambridge University Hospitals NHS Foundation Trust	5,734	4.71	4.47 (3.59 to 5.56)	1.58	2.08 (1.40 to 3.05)	6.28	6.43 (5.59 to 8.35)	●
Chelsea and Westminster Hospital NHS Foundation Trust	11,479	3.92	4.10 (3.38 to 4.89)	1.40	2.04 (1.43 to 2.94)	5.31	6.16 (5.57 to 7.74)	●
Guy's and St Thomas' NHS Foundation Trust	6,918	4.19	4.09 (3.32 to 4.97)	3.48	2.78 (2.00 to 3.97)	7.66	6.88 (6.12 to 8.82)	●
Hull and East Yorkshire Hospitals NHS Trust	5,495	5.64	4.56 (3.62 to 5.65)	1.83	2.23 (1.59 to 3.27)	7.46	6.72 (5.97 to 8.65)	●
King's College Hospital NHS Foundation Trust	9,843	4.27	4.20 (3.49 to 5.01)	1.84	2.45 (1.73 to 3.48)	6.10	6.64 (6.01 to 8.35)	●
Liverpool Women's NHS Foundation Trust	8,863	3.95	4.24 (3.51 to 5.00)	4.19	3.32 (2.36 to 4.75)	8.12	7.65 (6.79 to 9.92)	●
Manchester University NHS Foundation Trust	13,746	4.22	4.18 (3.51 to 4.90)	2.92	2.93 (2.16 to 4.07)	7.13	7.09 (6.38 to 8.94)	●
Norfolk and Norwich University Hospitals NHS Foundation Trust	5,877	3.40	4.22 (3.43 to 4.98)	1.02	1.99 (1.28 to 2.87)	4.42	6.18 (5.47 to 7.87)	●
Nottingham University Hospitals NHS Trust	9,819	3.36	4.05 (3.27 to 4.82)	2.04	2.40 (1.72 to 3.41)	5.40	6.44 (5.78 to 8.15)	●
Oxford University Hospitals NHS Trust	8,420	4.16	4.39 (3.63 to 5.22)	3.10	2.51 (1.85 to 3.46)	7.24	6.87 (6.12 to 8.79)	●
Sheffield Teaching Hospitals NHS Foundation Trust	7,053	4.82	4.37 (3.55 to 5.26)	3.70	2.91 (2.04 to 3.97)	8.51	7.32 (6.41 to 9.29)	●
St George's University Hospitals NHS Foundation Trust	5,207	4.03	4.17 (3.47 to 4.95)	2.31	2.15 (1.50 to 3.01)	6.34	6.26 (5.61 to 8.00)	●
The Leeds Teaching Hospitals NHS Trust	10,031	5.68	4.61 (3.72 to 5.67)	3.11	3.03 (2.10 to 4.17)	8.77	7.62 (6.71 to 9.70)	●

Organisation	Total births [§]	Rate per 1,000 births [§]						
		Stillbirth [†]		Neonatal [‡]		Extended perinatal [†]		
		Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI) [#]	
The Newcastle upon Tyne Hospitals NHS Foundation Trust	6,710	2.83	4.03 (3.22 to 4.99)	3.74	3.02 (2.13 to 4.25)	6.56	7.11 (6.16 to 9.31)	●
University College London Hospitals NHS Foundation Trust	6,839	2.92	3.97 (3.06 to 4.91)	3.08	2.45 (1.82 to 3.47)	6.00	6.43 (5.65 to 8.27)	●
University Hospital Southampton NHS Foundation Trust	5,793	5.18	4.50 (3.58 to 5.58)	3.30	2.82 (1.97 to 4.08)	8.46	7.33 (6.42 to 9.49)	●
University Hospitals Bristol NHS Foundation Trust	5,430	3.13	4.10 (3.31 to 4.88)	3.14	3.13 (2.10 to 4.62)	6.26	7.14 (6.22 to 9.24)	●
University Hospitals of Leicester NHS Trust	10,606	4.43	4.25 (3.50 to 4.91)	2.37	2.39 (1.70 to 3.26)	6.79	6.63 (6.03 to 8.34)	●
SCOTLAND								
NHS Grampian	6,367	2.04	3.98 (3.05 to 4.83)	1.26	2.24 (1.49 to 3.30)	3.30	6.21 (5.36 to 8.06)	●
NHS Greater Glasgow and Clyde	15,015	4.06	4.36 (3.63 to 5.12)	1.47	2.05 (1.44 to 2.86)	5.53	6.39 (5.73 to 7.83)	●
NHS Lothian	9,540	2.73	4.01 (3.26 to 4.89)	1.68	2.27 (1.56 to 3.15)	4.40	6.27 (5.53 to 8.03)	●
WALES								
Cardiff and Vale University Health Board	5,955	6.05	4.59 (3.67 to 5.76)	1.18	2.25 (1.48 to 3.28)	7.22	6.89 (6.07 to 8.90)	●
NORTHERN IRELAND[°]								
Belfast Health and Social Care Trust	5,928	4.89	4.42 (3.59 to 5.28)	4.92	3.52 (2.42 to 4.92)	9.78	8.07 (7.02 to 10.50)	●

§ excluding terminations of pregnancy and births <24⁺⁰ weeks gestational age

[†] per 1,000 total births

[‡] per 1,000 live births

[#] colours represent variation from comparator group average extended perinatal mortality rate

[°] different laws exist in Northern Ireland for the termination of pregnancy

Data sources: MBRRACE-UK, PDS, ONS, NRS, ISD, NIMATS, States of Guernsey, States of Jersey

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**Table 9: Crude and stabilised & adjusted stillbirth, neonatal, and extended perinatal mortality rates by NHS Trust (England), Health Board (Scotland and Wales), Health and Social Care Trust (Northern Ireland), and Crown Dependency based on place of birth: United Kingdom and Crown Dependencies, for births in 2016
FOR TRUSTS AND HEALTH BOARDS WITH A LEVEL 3 NICU**

Organisation	Total births [§]	Rate per 1,000 births [§]						
		Stillbirth [†]		Neonatal [‡]		Extended perinatal [†]		
		Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI) [#]	
Average for comparator group			4.11		2.10		6.20	
ENGLAND								
Ashford and St Peter's Hospital NHS Foundation Trust	4,155	3.85	4.15 (3.39 to 5.07)	3.14	2.40 (1.66 to 3.45)	6.98	6.59 (5.73 to 8.53)	●
Bolton NHS Foundation Trust	6,064	4.29	4.14 (3.39 to 5.01)	2.32	2.10 (1.46 to 3.04)	6.60	6.23 (5.40 to 7.95)	●
Bradford Teaching Hospitals NHS Foundation Trust	5,926	6.75	4.38 (3.63 to 5.58)	2.21	1.96 (1.38 to 2.90)	8.94	6.31 (5.61 to 8.16)	●
City Hospitals Sunderland NHS Foundation Trust	3,255	*	3.96 (3.13 to 4.84)	*	1.71 (1.06 to 2.65)	2.46	5.67 (4.89 to 7.33)	●
East Kent Hospitals University NHS Foundation Trust	7,029	3.70	4.12 (3.38 to 4.98)	2.57	2.53 (1.72 to 3.75)	6.26	6.63 (5.79 to 8.45)	●
East Lancashire Hospitals NHS Trust	6,542	6.11	4.43 (3.56 to 5.64)	2.31	2.08 (1.41 to 3.03)	8.41	6.48 (5.56 to 8.40)	●
Heart of England NHS Foundation Trust	10,337	5.42	4.32 (3.63 to 5.36)	3.11	2.90 (2.03 to 4.21)	8.51	7.15 (6.43 to 9.22)	●
Homerton University Hospital NHS Foundation Trust	5,732	4.54	4.04 (3.33 to 4.91)	2.10	1.93 (1.32 to 2.83)	6.63	5.95 (5.25 to 7.70)	●
Imperial College Healthcare NHS Trust	10,657	5.16	4.23 (3.59 to 5.06)	3.02	2.47 (1.74 to 3.48)	8.16	6.70 (6.05 to 8.49)	●
Lancashire Teaching Hospitals NHS Foundation Trust	4,680	3.63	4.12 (3.34 to 4.94)	1.07	1.79 (1.12 to 2.67)	4.70	5.87 (5.01 to 7.52)	●
Luton and Dunstable University Hospital NHS Foundation Trust	5,400	3.70	3.98 (3.29 to 4.70)	2.42	2.23 (1.52 to 3.21)	6.11	6.20 (5.40 to 7.94)	●
Medway NHS Foundation Trust	5,095	2.16	3.88 (3.00 to 4.74)	1.38	1.91 (1.28 to 2.82)	3.53	5.78 (4.91 to 7.52)	●
North Bristol NHS Trust	6,375	3.61	4.13 (3.43 to 4.93)	0.94	1.82 (1.20 to 2.70)	4.55	5.96 (5.18 to 7.52)	●
North Tees and Hartlepool NHS Foundation Trust	3,025	5.29	4.25 (3.54 to 5.17)	1.99	2.14 (1.47 to 3.24)	7.27	6.38 (5.57 to 8.23)	●
Plymouth Hospitals NHS Trust	4,263	4.93	4.29 (3.52 to 5.20)	2.59	2.31 (1.53 to 3.35)	7.51	6.60 (5.70 to 8.50)	●
Portsmouth Hospitals NHS Trust	5,932	3.20	4.06 (3.30 to 4.93)	0.68	1.53 (0.95 to 2.41)	3.88	5.49 (4.69 to 7.18)	●
South Tees Hospitals NHS Foundation Trust	5,165	2.71	3.95 (3.18 to 4.85)	1.36	1.93 (1.29 to 2.86)	4.07	5.88 (5.04 to 7.61)	●
The Pennine Acute Hospitals NHS Trust	9,626	4.26	4.06 (3.42 to 4.95)	2.09	2.07 (1.49 to 2.90)	6.34	6.12 (5.47 to 7.76)	●
The Royal Wolverhampton NHS Trust	4,921	2.84	3.91 (2.98 to 4.73)	2.45	2.19 (1.52 to 3.22)	5.28	6.10 (5.21 to 8.02)	●

Organisation	Total births [§]	Rate per 1,000 births [§]						
		Stillbirth [†]		Neonatal [‡]		Extended perinatal [†]		
		Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI) [#]	
University Hospitals Coventry and Warwickshire NHS Trust	6,250	4.48	4.17 (3.47 to 5.02)	2.89	2.44 (1.65 to 3.50)	7.36	6.61 (5.78 to 8.42)	●
University Hospitals of North Midlands NHS Trust	6,702	2.83	3.94 (3.12 to 4.82)	2.39	2.40 (1.62 to 3.58)	5.22	6.32 (5.41 to 8.15)	●
Wirral University Teaching Hospital NHS Foundation Trust	3,353	4.18	4.18 (3.45 to 5.08)	2.40	2.07 (1.36 to 3.07)	6.56	6.22 (5.34 to 8.21)	●
SCOTLAND								
NHS Ayrshire & Arran	3,427	2.92	4.05 (3.27 to 4.87)	2.34	2.24 (1.51 to 3.29)	5.25	6.29 (5.50 to 8.13)	●
NHS Fife	3,421	5.55	4.32 (3.54 to 5.37)	3.53	2.66 (1.72 to 4.10)	9.06	6.98 (5.96 to 9.16)	●
NHS Lanarkshire	4,552	4.39	4.24 (3.44 to 5.15)	1.10	1.92 (1.24 to 2.92)	5.49	6.15 (5.40 to 7.88)	●
NHS Tayside	4,220	3.55	4.12 (3.36 to 4.96)	3.33	2.81 (1.83 to 4.31)	6.87	6.89 (5.93 to 8.98)	●
WALES								
Abertawe Bro Morgannwg University Health Board	5,958	3.69	4.13 (3.39 to 4.95)	0.51	1.61 (1.01 to 2.48)	4.20	5.74 (4.99 to 7.29)	●
Aneurin Bevan University Health Board	5,958	2.69	3.94 (3.20 to 4.80)	1.01	1.81 (1.22 to 2.67)	3.69	5.76 (4.98 to 7.33)	●

§ excluding terminations of pregnancy and births <24⁺ weeks gestational age

† per 1,000 total births

‡ per 1,000 live births

colours represent variation from comparator group average extended perinatal mortality rate

Data sources: MBRRACE-UK, PDS, ONS, NRS, ISD, NIMATS, States of Guernsey, States of Jersey

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**Table 10: Crude and stabilised & adjusted stillbirth, neonatal, and extended perinatal mortality rates by NHS Trust (England), Health Board (Scotland and Wales), Health and Social Care Trust (Northern Ireland), and Crown Dependency based on place of birth: United Kingdom and Crown Dependencies, for births in 2016
FOR TRUSTS AND HEALTH BOARDS WITH 4,000 OR MORE BIRTHS ≥24⁺⁰ WEEKS GESTATIONAL AGE PER ANNUM**

Organisation	Total births [§]	Rate per 1,000 births [§]						
		Stillbirth [†]		Neonatal [†]		Extended perinatal [†]		
		Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI) [#]	
Average for comparator group			3.74		1.22		4.95	
ENGLAND								
Barking, Havering and Redbridge University Hospitals NHS Trust	8,030	3.99	3.62 (3.04 to 4.29)	1.13	1.17 (0.78 to 1.71)	5.11	4.78 (4.24 to 5.82)	●
Basildon and Thurrock University Hospitals NHS Foundation Trust	4,659	*	3.73 (3.14 to 4.39)	*	1.07 (0.69 to 1.66)	4.08	4.80 (4.25 to 5.92)	●
Buckinghamshire Healthcare NHS Trust	5,373	2.61	3.60 (2.93 to 4.30)	0.56	1.10 (0.69 to 1.77)	3.16	4.71 (4.11 to 5.87)	●
Calderdale and Huddersfield NHS Foundation Trust	5,634	4.26	3.79 (3.20 to 4.43)	1.96	1.39 (0.95 to 2.16)	6.21	5.20 (4.59 to 6.51)	●
County Durham and Darlington NHS Foundation Trust	5,221	3.26	3.71 (3.10 to 4.35)	0.58	1.07 (0.67 to 1.58)	3.83	4.76 (4.10 to 5.89)	●
Dartford and Gravesham NHS Trust	5,039	4.37	3.82 (3.21 to 4.63)	1.59	1.35 (0.90 to 2.00)	5.95	5.16 (4.55 to 6.51)	●
Derby Teaching Hospitals NHS Foundation Trust	6,207	5.48	4.05 (3.27 to 5.11)	2.92	1.59 (1.07 to 2.40)	8.38	5.72 (4.97 to 7.40)	●
Doncaster and Bassetlaw Hospitals NHS Foundation Trust	5,077	3.35	3.71 (3.15 to 4.40)	0.99	1.15 (0.74 to 1.71)	4.33	4.86 (4.29 to 5.99)	●
East and North Hertfordshire NHS Trust	5,748	2.09	3.54 (2.81 to 4.24)	0.87	1.12 (0.75 to 1.67)	2.96	4.66 (4.03 to 5.73)	●
Epsom and St Helier University Hospitals NHS Trust	4,870	2.46	3.60 (2.93 to 4.38)	1.44	1.30 (0.85 to 1.99)	3.90	4.90 (4.16 to 6.10)	●
Frimley Health NHS Foundation Trust	10,127	3.06	3.58 (2.95 to 4.33)	0.99	1.16 (0.80 to 1.71)	4.05	4.73 (4.15 to 5.92)	●
Gloucestershire Hospitals NHS Foundation Trust	6,463	2.79	3.65 (3.01 to 4.35)	1.09	1.18 (0.79 to 1.84)	3.87	4.83 (4.23 to 6.04)	●
Great Western Hospitals NHS Foundation Trust	5,020	2.19	3.58 (2.93 to 4.30)	1.60	1.37 (0.87 to 2.11)	3.78	4.95 (4.23 to 6.18)	●
Hampshire Hospitals NHS Foundation Trust	5,559	3.06	3.72 (3.08 to 4.38)	0.90	1.18 (0.81 to 1.79)	3.96	4.90 (4.32 to 6.01)	●
Kingston Hospital NHS Foundation Trust	5,696	2.11	3.54 (2.81 to 4.28)	0.70	1.14 (0.74 to 1.84)	2.81	4.68 (4.05 to 5.85)	●
Lewisham and Greenwich NHS Trust	8,741	5.26	3.88 (3.31 to 4.61)	1.15	1.15 (0.79 to 1.75)	6.41	5.02 (4.49 to 6.29)	●

Organisation	Total births [§]	Rate per 1,000 births [§]						
		Stillbirth [†]		Neonatal [†]		Extended perinatal [†]		
		Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI) [#]	
London North West University Healthcare NHS Trust	5,191	5.39	3.82 (3.26 to 4.60)	0.97	1.14 (0.76 to 1.73)	6.36	4.95 (4.45 to 6.13)	●
Maidstone and Tunbridge Wells NHS Trust	5,890	3.23	3.75 (3.14 to 4.43)	0.85	1.19 (0.81 to 1.87)	4.07	4.93 (4.31 to 6.15)	●
Mid Essex Hospital Services NHS Trust	4,775	4.40	3.90 (3.24 to 4.70)	1.26	1.32 (0.85 to 2.12)	5.65	5.21 (4.56 to 6.44)	●
North Middlesex University Hospital NHS Trust	5,174	5.22	3.80 (3.21 to 4.45)	1.17	1.24 (0.83 to 1.89)	6.38	5.03 (4.48 to 6.27)	●
North West Anglia NHS Foundation Trust	7,177	4.04	3.82 (3.16 to 4.61)	1.12	1.20 (0.79 to 1.81)	5.16	5.02 (4.41 to 6.18)	●
Northampton General Hospital NHS Trust	4,847	3.51	3.72 (3.12 to 4.44)	1.86	1.41 (0.94 to 2.16)	5.36	5.14 (4.54 to 6.42)	●
Northern Lincolnshire and Goole Hospitals NHS Foundation Trust	4,517	3.10	3.68 (3.07 to 4.34)	2.22	1.40 (0.92 to 2.21)	5.31	5.12 (4.47 to 6.48)	●
Poole Hospital NHS Foundation Trust	4,580	3.93	3.81 (3.11 to 4.60)	0.66	1.14 (0.73 to 1.78)	4.59	4.95 (4.34 to 6.21)	●
Royal Berkshire NHS Foundation Trust	5,454	4.40	3.85 (3.19 to 4.65)	0.92	1.15 (0.77 to 1.83)	5.32	4.99 (4.41 to 6.20)	●
Royal Cornwall Hospitals NHS Trust	4,302	3.02	3.71 (3.08 to 4.44)	0.93	1.18 (0.77 to 1.77)	3.95	4.88 (4.24 to 6.05)	●
Royal Devon and Exeter NHS Foundation Trust	4,043	2.47	3.66 (3.00 to 4.35)	1.49	1.31 (0.85 to 2.03)	3.96	4.97 (4.37 to 6.22)	●
Royal Free London NHS Foundation Trust	8,694	4.14	3.77 (3.23 to 4.47)	0.69	1.08 (0.70 to 1.65)	4.83	4.87 (4.38 to 6.05)	●
Royal United Hospitals Bath NHS Foundation Trust	4,247	4.24	3.87 (3.23 to 4.65)	0.95	1.17 (0.79 to 1.80)	5.18	5.01 (4.38 to 6.32)	●
Sandwell and West Birmingham Hospitals NHS Trust	5,779	5.71	3.79 (3.25 to 4.48)	1.57	1.19 (0.82 to 1.77)	7.27	4.97 (4.47 to 6.08)	●
St Helens and Knowsley Teaching Hospitals NHS Trust	3,998	3.50	3.74 (3.11 to 4.49)	1.26	1.27 (0.84 to 1.93)	4.75	5.01 (4.39 to 6.24)	●
Surrey and Sussex Healthcare NHS Trust	4,587	*	3.71 (3.13 to 4.46)	*	1.05 (0.67 to 1.64)	3.71	4.75 (4.20 to 5.93)	●
The Dudley Group NHS Foundation Trust	4,503	3.78	3.73 (3.10 to 4.42)	1.34	1.23 (0.83 to 1.87)	5.11	4.95 (4.32 to 6.16)	●
The Hillingdon Hospitals NHS Foundation Trust	4,860	4.73	3.71 (3.08 to 4.39)	0.83	1.11 (0.72 to 1.75)	5.56	4.83 (4.21 to 5.93)	●
The Mid Yorkshire Hospitals NHS Trust	6,351	4.25	3.78 (3.20 to 4.60)	1.74	1.30 (0.88 to 1.92)	5.98	5.08 (4.50 to 6.40)	●
The Princess Alexandra Hospital NHS Trust	4,258	*	3.60 (2.97 to 4.31)	*	1.08 (0.67 to 1.73)	2.58	4.67 (3.98 to 5.89)	●
The Shrewsbury and Telford Hospital NHS Trust	4,948	4.45	3.87 (3.24 to 4.77)	1.83	1.38 (0.93 to 2.22)	6.27	5.27 (4.60 to 6.71)	●
United Lincolnshire Hospitals NHS Trust	5,334	3.37	3.74 (3.12 to 4.42)	1.32	1.27 (0.84 to 1.98)	4.69	5.01 (4.45 to 6.21)	●

Organisation	Total births [§]	Rate per 1,000 births [§]						
		Stillbirth [†]		Neonatal [‡]		Extended perinatal [†]		
		Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI) [#]	
Walsall Healthcare NHS Trust	4,388	4.56	3.78 (3.21 to 4.42)	3.21	1.58 (1.04 to 2.54)	7.75	5.43 (4.77 to 6.93)	●
West Hertfordshire Hospitals NHS Trust	4,982	3.81	3.77 (3.12 to 4.51)	1.21	1.24 (0.85 to 1.94)	5.02	5.00 (4.45 to 6.31)	●
Western Sussex Hospitals NHS Foundation Trust	5,064	4.15	3.86 (3.18 to 4.67)	0.79	1.15 (0.75 to 1.78)	4.94	4.99 (4.43 to 6.31)	●
Worcestershire Acute Hospitals NHS Trust	5,626	3.38	3.74 (3.12 to 4.49)	1.07	1.17 (0.80 to 1.73)	4.44	4.90 (4.32 to 6.10)	●
York Teaching Hospital NHS Foundation Trust	4,965	2.82	3.69 (3.07 to 4.39)	1.01	1.20 (0.80 to 1.91)	3.83	4.89 (4.29 to 6.09)	●
WALES								
Betsi Cadwaladr University Health Board	6,620	4.23	3.88 (3.24 to 4.71)	1.52	1.25 (0.86 to 1.84)	5.74	5.12 (4.49 to 6.37)	●
NORTHERN IRELAND[°]								
Northern Health and Social Care Trust	4,042	5.20	3.96 (3.32 to 4.86)	1.49	1.36 (0.89 to 2.13)	6.68	5.31 (4.66 to 6.81)	●
South Eastern Health and Social Care Trust	4,388	3.65	3.79 (3.16 to 4.47)	1.60	1.39 (0.92 to 2.18)	5.24	5.18 (4.58 to 6.41)	●
Southern Health and Social Care Trust	5,973	2.68	3.64 (3.00 to 4.29)	1.34	1.34 (0.89 to 2.07)	4.02	4.98 (4.36 to 6.18)	●

[§] excluding terminations of pregnancy and births <24⁺⁰ weeks gestational age

[†] per 1,000 total births

[‡] per 1,000 live births

[#] colours represent variation from comparator group average extended perinatal mortality rate

* entry suppressed because of small number of deaths

[°] different laws exist in Northern Ireland for the termination of pregnancy

Data sources: MBRRACE-UK, PDS, ONS, NRS, ISD, NIMATS, States of Guernsey, States of Jersey

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**Table 11: Crude and stabilised & adjusted stillbirth, neonatal, and extended perinatal mortality rates by NHS Trust (England), Health Board (Scotland and Wales), Health and Social Care Trust (Northern Ireland), and Crown Dependency based on place of birth: United Kingdom and Crown Dependencies, for births in 2016
FOR TRUSTS AND HEALTH BOARDS WITH 2,000 TO 3,999 BIRTHS ≥24⁺⁰ WEEKS GESTATIONAL AGE PER ANNUM**

Organisation	Total births [§]	Rate per 1,000 births [§]						
		Stillbirth [†]		Neonatal [†]		Extended perinatal [†]		
		Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI) [#]	
Average for comparator group			3.73		1.06		4.79	
ENGLAND								
Airedale NHS Foundation Trust	2,174	*	3.81 (3.12 to 4.69)	*	0.99 (0.60 to 1.55)	5.52	4.80 (4.18 to 5.90)	●
Barnsley Hospital NHS Foundation Trust	3,034	*	3.75 (3.08 to 4.56)	*	0.96 (0.60 to 1.60)	4.28	4.71 (4.10 to 5.89)	●
Bedford Hospital NHS Trust	2,941	3.40	3.69 (3.05 to 4.49)	1.02	1.05 (0.67 to 1.62)	4.42	4.74 (4.11 to 5.88)	●
Blackpool Teaching Hospitals NHS Foundation Trust	3,000	3.00	3.67 (2.95 to 4.39)	2.34	1.22 (0.79 to 1.94)	5.33	4.93 (4.29 to 6.10)	●
Burton Hospitals NHS Foundation Trust	3,539	3.67	3.74 (3.01 to 4.50)	1.99	1.22 (0.78 to 1.88)	5.65	4.97 (4.31 to 6.15)	●
Chesterfield Royal Hospital NHS Foundation Trust	2,919	5.14	3.87 (3.20 to 4.88)	1.38	1.11 (0.72 to 1.74)	6.51	4.97 (4.27 to 6.25)	●
Colchester Hospital University NHS Foundation Trust	3,738	4.55	3.82 (3.16 to 4.73)	1.88	1.23 (0.76 to 1.98)	6.42	5.05 (4.38 to 6.33)	●
Countess of Chester Hospital NHS Foundation Trust	3,057	*	3.50 (2.70 to 4.35)	*	1.49 (0.91 to 2.62)	3.93	5.00 (4.14 to 6.61)	●
Croydon Health Services NHS Trust	3,867	3.10	3.52 (2.74 to 4.41)	1.56	1.09 (0.70 to 1.72)	4.65	4.61 (3.93 to 5.88)	●
East Sussex Healthcare NHS Trust	3,406	*	3.69 (3.01 to 4.45)	*	0.96 (0.60 to 1.49)	3.52	4.65 (4.05 to 5.72)	●
George Eliot Hospital NHS Trust	2,190	*	3.76 (3.08 to 4.64)	*	1.05 (0.67 to 1.73)	5.02	4.81 (4.13 to 6.06)	●
James Paget University Hospitals NHS Foundation Trust	2,160	*	3.82 (3.15 to 4.70)	*	1.06 (0.65 to 1.69)	6.02	4.87 (4.30 to 6.10)	●
Kettering General Hospital NHS Foundation Trust	3,662	3.28	3.69 (3.05 to 4.40)	1.92	1.20 (0.78 to 1.91)	5.19	4.91 (4.29 to 6.10)	●
Mid Cheshire Hospitals NHS Foundation Trust	2,897	*	3.73 (3.07 to 4.50)	*	0.95 (0.59 to 1.54)	3.80	4.66 (4.02 to 5.79)	●
Milton Keynes University Hospital NHS Foundation Trust	3,837	3.65	3.67 (2.98 to 4.45)	1.31	1.12 (0.70 to 1.79)	4.95	4.79 (4.15 to 5.92)	●
North Cumbria University Hospitals NHS Trust	3,015	*	3.64 (2.99 to 4.38)	*	1.03 (0.64 to 1.68)	2.99	4.67 (4.03 to 5.70)	●
Northumbria Healthcare NHS Foundation Trust	3,342	3.59	3.74 (3.08 to 4.41)	0.90	1.07 (0.67 to 1.72)	4.49	4.80 (4.16 to 5.83)	●

Organisation	Total births [§]	Rate per 1,000 births [§]						
		Stillbirth [†]		Neonatal [‡]		Extended perinatal [†]		
		Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI) [#]	
Royal Surrey County Hospital NHS Foundation Trust	3,008	*	3.76 (3.15 to 4.72)	*	1.05 (0.65 to 1.73)	4.32	4.81 (4.25 to 6.02)	●
Salisbury NHS Foundation Trust	2,350	1.70	3.62 (2.86 to 4.39)	1.28	1.09 (0.67 to 1.81)	2.98	4.72 (3.96 to 5.92)	●
Sherwood Forest Hospitals NHS Foundation Trust	3,455	4.63	3.82 (3.10 to 4.68)	2.04	1.26 (0.79 to 2.11)	6.66	5.09 (4.37 to 6.43)	●
South Devon Healthcare NHS Foundation Trust	2,266	*	3.62 (2.90 to 4.35)	*	1.02 (0.62 to 1.66)	2.21	4.64 (3.94 to 5.73)	●
South Warwickshire NHS Foundation Trust	2,746	2.91	3.70 (2.98 to 4.50)	1.10	1.12 (0.67 to 1.84)	4.01	4.81 (4.12 to 5.98)	●
Southend University Hospital NHS Foundation Trust	3,823	*	3.79 (3.09 to 4.70)	*	0.91 (0.55 to 1.42)	4.45	4.67 (4.01 to 5.86)	●
Southport & Ormskirk Hospital NHS Trust	2,378	*	3.67 (2.96 to 4.46)	*	1.01 (0.63 to 1.71)	2.94	4.69 (3.98 to 5.74)	●
Stockport NHS Foundation Trust	3,434	*	3.73 (3.09 to 4.47)	*	0.98 (0.61 to 1.60)	4.08	4.69 (4.04 to 5.84)	●
Tameside Hospital NHS Foundation Trust	2,495	2.81	3.65 (2.98 to 4.40)	1.61	1.16 (0.72 to 1.88)	4.41	4.80 (4.14 to 5.97)	●
Taunton and Somerset NHS Foundation Trust	3,305	3.33	3.72 (3.08 to 4.51)	1.21	1.07 (0.68 to 1.73)	4.54	4.79 (4.15 to 6.05)	●
The Ipswich Hospital NHS Trust	3,702	2.97	3.67 (2.90 to 4.39)	0.81	1.03 (0.63 to 1.59)	3.78	4.70 (4.06 to 5.72)	●
The Queen Elizabeth Hospital King's Lynn NHS Foundation Trust	2,339	3.85	3.75 (3.12 to 4.57)	1.29	1.08 (0.67 to 1.72)	5.13	4.82 (4.22 to 5.98)	●
The Rotherham NHS Foundation Trust	2,703	*	3.82 (3.13 to 4.74)	*	0.97 (0.59 to 1.52)	5.55	4.79 (4.08 to 6.05)	●
University Hospitals of Morecambe Bay NHS Foundation Trust	3,168	2.84	3.68 (2.98 to 4.46)	0.95	1.07 (0.66 to 1.74)	3.79	4.75 (4.12 to 5.93)	●
Warrington and Halton Hospitals NHS Foundation Trust	2,917	1.37	3.56 (2.86 to 4.45)	1.37	1.12 (0.71 to 1.73)	2.74	4.68 (4.02 to 5.92)	●
West Suffolk NHS Foundation Trust	2,525	*	3.89 (3.20 to 4.83)	*	0.95 (0.59 to 1.51)	5.54	4.83 (4.18 to 6.08)	●
Whittington Health	3,715	*	3.83 (3.13 to 4.72)	*	0.98 (0.61 to 1.58)	5.92	4.81 (4.15 to 6.01)	●
Wrightington, Wigan and Leigh NHS Foundation Trust	2,773	4.33	3.79 (3.13 to 4.59)	1.09	1.08 (0.67 to 1.72)	5.41	4.87 (4.22 to 5.99)	●
SCOTLAND								
NHS Forth Valley	3,134	*	4.02 (3.24 to 5.23)	*	1.00 (0.61 to 1.55)	7.34	4.98 (4.24 to 6.43)	●
NHS Highland	2,230	*	3.68 (2.98 to 4.39)	*	1.01 (0.60 to 1.58)	3.14	4.69 (4.02 to 5.74)	●
WALES								
Cwm Taf University Health Board	3,951	5.57	3.93 (3.17 to 4.86)	0.76	0.99 (0.65 to 1.53)	6.33	4.90 (4.19 to 6.19)	●
Hywel Dda University Health Board	3,430	5.83	3.95 (3.21 to 4.94)	0.88	1.07 (0.66 to 1.71)	6.71	5.02 (4.29 to 6.33)	●

Organisation	Total births [§]	Rate per 1,000 births [§]						
		Stillbirth [†]		Neonatal [‡]		Extended perinatal [†]		
		Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI) [#]	
NORTHERN IRELAND[°]								
Western Health and Social Care Trust	3,980	3.52	3.72 (2.98 to 4.48)	1.26	1.08 (0.69 to 1.69)	4.77	4.80 (4.11 to 6.04)	●

[§] excluding terminations of pregnancy and births <24⁺⁰ weeks gestational age

[†] per 1,000 total births

[‡] per 1,000 live births

[#] colours represent variation from comparator group average extended perinatal mortality rate

* entry suppressed because of small number of deaths

[°] different laws exist in Northern Ireland for the termination of pregnancy

Data sources: MBRRACE-UK, PDS, ONS, NRS, ISD, NIMATS, States of Guernsey, States of Jersey

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**Table 12: Crude and stabilised & adjusted stillbirth, neonatal, and extended perinatal mortality rates by NHS Trust (England), Health Board (Scotland and Wales), Health and Social Care Trust (Northern Ireland), and Crown Dependency based on place of birth: United Kingdom and Crown Dependencies, for births in 2016
FOR TRUSTS AND HEALTH BOARDS WITH FEWER THAN 2,000 BIRTHS ≥24+0 WEEKS GESTATIONAL AGE PER ANNUM**

Organisation	Total births [§]	Rate per 1,000 births [§]						
		Stillbirth [†]		Neonatal [†]		Extended perinatal [†]		
		Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI) [#]	
Average for comparator group			2.96		1.07		4.03	
ENGLAND								
Dorset County Hospital NHS Foundation Trust	1,907	*	2.98 (2.13 to 4.01)	*	0.99 (0.50 to 1.69)	3.67	3.96 (3.03 to 5.53)	●
East Cheshire NHS Trust	1,728	*	3.00 (2.16 to 4.15)	*	1.09 (0.59 to 1.90)	4.63	4.08 (3.18 to 5.75)	●
Gateshead Health NHS Foundation Trust	1,888	*	2.99 (2.21 to 4.07)	*	1.07 (0.56 to 1.89)	4.77	4.05 (3.19 to 5.74)	●
Harrogate and District NHS Foundation Trust	1,959	*	2.99 (2.08 to 4.00)	*	0.97 (0.48 to 1.65)	3.06	3.95 (2.98 to 5.53)	●
Isle of Wight NHS Trust	1,132	*	2.95 (2.11 to 4.03)	*	1.09 (0.59 to 2.01)	4.42	4.05 (3.13 to 5.94)	●
Northern Devon Healthcare NHS Trust	1,587	1.89	2.93 (2.01 to 3.93)	1.89	1.12 (0.62 to 1.92)	3.78	4.06 (3.09 to 5.78)	●
RAF Lakenheath (48th Medical Group)	448	*	2.94 (1.98 to 3.93)	*	1.11 (0.58 to 2.01)	*	4.03 (3.18 to 5.72)	●
South Tyneside NHS Foundation Trust	1,308	*	2.89 (1.98 to 3.86)	*	1.10 (0.61 to 2.05)	2.29	3.99 (3.03 to 5.64)	●
The Portland Hospital for Women and Children	1,539	*	2.90 (1.97 to 3.82)	*	1.00 (0.50 to 1.64)	*	3.91 (2.87 to 5.27)	●
The Royal Bournemouth and Christchurch Hospitals NHS Foundation Trust	292	*	2.95 (2.02 to 3.96)	*	1.06 (0.53 to 1.85)	*	4.00 (3.11 to 5.67)	●
Weston Area Health NHS Trust	151	*	2.98 (2.10 to 4.05)	*	1.06 (0.55 to 1.86)	*	4.04 (3.06 to 5.74)	●
Wye Valley NHS Trust	1,783	3.93	3.01 (2.17 to 4.18)	2.25	1.18 (0.68 to 2.18)	6.17	4.21 (3.34 to 6.19)	●
Yeovil District Hospital NHS Foundation Trust	1,485	*	2.99 (2.16 to 4.07)	*	1.05 (0.55 to 1.85)	4.04	4.04 (3.11 to 5.59)	●
SCOTLAND								
NHS Borders	1,015	*	2.92 (1.95 to 3.94)	*	1.07 (0.55 to 1.90)	*	3.99 (3.06 to 5.63)	●
NHS Dumfries & Galloway	1,276	*	3.09 (2.36 to 4.40)	*	1.10 (0.62 to 1.96)	8.62	4.18 (3.45 to 6.18)	●
NHS Orkney	124	*	2.96 (2.06 to 3.97)	*	1.06 (0.53 to 1.87)	*	4.02 (3.10 to 5.62)	●
NHS Shetland	145	*	2.96 (2.01 to 4.07)	*	1.06 (0.55 to 1.87)	*	4.02 (3.00 to 5.65)	●
NHS Western Isles	194	*	2.98 (2.10 to 4.07)	*	1.06 (0.51 to 1.86)	*	4.04 (3.11 to 5.66)	●

Organisation	Total births [§]	Rate per 1,000 births [§]						
		Stillbirth [†]		Neonatal [‡]		Extended perinatal [†]		
		Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI) [#]	
WALES								
Powys Teaching Health Board	250	*	2.98 (2.11 to 4.18)	*	1.06 (0.54 to 1.88)	*	4.03 (3.10 to 5.74)	●
ISLE OF MAN								
Department of Health	754	*	2.94 (2.05 to 3.94)	*	1.11 (0.63 to 2.02)	3.98	4.07 (3.19 to 5.81)	●
STATES OF GUERNSEY								
Health & Social Services	599	*	3.07 (2.29 to 4.33)	*	1.08 (0.58 to 1.90)	11.69	4.14 (3.36 to 5.96)	●
STATES OF JERSEY								
Health & Social Services	1,010	*	2.93 (1.99 to 4.02)	*	1.01 (0.52 to 1.71)	*	3.94 (3.00 to 5.54)	●

[§] excluding terminations of pregnancy and births <24⁺⁰ weeks gestational age

[†] per 1,000 total births

[‡] per 1,000 live births

[#] colours represent variation from comparator group average extended perinatal mortality rate

* entry suppressed because of small number of deaths

Data sources: MBRRACE-UK, PDS, ONS, NRS, ISD, NIMATS, States of Guernsey, States of Jersey

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5.2 Mortality rates by Neonatal Network

Figure 23: Crude stillbirth mortality rates by Neonatal Network based on place of birth: United Kingdom, for births in 2016

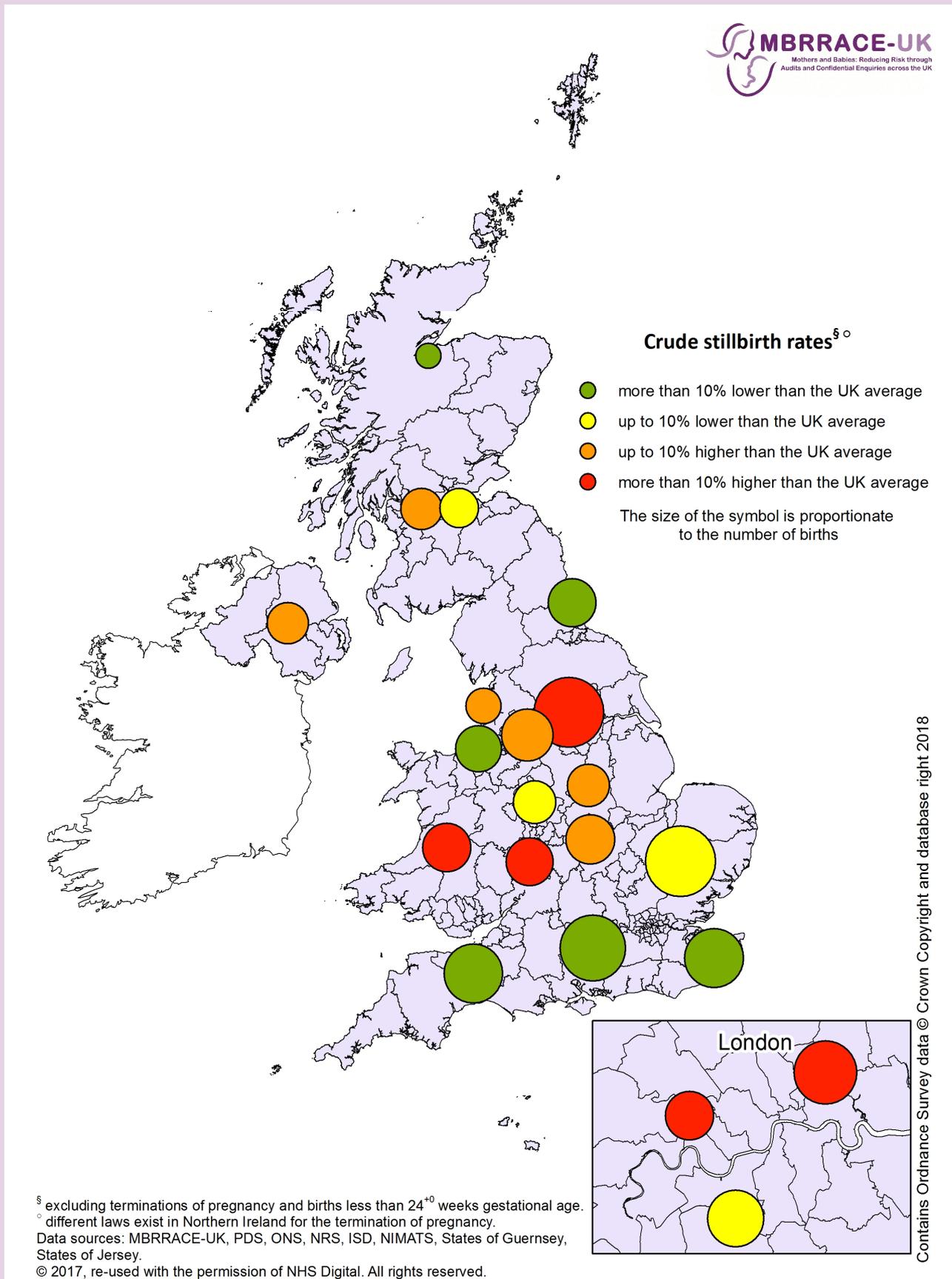


Figure 24: Stabilised & adjusted stillbirth mortality rates by Neonatal Network based on place of birth: United Kingdom, for births in 2016

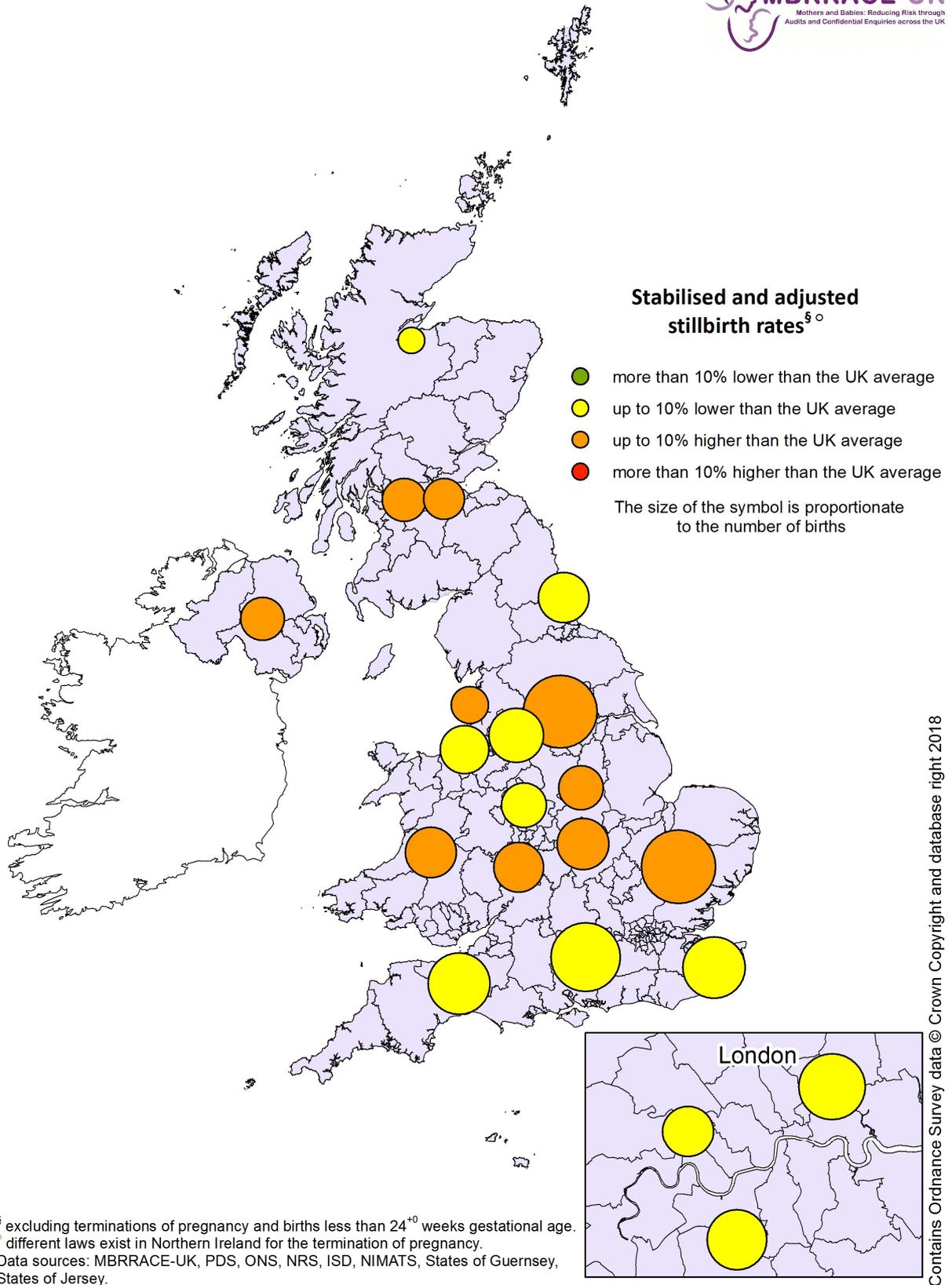
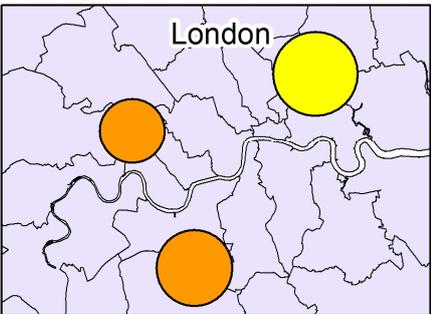
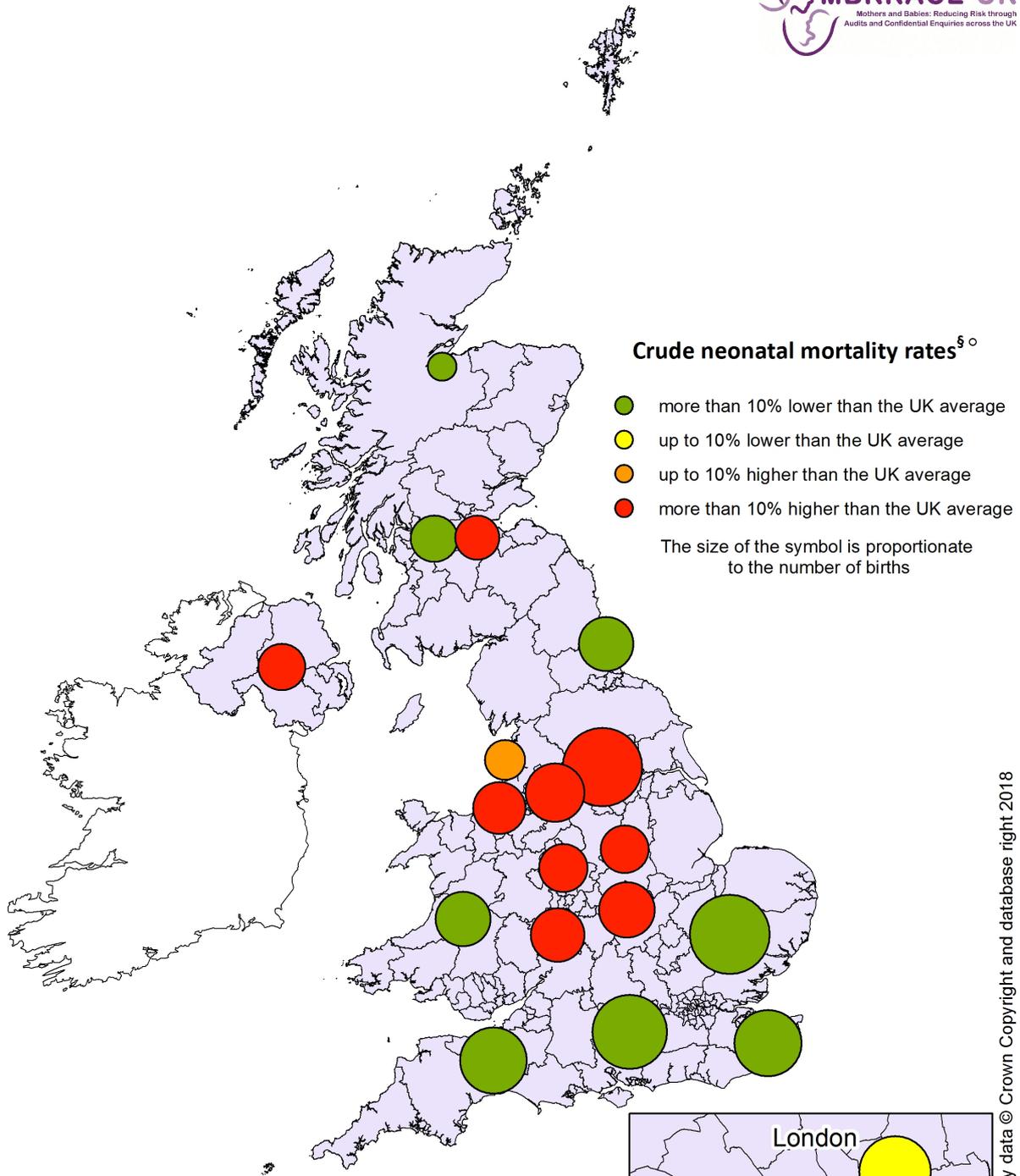


Figure 25: Crude neonatal mortality rates by Neonatal Network based on place of birth: United Kingdom, for births in 2016



[§] excluding terminations of pregnancy and births less than 24⁺⁰ weeks gestational age.
[°] different laws exist in Northern Ireland for the termination of pregnancy.
 Data sources: MBRRACE-UK, PDS, ONS, NRS, ISD, NIMATS, States of Guernsey, States of Jersey.
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Figure 26: Stabilised & adjusted neonatal mortality rates by Neonatal Network based on place of birth: United Kingdom, for births in 2016

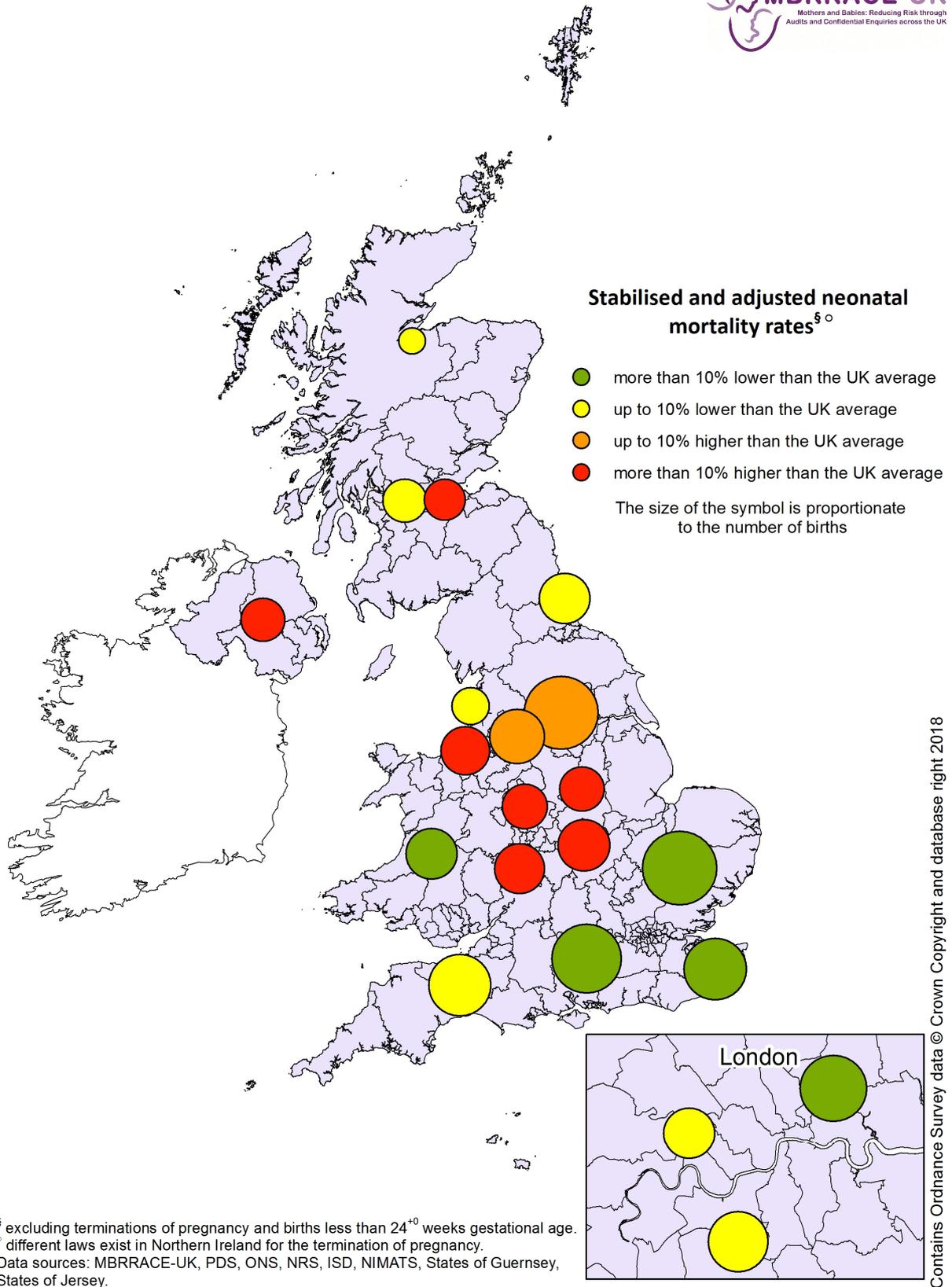
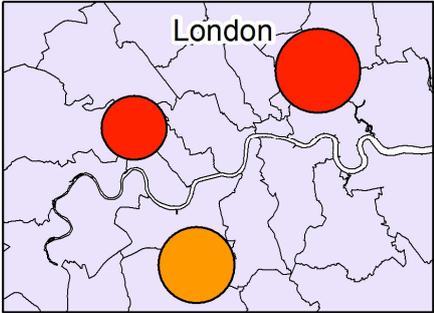
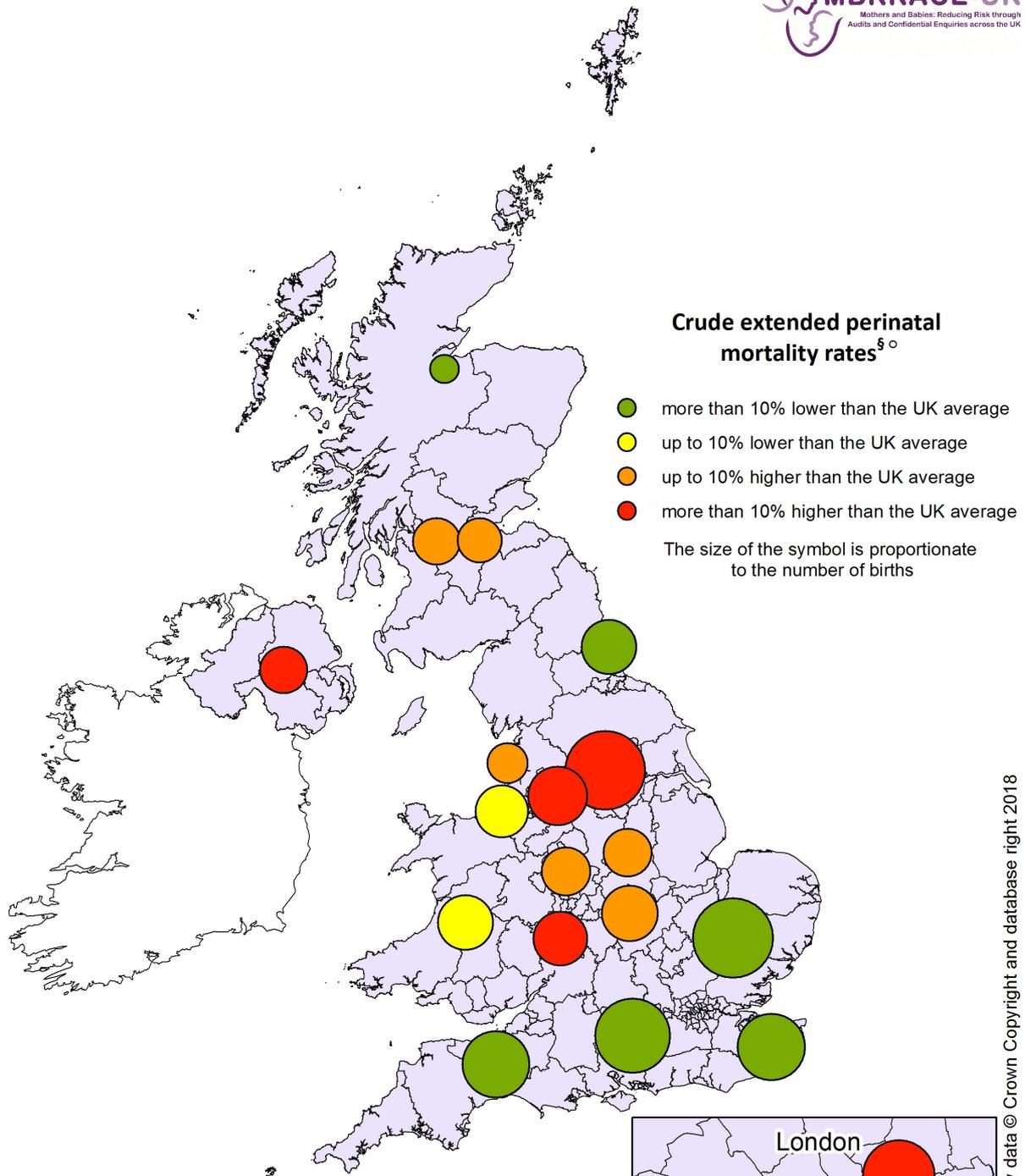


Figure 27: Crude extended perinatal mortality rates by Neonatal Network based on place of birth: United Kingdom, for births in 2016



[§] excluding terminations of pregnancy and births less than 24⁺⁰ weeks gestational age.
[°] different laws exist in Northern Ireland for the termination of pregnancy.
 Data sources: MBRRACE-UK, PDS, ONS, NRS, ISD, NIMATS, States of Guernsey, States of Jersey.
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Figure 28: Stabilised & adjusted extended perinatal mortality rates by Neonatal Network based on place of birth: United Kingdom, for births in 2016

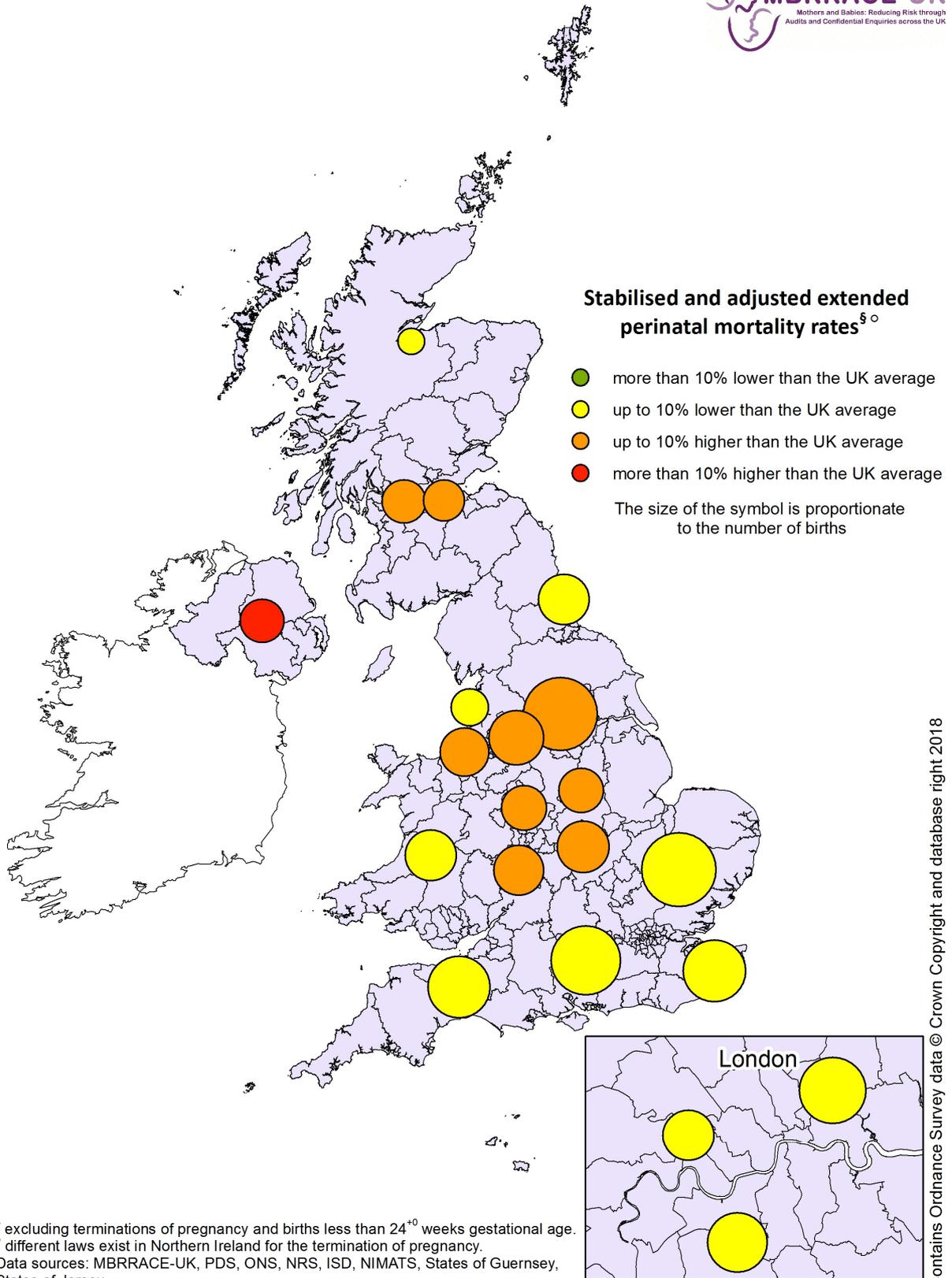


Table 13: Crude and stabilised & adjusted stillbirth, neonatal, and extended perinatal mortality rates by Neonatal Network based on place of birth: United Kingdom, for births in 2016

Neonatal Network	Total births [§]	Rate per 1,000 births [§]						
		Stillbirth [†]		Neonatal [‡]		Extended perinatal [†]		
		Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI) [#]	
ENGLAND								
Central	33,840	3.96	3.94 (3.50 to 4.44)	2.11	1.94 (1.52 to 2.43)	6.06	5.89 (5.53 to 7.00)	●
East of England	69,838	3.75	3.97 (3.53 to 4.42)	1.09	1.35 (1.06 to 1.73)	4.84	5.31 (4.97 to 6.26)	●
North Central & East London	54,881	4.81	3.91 (3.55 to 4.44)	1.70	1.54 (1.25 to 1.98)	6.50	5.44 (5.25 to 6.52)	●
North West (Cheshire and Merseyside)	29,191	3.12	3.76 (3.27 to 4.30)	2.34	2.10 (1.65 to 2.77)	5.45	5.91 (5.50 to 7.21)	●
North West (Greater Manchester)	38,138	4.09	3.89 (3.46 to 4.40)	2.19	1.84 (1.50 to 2.30)	6.27	5.74 (5.48 to 6.86)	●
North West (Lancashire and South Cumbria)	17,390	4.31	4.03 (3.54 to 4.61)	1.73	1.57 (1.21 to 2.06)	6.04	5.56 (5.14 to 6.70)	●
North West London	32,187	4.69	3.93 (3.47 to 4.46)	1.78	1.61 (1.26 to 2.05)	6.46	5.53 (5.19 to 6.63)	●
Northern	32,929	3.04	3.67 (3.15 to 4.31)	1.55	1.64 (1.30 to 2.12)	4.59	5.30 (4.93 to 6.40)	●
South East Coast	49,146	3.36	3.81 (3.36 to 4.30)	1.31	1.49 (1.18 to 1.91)	4.66	5.29 (5.02 to 6.33)	●
South London	45,142	3.85	3.68 (3.20 to 4.33)	1.80	1.71 (1.36 to 2.17)	5.65	5.39 (5.02 to 6.58)	●
South West	48,937	3.17	3.76 (3.29 to 4.32)	1.48	1.71 (1.37 to 2.15)	4.64	5.47 (5.09 to 6.50)	●
Southern West Midlands	31,922	4.98	4.09 (3.59 to 4.70)	2.64	2.07 (1.63 to 2.64)	7.61	6.17 (5.77 to 7.42)	●
Staffordshire, Shropshire and Black Country	25,462	3.61	3.80 (3.34 to 4.33)	2.25	1.91 (1.53 to 2.47)	5.85	5.73 (5.37 to 6.88)	●
Thames Valley and Wessex	60,756	3.54	3.87 (3.47 to 4.35)	1.42	1.52 (1.22 to 1.92)	4.95	5.38 (5.09 to 6.30)	●
Trent	24,815	4.07	4.02 (3.52 to 4.61)	2.10	1.96 (1.52 to 2.51)	6.17	5.98 (5.63 to 7.19)	●
Yorkshire & Humber	67,838	4.66	4.31 (3.79 to 4.96)	1.91	1.79 (1.48 to 2.25)	6.56	6.08 (5.75 to 7.26)	●
SCOTLAND								
North of Scotland	9,060	2.21	3.76 (3.16 to 4.44)	1.00	1.62 (1.21 to 2.24)	3.20	5.37 (4.84 to 6.57)	●
South East Scotland & Tayside	21,330	3.84	4.02 (3.52 to 4.66)	2.12	2.00 (1.53 to 2.61)	5.95	6.03 (5.55 to 7.30)	●
West of Scotland	24,270	4.12	4.09 (3.56 to 4.77)	1.53	1.63 (1.26 to 2.15)	5.64	5.69 (5.28 to 6.95)	●
WALES	32,122	4.51	4.25 (3.54 to 5.09)	1.00	1.35 (1.00 to 1.87)	5.51	5.57 (5.00 to 6.89)	●
NORTHERN IRELAND[°]	24,311	3.95	4.06 (3.55 to 4.67)	2.27	2.23 (1.68 to 3.03)	6.21	6.30 (5.85 to 7.69)	●

[§] excluding terminations of pregnancy and births <24⁺⁰ weeks gestational age

[†] per 1,000 total births

[‡] per 1,000 live births

[#] colours represent variation from comparator group average extended perinatal mortality rate

[°] different laws exist in Northern Ireland for the termination of pregnancy

* entry suppressed because of small number of deaths

Data sources: MBRRACE-UK, PDS, ONS, NRS, ISD, NIMATS, States of Guernsey, States of Jersey

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6. Mortality rates by Local Authority

This chapter presents the outcomes for populations covered by individual organisations responsible for public health (Local Authorities), in order to facilitate public health interventions to reduce mortality at a local level. Previous MBRRACE-UK reports have included this information in the appendices. Here, for the first time, we present the information in the main body of the report in order to highlight the importance of targeted public health programmes to reduce these mortality rates in their local populations.

MBRRACE-UK Recommendation

Public health initiatives should continue to be developed to reduce the impact of known risk factors for stillbirth and neonatal death; for example, smoking and obesity.

Figure 29: Crude stillbirth rates by Local Authority based on postcode of mother's residence at time of delivery: United Kingdom and Crown Dependencies, for births in 2016

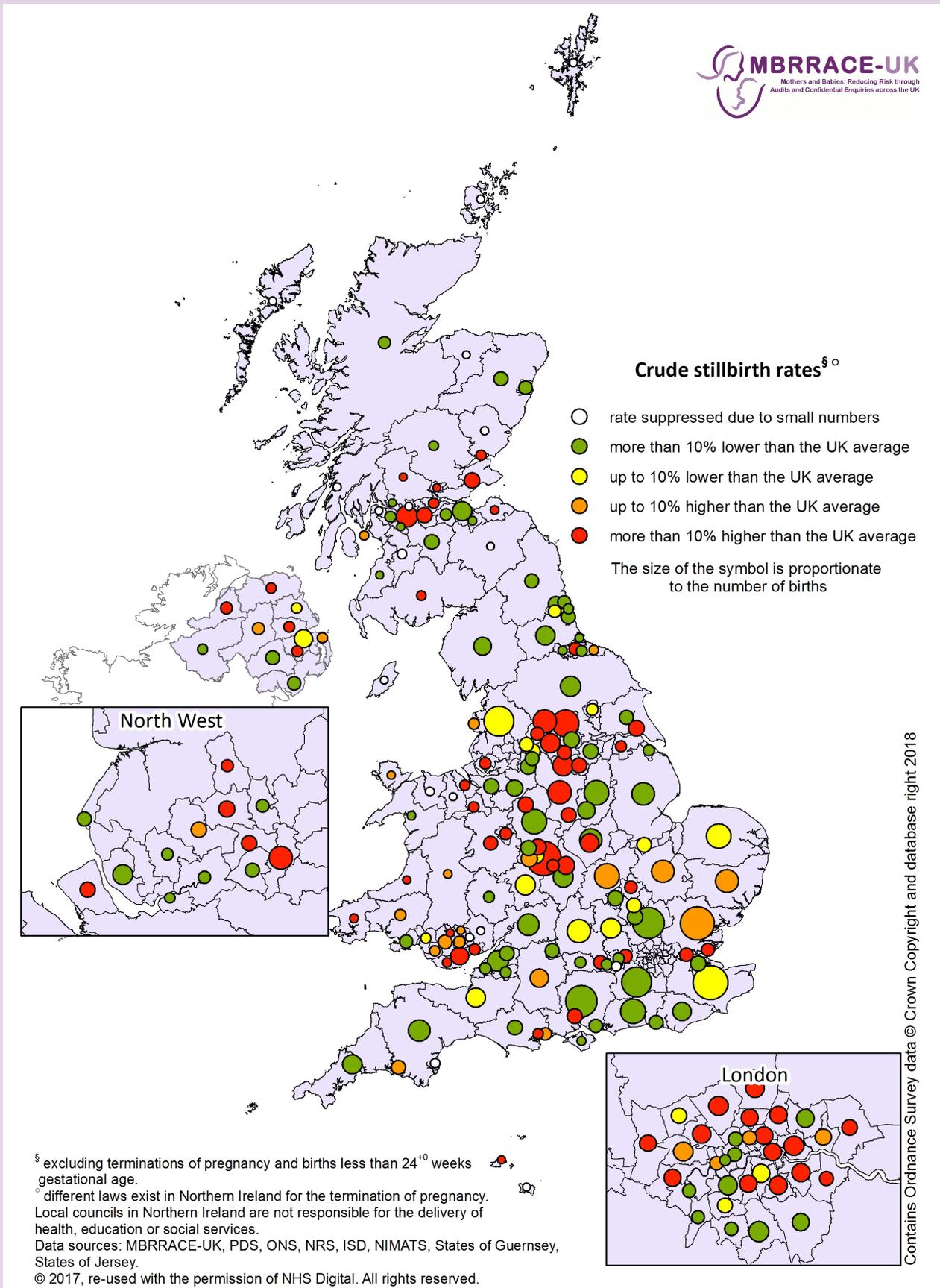


Figure 30: Stabilised & adjusted stillbirth rates by Local Authority based on postcode of mother's residence at time of delivery: United Kingdom and Crown Dependencies, for births in 2016

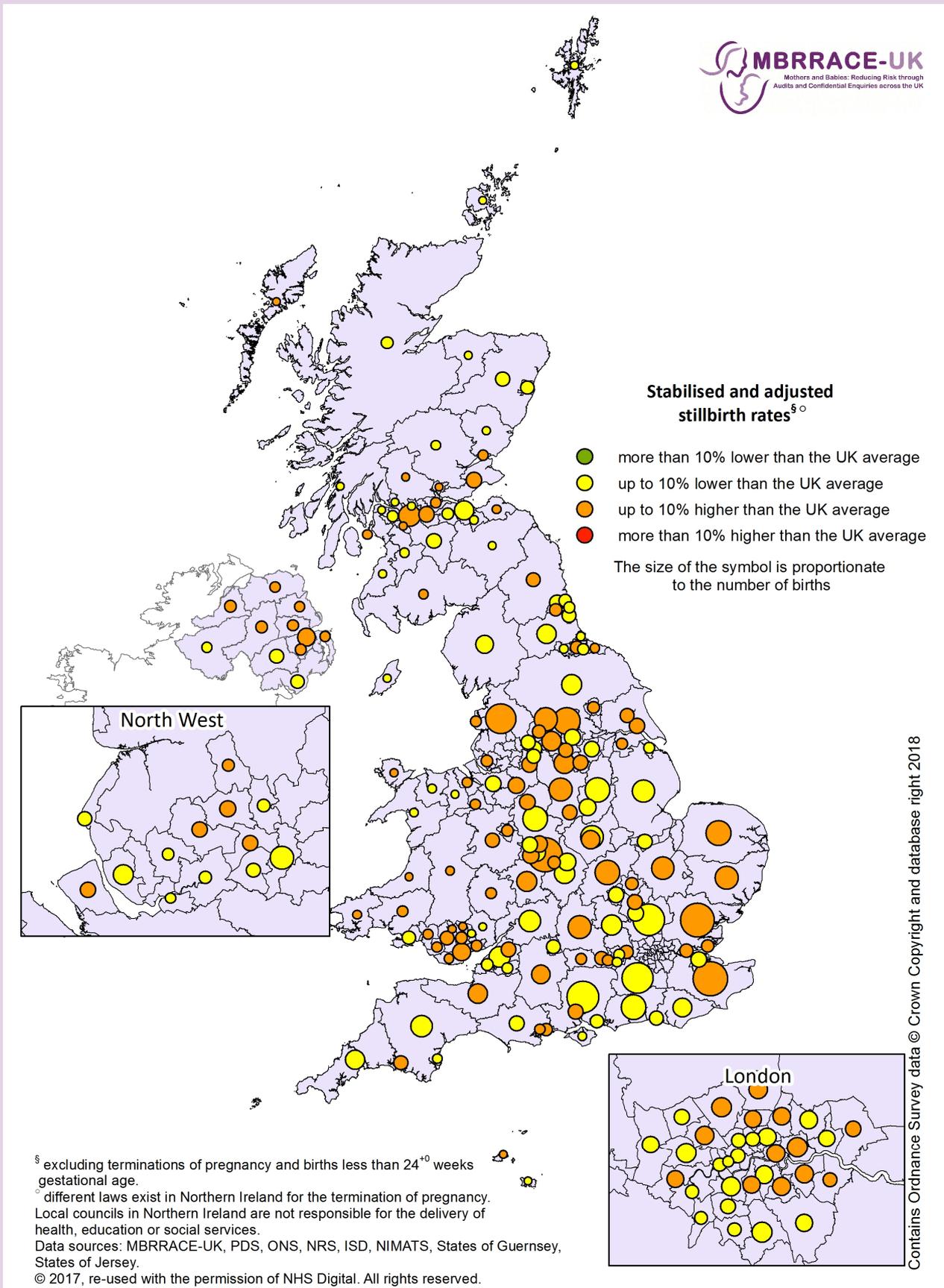


Figure 31: Crude neonatal mortality rates by Local Authority based on postcode of mother's residence at time of delivery: United Kingdom and Crown Dependencies, for births in 2016

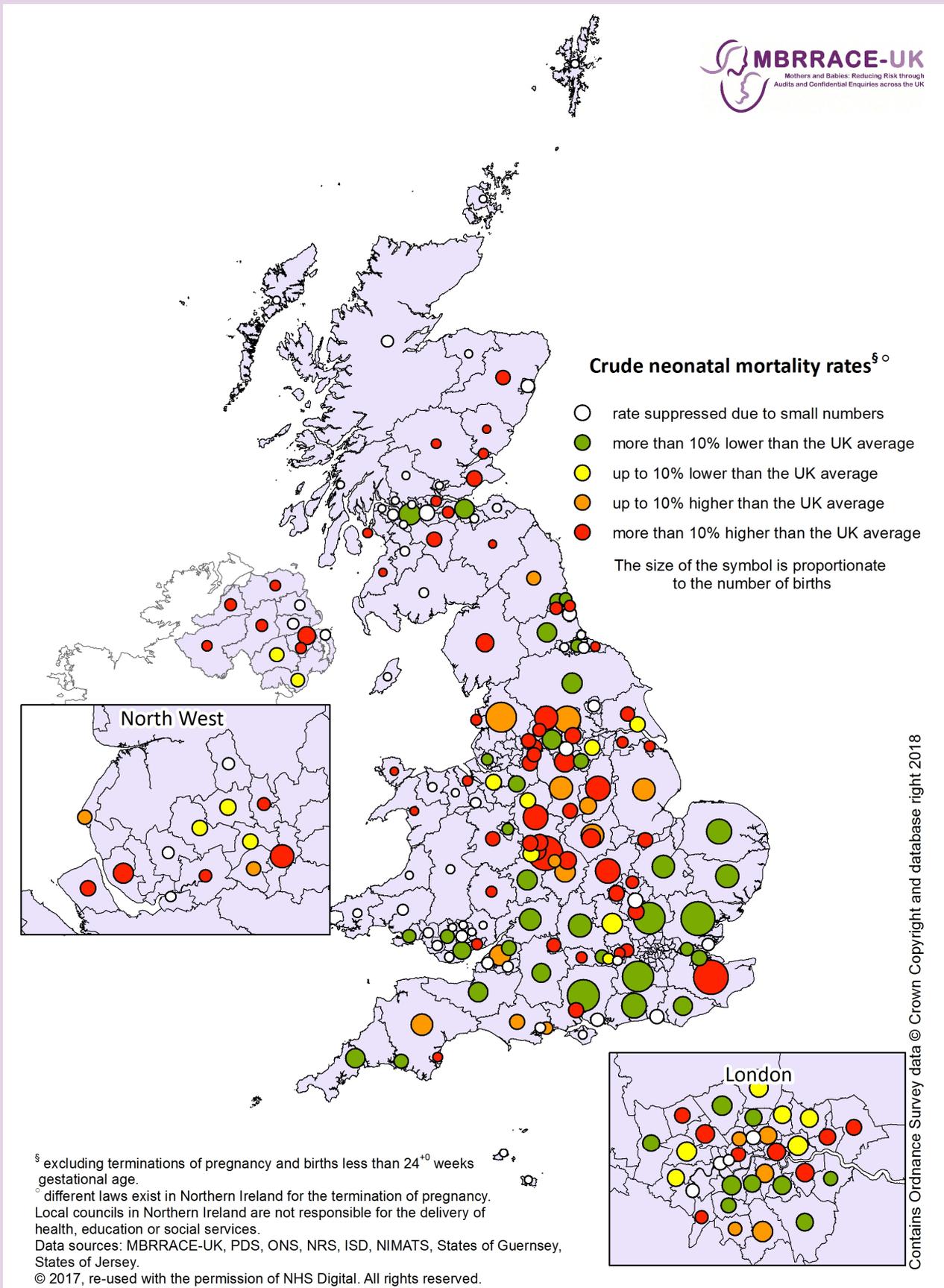


Figure 32: Stabilised & adjusted neonatal mortality rates by Local Authority based on postcode of mother's residence at time of delivery: United Kingdom and Crown Dependencies, for births in 2016

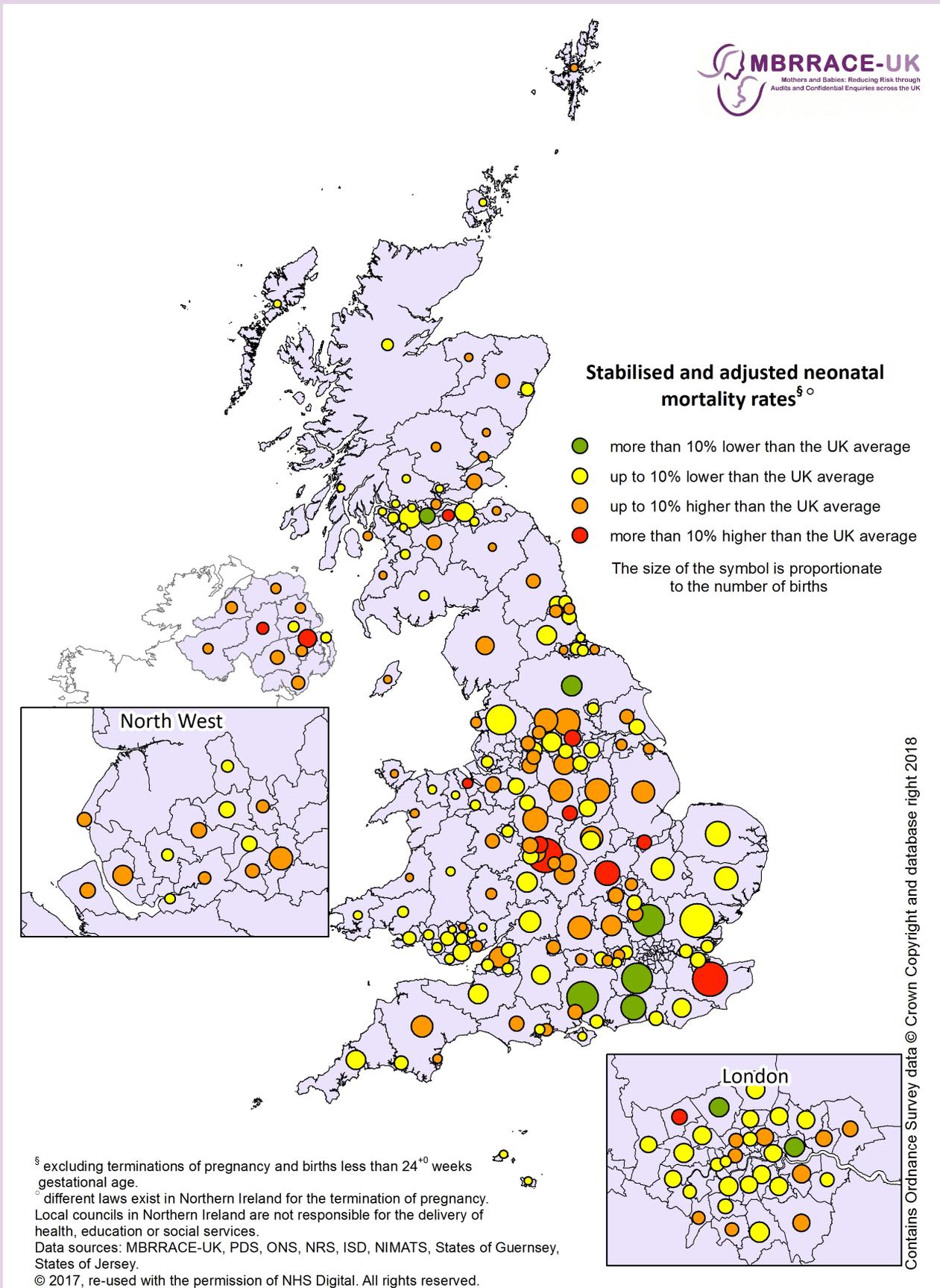


Figure 33: Crude extended perinatal mortality rates by Local Authority based on postcode of mother's residence at time of delivery: United Kingdom and Crown Dependencies, for births in 2016

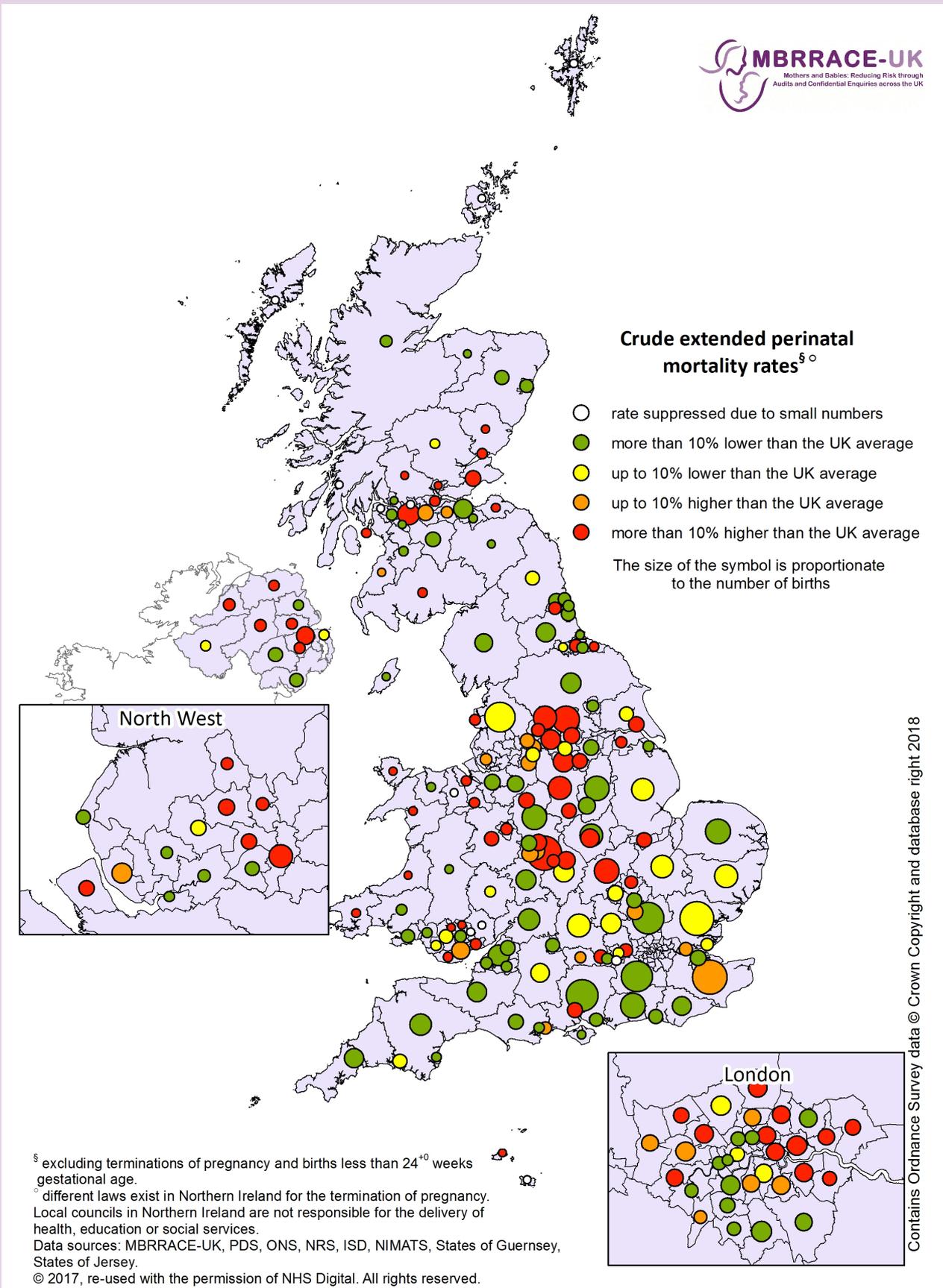


Figure 34: Stabilised & adjusted extended perinatal mortality rates by Local Authority based on postcode of mother's residence at time of delivery: United Kingdom and Crown Dependencies, for births in 2016

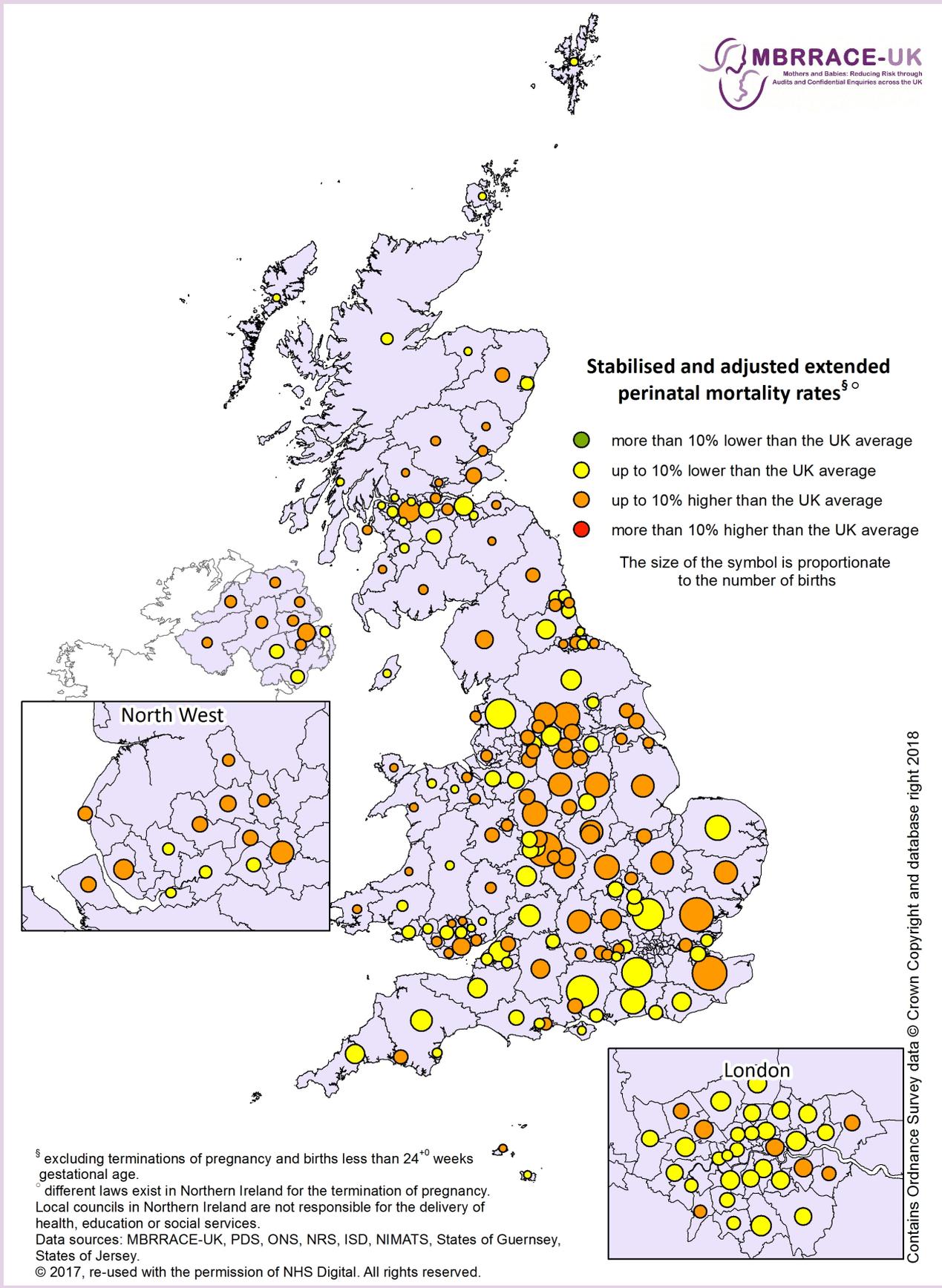


Table 14: Crude and stabilised & adjusted stillbirth, neonatal, and extended perinatal mortality rates by Local Authority based on postcode of mother's residence at time of delivery: United Kingdom and Crown Dependencies, for births in 2016

Local Authority	Total births [§]	Rate per 1,000 births [§]						
		Stillbirth [†]		Neonatal [‡]		Extended perinatal [†]		
		Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI) [#]	
ENGLAND								
Barking and Dagenham	3,937	4.06	3.80 (3.16 to 4.55)	2.30	1.74 (1.28 to 2.29)	6.35	5.53 (4.99 to 6.83)	●
Barnet	5,356	5.04	4.06 (3.40 to 4.96)	0.56	1.53 (1.03 to 2.10)	5.60	5.60 (5.06 to 6.90)	●
Barnsley	2,841	*	4.03 (3.33 to 4.89)	*	1.63 (1.13 to 2.21)	5.63	5.65 (5.07 to 7.03)	●
Bath and North East Somerset	1,811	*	3.91 (3.27 to 4.67)	*	1.65 (1.21 to 2.26)	3.31	5.55 (5.05 to 6.85)	●
Bedford	2,214	4.52	3.96 (3.29 to 4.75)	2.27	1.72 (1.27 to 2.27)	6.78	5.67 (5.11 to 6.93)	●
Bexley	3,058	5.23	4.02 (3.37 to 4.91)	0.99	1.64 (1.16 to 2.24)	6.21	5.66 (5.04 to 7.07)	●
Birmingham	17,557	5.75	4.14 (3.55 to 4.92)	3.04	1.98 (1.53 to 2.59)	8.77	6.13 (5.61 to 7.37)	●
Blackburn with Darwen	2,174	*	4.08 (3.47 to 5.05)	*	1.61 (1.14 to 2.16)	8.28	5.66 (5.09 to 7.03)	●
Blackpool	1,698	4.12	3.94 (3.30 to 4.82)	3.55	1.84 (1.37 to 2.55)	7.66	5.79 (5.24 to 7.28)	●
Bolton	3,842	5.73	4.06 (3.39 to 4.99)	1.57	1.63 (1.19 to 2.16)	7.29	5.65 (5.02 to 7.12)	●
Bournemouth	2,192	4.11	3.96 (3.27 to 4.85)	1.83	1.77 (1.32 to 2.38)	5.93	5.72 (5.13 to 7.08)	●
Bracknell Forest	1,399	*	3.85 (3.12 to 4.53)	*	1.64 (1.16 to 2.32)	*	5.49 (4.89 to 6.79)	●
Bradford	7,962	6.53	4.25 (3.50 to 5.33)	2.40	1.75 (1.36 to 2.26)	8.92	5.98 (5.37 to 7.47)	●
Brent	5,218	6.32	4.09 (3.48 to 4.98)	1.93	1.70 (1.29 to 2.21)	8.24	5.78 (5.27 to 7.16)	●
Brighton and Hove	2,869	*	3.92 (3.29 to 4.67)	*	1.61 (1.17 to 2.17)	3.83	5.53 (5.03 to 6.79)	●
Bristol, City of	6,481	3.24	3.80 (3.10 to 4.40)	1.86	1.83 (1.36 to 2.51)	5.09	5.61 (4.97 to 6.75)	●
Bromley	4,281	3.04	3.85 (3.18 to 4.54)	1.41	1.72 (1.27 to 2.28)	4.44	5.56 (5.07 to 6.76)	●
Buckinghamshire	6,089	3.61	3.91 (3.28 to 4.64)	1.65	1.75 (1.31 to 2.35)	5.26	5.66 (5.18 to 6.88)	●
Bury	2,359	3.39	3.90 (3.23 to 4.64)	2.98	1.86 (1.37 to 2.52)	6.36	5.75 (5.21 to 7.11)	●
Calderdale	2,492	5.62	4.04 (3.37 to 4.99)	3.23	1.80 (1.36 to 2.42)	8.83	5.85 (5.28 to 7.29)	●
Cambridgeshire	7,262	3.99	4.04 (3.41 to 4.87)	1.24	1.64 (1.26 to 2.20)	5.23	5.67 (5.19 to 7.02)	●
Camden	2,790	2.87	3.82 (3.12 to 4.61)	1.80	1.73 (1.25 to 2.36)	4.66	5.54 (4.92 to 6.84)	●
Central Bedfordshire	3,278	*	3.96 (3.37 to 4.68)	*	1.61 (1.16 to 2.21)	4.27	5.55 (5.06 to 6.83)	●
Cheshire East	3,836	3.39	3.94 (3.34 to 4.69)	1.05	1.66 (1.19 to 2.30)	4.43	5.59 (5.03 to 6.93)	●
Cheshire West and Chester	3,586	1.67	3.77 (3.01 to 4.52)	1.68	1.74 (1.31 to 2.36)	3.35	5.51 (4.91 to 6.85)	●
Cornwall	5,303	3.39	3.92 (3.36 to 4.58)	1.32	1.71 (1.27 to 2.31)	4.71	5.62 (5.18 to 6.84)	●

Local Authority	Total births [§]	Rate per 1,000 births [§]						
		Stillbirth [†]		Neonatal [†]		Extended perinatal [†]		
		Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI) [#]	
County Durham	5,305	3.02	3.85 (3.18 to 4.49)	1.32	1.64 (1.23 to 2.20)	4.34	5.48 (4.98 to 6.69)	●
Coventry	4,548	4.40	3.92 (3.34 to 4.62)	2.65	1.80 (1.36 to 2.43)	7.04	5.72 (5.21 to 6.99)	●
Croydon	5,779	2.77	3.63 (2.85 to 4.46)	1.74	1.66 (1.19 to 2.21)	4.50	5.29 (4.59 to 6.59)	●
Cumbria	4,756	2.52	3.83 (3.13 to 4.50)	2.53	1.84 (1.38 to 2.53)	5.05	5.69 (5.08 to 7.08)	●
Darlington	1,156	*	3.92 (3.23 to 4.66)	*	1.73 (1.26 to 2.37)	5.19	5.65 (5.02 to 6.94)	●
Derby	3,331	6.30	4.13 (3.46 to 5.17)	4.23	1.96 (1.45 to 2.87)	10.51	6.12 (5.54 to 7.85)	●
Derbyshire	7,855	5.09	4.28 (3.53 to 5.45)	1.79	1.73 (1.34 to 2.27)	6.87	5.97 (5.38 to 7.56)	●
Devon	6,979	2.44	3.78 (3.09 to 4.49)	1.87	1.85 (1.39 to 2.49)	4.30	5.61 (5.03 to 6.96)	●
Doncaster	3,547	3.38	3.89 (3.29 to 4.57)	1.70	1.70 (1.26 to 2.28)	5.07	5.59 (5.07 to 6.82)	●
Dorset	3,377	2.37	3.84 (3.20 to 4.50)	1.78	1.76 (1.31 to 2.49)	4.15	5.59 (5.12 to 6.81)	●
Dudley	3,809	4.20	3.96 (3.37 to 4.80)	1.58	1.69 (1.24 to 2.22)	5.78	5.63 (5.16 to 7.01)	●
Ealing	5,333	4.31	3.84 (3.20 to 4.48)	1.69	1.67 (1.24 to 2.19)	6.00	5.49 (5.00 to 6.68)	●
East Riding of Yorkshire	2,883	3.47	3.94 (3.25 to 4.77)	2.09	1.79 (1.31 to 2.46)	5.55	5.73 (5.18 to 7.08)	●
East Sussex	5,217	2.49	3.79 (3.11 to 4.48)	0.77	1.57 (1.13 to 2.09)	3.26	5.35 (4.76 to 6.58)	●
Enfield	4,981	5.02	3.96 (3.37 to 4.75)	1.61	1.67 (1.26 to 2.17)	6.63	5.62 (5.13 to 6.90)	●
Essex	16,530	3.99	4.11 (3.53 to 4.84)	1.21	1.63 (1.23 to 2.13)	5.20	5.72 (5.25 to 6.95)	●
Gateshead	2,303	3.91	3.94 (3.34 to 4.65)	2.62	1.81 (1.31 to 2.53)	6.51	5.75 (5.19 to 7.11)	●
Gloucestershire	6,730	2.97	3.85 (3.18 to 4.56)	1.04	1.59 (1.17 to 2.11)	4.01	5.43 (4.93 to 6.55)	●
Greenwich	4,625	5.62	4.03 (3.38 to 4.81)	1.96	1.75 (1.32 to 2.33)	7.57	5.78 (5.26 to 7.10)	●
Hackney and City of London	4,596	4.57	3.87 (3.17 to 4.53)	1.75	1.72 (1.29 to 2.28)	6.31	5.58 (5.02 to 6.76)	●
Halton	1,508	*	3.92 (3.26 to 4.82)	*	1.71 (1.22 to 2.35)	4.64	5.62 (5.14 to 6.95)	●
Hammersmith and Fulham	2,605	*	3.92 (3.26 to 4.68)	*	1.65 (1.14 to 2.25)	4.99	5.57 (5.00 to 6.87)	●
Hampshire	14,375	3.13	3.88 (3.33 to 4.50)	1.19	1.56 (1.20 to 2.03)	4.31	5.42 (5.01 to 6.50)	●
Haringey	4,127	4.60	3.94 (3.24 to 4.66)	1.46	1.65 (1.23 to 2.20)	6.06	5.58 (5.09 to 6.72)	●
Harrow	3,618	3.87	3.85 (3.20 to 4.59)	4.44	2.09 (1.50 to 3.20)	8.29	5.94 (5.34 to 7.61)	●
Hartlepool	1,051	*	3.90 (3.16 to 4.71)	*	1.69 (1.15 to 2.27)	3.81	5.58 (5.02 to 6.81)	●
Havering	3,405	4.70	3.99 (3.37 to 4.71)	2.36	1.88 (1.39 to 2.77)	7.05	5.85 (5.31 to 7.35)	●
Herefordshire, County of	1,775	3.38	3.93 (3.35 to 4.69)	2.26	1.78 (1.34 to 2.43)	5.63	5.71 (5.20 to 7.05)	●
Hertfordshire	14,541	2.96	3.74 (3.09 to 4.45)	1.03	1.53 (1.10 to 2.01)	3.99	5.26 (4.73 to 6.46)	●

Local Authority	Total births [§]	Rate per 1,000 births [§]						
		Stillbirth [†]		Neonatal [‡]		Extended perinatal [†]		
		Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI) [#]	
Hillingdon	4,471	4.70	3.92 (3.37 to 4.80)	1.35	1.65 (1.20 to 2.27)	6.04	5.57 (5.07 to 6.94)	●
Hounslow	4,395	5.23	3.95 (3.35 to 4.72)	1.60	1.69 (1.28 to 2.23)	6.83	5.64 (5.10 to 6.88)	●
Isle of Wight	1,145	*	3.90 (3.24 to 4.69)	*	1.71 (1.26 to 2.34)	4.37	5.60 (5.10 to 6.92)	●
Islington	3,013	*	3.88 (3.19 to 4.55)	*	1.58 (1.11 to 2.07)	4.65	5.45 (4.85 to 6.63)	●
Kensington and Chelsea	1,867	*	3.88 (3.21 to 4.59)	*	1.65 (1.20 to 2.28)	4.28	5.52 (4.93 to 6.88)	●
Kent	17,391	3.85	4.01 (3.45 to 4.69)	2.02	1.89 (1.45 to 2.40)	5.87	5.91 (5.47 to 7.09)	●
Kingston upon Hull, City of	3,576	5.87	4.12 (3.36 to 5.11)	1.69	1.69 (1.32 to 2.27)	7.55	5.79 (5.21 to 7.29)	●
Kingston upon Thames	2,234	3.13	3.89 (3.19 to 4.60)	2.69	1.84 (1.37 to 2.69)	5.82	5.72 (5.17 to 7.11)	●
Kirklees	5,422	5.16	4.03 (3.41 to 4.75)	1.30	1.61 (1.19 to 2.13)	6.46	5.61 (5.18 to 6.81)	●
Knowsley	1,939	4.64	3.98 (3.36 to 4.82)	1.55	1.70 (1.24 to 2.36)	6.19	5.66 (5.18 to 7.01)	●
Lambeth	4,351	5.06	3.94 (3.34 to 4.65)	0.92	1.59 (1.16 to 2.11)	5.98	5.54 (5.06 to 6.71)	●
Lancashire	13,215	3.86	3.96 (3.39 to 4.51)	1.75	1.67 (1.31 to 2.21)	5.60	5.61 (5.22 to 6.73)	●
Leeds	10,337	4.74	4.08 (3.54 to 4.82)	1.75	1.78 (1.38 to 2.34)	6.48	5.85 (5.42 to 7.08)	●
Leicester	5,185	5.98	4.04 (3.43 to 4.80)	2.13	1.67 (1.24 to 2.22)	8.10	5.69 (5.20 to 6.93)	●
Leicestershire and Rutland	7,428	3.23	3.90 (3.33 to 4.54)	1.89	1.80 (1.37 to 2.44)	5.12	5.70 (5.25 to 6.95)	●
Lewisham	4,761	5.04	3.96 (3.32 to 4.74)	1.06	1.58 (1.13 to 2.13)	6.09	5.53 (5.00 to 6.77)	●
Lincolnshire	7,493	3.34	3.90 (3.32 to 4.53)	1.87	1.82 (1.42 to 2.45)	5.20	5.73 (5.25 to 7.01)	●
Liverpool	6,057	3.30	3.83 (3.19 to 4.55)	2.82	1.87 (1.39 to 2.56)	6.11	5.72 (5.08 to 7.10)	●
Luton	3,625	2.76	3.70 (2.98 to 4.46)	3.04	1.81 (1.41 to 2.43)	5.79	5.52 (4.96 to 6.83)	●
Manchester	8,023	4.49	3.84 (3.23 to 4.46)	2.38	1.84 (1.44 to 2.50)	6.86	5.67 (5.26 to 6.87)	●
Medway	3,635	1.65	3.72 (2.89 to 4.53)	1.10	1.64 (1.17 to 2.20)	2.75	5.35 (4.61 to 6.67)	●
Merton	3,279	3.66	3.89 (3.27 to 4.62)	1.22	1.67 (1.19 to 2.30)	4.88	5.55 (5.02 to 6.85)	●
Middlesbrough	1,916	*	3.86 (3.13 to 4.61)	*	1.63 (1.16 to 2.23)	3.65	5.49 (4.90 to 6.76)	●
Milton Keynes	3,671	3.27	3.84 (3.15 to 4.58)	2.19	1.79 (1.36 to 2.49)	5.45	5.62 (5.05 to 7.03)	●
Newcastle upon Tyne	3,407	2.35	3.77 (3.01 to 4.48)	1.18	1.63 (1.16 to 2.15)	3.52	5.39 (4.72 to 6.57)	●
Newham	6,113	6.05	3.99 (3.44 to 4.66)	1.65	1.54 (1.14 to 2.07)	7.69	5.50 (5.07 to 6.73)	●
Norfolk	9,087	3.63	3.96 (3.34 to 4.75)	1.10	1.61 (1.21 to 2.12)	4.73	5.56 (5.06 to 6.76)	●
North East Lincolnshire	1,863	1.61	3.81 (3.07 to 4.58)	3.23	1.82 (1.34 to 2.59)	4.83	5.65 (5.02 to 7.10)	●
North Lincolnshire	1,779	5.06	4.00 (3.36 to 4.93)	2.82	1.76 (1.32 to 2.47)	7.87	5.76 (5.22 to 7.28)	●

Local Authority	Total births [§]	Rate per 1,000 births [§]						
		Stillbirth [†]		Neonatal [†]		Extended perinatal [†]		
		Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI) [#]	
North Somerset	2,180	*	3.86 (3.08 to 4.61)	*	1.68 (1.20 to 2.30)	3.21	5.54 (4.91 to 6.86)	●
North Tyneside	2,267	2.65	3.88 (3.11 to 4.57)	1.33	1.72 (1.24 to 2.41)	3.97	5.59 (4.97 to 6.85)	●
North Yorkshire	5,747	3.13	3.91 (3.25 to 4.59)	0.70	1.56 (1.09 to 2.12)	3.83	5.45 (4.90 to 6.67)	●
Northamptonshire	9,126	3.94	3.99 (3.37 to 4.76)	2.31	1.96 (1.45 to 2.74)	6.25	5.95 (5.37 to 7.29)	●
Northumberland	2,831	3.53	3.93 (3.26 to 4.69)	1.77	1.76 (1.32 to 2.39)	5.30	5.69 (5.12 to 6.95)	●
Nottingham	4,340	3.23	3.76 (3.02 to 4.47)	1.85	1.69 (1.24 to 2.29)	5.07	5.44 (4.83 to 6.64)	●
Nottinghamshire	8,698	2.99	3.82 (3.28 to 4.56)	1.96	1.87 (1.43 to 2.54)	4.94	5.69 (5.22 to 6.98)	●
Oldham	3,338	3.59	3.85 (3.12 to 4.60)	2.10	1.66 (1.25 to 2.24)	5.69	5.49 (4.92 to 6.77)	●
Oxfordshire	7,776	3.60	3.97 (3.37 to 4.80)	1.55	1.74 (1.30 to 2.34)	5.14	5.70 (5.22 to 7.10)	●
Peterborough	3,093	3.88	3.90 (3.32 to 4.66)	3.25	1.90 (1.41 to 2.69)	7.11	5.79 (5.28 to 7.25)	●
Plymouth	2,922	4.11	3.97 (3.32 to 4.81)	1.37	1.69 (1.20 to 2.26)	5.48	5.65 (5.11 to 7.00)	●
Poole	1,605	*	3.98 (3.28 to 4.81)	*	1.67 (1.22 to 2.24)	4.98	5.64 (5.08 to 6.89)	●
Portsmouth	2,607	*	3.90 (3.19 to 4.66)	*	1.62 (1.17 to 2.16)	4.22	5.52 (4.96 to 6.77)	●
Reading	2,508	5.98	4.05 (3.41 to 5.03)	1.20	1.69 (1.20 to 2.29)	7.18	5.74 (5.23 to 7.14)	●
Redbridge	4,696	2.56	3.63 (2.73 to 4.47)	1.71	1.68 (1.26 to 2.24)	4.26	5.29 (4.51 to 6.70)	●
Redcar and Cleveland	1,448	4.14	3.95 (3.28 to 4.74)	3.47	1.83 (1.35 to 2.64)	7.60	5.77 (5.23 to 7.25)	●
Richmond upon Thames	2,536	*	3.88 (3.25 to 4.63)	*	1.63 (1.15 to 2.24)	3.15	5.51 (4.95 to 6.77)	●
Rochdale	3,066	3.91	3.89 (3.27 to 4.72)	2.29	1.76 (1.35 to 2.47)	6.20	5.65 (5.19 to 7.04)	●
Rotherham	3,109	5.47	4.07 (3.40 to 5.04)	0.97	1.62 (1.16 to 2.16)	6.43	5.66 (5.11 to 7.02)	●
Salford	3,711	5.93	4.12 (3.45 to 5.15)	1.63	1.67 (1.25 to 2.16)	7.55	5.76 (5.26 to 7.21)	●
Sandwell	4,719	3.60	3.78 (3.06 to 4.48)	2.55	1.80 (1.39 to 2.40)	6.15	5.58 (5.06 to 6.80)	●
Sefton	2,813	3.20	3.91 (3.26 to 4.67)	1.78	1.77 (1.30 to 2.48)	4.98	5.67 (5.08 to 6.99)	●
Sheffield	6,554	4.58	4.00 (3.39 to 4.76)	2.15	1.84 (1.41 to 2.43)	6.71	5.83 (5.36 to 7.17)	●
Shropshire	2,944	4.42	4.02 (3.36 to 4.94)	2.05	1.80 (1.32 to 2.50)	6.45	5.82 (5.25 to 7.24)	●
Slough	2,630	5.70	3.96 (3.33 to 4.69)	1.91	1.67 (1.24 to 2.24)	7.60	5.62 (5.13 to 6.82)	●
Solihull	2,324	4.73	4.00 (3.33 to 4.95)	1.73	1.73 (1.29 to 2.39)	6.45	5.72 (5.25 to 7.12)	●
Somerset	5,487	3.64	3.97 (3.29 to 4.79)	1.10	1.67 (1.23 to 2.21)	4.74	5.63 (5.11 to 6.90)	●
South Gloucestershire	3,086	3.56	3.95 (3.32 to 4.68)	0.98	1.71 (1.24 to 2.23)	4.54	5.66 (5.05 to 6.93)	●
South Tyneside	1,682	1.78	3.83 (3.14 to 4.58)	2.98	1.83 (1.31 to 2.66)	4.76	5.65 (5.09 to 7.16)	●

Local Authority	Total births [§]	Rate per 1,000 births [§]						
		Stillbirth [†]		Neonatal [†]		Extended perinatal [†]		
		Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI) [#]	
Southampton	3,201	5.00	4.03 (3.35 to 4.97)	2.20	1.77 (1.32 to 2.40)	7.19	5.79 (5.28 to 7.20)	●
Southend-on-Sea	2,263	*	3.97 (3.34 to 4.79)	*	1.64 (1.21 to 2.21)	5.30	5.59 (5.12 to 6.88)	●
Southwark	4,650	3.66	3.77 (3.04 to 4.50)	1.73	1.71 (1.23 to 2.32)	5.38	5.47 (4.95 to 6.65)	●
St. Helens	1,996	*	3.87 (3.21 to 4.57)	*	1.64 (1.17 to 2.28)	3.01	5.50 (4.94 to 6.75)	●
Staffordshire	8,673	2.65	3.76 (3.06 to 4.41)	2.08	1.88 (1.40 to 2.59)	4.73	5.65 (5.03 to 6.97)	●
Stockport	3,430	3.50	3.93 (3.28 to 4.66)	2.34	1.80 (1.35 to 2.45)	5.83	5.73 (5.23 to 7.10)	●
Stockton-on-Tees	2,302	5.21	4.02 (3.34 to 4.88)	1.31	1.68 (1.24 to 2.29)	6.52	5.68 (5.09 to 7.08)	●
Stoke-on-Trent	3,514	4.55	3.96 (3.31 to 4.69)	1.72	1.70 (1.26 to 2.33)	6.26	5.65 (5.16 to 7.01)	●
Suffolk	7,872	4.32	4.10 (3.41 to 4.93)	1.02	1.60 (1.19 to 2.08)	5.34	5.69 (5.11 to 7.00)	●
Sunderland	2,990	*	3.81 (3.13 to 4.52)	*	1.56 (1.09 to 2.16)	2.68	5.37 (4.78 to 6.59)	●
Surrey	13,430	2.83	3.77 (3.13 to 4.44)	0.90	1.50 (1.08 to 2.03)	3.72	5.26 (4.78 to 6.35)	●
Sutton	2,711	2.95	3.87 (3.20 to 4.53)	1.85	1.75 (1.30 to 2.39)	4.80	5.61 (5.05 to 6.84)	●
Swindon	2,849	2.46	3.83 (3.19 to 4.67)	2.11	1.75 (1.31 to 2.43)	4.56	5.59 (5.03 to 7.02)	●
Tameside	2,876	3.13	3.87 (3.23 to 4.58)	2.44	1.82 (1.34 to 2.60)	5.56	5.69 (5.12 to 7.09)	●
Telford and Wrekin	2,092	5.26	4.01 (3.38 to 4.83)	1.44	1.71 (1.28 to 2.38)	6.69	5.71 (5.26 to 7.12)	●
Thurrock	2,485	4.83	3.97 (3.33 to 4.77)	1.21	1.69 (1.21 to 2.29)	6.04	5.66 (5.15 to 6.98)	●
Torbay	1,312	*	3.85 (3.15 to 4.61)	*	1.76 (1.27 to 2.48)	3.81	5.61 (4.97 to 6.94)	●
Tower Hamlets	4,691	7.67	4.20 (3.48 to 5.22)	1.93	1.69 (1.25 to 2.32)	9.59	5.88 (5.31 to 7.35)	●
Trafford	2,817	2.48	3.84 (3.10 to 4.54)	1.78	1.72 (1.26 to 2.34)	4.26	5.56 (4.98 to 6.84)	●
Wakefield	4,077	3.43	3.89 (3.20 to 4.72)	2.95	1.90 (1.44 to 2.66)	6.38	5.81 (5.27 to 7.24)	●
Walsall	3,768	5.57	4.04 (3.40 to 4.95)	4.00	1.96 (1.42 to 2.80)	9.55	6.04 (5.40 to 7.74)	●
Waltham Forest	4,757	4.83	3.93 (3.34 to 4.72)	1.69	1.70 (1.25 to 2.30)	6.52	5.63 (5.11 to 6.84)	●
Wandsworth	4,965	3.42	3.85 (3.18 to 4.52)	1.01	1.61 (1.17 to 2.20)	4.43	5.46 (4.92 to 6.74)	●
Warrington	2,303	1.74	3.82 (3.17 to 4.51)	2.61	1.82 (1.35 to 2.52)	4.34	5.64 (5.07 to 7.05)	●
Warwickshire	5,948	3.36	3.92 (3.29 to 4.60)	1.86	1.81 (1.34 to 2.48)	5.21	5.73 (5.24 to 7.05)	●
West Berkshire	1,770	3.39	3.93 (3.33 to 4.65)	2.27	1.77 (1.28 to 2.44)	5.65	5.70 (5.09 to 7.01)	●
West Sussex	8,795	3.30	3.89 (3.26 to 4.53)	0.91	1.55 (1.12 to 2.10)	4.21	5.43 (4.93 to 6.51)	●
Westminster	2,767	2.89	3.82 (3.18 to 4.49)	2.54	1.82 (1.38 to 2.59)	5.42	5.62 (5.10 to 6.95)	●
Wigan	3,549	3.94	3.97 (3.29 to 4.77)	1.70	1.75 (1.30 to 2.36)	5.64	5.72 (5.14 to 7.04)	●

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		Stillbirth [†]		Neonatal [‡]		Extended perinatal [†]		
		Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI) [#]	
Wiltshire	5,123	4.10	4.03 (3.43 to 4.90)	1.18	1.67 (1.22 to 2.24)	5.27	5.69 (5.18 to 6.96)	●
Windsor and Maidenhead	1,743	2.29	3.87 (3.19 to 4.59)	2.88	1.78 (1.30 to 2.49)	5.16	5.66 (5.07 to 7.06)	●
Wirral	3,437	4.36	4.00 (3.34 to 4.80)	2.05	1.75 (1.32 to 2.46)	6.40	5.75 (5.17 to 7.18)	●
Wokingham	1,815	3.31	3.93 (3.33 to 4.68)	1.66	1.73 (1.26 to 2.34)	4.96	5.65 (5.19 to 7.01)	●
Wolverhampton	3,469	2.02	3.69 (2.92 to 4.48)	2.89	1.82 (1.34 to 2.50)	4.90	5.52 (4.89 to 6.93)	●
Worcestershire	6,074	3.62	3.95 (3.34 to 4.60)	1.32	1.64 (1.21 to 2.13)	4.94	5.58 (5.02 to 6.72)	●
York	1,948	*	3.95 (3.32 to 4.83)	*	1.69 (1.25 to 2.28)	4.62	5.64 (5.09 to 7.00)	●
SCOTLAND								
Aberdeen City	2,538	*	3.84 (3.16 to 4.50)	*	1.66 (1.20 to 2.28)	3.15	5.49 (4.95 to 6.67)	●
Aberdeenshire	2,793	2.51	3.88 (3.21 to 4.60)	2.15	1.81 (1.33 to 2.58)	4.65	5.69 (5.14 to 7.17)	●
Angus	1,026	*	3.89 (3.17 to 4.59)	*	1.87 (1.37 to 2.72)	6.82	5.76 (5.13 to 7.28)	●
Argyll and Bute	696	*	3.86 (3.17 to 4.60)	*	1.71 (1.24 to 2.32)	*	5.57 (5.04 to 6.95)	●
City of Edinburgh	5,296	2.45	3.77 (3.05 to 4.50)	1.33	1.69 (1.27 to 2.23)	3.78	5.45 (4.87 to 6.60)	●
Clackmannanshire	513	*	3.99 (3.31 to 4.84)	*	1.68 (1.20 to 2.38)	7.80	5.65 (5.07 to 7.13)	●
Dumfries and Galloway	1,318	*	4.06 (3.39 to 5.04)	*	1.71 (1.27 to 2.34)	8.35	5.75 (5.18 to 7.30)	●
Dundee City	1,591	6.29	4.04 (3.39 to 5.06)	3.16	1.81 (1.34 to 2.63)	9.43	5.85 (5.21 to 7.62)	●
East Ayrshire	1,268	*	3.86 (3.06 to 4.60)	*	1.72 (1.23 to 2.34)	3.15	5.57 (4.99 to 6.88)	●
East Dunbartonshire	961	*	3.90 (3.25 to 4.71)	*	1.67 (1.18 to 2.37)	*	5.57 (4.97 to 6.95)	●
East Lothian	1,051	*	3.97 (3.25 to 4.79)	*	1.74 (1.23 to 2.47)	6.66	5.71 (5.12 to 7.17)	●
East Renfrewshire	872	*	3.94 (3.25 to 4.77)	*	1.67 (1.17 to 2.36)	3.44	5.61 (4.99 to 6.99)	●
Falkirk	1,586	6.31	4.06 (3.38 to 5.04)	3.81	1.82 (1.35 to 2.53)	10.09	5.89 (5.16 to 7.57)	●
Fife	3,705	4.86	4.06 (3.45 to 4.95)	2.17	1.82 (1.35 to 2.55)	7.02	5.87 (5.33 to 7.47)	●
Glasgow City	6,922	5.78	4.26 (3.47 to 5.48)	1.16	1.62 (1.21 to 2.11)	6.93	5.86 (5.25 to 7.50)	●
Highland	2,139	*	3.92 (3.28 to 4.67)	*	1.67 (1.19 to 2.35)	4.21	5.59 (5.05 to 6.96)	●
Inverclyde	698	*	3.86 (3.12 to 4.64)	*	1.70 (1.22 to 2.29)	*	5.55 (4.99 to 6.97)	●
Midlothian	1,108	*	3.90 (3.24 to 4.77)	*	1.68 (1.21 to 2.30)	3.61	5.58 (4.98 to 6.94)	●
Moray	933	*	3.87 (3.11 to 4.63)	*	1.76 (1.26 to 2.50)	3.22	5.61 (4.97 to 6.98)	●
Na h-Eileanan Siar	241	*	3.94 (3.34 to 4.84)	*	1.70 (1.20 to 2.29)	*	5.63 (5.10 to 6.94)	●
North Ayrshire	1,247	4.01	3.94 (3.30 to 4.78)	2.42	1.77 (1.28 to 2.47)	6.42	5.70 (5.14 to 7.08)	●
North Lanarkshire	3,528	*	4.17 (3.44 to 5.29)	*	1.51 (1.01 to 2.11)	5.95	5.64 (5.00 to 7.23)	●

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		Stillbirth [†]		Neonatal [‡]		Extended perinatal [†]		
		Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI) [#]	
Orkney Islands	185	*	3.91 (3.29 to 4.77)	*	1.71 (1.18 to 2.40)	*	5.62 (5.05 to 6.98)	●
Perth and Kinross	1,336	2.25	3.89 (3.15 to 4.68)	3.00	1.81 (1.34 to 2.51)	5.24	5.69 (5.00 to 7.05)	●
Renfrewshire	1,762	*	3.87 (3.15 to 4.60)	*	1.65 (1.14 to 2.30)	2.84	5.52 (4.87 to 6.87)	●
Scottish Borders	987	*	3.89 (3.18 to 4.65)	*	1.77 (1.30 to 2.46)	5.07	5.67 (5.10 to 7.16)	●
Shetland Islands	262	*	3.91 (3.20 to 4.63)	*	1.76 (1.28 to 2.47)	*	5.64 (5.02 to 7.01)	●
South Ayrshire	968	3.10	3.92 (3.26 to 4.73)	3.11	1.76 (1.32 to 2.46)	6.20	5.68 (5.15 to 7.13)	●
South Lanarkshire	3,311	1.81	3.79 (3.04 to 4.51)	2.42	1.81 (1.32 to 2.49)	4.23	5.61 (4.98 to 6.95)	●
Stirling	811	*	4.05 (3.37 to 5.04)	*	1.68 (1.17 to 2.30)	8.63	5.71 (5.21 to 7.19)	●
West Dunbartonshire	950	*	3.92 (3.26 to 4.70)	*	1.69 (1.21 to 2.32)	4.21	5.60 (5.09 to 6.87)	●
West Lothian	1,977	2.02	3.85 (3.16 to 4.57)	4.05	1.93 (1.40 to 2.94)	6.07	5.79 (5.18 to 7.45)	●
WALES								
Blaenau Gwent	733	*	3.93 (3.28 to 4.72)	*	1.73 (1.30 to 2.33)	6.82	5.66 (5.07 to 6.95)	●
Bridgend	1,510	*	3.94 (3.29 to 4.74)	*	1.72 (1.23 to 2.39)	5.30	5.66 (5.08 to 7.04)	●
Caerphilly	2,017	*	3.95 (3.32 to 4.73)	*	1.61 (1.12 to 2.18)	3.97	5.55 (5.06 to 6.90)	●
Cardiff	4,490	5.12	4.05 (3.39 to 4.87)	0.90	1.64 (1.18 to 2.26)	6.01	5.70 (5.16 to 6.96)	●
Carmarthenshire	1,883	*	3.97 (3.33 to 4.95)	*	1.65 (1.21 to 2.26)	4.78	5.62 (5.09 to 6.98)	●
Ceredigion	617	*	3.99 (3.37 to 5.00)	*	1.76 (1.25 to 2.41)	9.72	5.75 (5.15 to 7.44)	●
Conwy	1,053	*	3.88 (3.20 to 4.66)	*	1.69 (1.24 to 2.32)	2.85	5.56 (5.03 to 6.89)	●
Denbighshire	1,003	*	3.85 (3.11 to 4.59)	*	1.68 (1.23 to 2.29)	*	5.52 (4.93 to 6.88)	●
Flintshire	1,591	4.40	3.97 (3.35 to 4.86)	6.94	2.10 (1.43 to 3.59)	11.31	6.12 (5.34 to 8.51)	●
Gwynedd	1,156	3.46	3.93 (3.20 to 4.72)	3.47	1.80 (1.36 to 2.44)	6.92	5.73 (5.14 to 7.20)	●
Isle of Anglesey	716	4.19	3.94 (3.26 to 4.75)	5.61	1.80 (1.34 to 2.59)	9.78	5.77 (5.16 to 7.37)	●
Merthyr Tydfil	718	*	3.97 (3.36 to 4.80)	*	1.70 (1.22 to 2.30)	6.96	5.65 (5.01 to 7.00)	●
Monmouthshire	741	*	3.92 (3.23 to 4.64)	*	1.68 (1.18 to 2.27)	*	5.59 (5.02 to 6.88)	●
Neath Port Talbot	1,529	*	3.94 (3.27 to 4.80)	*	1.62 (1.14 to 2.19)	3.92	5.54 (4.97 to 6.95)	●
Newport	1,893	4.75	3.97 (3.31 to 4.82)	2.65	1.81 (1.32 to 2.65)	7.40	5.77 (5.19 to 7.19)	●
Pembrokeshire	1,135	*	4.11 (3.44 to 5.26)	*	1.65 (1.15 to 2.29)	8.81	5.75 (5.17 to 7.38)	●
Powys	1,184	*	3.96 (3.29 to 4.72)	*	1.68 (1.20 to 2.25)	5.07	5.63 (5.03 to 6.92)	●
Rhondda Cynon Taf	2,786	4.31	3.98 (3.40 to 4.73)	1.08	1.65 (1.20 to 2.20)	5.38	5.61 (5.12 to 6.81)	●
Swansea	2,481	2.82	3.87 (3.22 to 4.59)	1.21	1.67 (1.20 to 2.23)	4.03	5.53 (4.93 to 6.75)	●

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		Stillbirth [†]		Neonatal [‡]		Extended perinatal [†]		
		Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI)	Crude	Stabilised & adjusted (95% CI) [#]	
Torfaen	1,013	*	3.88 (3.21 to 4.60)	*	1.64 (1.15 to 2.24)	*	5.51 (4.90 to 6.77)	●
Vale of Glamorgan	1,322	*	4.09 (3.41 to 5.16)	*	1.66 (1.15 to 2.44)	7.56	5.76 (5.16 to 7.32)	●
Wrexham	1,506	*	4.10 (3.41 to 5.25)	*	1.71 (1.26 to 2.35)	8.63	5.79 (5.25 to 7.34)	●
NORTHERN IRELAND[°]								
Antrim and Newtownabbey	1,748	*	4.08 (3.36 to 5.15)	*	1.71 (1.26 to 2.32)	7.44	5.76 (5.22 to 7.41)	●
Ards and North Down	1,677	*	3.97 (3.34 to 4.77)	*	1.68 (1.18 to 2.35)	5.37	5.63 (5.11 to 6.97)	●
Armagh City, Banbridge and Craigavon	2,942	2.04	3.82 (3.08 to 4.49)	1.70	1.77 (1.33 to 2.45)	3.74	5.57 (5.01 to 6.83)	●
Belfast	4,618	3.90	3.93 (3.24 to 4.74)	2.61	1.90 (1.41 to 2.71)	6.50	5.83 (5.25 to 7.20)	●
Causeway Coast and Glens	1,639	6.10	4.05 (3.39 to 4.98)	2.46	1.78 (1.32 to 2.47)	8.54	5.83 (5.30 to 7.35)	●
Derry City and Strabane	2,008	5.48	4.03 (3.34 to 5.04)	3.00	1.83 (1.39 to 2.57)	8.47	5.85 (5.28 to 7.40)	●
Fermanagh and Omagh	1,526	3.28	3.93 (3.27 to 4.68)	1.97	1.77 (1.31 to 2.46)	5.24	5.69 (5.08 to 7.02)	●
Lisburn and Castlereagh	1,763	5.67	4.06 (3.37 to 4.99)	3.42	1.87 (1.38 to 2.79)	9.08	5.94 (5.27 to 7.68)	●
Mid Ulster	2,152	4.18	3.98 (3.30 to 4.83)	3.27	1.91 (1.37 to 2.98)	7.43	5.89 (5.36 to 7.61)	●
Mid and East Antrim	1,585	*	3.95 (3.32 to 4.75)	*	1.72 (1.25 to 2.42)	5.05	5.66 (5.20 to 7.01)	●
Newry, Mourne and Down	2,510	1.20	3.77 (3.02 to 4.52)	1.60	1.74 (1.27 to 2.35)	2.79	5.50 (4.85 to 6.77)	●
GUERNSEY	608	*	4.05 (3.33 to 5.14)	*	1.71 (1.28 to 2.37)	11.51	5.73 (5.14 to 7.27)	●
ISLE OF MAN	754	*	3.89 (3.17 to 4.68)	*	1.75 (1.27 to 2.42)	3.98	5.64 (5.08 to 7.09)	●
JERSEY	1,019	*	3.86 (3.11 to 4.58)	*	1.68 (1.13 to 2.30)	*	5.54 (4.82 to 6.78)	●

§ excluding terminations of pregnancy and births <24⁺⁰ weeks gestational age

† per 1,000 total births

‡ per 1,000 live births

colours represent variation from comparator group average extended perinatal mortality rate

* entry suppressed because of small number of deaths

° different laws exist in Northern Ireland for the termination of pregnancy

Data sources: MBRRACE-UK, PDS, ONS, NRS, ISD, NIMATS, States of Guernsey, States of Jersey

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7. Causes of death

7.1 Reported causes of death

Causes of death are reported to MBRRACE-UK using the Cause of Death & Associated Conditions (CODAC) classification system [18]. The CODAC system has a three level hierarchical tree for the coding of both the main cause of death and any associated conditions. The reported CODAC level 1 classification is presented in Table 15 for all stillbirths, neonatal deaths, and extended perinatal deaths for babies born at 24 weeks gestational age or later in 2016.

In the MBRRACE-UK data entry system reporters are asked to complete both a primary cause of death and up to two associated conditions which are coded using the CODAC system. Following our detailed review of the coding of deaths reported as due to congenital anomalies in the 2015 MBRRACE-UK report, all cause of death data in this report is presented using congenital anomaly for the cause of death for all cases where a congenital anomaly is coded as either the primary cause of death or an associated condition.

Table 15: Stillbirths, neonatal deaths, and extended perinatal deaths by CODAC level 1 cause of death: United Kingdom and Crown Dependencies, for births in 2016

CODAC cause of death: level 1	Stillbirths [§]		Neonatal deaths [§]		Extended perinatal deaths [§]	
	Number	%	Number	%	Number	%
Infection	108	3.5	101	7.6	209	4.7
Neonatal	42	1.4	586	43.8	628	14.3
Intrapartum	71	2.3	27	2.0	98	2.2
Congenital anomaly	280	9.1	448	33.5	728	16.5
Fetal	149	4.9	49	3.7	198	4.5
Cord	130	4.2	2	0.1	132	3.0
Placenta	882	28.8	31	2.3	913	20.7
Maternal	122	4.0	5	0.4	127	2.9
Unknown	1145	37.4	65	4.9	1210	27.5
Missing	136	4.4	23	1.7	159	3.6

[§] excluding terminations of pregnancy and births <24⁺⁰ weeks gestational age
Data source: MBRRACE-UK

The reported level 1 CODAC cause of death for all stillbirths, neonatal deaths and extended perinatal deaths is presented in Table 15. The percentage of stillbirths and neonatal deaths due to congenital anomalies in 2016 was 9.1% of stillbirths and 33.5% of neonatal deaths compared with 8.8% and 33.1% respectively in 2015. There has been a small reduction in the number and proportion of deaths attributed to intrapartum causes since the last report: 2.3% of stillbirths and 2.0% of neonatal deaths compared with 2.8% and 2.5%, respectively in 2015. This continued reduction in deaths due to intrapartum events partly reflects a sustained improvement in both the expertise and quality of the coding using the CODAC system, with additional guidance being provided to reporters for this type of death, as well as a potential improvement in perinatal care provision. A random sample of term intrapartum stillbirths and intrapartum-related neonatal deaths from 2015 were the subject of the latest MBRRACE-UK confidential enquiry which reported in November 2017 and identified those areas of care provision that require further improvement in order to reduce these deaths to an absolute minimum. Despite the rate of term intrapartum stillbirth and intrapartum related neonatal death being reduced by 50% since 1993 findings from this enquiry indicated that improvements in care may have made a difference to the outcome for almost 80% of these babies. The main issues identified were focused around the care provision before labour was established including induction, monitoring during labour, delay in expediting birth and heavy workload of the units. A lack of joint obstetric and neonatal input into bereavement care and a lack of rigour in the local review of the deaths contributed to a poor outcome for mothers and families.

For births in 2016, the percentage of stillbirths and neonatal deaths attributed to a placental cause was 28.8% and 2.3% respectively, similar to our findings for stillbirths and neonatal deaths in 2015 (27.1% and 2.9% respectively). Although there is still a large percentage of stillbirths of unknown or missing causes of death, the data for 2016 once again showed a small reduction to 41.8%, from 42.2% in 2015. Similarly the proportion of neonatal deaths attributed with an unknown or missing cause of death has continued to reduce, with only 6.6% allocated to this combined category in 2016 from 7.5% in 2015.

As in previous years, approximately 44% of the neonatal deaths in 2016 were attributed to a neonatal cause. In Table 16 a breakdown of level 2 of the CODAC classification is shown for those neonatal deaths attributed to a neonatal cause (CODAC level 1). The vast majority of these neonatal deaths were categorised to clearly defined CODAC level 2 categories with 494 of the total 586 (84.3%) of the deaths defined as extreme prematurity, neurological or cardio-respiratory and only 29 (2.2%) of deaths being placed in the 'Unspecified or other' category. This information can be used to inform the targeting of interventions to reduce such deaths in the future.

Table 16: Neonatal deaths by CODAC level 1 and level 2 cause of death: United Kingdom and Crown Dependencies, for births in 2016

CODAC cause of death	Neonatal deaths [§]	
	Number	%
Infection	101	7.6
Neonatal	586	43.8
Unspecified or other	29	2.2
Extreme prematurity	210	15.7
Neurological	157	11.7
Cardio-respiratory	127	9.5
Gastrointestinal	43	3.2
Multi-organ failure	16	1.2
Trauma or suffocation	4	0.3
Inadequate care	0	0.0
Intrapartum	27	2.0
Congenital anomaly	448	33.5
Fetal	49	3.7
Cord	2	0.1
Placenta	31	2.3
Maternal	5	0.4
Unknown	65	4.9
Missing	23	1.7

[§] excluding terminations of pregnancy and births <24⁺ weeks gestational age
Data source: MBRRACE-UK

Although there is a steady improvement in the CODAC coding for the MBRRACE-UK deaths, reporters are still encouraged to make use of the additional guidance on the use of CODAC provided and to ensure that they are using the correct CODAC code at all three levels. Reporters are also invited to share their problems and experience of using CODAC with MBRRACE-UK to ensure that solutions and advice can be shared via the frequently asked questions (FAQs) on the MBRRACE-UK online reporting system.

MBRRACE-UK Recommendation

Trust and Health Board Perinatal Review groups should focus on the quality of cause of death coding.

7.2 Post-mortem examination

Information about the offer of post-mortem and whether consent was obtained is collected by MBRRACE-UK. Rates for consent to post-mortem for births in 2016 are presented in Table 17. Around half of the parents of stillborn babies and just over a quarter of the parents of neonates who died gave consent for full or limited post-mortem. This is a small increase over the three year period 2014-2016 from 47.2% to 49.4% for stillbirth but a small decrease from 29.1% to 28.6% for neonatal deaths (Figure 35 and Figure 36). The offer of a post-mortem to parents was reported in almost all stillbirths and just over 80% of neonatal deaths: an increase over the period 2014 to 2016 from 96.4% to 97.8% for stillbirths and from 78.7% to 81.3% for neonatal deaths.

Whilst the difference between the proportion of deaths where post-mortem was offered and the uptake of the offer by parents is a personal choice, unless a post-mortem is requested by the coroner, the manner in which a post-mortem is offered by the clinical team has a direct effect on the uptake. Post-mortem following stillbirth may not provide a definitive diagnosis of the cause of death but may exclude some of the potential causes and provide valuable information for the counselling of parents for future pregnancies. In 2016 the offer of post-mortem was recorded for almost all stillbirths. However, in the case of neonatal death, where the cause of death is often felt to be known by the clinical team and that a post-mortem is not required, parental counselling should be balanced and acknowledge that a post-mortem may identify or definitively exclude additional conditions or congenital anomalies that would contribute important information for parental counselling.

Placental histology is the single most important component of the investigation of stillbirths and there is a slow but steady increase in the proportion of stillbirths where this was carried out: 89.9% of stillbirths (2755 out of 3065) in 2016 compared to 88.8% in 2015. As indicated in our previous reports placental histology should, if possible, be undertaken for all stillbirths by a specialist pathologist. Given the information that can result from placental histology this should be also requested for liveborn infants where there is a high risk of death. In 2016 309 out of 422 neonatal deaths (73.2%) which occurred on day 1 or were classified as intrapartum related had placental histology investigations carried out.

Table 17: Number and percentage of post-mortems offered and consented to by type of death (stillbirth, neonatal death, extended perinatal death): United Kingdom and Crown Dependencies, for births in 2016

Post-mortem status*	Stillbirths [§]		Neonatal deaths [§]		Extended perinatal deaths [§]	
	Number	%	Number	%	Number	%
Not offered	38	1.2	155	11.6	193	4.4
Not known if offered	29	0.9	95	7.1	124	2.8
Offered but no consent	1450	47.3	672	50.3	2122	48.2
Offered but unknown consent	34	1.1	33	2.5	67	1.5
Offered and limited consent	149	4.9	31	2.3	180	4.1
Offered and full consent	1365	44.5	351	26.3	1716	39.0

[§] excluding terminations of pregnancy and births <24⁺⁰ weeks gestational age

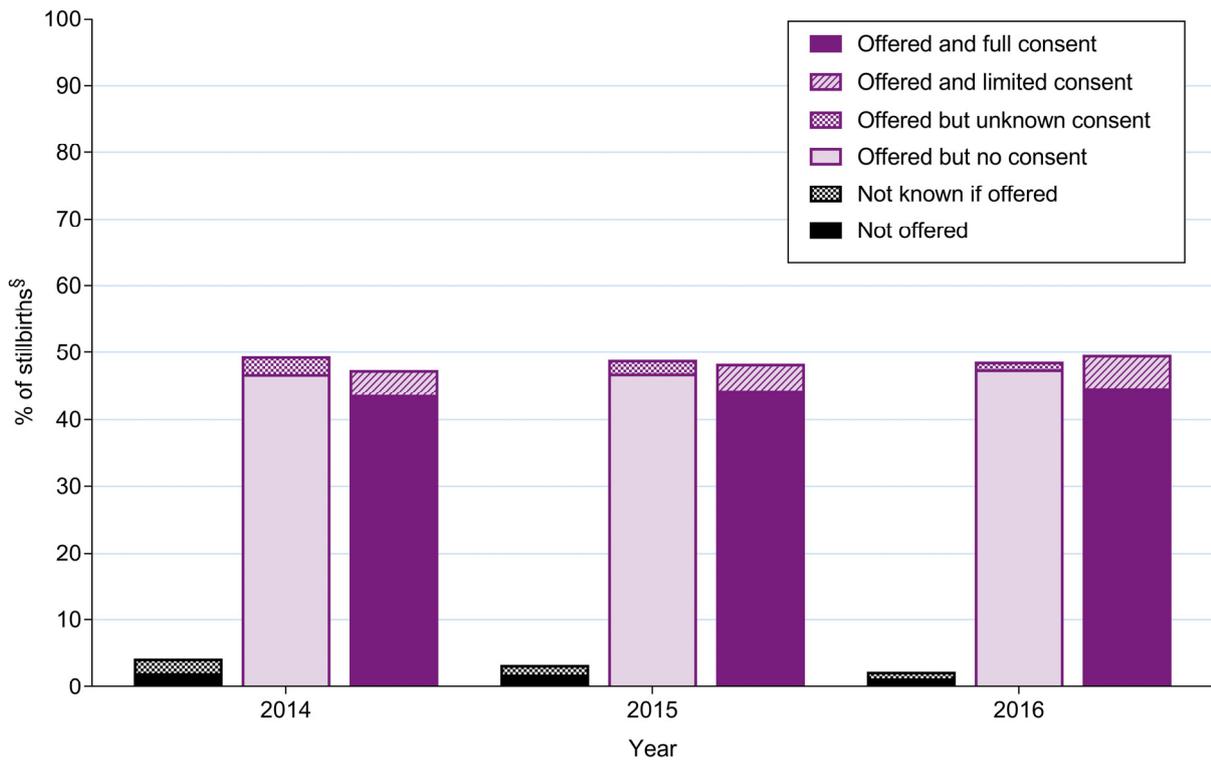
* Some Trusts and Health Boards report the post-mortem status of deaths accepted by the Coroner/Procurator Fiscal as "Not offered", as the post-mortem is conducted without the requirement for parental consent

Data source: MBRRACE-UK

MBRRACE-UK Recommendation

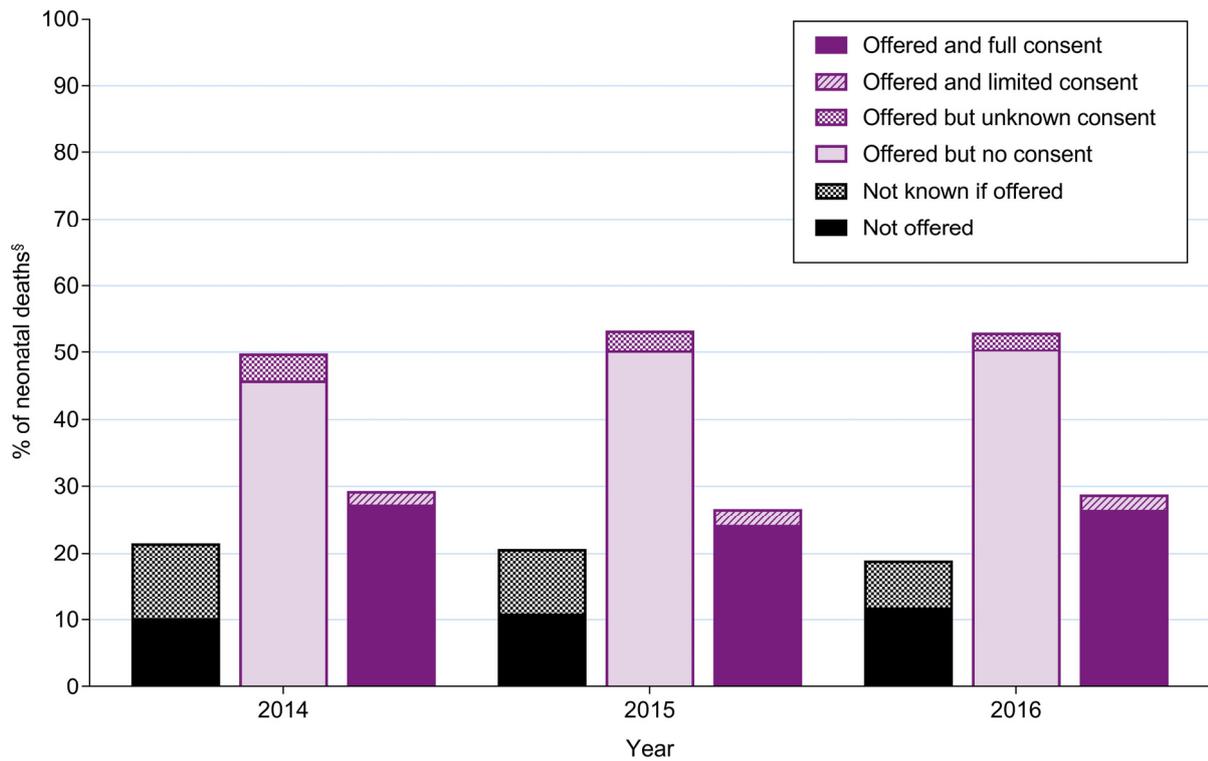
All parents of babies who die should be provided with unbiased counselling for post-mortem to enable them to make an informed decision.

Figure 35: Percentage of post-mortems offered and consented to for stillbirths: United Kingdom and Crown Dependencies, for births in 2016



§ excluding terminations of pregnancy and births <24⁺⁰ weeks gestational age
Data source: MBRRACE-UK

Figure 36: Percentage of post-mortems offered and consented to for neonatal deaths: United Kingdom and Crown Dependencies, for births in 2016



§ excluding terminations of pregnancy and births <24⁺⁰ weeks gestational age
 Data source: MBRRACE-UK

MBRRACE-UK Recommendation

Placental histology should be undertaken for all stillbirths and if possible all anticipated neonatal deaths, preferably by a perinatal pathologist.

7.3 Referrals to the Coroner and Procurator Fiscal

Table 18: Number and percentage of term stillbirths discussed with coroners/procurators fiscal and accepted for investigation, by UK Neonatal Network, for births in 2016

Neonatal Network	Number of term stillbirths	Discussed with coroner/procurator fiscal		Accepted by coroner/procurator fiscal	
		n	%	n	%
Central	49	0	0.0	0	0.0
East of England	96	12	12.5	2	2.1
North Central & East London	96	1	1.0	0	0.0
North West (Cheshire and Merseyside)	33	4	12.1	0	0.0
North West (Greater Manchester)	47	1	2.1	0	0.0
North West (Lancashire and South Cumbria)	24	1	4.2	0	0.0
North West London	55	0	0.0	0	0.0
Northern	30	3	10.0	0	0.0
South East Coast	56	6	10.7	1	1.8
South London	52	0	0.0	0	0.0
South West	53	2	3.8	0	0.0
Southern West Midlands	48	1	2.1	1	2.1
Staffordshire, Shropshire and Black Country	24	1	4.2	1	4.2
Thames Valley and Wessex	85	7	8.2	2	2.4
Trent	34	1	2.9	0	0.0
Yorkshire & Humber	94	3	3.2	2	2.1
North of Scotland	7	0	0.0	0	0.0
South East Scotland & Tayside	31	1	3.2	0	0.0
West of Scotland	28	0	0.0	0	0.0
Wales	48	2	4.2	0	0.0
Northern Ireland	38	25	65.8	3	7.9
Total	1028	71	6.9	12	1.2

Investigation of stillbirth is not currently included in the jurisdiction of coroners/procurators fiscal as babies who are stillborn are not considered to have an independent life. As such coroners/procurator fiscals have, to date, only been involved in cases where there was doubt as to whether a baby was stillborn or liveborn. In November 2017 the Department of Health and Social Care (England) launched a new strategy to improve safety in NHS maternity services. This included a statement from the Secretary of State for Health, that he would work with the Ministry of Justice “to look closely into enabling, for the first time, full term stillbirths to be covered by coronial law, giving due consideration to the impact on the devolved administration in Wales”. Table 18 presents the numbers of term stillbirths that this potential legislation may involve alongside the actual numbers of term stillbirths that were discussed with and/or accepted by the coroner/procurator fiscal, by Neonatal Network, for births in 2016. Of a total of 1028 term stillbirths in 2016 less than 7% of cases were discussed with a coroner/procurator fiscal and only 12 cases (1.2%) underwent a coronial post-mortem. Assuming that all term stillbirths were accepted for investigation and post-mortem by English and Welsh coroners this would have a major impact on their workload.

In Northern Ireland, which has separate legislation, the position is different. In 2013, the Northern Ireland Court of Appeal held that, under the law applicable in Northern Ireland, the Coroner did have jurisdiction to carry out an inquest on a child born beyond the legal limit for viability (24 weeks) that had been capable of being born alive. See <https://www.parliament.uk/documents/commons-library/The-investigation-of-stillbirth-CBP-8167.pdf> for further information.

Investigation of neonatal death is part of the remit of the coroner where the cause of death is unknown or there are specific issues concerning the death. Of the 465 term neonatal deaths that occurred in the UK in 2016 almost three fifths (n=270) were discussed with the coroner/procurator fiscal and almost half of these (n=132) were accepted by the coroner/procurator fiscal for post-mortem (Table 19).

Table 19: Number and percentage of term neonatal deaths discussed with coroners/procurators fiscal and accepted for investigation, by UK Neonatal Network, for births in 2016

Neonatal Network	Number of neonatal deaths	Discussed with coroner/procurator fiscal		Accepted by coroner/procurator fiscal	
		n	%	n	%
Central	26	19	73.1	6	23.1
East of England	18	12	66.7	7	38.9
North Central & East London	36	12	33.3	8	22.2
North West (Cheshire and Merseyside)	20	12	60.0	6	30.0
North West (Greater Manchester)	30	28	93.3	8	26.7
North West (Lancashire and South Cumbria)	13	13	100.0	9	69.2
North West London	20	14	70.0	7	35.0
Northern	18	14	77.8	4	22.2
South East Coast	24	14	58.3	7	29.2
South London	32	16	50.0	8	25.0
South West	27	14	51.9	7	25.9
Southern West Midlands	33	11	33.3	7	21.2
Staffordshire, Shropshire and Black Country	21	16	76.2	10	47.6
Thames Valley and Wessex	33	20	60.6	6	18.2
Trent	19	17	89.5	8	42.1
Yorkshire & Humber	43	22	51.2	14	32.6
North of Scotland	6	0	0.0	0	0.0
South East Scotland & Tayside	13	3	23.1	3	23.1
West of Scotland	9	4	44.4	3	33.3
Wales	6	2	33.3	1	16.7
Northern Ireland	18	7	38.9	3	16.7
Total	465	270	58.1	132	28.4

Consideration needs to be given as to whether the use of a coronial investigation is the best way of reviewing stillbirths and trying to help parents find out, as far as possible, why their baby died [20]. Although pathology plays a vital role in the determination of the cause of death there are many factors which would not be identified by pathological examination alone. Within the NHS a multidisciplinary approach is required to ensure that all factors and events are reviewed in a constructive and educational way. This approach will be facilitated by perinatal reviews using the Perinatal Mortality Review Tool which aims to support systematic, multidisciplinary, high quality reviews of the circumstances and care leading up to and surrounding each stillbirth and neonatal death, including any pathological examination. The PMRT encourages active communication with parents allowing them to feed their perspectives and any concerns about their care into the process of the review. If implemented fully, this structured process of review, learning and reporting will result in actions to improve future care and a clearer understanding of why each baby died (accepting that this may not be possible in all cases even when all appropriate investigations and review have been carried out).



8. Factors affecting perinatal mortality

Information concerning the main known maternal and baby risk factors for stillbirth and neonatal death is included in the data reported for each death through the MBRRACE-UK online reporting system. This chapter focuses on the trends in these factors for stillbirths and neonatal deaths over the last three years of data collection for MBRRACE-UK, i.e. births in 2014 to 2016. For risk factors where denominator data is available for all births, a crude population mortality rate is presented for stillbirths and neonatal deaths, together with an estimate of the relative risk associated with the factor in the form of a ratio of mortality rates (Tables 20 to 21). The quality of the denominator data for all births is dependent upon routine data submission about births from each Trust and Health Board and therefore it is important to ensure that the data submitted for birth and death registration and concerning in-patients is accurate and complete (see Appendix 4). Some of these factors have been used to calculate the stabilised & adjusted mortality rates presented in Chapters 4, 5 and 6. For factors where there is no routine denominator data for all births, the prevalence of the factor for stillbirths and neonatal deaths is presented.

8.1 Mortality rates and ratios of mortality rates: mothers' characteristics

The overall reduction in the stillbirth and neonatal mortality rates from 2014 to 2016 and investigation of the trends in mortality rates for individual characteristics can help identify whether this reduction occurred primarily within particular groups of mothers or equally across the population. Tables 20 and 21 show that whilst there has been little change in the rate of stillbirth for the youngest mothers (<20 years of age) over the period 2014 to 2016 (from 5.11 to 5.05 stillbirths per 1,000 total births) there has been a steady increase in the neonatal mortality rate each year over the same period (from 2.33 to 2.95 to 3.25 per 1,000 live births). For older mothers (>40 years age) both the stillbirth rate and the neonatal death rate have increased over this period (stillbirths: 6.29 to 6.61 per 1,000 total births; neonatal deaths: 2.46 to 2.69 per 1,000 live births). The mortality rate ratios have increased for stillbirths and neonatal deaths over the period 2014 to 2016, for both the very young (<20 years) and older mothers (>40 years) (Tables 22 and 23).

The direct relationship between higher levels of socio-economic deprivation (based on the mother's postcode of residence at time of delivery, using the Children in Low-Income Families Local Measure [19]) and higher stillbirth and neonatal mortality rates can be seen for all years. There is an overall small but steady decline in mortality rates for stillbirths over the period 2014 to 2016 for all levels of deprivation. For neonatal deaths the mortality rates have remained fairly static over the three year period with the exception of the least deprived mothers, where the neonatal mortality rate has reduced from 1.48 to 1.21 per 1,000 live births. Relative to the least deprived group mortality rate ratios for quintiles of socio-economic deprivation have remained fairly constant over time for stillbirths but have increased across all levels of deprivation for neonatal deaths (Table 23), in particular for the most deprived compared to the least deprived mothers which shows an increase from 1.48 to 1.88 over the three years.

Table 20: Stillbirth rates by mother's age and socio-economic deprivation quintile of residence by year: United Kingdom and Crown Dependencies, for births in 2014 to 2016

Mother's characteristic	Number (%) [§]						Rate per 1,000 births [§]		
	Stillbirths						Stillbirths [†]		
	2014		2015		2016		2014	2015	2016
Mother's age (years)									
<20	150	(4.6)	122	(4.0)	125	(4.1)	5.11	4.65	5.05
20-24	590	(18.1)	500	(16.5)	539	(17.6)	4.67	4.22	4.77
25-29	833	(25.6)	804	(26.5)	799	(26.1)	3.81	3.73	3.74
30-34	934	(28.7)	858	(28.3)	832	(27.1)	3.89	3.62	3.47
35-39	550	(16.9)	573	(18.9)	560	(18.3)	4.27	4.36	4.12
≥40	201	(6.2)	175	(5.8)	210	(6.9)	6.29	5.62	6.61
Not known	0	(0.0)	2	(0.1)	0	(0.0)	0.00	0.08	0.00
Socio-economic deprivation quintile*									
1 - Least deprived	491	(15.1)	464	(15.3)	456	(14.9)	3.23	3.00	2.96
2	596	(18.3)	513	(16.9)	546	(17.8)	3.82	3.25	3.48
3	666	(20.4)	570	(18.8)	608	(19.8)	4.35	3.68	3.95
4	697	(21.4)	690	(22.7)	671	(21.9)	4.52	4.44	4.33
5 - Most deprived	771	(23.7)	787	(25.9)	764	(24.9)	4.97	5.05	4.91
Not known	37	(1.1)	10	(0.3)	20	(0.7)	3.03	2.09	4.33

[§] excluding terminations of pregnancy and births <24⁺⁰ weeks gestational age

[†] per 1,000 total births

* based on mothers' postcodes at time of delivery, using the Children in Low-Income Families Local Measure

Data sources: MBRRACE-UK, PDS, ONS, NRS, ISD, NIMATS, States of Guernsey, States of Jersey

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Table 21: Neonatal mortality rates by mother's age and socio-economic deprivation quintile of residence by year: United Kingdom and Crown Dependencies, for births in 2014 to 2016

Mother's characteristic	Number (%) [§]						Rate per 1,000 births [§]		
	Neonatal deaths						Neonatal deaths [‡]		
	2014		2015		2016		2014	2015	2016
Mother's age (years)									
<20	68	(4.9)	77	(5.6)	80	(6.0)	2.33	2.95	3.25
20-24	229	(16.5)	239	(17.4)	226	(16.9)	1.82	2.03	2.01
25-29	352	(25.4)	360	(26.2)	340	(25.4)	1.61	1.68	1.60
30-34	405	(29.3)	377	(27.5)	380	(28.4)	1.69	1.60	1.59
35-39	249	(18.0)	242	(17.6)	226	(16.9)	1.94	1.85	1.67
≥40	78	(5.6)	78	(5.7)	85	(6.4)	2.46	2.52	2.69
Not known	3	(0.2)	0	(0.0)	0	(0.0)	0.41	0.00	0.00
Socio-economic deprivation quintile*									
1 - Least deprived	225	(16.3)	218	(15.9)	186	(13.9)	1.48	1.41	1.21
2	223	(16.1)	237	(17.3)	234	(17.5)	1.43	1.51	1.50
3	260	(18.8)	247	(18.0)	257	(19.2)	1.71	1.60	1.68
4	307	(22.2)	310	(22.6)	303	(22.7)	2.00	2.00	1.96
5 - Most deprived	349	(25.2)	353	(25.7)	351	(26.3)	2.26	2.28	2.27
Not known	20	(1.5)	8	(0.6)	6	(0.4)	1.64	1.68	1.31

[§] excluding terminations of pregnancy and births <24⁺⁰ weeks gestational age

* based on mothers' postcodes at time of delivery, using the Children in Low-Income Families Local Measure

[‡] per 1,000 live births

Data sources: MBRRACE-UK, PDS, ONS, NRS, ISD, NIMATS, States of Guernsey, States of Jersey

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Table 22: Ratios of mortality rates for stillbirth by mother's age and socio-economic deprivation quintile of residence by year: United Kingdom and Crown Dependencies, for births in 2014 to 2016

Mother's characteristic	Ratio of mortality rates (RR) [§]		
	Stillbirths		
	2014	2015	2016
Mother's age (years)			
<20	1.32 (1.11 to 1.56)	1.28 (1.06 to 1.55)	1.46 (1.29 to 1.65)
20-24	1.20 (1.09 to 1.33)	1.17 (1.04 to 1.30)	1.37 (1.29 to 1.46)
25-29	0.98 (0.89 to 1.08)	1.03 (0.94 to 1.13)	1.08 (1.02 to 1.14)
30-34	Reference	Reference	Reference
35-39	1.10 (0.99 to 1.22)	1.20 (1.08 to 1.34)	1.19 (1.11 to 1.27)
≥40	1.62 (1.39 to 1.89)	1.55 (1.32 to 1.82)	1.9 (1.76 to 2.06)
Socio-economic deprivation quintile*			
1 - Least deprived	Reference	Reference	Reference
2	1.20 (1.06 to 1.35)	1.08 (0.96 to 1.23)	1.18 (1.1 to 1.26)
3	1.35 (1.20 to 1.51)	1.23 (1.09 to 1.39)	1.33 (1.25 to 1.42)
4	1.41 (1.25 to 1.58)	1.48 (1.31 to 1.66)	1.46 (1.38 to 1.55)
5 - Most deprived	1.48 (1.25 to 1.75)	1.61 (1.36 to 1.91)	1.88 (1.7 to 2.07)

[§] excluding terminations of pregnancy and births <24+0 weeks gestational age

* based on mothers' postcodes at time of delivery, using the Children in Low-Income Families Local Measure

Data sources: MBRRACE-UK, PDS, ONS, NRS, ISD, NIMATS, States of Guernsey, States of Jersey

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Table 23: Ratios of mortality rates for neonatal death by mother's age and socio-economic deprivation quintile of residence by year: United Kingdom and Crown Dependencies, for births in 2014 to 2016

Mother's characteristic	Ratio of mortality rates (RR) [§]		
	Neonatal deaths		
	2014	2015	2016
Mother's age (years)			
<20	1.38 (1.06 to 1.78)	1.85 (1.44 to 2.36)	2.04 (1.7 to 2.45)
20-24	1.08 (0.92 to 1.27)	1.27 (1.08 to 1.49)	1.26 (1.12 to 1.42)
25-29	0.95 (0.83 to 1.10)	1.05 (0.91 to 1.21)	1.08 (1.02 to 1.14)
30-34	Reference	Reference	Reference
35-39	1.15 (0.98 to 1.35)	1.16 (0.99 to 1.36)	1.05 (0.93 to 1.19)
≥40	1.45 (1.14 to 1.85)	1.58 (1.24 to 2.01)	1.69 (1.41 to 2.03)
Socio-economic deprivation quintile*			
1 - Least deprived	Reference	Reference	Reference
2	0.98 (0.81 to 1.17)	1.07 (0.89 to 1.28)	1.24 (1.1 to 1.4)
3	1.14 (0.95 to 1.36)	1.13 (0.94 to 1.36)	1.39 (1.24 to 1.56)
4	1.35 (1.14 to 1.60)	1.42 (1.19 to 1.68)	1.62 (1.46 to 1.8)
5 - Most deprived	1.48 (1.25 to 1.75)	1.61 (1.36 to 1.91)	1.88 (1.7 to 2.07)

[§] excluding terminations of pregnancy and births <24+0 weeks gestational age

* based on mothers' postcodes at time of delivery, using the Children in Low-Income Families Local Measure

Data sources: MBRRACE-UK, PDS, ONS, NRS, ISD, NIMATS, States of Guernsey, States of Jersey

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8.2 Mortality rates and ratios of rates: babies' characteristics

The prevalence of characteristics of babies in terms of sex, multiplicity of birth, ethnicity, gestational age at birth and birthweight and their related ratios of mortality rate for stillbirths and neonatal deaths over the period 2014 to 2016 are presented in Tables 24 to 27. A small reduction in mortality rates over time can be seen related to most of these characteristics for stillbirths apart from a continued increase in the rate of stillbirth for the Black, Black British ethnic group which was 7.02 per 1,000 births in 2013 and continued to increase from 7.49 to 8.29 per 1,000 total births over the three years from 2014 to 2016. There has been a statistically significant reduction in the rate of stillbirth in twins over the period from 11.07 (95%CI, 9.78 to 12.47) to 6.16 (95% CI, 5.20 to 7.24) per 1,000 total births.

Table 24: Stillbirth rates by baby's sex, multiplicity of birth, ethnicity, gestational age, and birthweight by year: United Kingdom and Crown Dependencies, for births in 2014 to 2016

Baby's characteristic	Number (%) [§]						Rate per 1,000 births [§]		
	Stillbirths						Stillbirths†		
	2014		2015		2016		2014	2015	2016
Sex									
Male	1,594	(48.9)	1,566	(51.6)	1504	(49.1)	3.98	3.90	3.76
Female	1,562	(47.9)	1,451	(47.8)	1522	(49.7)	4.09	3.81	4.00
Not known	102	(3.1)	17	(0.6)	36	(1.2)			
Multiplicity									
1	2,975	(91.3)	2,819	(92.9)	2912	(95.0)	3.96	3.72	3.86
2	265	(8.1)	200	(6.6)	145	(4.7)	11.07	8.34	6.16
≥3	6	(0.2)	13	(0.4)	7	(0.2)	9.98	21.81	11.78
Not known	12	(0.4)	2	(0.1)	1	(0.0)			
Baby's ethnicity									
White	2,145	(65.8)	1,987	(65.5)	2067	(67.4)	3.78	3.55	3.74
Mixed	154	(4.7)	162	(5.3)	164	(5.4)	4.06	4.11	4.01
Asian, Asian British	476	(14.6)	433	(14.3)	457	(14.9)	6.32	5.88	6.09
Black, Black British	255	(7.8)	269	(8.9)	275	(9.0)	7.49	8.17	8.29
Other	65	(2.0)	71	(2.3)	87	(2.8)	4.11	3.56	4.14
Refused/Not Known	151	(4.6)	112	(3.7)	15	(0.5)			
Gestational age at birth (weeks)									
24 ⁺⁰ -27 ⁺⁶	726	(22.2)	733	(24.2)	717	(23.4)	227.09	227.57	219.33
28 ⁺⁰ -31 ⁺⁶	538	(16.4)	495	(16.3)	512	(16.7)	83.15	75.48	77.34
32 ⁺⁰ -36 ⁺⁶	806	(24.6)	762	(25.1)	786	(25.6)	16.32	15.35	15.60
37 ⁺⁰ -41 ⁺⁶	1,151	(35.1)	1,025	(33.8)	1031	(33.6)	1.67	1.51	1.52
≥42 ⁺⁰	21	(0.6)	15	(0.5)	19	(0.6)	0.96	0.79	1.04
Not known	35	(1.1)	4	(0.1)	0	(0.0)			

Baby's characteristic	Number (%) [§]						Rate per 1,000 births [§]		
	Stillbirths						Stillbirths [†]		
	2014		2015		2016		2014	2015	2016
Birthweight (g)									
<1,500	1,306	(40.1)	1,283	(42.3)	1266	(41.3)	163.31	156.23	150.98
1,500-2,499	754	(23.1)	691	(22.8)	702	(22.9)	16.39	14.75	15.00
2,500-3,499	867	(26.6)	813	(26.8)	801	(26.1)	2.19	2.05	2.01
3,500-4,499	270	(8.3)	218	(7.2)	259	(8.5)	0.90	0.71	0.86
≥4,500	18	(0.6)	13	(0.4)	24	(0.8)	1.44	1.03	1.99
Not known	43	(1.3)	16	(0.5)	13	(0.4)			

§ excluding terminations of pregnancy and births <24⁺⁰ weeks gestational age

† per 1,000 total births

Data sources: MBRRACE-UK, PDS, ONS, NRS, ISD, NIMATS, States of Guernsey, States of Jersey

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Most neonatal mortality rates for baby characteristics either remained static or showed a small reduction over the three years presented in Table 25. The reduction in neonatal mortality rates for twin pregnancies was statistically significant reducing from 7.81 (95%CI, 6.73 to 9.01) to 5.34 (95%CI, 4.47 to 6.36) per 1,000 live births. In contrast neonatal rates for the mixed race and Asian, Asian British groups showed a small increase from 1.40 to 1.74 per 1,000 live births and 2.34 to 2.84 live births, respectively.

Table 25: Neonatal mortality rates by baby's sex, multiplicity of birth, ethnicity, gestational age, and birthweight by year: United Kingdom and Crown Dependencies, for births in 2014 to 2016

Baby's characteristic	Number (%) [§]						Rate per 1,000 births [§]		
	Neonatal deaths						Neonatal deaths [†]		
	2014		2015		2016		2014	2015	2016
Sex									
Male	727	(52.5)	819	(59.7)	711	(53.2)	1.82	2.05	1.79
Female	623	(45.0)	553	(40.3)	614	(45.9)	1.64	1.46	1.62
Not known	34	(2.5)	1	(0.1)	12	(0.9)			
Multiplicity									
1	1,193	(86.2)	1,235	(89.9)	1204	(90.1)	1.59	1.64	1.60
2	185	(13.4)	125	(9.1)	125	(9.3)	7.81	5.26	5.34
≥3	5	(0.4)	13	(0.9)	7	(0.5)	8.40	22.30	11.93
Not known	1	(0.1)	0	(0.0)	1	(0.1)			
Baby's ethnicity									
White	959	(69.3)	953	(69.4)	937	(70.1)	1.70	1.71	1.70
Mixed	53	(3.8)	65	(4.7)	71	(5.3)	1.40	1.66	1.74
Asian, Asian British	175	(12.6)	183	(13.3)	211	(15.8)	2.34	2.50	2.83
Black, Black British	82	(5.9)	80	(5.8)	84	(6.3)	2.43	2.45	2.55
Other	35	(2.5)	32	(2.3)	29	(2.2)	2.22	1.61	1.38
Refused/Not Known	75	(5.4)	60	(4.4)	5	(0.4)			

Baby's characteristic	Number (%) [§]						Rate per 1,000 births [§]		
	Neonatal deaths						Neonatal deaths [‡]		
	2014		2015		2016		2014	2015	2016
Gestational age at birth (weeks)									
24 ⁺⁰ -27 ⁺⁶	384	(27.2)	387	(28.2)	404	(30.2)	155.40	155.55	158.31
28 ⁺⁰ -31 ⁺⁶	182	(12.9)	207	(15.1)	177	(13.2)	30.68	34.14	28.98
32 ⁺⁰ -36 ⁺⁶	311	(22.0)	271	(19.7)	275	(20.6)	6.40	5.54	5.55
37 ⁺⁰ -41 ⁺⁶	510	(36.1)	500	(36.4)	468	(35.0)	0.74	0.74	0.69
≥42 ⁺⁰	10	(0.7)	7	(0.5)	9	(0.7)	0.46	0.37	0.49
Not known	15	(1.1)	1	(0.1)	4	(0.3)			
Birthweight (g)									
<1,500	558	(40.3)	553	(40.3)	555	(41.5)	83.40	79.81	77.96
1,500-2,499	298	(21.5)	303	(22.1)	281	(21.0)	6.58	6.56	6.10
2,500-3,499	359	(25.9)	367	(26.7)	366	(27.4)	0.91	0.93	0.92
3,500-4,499	137	(9.9)	127	(9.2)	117	(8.8)	0.46	0.41	0.39
≥4,500	8	(0.6)	10	(0.7)	7	(0.5)	0.64	0.79	0.58
Not known	24	(1.7)	13	(0.9)	11	(0.8)			

[§] excluding terminations of pregnancy and births <24⁺⁰ weeks gestational age

[‡] per 1,000 live births

Data sources: MBRRACE-UK, PDS, ONS, NRS, ISD, NIMATS, States of Guernsey, States of Jersey

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Table 26: Ratios of mortality rates for stillbirth by baby's sex, multiplicity of birth, ethnicity, gestational age, and birthweight by year: United Kingdom and Crown Dependencies, for births in 2014 to 2016

Baby's characteristic	Ratio of mortality rates (RR) [§]		
	Stillbirths		
	2014	2015	2016
Sex			
Male	0.97 (0.91 to 1.04)	1.02 (0.95 to 1.10)	0.94 (0.89 to 0.99)
Female	Reference	Reference	Reference
Multiplicity			
1	Reference	Reference	Reference
2	2.80 (2.47 to 3.17)	2.24 (1.94 to 2.59)	1.6 (1.36 to 1.88)
≥3	2.52 (1.13 to 5.62)	5.86 (3.40 to 10.10)	3.05 (1.46 to 6.38)
Baby's ethnicity			
White	Reference	Reference	Reference
Mixed	1.07 (0.91 to 1.27)	1.16 (0.99 to 1.36)	1.07 (0.92 to 1.25)
Asian, Asian British	1.67 (1.51 to 1.85)	1.66 (1.49 to 1.84)	1.63 (1.48 to 1.78)
Black, Black British	1.98 (1.74 to 2.26)	2.30 (2.03 to 2.61)	2.21 (1.97 to 2.49)
Other	1.09 (0.85 to 1.39)	1.00 (0.79 to 1.27)	1.1 (0.89 to 1.36)
Gestational age at birth (weeks)			
24 ⁺⁰ -27 ⁺⁶	136.13 (124.06 to 149.38)	150.45 (136.84 to 165.41)	144.26 (135.09 to 154.04)
28 ⁺⁰ -31 ⁺⁶	49.83 (44.98 to 55.20)	49.90 (44.82 to 55.55)	50.87 (46.76 to 55.33)
32 ⁺⁰ -36 ⁺⁶	9.78 (8.94 to 10.70)	10.15 (9.24 to 11.14)	10.26 (9.57 to 11.01)
37 ⁺⁰ -41 ⁺⁶	Reference	Reference	Reference
≥42+0	0.58 (0.37 to 0.89)	0.52 (0.31 to 0.87)	0.68 (0.44 to 1.07)
Birthweight (g)			
<1,500	181.26 (159.00 to 206.63)	220.00 (190.57 to 253.96)	176.19 (166.83 to 186.08)
1,500-2,499	18.19 (15.83 to 20.90)	20.77 (17.84 to 24.19)	17.51 (16.2 to 18.91)
2,500-3,499	2.43 (2.12 to 2.79)	2.89 (2.49 to 3.35)	2.35 (2.18 to 2.53)
3,500-4,499	Reference	Reference	Reference
≥4,500	1.60 (0.99 to 2.58)	1.45 (0.83 to 2.53)	2.33 (1.55 to 3.48)

[§] excluding terminations of pregnancy and births <24⁺⁰ weeks gestational age

Data sources: MBRRACE-UK, PDS, ONS, NRS, ISD, NIMATS, States of Guernsey, States of Jersey

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The ratio of mortality rates for stillbirths has remained fairly constant over time in terms of baby's sex, ethnicity, gestational age and birthweight. However, relative to singletons there has been a significant reduction in the stillbirth rate ratio associated with twin pregnancies, reducing from 2.8 (95% CI, 2.47 to 3.17) to 1.6 (95% CI, 1.36 to 1.88) from 2014 to 2016.

Table 27: Ratios of mortality rates for neonatal death by baby's sex, multiplicity of birth, ethnicity, gestational age, and birthweight by year: United Kingdom and Crown Dependencies, for births in 2014 to 2016

Baby's characteristic	Ratio of mortality rates (RR) [§]		
	Neonatal deaths		
	2014	2015	2016
Sex			
Male	1.11 (1.00 to 1.24)	1.40 (1.26 to 1.56)	1.10 (1.02 to 1.19)
Female	Reference	Reference	Reference
Multiplicity			
1	Reference	Reference	Reference
2	4.91 (4.20 to 5.73)	3.21 (2.67 to 3.86)	3.33 (2.80 to 3.98)
≥3	5.28 (2.19 to 12.70)	13.62 (7.89 to 23.53)	7.45 (3.56 to 15.56)
Baby's ethnicity			
White	Reference	Reference	Reference
Mixed	0.83 (0.63 to 1.09)	0.97 (0.75 to 1.25)	1.02 (0.81 to 1.29)
Asian, Asian British	1.38 (1.17 to 1.62)	1.46 (1.25 to 1.71)	1.66 (1.45 to 1.90)
Black, Black British	1.43 (1.14 to 1.79)	1.43 (1.14 to 1.80)	1.50 (1.21 to 1.86)
Other	1.31 (0.94 to 1.84)	0.94 (0.66 to 1.34)	0.81 (0.56 to 1.17)
Gestational age at birth (weeks)			
24 ⁺⁰ -27 ⁺⁶	209.92 (183.88 to 239.64)	210.49 (184.33 to 240.36)	229.03 (208.98 to 250.99)
28 ⁺⁰ -31 ⁺⁶	41.43 (34.98 to 49.07)	46.20 (39.29 to 54.33)	41.92 (36.18 to 48.58)
32 ⁺⁰ -36 ⁺⁶	8.64 (7.51 to 9.95)	7.50 (6.47 to 8.70)	8.02 (7.12 to 9.05)
37 ⁺⁰ -41 ⁺⁶	Reference	Reference	Reference
≥42+0	0.62 (0.33 to 1.16)	0.50 (0.24 to 1.05)	0.71 (0.37 to 1.37)
Birthweight (g)			
<1,500	182.25 (151.19 to 219.70)	192.77 (158.96 to 233.77)	201.22 (184.19 to 219.82)
1,500-2,499	14.39 (11.75 to 17.62)	15.86 (12.89 to 19.51)	15.73 (13.88 to 17.83)
2,500-3,499	1.99 (1.63 to 2.42)	2.24 (1.83 to 2.74)	2.38 (2.13 to 2.66)
3,500-4,499	Reference	Reference	Reference
≥4,500	1.40 (0.69 to 2.87)	1.91 (1.00 to 3.63)	1.50 (0.71 to 3.18)

[§] excluding terminations of pregnancy and births <24⁺⁰ weeks gestational age

Data sources: MBRRACE-UK, PDS, ONS, NRS, ISD, NIMATS, States of Guernsey, States of Jersey

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Relative to white ethnicity there has been an increasing trend in the pattern of the ratios of neonatal mortality rates for babies of Asian or Asian British ethnicity from a 38% increased risk in 2014 to a 66% increased risk in 2016. The increased risk of mortality for this group is now equivalent for both stillbirths and neonatal deaths. The increased risk of both stillbirth and neonatal death for babies of Black or Black British ethnicity (compared to babies of White ethnicity) remains fairly constant at 121% increased risk for stillbirth and 50% increased risk for neonatal death. As found in the stillbirths, relative to singletons there has been a significant reduction in the neonatal mortality rate ratio associated with twin pregnancies, reducing from 4.91 (95% CI, 4.20 to 5.73) to 3.33 (95% CI, 2.80 to 3.98) from 2014 to 2016.

8.3 Mothers' demographic, behavioural and pregnancy characteristics of deaths

Data is collected by MBRRACE-UK for a number of the mothers' characteristics known to be associated with increased perinatal mortality but for which UK-wide denominator data is not available. Therefore, mortality rates cannot be calculated for these characteristics. In Table 28 to Table 33 the prevalence of these factors is presented for stillbirths and neonatal deaths for the last three years of MBRRACE-UK data collection, i.e. 2014 to 2016. These tables show demographic, behavioural and pregnancy characteristics which appear to be fairly stable over time for both stillbirths and neonatal deaths. However, due to the levels of missing data for these characteristics we are unable to determine the exact proportions of stillbirths and neonatal deaths affected by specific characteristics. Data quality (in terms of both accuracy and completeness) is of the utmost importance in the production of accurate risk adjusted mortality rates and more recently for data sharing with the Perinatal Mortality Review Tool. MBRRACE-UK are continuing to monitor the completeness of this data for both stillbirths and neonatal deaths and the proportion of missing data for the neonatal deaths due to problems with accessing the maternal notes is being gradually reduced over time. Reporters to MBRRACE-UK are now familiar with the reporting system and frequently use the facility to temporarily assign cases between the Trusts and Health Boards where care was provided in order to facilitate data collection from the maternal notes. This can be clearly seen for many of the maternal characteristics in the tables in this chapter, where there continues to be a small reduction in the percentage of stillbirths and neonatal deaths with missing data, in particular for previous obstetric history, where there was no missing data for either stillbirths or neonatal deaths in 2016. However, the improvement appears to be plateauing and further improvement in data quality and completeness is still required.

Data items that identify whether a mother is high or low risk determine the care provision a mother receives and should be readily available from all maternal notes. Trusts and Health Boards are encouraged to check their data completeness in the overall summary for key variables in Figure 40 and Table 35 (Appendix A5), which provide information for the UK as a whole and for individual Trusts and Health Boards

MBRRACE-UK Recommendation

All Trusts and Health Boards should endeavour to improve the quality and completeness of data reported to MBRRACE-UK and for routine inpatient, and birth and death registration purposes. Children's hospitals should continue to develop and embed systems that allow for consistent liaison with birth hospitals to facilitate the collection of maternal details.

As in last year's report, the results from breath carbon monoxide testing to monitor smoking during pregnancy are collected by MBRRACE-UK and presented in Table 30 for stillbirths and Table 31 for neonatal deaths. This information will facilitate the evaluation of this aspect of the Saving Babies' Lives Care Bundle from NHS England [3] (which was launched in March 2016) and other initiatives which indicate that a carbon monoxide (CO) test should be provided to all pregnant women at booking to determine their smoking status and to encourage smokers to quit [21]. Once again, as in 2015 around a fifth of the mothers of both stillbirths and neonatal deaths were identified as smoking throughout pregnancy in 2016. This is substantially higher than the 10.5% prevalence of smoking reported for all women at the time of delivery in England in 2016-17 [22], and higher than in Scotland where 15.5% of pregnant women reported smoking at booking in 2016 [23]. Overall, although the proportion of missing data for carbon monoxide monitoring has reduced over time from 74.8% in 2014 to 55.6% in 2016 for stillbirths and from 81.0% to 59.8% in neonatal deaths renewed effort is still required at Trust and Health Board level to ensure that this data is collected for all women. Proportions of missing data for smoking status and substance abuse remain fairly low for stillbirths but there is still work to do to ensure that these data are available for the neonatal deaths.

Table 28: Stillbirths by mothers' demographic characteristics by year: United Kingdom and Crown Dependencies, for births in 2014 to 2016

Mothers' demographic characteristics	Number (%) [§]					
	Stillbirths					
	2014		2015		2016	
Body Mass Index						
<16.0	6	(0.2)	9	(0.3)	4	(0.1)
16.0 to 18.4	79	(2.5)	70	(2.3)	69	(2.3)
18.5 to 24.9	1,297	(40.4)	1,163	(38.3)	1,183	(38.6)
25.0 to 29.9	884	(27.5)	806	(26.6)	830	(27.1)
30.0 to 34.9	446	(13.9)	449	(14.8)	431	(14.1)
≥35.0	333	(10.4)	314	(10.3)	333	(10.9)
Not known	165	(5.1)	223	(7.4)	215	(7.0)
Previous obstetric history^v						
Never pregnant	1,185	(36.9)	1,101	(38.2)	1,091	(35.6)
Stillbirth or neonatal death	165	(5.1)	117	(4.1)	164	(5.4)
Pre 24 week loss	868	(27.0)	652	(22.6)	685	(22.3)
Surviving child	1,579	(49.2)	1,520	(52.7)	1,591	(51.9)
Not known	27	(0.8)	8	(0.3)	0	(0.0)
Consanguinity						
Unrelated	2,696	(84.0)	2,636	(86.9)	2,698	(88.0)
First cousins or closer	88	(2.7)	80	(2.6)	82	(2.7)
Other relation	43	(1.3)	27	(0.9)	38	(1.2)
Not known	383	(11.9)	291	(9.6)	247	(8.1)
Born in the UK						
Yes	2,154	(67.1)	1,968	(64.9)	2,006	(65.4)
No	793	(24.7)	791	(26.1)	823	(26.9)
Not known	263	(8.2)	275	(9.1)	236	(7.7)
Time resident in the UK^w						
Less than 1 year	79	(2.5)	70	(2.3)	96	(3.1)
More than 1 year	3,072	(94.4)	2,894	(95.4)	2,891	(94.3)
Not known	101	(3.2)	71	(2.3)	78	(2.5)
Support during pregnancy						
Partner, cohabiting	2,664	(83.0)	2,526	(83.3)	2,547	(83.1)
Partner, not cohabiting	192	(6.0)	191	(6.3)	221	(7.2)
Family/friend	224	(7.0)	220	(7.3)	204	(6.7)
None	26	(0.8)	30	(1.0)	24	(0.8)
Not known	104	(3.2)	67	(2.2)	69	(2.3)

Mothers' demographic characteristics	Number (%) [§]					
	Stillbirths					
	2014		2015		2016	
Employment status						
Employed or self-employed	1,778	(55.4)	1,789	(59.0)	1,748	(57.0)
Unemployed (looking for work)	419	(13.1)	329	(10.8)	363	(11.8)
Retired	0	(0.0)	0	(0.0)	1	(0.0)
Student	93	(2.9)	88	(2.9)	70	(2.3)
Looking after home/family	608	(18.9)	610	(20.1)	642	(20.9)
Permanently sick/disabled	8	(0.3)	16	(0.5)	16	(0.5)
Other	26	(0.8)	26	(0.9)	28	(0.9)
Not known	278	(8.7)	176	(5.8)	197	(6.4)

[§] excluding terminations of pregnancy and births <24⁺⁰ weeks gestational age

^v multiparous mothers can be included in more than one category

[~] women not born in the UK

Data source: MBRRACE-UK

Table 29: Neonatal deaths by mothers' demographic characteristics by year: United Kingdom and Crown Dependencies, for births in 2014 to 2016

Mothers' demographic characteristics	Number (%) [§]					
	Neonatal deaths					
	2014		2015		2016	
Body Mass Index						
<16.0	4	(0.3)	3	(0.2)	1	(0.1)
16.0 to 18.4	23	(1.7)	41	(3.0)	46	(3.4)
18.5 to 24.9	400	(29.3)	449	(32.7)	482	(36.1)
25.0 to 29.9	267	(19.5)	274	(20.0)	273	(20.4)
30.0 to 34.9	137	(10.0)	153	(11.1)	170	(12.7)
≥35.0	102	(7.5)	107	(7.8)	113	(8.5)
Not known	433	(31.7)	346	(25.2)	252	(18.8)
Previous obstetric history^v						
Never pregnant	515	(37.7)	437	(33.5)	462	(34.6)
Stillbirth or neonatal death	63	(4.6)	83	(6.4)	76	(5.7)
Pre 24 week loss	358	(26.2)	339	(26.0)	328	(24.5)
Surviving child	678	(49.6)	721	(55.3)	707	(52.9)
Not known	28	(2.0)	10	(0.8)	0	(0.0)
Consanguinity						
Unrelated	1,047	(76.7)	1,118	(81.4)	1,072	(80.2)
First cousins or closer	41	(3.0)	51	(3.7)	54	(4.0)
Other relation	17	(1.2)	23	(1.7)	18	(1.3)
Not known	261	(19.1)	181	(13.2)	193	(14.4)
Born in the UK						
Yes	837	(61.3)	925	(67.4)	860	(64.3)
No	213	(15.6)	235	(17.1)	295	(22.1)
Not known	316	(23.1)	213	(15.5)	182	(13.6)
Time resident in the UK^w						
Less than 1 year	15	(1.1)	20	(1.5)	23	(1.7)
More than 1 year	1314	(96.2)	1314	(95.7)	1,264	(94.5)
Not known	37	(2.7)	39	(2.8)	50	(3.7)
Support during pregnancy						
Partner, cohabiting	1,090	(79.8)	1,120	(81.6)	1,113	(83.2)
Partner, not cohabiting	79	(5.8)	101	(7.4)	90	(6.7)
Family/friend	54	(4.0)	83	(6.0)	70	(5.2)
None	7	(0.5)	8	(0.6)	9	(0.7)
Not known	136	(10.0)	61	(4.4)	55	(4.1)

Mothers' demographic characteristics	Number (%) [§]					
	Neonatal deaths					
	2014		2015		2016	
Employment status						
Employed or self-employed	654	(47.9)	689	(50.2)	709	(53.0)
Unemployed (looking for work)	124	(9.1)	132	(9.6)	141	(10.5)
Retired	0	(0.0)	0	(0.0)	0	(0.0)
Student	36	(2.6)	38	(2.8)	30	(2.2)
Looking after home/family	234	(17.1)	286	(20.8)	257	(19.2)
Permanently sick/disabled	4	(0.3)	1	(0.1)	7	(0.5)
Other	14	(1.0)	8	(0.6)	7	(0.5)
Not known	299	(21.9)	219	(16.0)	186	(13.9)

[§] excluding terminations of pregnancy and births <24⁺ weeks gestational age
Data source: MBRRACE-UK

Table 30: Stillbirths by mothers' behavioural characteristics by year: United Kingdom and Crown Dependencies, for births in 2014 to 2016

Mothers' behavioural characteristics	Number (%) [§]					
	Stillbirths					
	2014		2015		2016	
Smoking status						
Never smoked	2,029	(63.2)	1,920	(63.3)	1866	(60.9)
Gave up before pregnancy	295	(9.2)	273	(9.0)	253	(8.3)
Gave up during pregnancy	130	(4.1)	137	(4.5)	138	(4.5)
Smoker	657	(20.5)	605	(19.9)	640	(20.9)
Not known	99	(3.1)	99	(3.3)	168	(5.5)
Breath carbon monoxide (ppm)						
<3	582	(18.1)	796	(26.2)	909	(29.7)
3-6	84	(2.6)	129	(4.3)	193	(6.3)
7-9	36	(1.1)	40	(1.3)	75	(2.4)
10+	108	(3.4)	124	(4.1)	184	(6.0)
Unknown	2,400	(74.8)	1,945	(64.1)	1704	(55.6)
Substance abuse						
No	3,039	(94.7)	2,879	(94.9)	2890	(94.3)
Yes	91	(2.8)	83	(2.7)	104	(3.4)
Not known	80	(2.5)	72	(2.4)	71	(2.3)

Table 31: Neonatal deaths by mothers' behavioural characteristics by year: United Kingdom and Crown Dependencies, for births in 2014 to 2016

Mothers' behavioural characteristics	Number (%) [§]					
	Neonatal deaths					
	2014		2015		2016	
Smoking status						
Never smoked	798	(58.4)	797	(58.0)	779	(58.3)
Gave up before pregnancy	75	(5.5)	82	(6.0)	98	(7.3)
Gave up during pregnancy	36	(2.6)	52	(3.8)	56	(4.2)
Smoker	240	(17.6)	290	(21.1)	246	(18.4)
Not known	217	(15.9)	152	(11.1)	158	(11.8)
Breath carbon monoxide (ppm)						
<3	204	(14.9)	306	(22.3)	395	(29.5)
3-6	17	(1.2)	44	(3.2)	64	(4.8)
7-9	11	(0.8)	16	(1.2)	22	(1.6)
10+	28	(2.0)	54	(3.9)	56	(4.2)
Unknown	1,106	(81.0)	953	(69.4)	800	(59.8)
Substance abuse						
No	1,166	(85.4)	1,244	(90.6)	1242	(92.9)
Yes	30	(2.2)	47	(3.4)	32	(2.4)
Not known	170	(12.4)	82	(6.0)	63	(4.7)

[§] excluding terminations of pregnancy and births <24⁺⁰ weeks gestational age
Data source: MBRRACE-UK

Table 32: Stillbirths by mothers' pregnancy characteristics by year: United Kingdom and Crown Dependencies, for births in 2014 to 2016)

Mothers' pregnancy characteristics	Number (%) [§]					
	Stillbirths					
	2014		2015		2016	
Booking (weeks gestational age)						
Less than 12 ⁺⁰	2,194	(68.3)	2,103	(69.3)	2087	(68.1)
12 ⁺⁰ to 17 ⁺⁶	597	(18.6)	566	(18.7)	577	(18.8)
18 ⁺⁰	236	(7.3)	217	(7.2)	249	(8.1)
Not known	183	(5.7)	148	(4.9)	152	(5.0)
Documented poor antenatal care attender)						
No	2,936	(91.5)	2,805	(92.5)	2774	(90.5)
Yes	104	(3.2)	114	(3.8)	157	(5.1)
Not known	170	(5.3)	115	(3.8)	134	(4.4)
Assisted conception						
Not assisted	2,980	(92.8)	2,850	(93.9)	2878	(93.9)
Ovulation induction only	20	(0.6)	26	(0.9)	14	(0.5)
In vitro fertilisation (IVF) [°]	112	(3.5)	102	(3.4)	106	(3.5)
Artificial insemination [□]	13	(0.4)	3	(0.1)	8	(0.3)
Not known	85	(2.7)	53	(1.7)	59	(1.9)

Table 33: Neonatal deaths by mothers' pregnancy characteristics by year: United Kingdom and Crown Dependencies, for births in 2014 to 2016

Mothers' pregnancy characteristics	Number (%) [§]					
	Neonatal deaths					
	2014		2015		2016	
Booking (weeks gestational age)						
Less than 12 ⁺⁰	678	(49.6)	757	(55.1)	806	(60.3)
12 ⁺⁰ to 17 ⁺⁶	204	(14.9)	240	(17.5)	220	(16.5)
18 ⁺⁰	69	(5.1)	85	(6.2)	90	(6.7)
Not known	415	(30.4)	291	(21.2)	221	(16.5)
Documented poor antenatal care attender						
No	1,037	(75.9)	1,123	(81.8)	1098	(82.1)
Yes	26	(1.9)	29	(2.1)	36	(2.7)
Not known	303	(22.2)	221	(16.1)	203	(15.2)
Assisted conception						
Not assisted	1,059	(77.5)	1,145	(83.4)	1141	(85.3)
Ovulation induction only	5	(0.4)	8	(0.6)	11	(0.8)
In vitro fertilisation (IVF) [°]	60	(4.4)	68	(5.0)	75	(5.6)
Artificial insemination [□]	3	(0.2)	2	(0.1)	3	(0.2)
Not known	239	(17.5)	150	(10.9)	107	(8.0)

[§] excluding terminations of pregnancy and births <24⁺⁰ weeks gestational age

[°] including egg donation and intra-cytoplasmic sperm injection

[□] with or without ovulation induction

Data source: MBRRACE-UK

Key Findings

1. There has been little change in the rate of extended perinatal mortality in the UK in 2016: 5.64 per 1,000 total births for babies born at 24⁺⁰ weeks gestational age or later compared with 5.61 in 2015. However this represents an overall fall from 6.04 deaths per 1,000 total births in 2013.
2. The stillbirth rate for the UK in 2016 has remained fairly static at 3.93 per 1,000 total births. This follows a three year period of reduction from 4.20 to 3.87 stillbirths per 1,000 total births (2013 to 2015).
3. The rate of neonatal mortality in the UK has shown a slow but steady decline over the period 2013 to 2016 from 1.84 to 1.72 deaths per 1,000 live births.
4. The timing of the reporting of deaths to MBRRACE-UK in 2016 shows a wide variation across the four countries of the UK. Data entry was started within 6 months of a death for 95.1% of cases in Wales, 86.7% in England, 71.7% in Northern Ireland and 64.0% in Scotland.
5. All stabilised & adjusted stillbirth rates for commissioning groups, Trusts and Health Boards, Neonatal Networks and Local Authorities now fall within 10% of the UK or their comparator average. Wider variation is seen for neonatal mortality rates.
6. For the Trusts and Health Boards which care for the most complex pregnancies and deliveries, the reported neonatal mortality rates show a wide variation, with rates of between 1.78 and 3.52 per 1,000 live births in those with level 3 Neonatal Intensive Care Units (NICUs) and surgical provision and significantly lower rates in the small units delivering less than 2,000 births per annum (0.97 to 1.18). This variation reflects both the high risk case-mix in the Trusts and Health Boards with level 3 NICUs and surgical provision which cannot be fully accounted for by stabilisation & adjustment as well as any variation in the quality of care provision.
7. The marked regional variation in crude rates of neonatal mortality for STPs is clear. However, the variation in the stabilised & adjusted rates of neonatal mortality has reduced in 2016, with rates ranging from 1.44 to 2.05 deaths per 1,000 live births.
8. Significant variation in the rates of extended perinatal mortality across the UK persists, even after taking into account the effects of chance and the case-mix differences we are able to account for, with stabilised & adjusted extended perinatal mortality rates for commissioning organisations ranging from 5.32 to 6.29 deaths per 1,000 total births.
9. There has been a small increase in the rate of consent for post-mortem for stillbirth from 47.2% to 49.4% (2014 to 2016) and a small decrease for neonatal deaths from 29.1% to 28.6% over the same period. However, the offer of a post-mortem to parents was reported in almost all stillbirths (97.8%) and for 81.3% of neonatal deaths.
10. There has been a small but non-significant improvement in the percentage of stillbirths in the UK for which placental histology is carried out: 89.9% in 2016 compared to 88.8% in 2015.
11. Relative to singletons there has been a significant reduction in both the stillbirth and neonatal death rate ratios associated with twin pregnancies over the period 2014 to 2016, reducing from 2.8 (95% CI, 2.47 to 3.17) to 1.6 (95% CI, 1.36 to 1.88) for stillbirths and from 4.91 (95% CI, 4.20 to 5.73) to 3.33 (95% CI, 2.80 to 3.98) for neonatal deaths.
12. There is a steady improvement in data quality overall, although there continues to be a problem with the completion of some maternal data especially carbon monoxide exposure monitoring (43.1% complete).



Recommendations

1. In order to achieve the various UK Governments' ambitions renewed efforts need to be focused on reducing stillbirths and continuing the slow but steady decline in neonatal mortality rates observed since 2013.
2. In order to facilitate the close working between MBRRACE-UK and the Perinatal Mortality Review Tool (PMRT), within Trusts and Health Boards all stillbirths and neonatal deaths should be notified to MBRRACE-UK via the joint web-based system as soon as possible following the death.
3. Commissioning organisations should review both their crude and their stabilised & adjusted mortality rates to facilitate the identification of high risk populations and to target interventions for known inequalities.
4. Trusts and Health Boards with a stabilised & adjusted stillbirth, neonatal mortality or extended perinatal mortality rate that falls into the red or amber band should carry out an initial investigation of their data quality and possible contributing local factors.
5. Irrespective of where they fall in the spectrum of national performance all Trusts and Health Boards should use the national PMRT to review all their stillbirths and neonatal deaths.
6. Trusts and Health Boards should ensure that the data provided to MBRRACE-UK is of the highest quality. This is of particular importance for those providing the most complex care to particularly high-risk mothers and babies as this will permit more appropriate sub-analyses and comparisons.
7. A national forum should be established by NHS England, the Scottish government, NHS Wales, and the Northern Ireland Department of Health, in conjunction with professional bodies and national healthcare advisors responsible for clinical standards in relevant specialties, to agree an appropriate benchmark against which stillbirth and neonatal mortality rates should be monitored across the UK. This process should be facilitated by HQIP.
8. Public health initiatives should continue to be developed to reduce the impact of known risk factors for stillbirth and neonatal death; for example, smoking and obesity.
9. Trust and Health Board Perinatal Review groups should focus on the quality of cause of death coding.
10. All parents of babies who die should be provided with unbiased counselling for post-mortem to enable them to make an informed decision.
11. Placental histology should be undertaken for all stillbirths and if possible all anticipated neonatal deaths, preferably by a perinatal pathologist.
12. All Trusts and Health Boards should endeavour to improve the quality and completeness of data reported to MBRRACE-UK and for routine inpatient, and birth and death registration purposes. Children's hospitals should continue to develop and embed systems that allow for consistent liaison with birth hospitals to facilitate the collection of maternal information.



Appendices



A1. Perinatal mortality in the UK from routine sources

Data presented in Table 34 shows the stillbirth, neonatal death and extended perinatal death rates in the UK for 2006 to 2016 obtained from statutory registered births and deaths.

Table 34: Total stillbirth, neonatal, and extended perinatal mortality rates from statutory registrations by country: United Kingdom, 2006 to 2016

Rate per 1,000 births	Country	Year of death										
		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Stillbirths [†]	UK	5.30	5.19	5.08	5.19	5.07	5.17	4.82	4.64	4.57	4.40	4.41
	England	5.35	5.18	5.07	5.17	5.08	5.23	4.81	4.65	4.59	4.42	4.35
	Scotland	5.29	5.63	5.38	5.34	4.93	5.08	4.70	4.16	4.00	3.81	4.31
	Wales	5.09	4.94	4.61	5.13	5.26	4.67	5.11	4.51	5.25	4.73	4.98
	Northern Ireland	3.81	4.15	4.47	4.75	4.13	3.59	4.18	4.51	3.31	3.13	3.39
Neonatal deaths [‡]	UK	3.46	3.26	3.18	3.12	2.96	2.95	2.85	2.71	2.71	2.72	2.79
	England	3.49	3.24	3.18	3.10	2.93	2.94	2.86	2.71	2.69	2.73	2.80
	Scotland	3.09	3.25	2.80	2.79	2.55	2.71	2.55	2.34	2.42	2.03	2.68
	Wales	2.68	3.31	2.95	3.09	2.73	2.75	2.92	2.43	2.38	2.46	2.00
	Northern Ireland	3.87	3.31	3.71	3.89	4.58	3.48	2.77	3.38	3.94	4.21	3.57
Extended perinatal deaths [†]	UK	8.74	8.43	8.24	8.30	8.01	8.11	7.59	7.33	7.26	7.11	7.18
	England	8.82	8.40	8.24	8.25	8.00	8.16	7.58	7.34	7.26	7.14	7.13
	Scotland	8.36	8.86	8.17	8.12	7.46	7.78	7.24	6.49	6.41	5.84	6.98
	Wales	7.75	8.24	7.54	8.20	7.97	7.41	7.85	6.93	7.62	7.18	6.98
	Northern Ireland	7.66	7.45	8.16	8.63	8.69	7.06	6.94	7.87	7.23	7.33	6.95

[†] per 1,000 total births

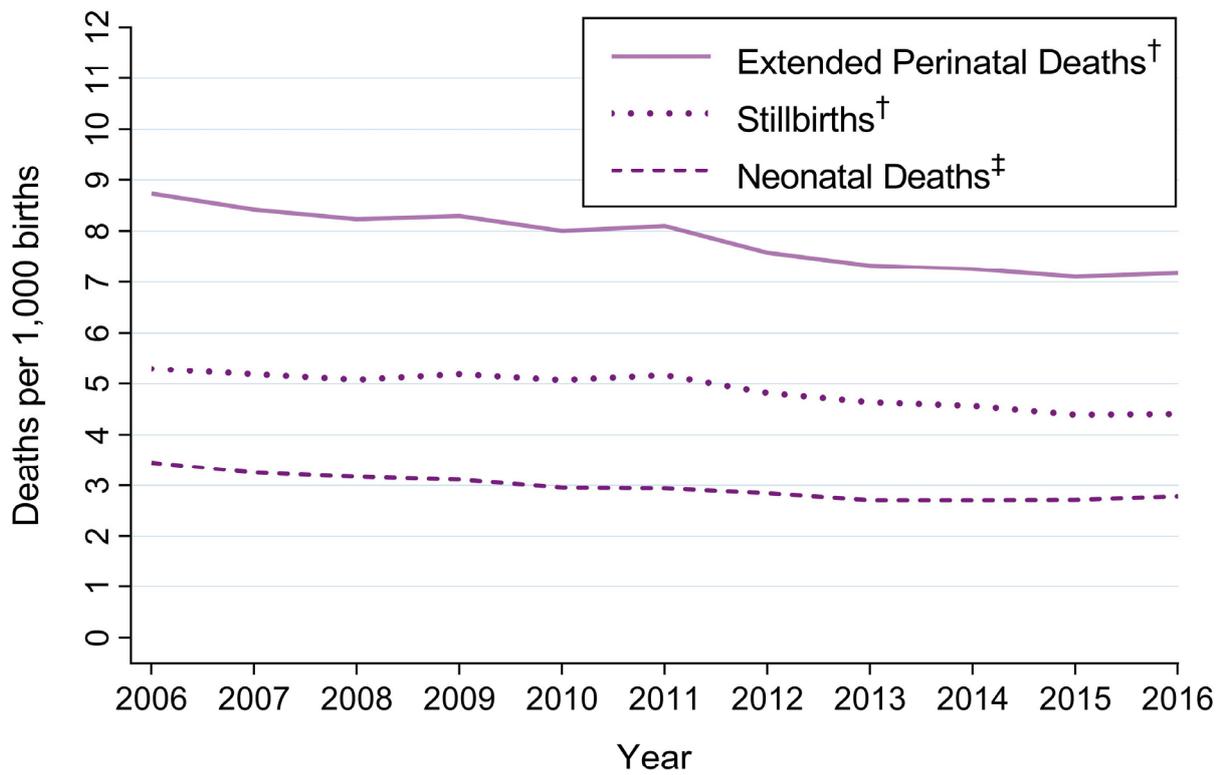
[‡] per 1,000 live births

Data sources: ONS, NRS, NISRA

Differences in the law in Northern Ireland relating to the termination of pregnancy means that a greater proportion of babies with severe congenital anomalies are born, but then die after birth. This may well be responsible for the relatively high rate of neonatal death for Northern Ireland.

The UK-wide rates are also shown in Figure 37, overleaf.

Figure 37: Total stillbirth, neonatal, and extended perinatal mortality rates from statutory registrations: United Kingdom, 2006 to 2016



Data sources: ONS, NRS & NISRA

[†] per 1,000 total births

[‡] per 1,000 live births

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Rachel Lister	East Sussex Healthcare NHS Trust
Kirsty Milward	East Sussex Healthcare NHS Trust
Lydia Baker	Epsom and St Helier University Hospitals NHS Trust
Katie Hamilton	Epsom and St Helier University Hospitals NHS Trust
Victor Odunaiya	Epsom and St Helier University Hospitals NHS Trust
Susan Adams	Frimley Health NHS Foundation Trust
Anna Jerome	Frimley Health NHS Foundation Trust
Jennifer Lomas	Frimley Health NHS Foundation Trust
Geraldine Mackey	Frimley Health NHS Foundation Trust
Rekha Sanghavi	Frimley Health NHS Foundation Trust
Dennis Bosman	Gateshead Health NHS Foundation Trust
Andrea Tweddell	Gateshead Health NHS Foundation Trust
Rob Walker	Gateshead Health NHS Foundation Trust
Gaynor Armstrong	George Eliot Hospital NHS Trust
Jackie Davies	George Eliot Hospital NHS Trust
Mukta Jain	George Eliot Hospital NHS Trust
Suet Wong	George Eliot Hospital NHS Trust
Caroline Wood	George Eliot Hospital NHS Trust
Shyam Bhakthavalsala	Gloucestershire Hospitals NHS Foundation Trust
Jennifer Holman	Gloucestershire Hospitals NHS Foundation Trust
Russell Peek	Gloucestershire Hospitals NHS Foundation Trust
Simon Pirie	Gloucestershire Hospitals NHS Foundation Trust
Laura Sharpe	Gloucestershire Hospitals NHS Foundation Trust
Andrew Pearson	Great Ormond Street Hospital for Children NHS Foundation Trust
Tamara Byrne	Great Western Hospitals NHS Foundation Trust
Helen Pepler	Great Western Hospitals NHS Foundation Trust
Maxine Sleath	Great Western Hospitals NHS Foundation Trust
Angela Costa	Guy's and St Thomas' NHS Foundation Trust
Zahra Famili	Guy's and St Thomas' NHS Foundation Trust
Samantha Luk	Guy's and St Thomas' NHS Foundation Trust
Karen Turnock	Guy's and St Thomas' NHS Foundation Trust
Maninder Bal	Hampshire Hospitals NHS Foundation Trust
Stephanie Goodwin	Hampshire Hospitals NHS Foundation Trust
Sharon Stone	Hampshire Hospitals NHS Foundation Trust
Sobia Bilal	Harrogate and District NHS Foundation Trust
Sue Oxendale	Harrogate and District NHS Foundation Trust
Clare Beesley	Heart of England NHS Foundation Trust
Charlotte Blake	Heart of England NHS Foundation Trust
Gemma Rees	Heart of England NHS Foundation Trust
Jaideep Singh	Heart of England NHS Foundation Trust
Paul Fleming	Homerton University Hospital NHS Foundation Trust
Tracy Hodgkinson	Homerton University Hospital NHS Foundation Trust
Catharine Atkinson	Hull and East Yorkshire Hospitals NHS Trust
Suzanne Cooper	Hull and East Yorkshire Hospitals NHS Trust
Jean Rennison	Hull and East Yorkshire Hospitals NHS Trust

Name of lead reporter	Trust or Health Board
Christopher Wood	Hull and East Yorkshire Hospitals NHS Trust
Sally Davies	Hywel Dda Health Board
Elizabeth Harcourt	Hywel Dda Health Board
Prem Kumar Pitchaikani	Hywel Dda Health Board
Sarah Beake	Imperial College Healthcare NHS Trust
Lauren Hutton	Imperial College Healthcare NHS Trust
Ujwal Kariholu	Imperial College Healthcare NHS Trust
Geraldine Ng	Imperial College Healthcare NHS Trust
Jane Scott	Imperial College Healthcare NHS Trust
Melanie Capewell	Isle of Man Department of Health
Tarun Ghosh	Isle of Man Department of Health
Paul McCann	Isle of Man Department of Health
Anthony Stock	Isle of Man Department of Health
Prakash Thiagarajan	Isle of Man Department of Health
Yvonne Harris	Isle of Wight NHS Trust
Priyadarshan Ambadkar	James Paget University Hospitals NHS Foundation Trust
Kerry Burwood	James Paget University Hospitals NHS Foundation Trust
Kirsty Cater	James Paget University Hospitals NHS Foundation Trust
Karen Crossan	James Paget University Hospitals NHS Foundation Trust
Samantha Jones	James Paget University Hospitals NHS Foundation Trust
Jayne Utting	James Paget University Hospitals NHS Foundation Trust
Lesley Yates	James Paget University Hospitals NHS Foundation Trust
Stephanie Fretter	Kettering General Hospital NHS Foundation Trust
Carolyn Rowbotham	Kettering General Hospital NHS Foundation Trust
Yasmin Akhtar Shan	King's College Hospital NHS Foundation Trust
Joanne Beltran	King's College Hospital NHS Foundation Trust
Ravindra Bhat	King's College Hospital NHS Foundation Trust
Layla Harhala	King's College Hospital NHS Foundation Trust
Sarah Phillips	King's College Hospital NHS Foundation Trust
Maxine Spencer	King's College Hospital NHS Foundation Trust
Jo Brooks	Kingston Hospital NHS Trust
Marie Richter	Kingston Hospital NHS Trust
Louise Wheeler	Kingston Hospital NHS Trust
Sandeep Dharmaraj	Lancashire Teaching Hospitals NHS Foundation Trust
Ruth Kirby	Lancashire Teaching Hospitals NHS Foundation Trust
Angela Philipson	Lancashire Teaching Hospitals NHS Foundation Trust
Emma Kenny	Lewisham and Greenwich NHS Trust
Sue Percival	Lewisham and Greenwich NHS Trust
Teresa Stimson	Lewisham and Greenwich NHS Trust
Michelle Wells-Braithwaite	Lewisham and Greenwich NHS Trust
Kelly Williams	Lewisham and Greenwich NHS Trust
Joanne Brady	Liverpool Women's NHS Foundation Trust
Jennifer Robinson	Liverpool Women's NHS Foundation Trust
Lisa Waby-Brown	Liverpool Women's NHS Foundation Trust
Alison Whitters	Liverpool Women's NHS Foundation Trust

Name of lead reporter	Trust or Health Board
Khadija Ben-Sasi	London North West University Healthcare NHS Trust
Christine Pace	London North West University Healthcare NHS Trust
Hiran Samarage	London North West University Healthcare NHS Trust
Marva Wilson	London North West University Healthcare NHS Trust
Tracey McGrath	Luton and Dunstable Hospital NHS Foundation Trust
Anne-Marie Mead	Luton and Dunstable Hospital NHS Foundation Trust
Julia Moat	Maidstone and Tunbridge Wells NHS Trust
Helen Pratt	Maidstone and Tunbridge Wells NHS Trust
Jackie Tyler	Maidstone and Tunbridge Wells NHS Trust
Ngozi Edi-Osagie	Manchester University NHS Foundation Trust
Lyndsey Evans	Manchester University NHS Foundation Trust
Victoria Holmes	Manchester University NHS Foundation Trust
Karl Monaghan	Manchester University NHS Foundation Trust
Chris Navin	Manchester University NHS Foundation Trust
Ranjit Akolekar	Medway NHS Foundation Trust
Sarah Jones	Medway NHS Foundation Trust
Helen McElroy	Medway NHS Foundation Trust
Julie Spencer	Medway NHS Foundation Trust
Suzanne Turner	Mid Cheshire Hospitals NHS Foundation Trust
Alison Cuthbertson	Mid Essex Hospital Services NHS Trust
Toni Laing	Mid Essex Hospital Services NHS Trust
Tabitha Stuthridge	Mid Essex Hospital Services NHS Trust
Indranil Misra	Milton Keynes Hospital NHS Foundation Trust
Tracy Rea	Milton Keynes Hospital NHS Foundation Trust
Sheena Kinmond	NHS Ayrshire & Arran
Inass Osman	NHS Ayrshire & Arran
Nicky Berry	NHS Borders
Andrew Duncan	NHS Borders
Brian Magowan	NHS Borders
Andrew Eccleston	NHS Dumfries & Galloway
Stephen Wisdom	NHS Dumfries & Galloway
Sean Ainsworth	NHS Fife
Doreen Brown	NHS Fife
Gail Bell	NHS Forth Valley
Lynette MacKenzie	NHS Forth Valley
Gillian McMillan	NHS Forth Valley
Lena Crichton	NHS Grampian
Neil Maclean	NHS Grampian
Mike Munro	NHS Grampian
Hilary Conetta	NHS Greater Glasgow & Clyde
Janice Gibson	NHS Greater Glasgow & Clyde
Allan Jackson	NHS Greater Glasgow & Clyde
Dawn Kernaghan	NHS Greater Glasgow & Clyde
Kathleen O'Reilly	NHS Greater Glasgow & Clyde
Andrew Quinn	NHS Greater Glasgow & Clyde

Name of lead reporter	Trust or Health Board
Suzanne Wills	NHS Greater Glasgow & Clyde
Anne Angus	NHS Highland
Laura Menzies	NHS Highland
Pauline Creaney	NHS Lanarkshire
Samuel Ighanesebhor	NHS Lanarkshire
Colin Malcolm	NHS Lanarkshire
Mary Moffat	NHS Lanarkshire
Sarah Court	NHS Lothian
Ewen Johnston	NHS Lothian
Frances McGuire	NHS Lothian
Peter Oduro	NHS Orkney
Kate Kenmure	NHS Shetland
Elaine McCover	NHS Shetland
Pauline Lynch	NHS Tayside
Roselyn Mudenha	NHS Tayside
Jennifer Scotland	NHS Tayside
Catherine Macdonald	NHS Western Isles
Mark Dyke	Norfolk and Norwich University Hospitals NHS Foundation Trust
Kari Kordtomeikel	Norfolk and Norwich University Hospitals NHS Foundation Trust
Pamela Sizer	Norfolk and Norwich University Hospitals NHS Foundation Trust
Ann Walker	Norfolk and Norwich University Hospitals NHS Foundation Trust
Jacqui Lewis	North Bristol NHS Trust
Paul Mannix	North Bristol NHS Trust
Claire Rose	North Bristol NHS Trust
Andrea Ewing	North Cumbria University Hospitals NHS Trust
Khairy Gad	North Cumbria University Hospitals NHS Trust
Michelle Lynch	North Middlesex University Hospital NHS Trust
Alison Oldfield	North Middlesex University Hospital NHS Trust
Stephanie El-Malak	North Tees & Hartlepool NHS Foundation Trust
Chidambara Harikumar	North Tees & Hartlepool NHS Foundation Trust
Iona MacLeod	North Tees & Hartlepool NHS Foundation Trust
Jane Malcolm	North Tees & Hartlepool NHS Foundation Trust
Rebecca Taylor	North Tees & Hartlepool NHS Foundation Trust
Lesley Carline	North West Anglia NHS Foundation Trust
Hilary Dixon	North West Anglia NHS Foundation Trust
Sandra Sibanda	North West Anglia NHS Foundation Trust
Shirley Steel	North West Anglia NHS Foundation Trust
Christine Ainsworth	Northampton General Hospital NHS Trust
Rachael Moss	Northampton General Hospital NHS Trust
Rachel Surl	Northampton General Hospital NHS Trust
Carolyn Hide	Northern Devon Healthcare NHS Trust
Elizabeth Mills	Northern Devon Healthcare NHS Trust
Jo Morgan	Northern Devon Healthcare NHS Trust
Michael Selter	Northern Devon Healthcare NHS Trust
Pauline Adiotomre	Northern Lincolnshire and Goole Hospitals NHS Foundation Trust

Name of lead reporter	Trust or Health Board
Nicola Atter	Northern Lincolnshire and Goole Hospitals NHS Foundation Trust
Dianne Bradley	Northern Lincolnshire and Goole Hospitals NHS Foundation Trust
Karen Cross	Northern Lincolnshire and Goole Hospitals NHS Foundation Trust
Hayli Garrod	Northern Lincolnshire and Goole Hospitals NHS Foundation Trust
Nicola Kerry	Northern Lincolnshire and Goole Hospitals NHS Foundation Trust
Amy Trippitt	Northern Lincolnshire and Goole Hospitals NHS Foundation Trust
Malini Shivanath	Northumbria Healthcare NHS Foundation Trust
Amy Brears	Nottingham University Hospitals NHS Trust
Victoria Brown	Nottingham University Hospitals NHS Trust
Louise Crabtree	Nottingham University Hospitals NHS Trust
Heather McEwen	Nottingham University Hospitals NHS Trust
Joy Moran	Nottingham University Hospitals NHS Trust
Jane Pidgeon	Nottingham University Hospitals NHS Trust
Catherine Bartlett	Oxford University Hospitals NHS Trust
Rachel Chakravarti	Oxford University Hospitals NHS Trust
Alexander Allwood	Plymouth Hospitals NHS Trust
Sue Wilkins	Plymouth Hospitals NHS Trust
Kirstie Willis	Plymouth Hospitals NHS Trust
Peter McEwan	Poole Hospital NHS Foundation Trust
Alison McGuinness	Poole Hospital NHS Foundation Trust
Daniel Webster	Poole Hospital NHS Foundation Trust
Charlotte Groves	Portsmouth Hospitals NHS Trust
Sharon Hackett	Portsmouth Hospitals NHS Trust
Amanda Whitaker	Portsmouth Hospitals NHS Trust
Cate Langley	Powys Teaching Health Board
Donna Owen	Powys Teaching Health Board
Jennifer Milam	RAF Lakenheath (48th Medical Group)
Amy Wood-Blagrove	Royal Berkshire NHS Foundation Trust
Val Hedley	Royal Brompton & Harefield NHS Foundation Trust
Paul Munyard	Royal Cornwall Hospitals NHS Trust
Karen Stoyles	Royal Cornwall Hospitals NHS Trust
Deborah Smith	Royal Devon & Exeter NHS Foundation Trust
Monica Delolmo	Royal Free London NHS Foundation Trust
Lindsay Frank	Royal Free London NHS Foundation Trust
Alina Lau	Royal Free London NHS Foundation Trust
Seeking Lee	Royal Free London NHS Foundation Trust
Michele Ramos-Gonzalez	Royal Free London NHS Foundation Trust
Miranda Ryan	Royal Free London NHS Foundation Trust
Meg Wilkinson	Royal Free London NHS Foundation Trust
Sheryl Roy	Royal Surrey County Hospital NHS Foundation Trust
Claire Worthington	Royal Surrey County Hospital NHS Foundation Trust
Rachel Coleman	Royal United Hospital Bath NHS Trust
Stephen Jones	Royal United Hospital Bath NHS Trust
Rachel Pass	Royal United Hospital Bath NHS Trust
Clare Baggot	Salisbury NHS Foundation Trust

Name of lead reporter	Trust or Health Board
Mandy Biddle	Salisbury NHS Foundation Trust
Louise Jones	Salisbury NHS Foundation Trust
Philippa Ridley	Salisbury NHS Foundation Trust
Clare Smith	Salisbury NHS Foundation Trust
Lindsay Halpern	Sandwell & West Birmingham Hospitals NHS Trust
Mary Molloy	Sandwell & West Birmingham Hospitals NHS Trust
Nicola Robinson	Sandwell & West Birmingham Hospitals NHS Trust
Neil Shah	Sandwell & West Birmingham Hospitals NHS Trust
Sheilah Zviripi Kamupira	Sandwell & West Birmingham Hospitals NHS Trust
Lilias Alison	Sheffield Children's NHS Foundation Trust
Anton Mayer	Sheffield Children's NHS Foundation Trust
Rebecca Callan	Sheffield Teaching Hospitals NHS Foundation Trust
Simon Clark	Sheffield Teaching Hospitals NHS Foundation Trust
Michelle Glave	Sheffield Teaching Hospitals NHS Foundation Trust
Kate Draper	Sherwood Forest Hospitals NHS Foundation Trust
Alison Whitham	Sherwood Forest Hospitals NHS Foundation Trust
Vedrana Caric	South Tees Hospitals NHS Foundation Trust
Shalabh Garg	South Tees Hospitals NHS Foundation Trust
Caroline Marshall	South Tees Hospitals NHS Foundation Trust
Umo Esen	South Tyneside NHS Foundation Trust
Yvonne Hood	South Warwickshire NHS Foundation Trust
Lynne Cook	Southend University Hospital NHS Foundation Trust
Angela Ashurst	Southport & Ormskirk Hospital NHS Trust
Karen Wareing	Southport & Ormskirk Hospital NHS Trust
Nasreen Aziz	St George's University Hospitals NHS Foundation Trust
Margaret Flynn	St George's University Hospitals NHS Foundation Trust
Sijo Francis	St George's University Hospitals NHS Foundation Trust
Melanie O'Byrne	St George's University Hospitals NHS Foundation Trust
Justin Richards	St George's University Hospitals NHS Foundation Trust
Julian Sutton	St George's University Hospitals NHS Foundation Trust
Catherine Hargreaves	St Helens & Knowsley Teaching Hospitals NHS Trust
Mary Hornby	St Helens & Knowsley Teaching Hospitals NHS Trust
Katherine Hughes	St Helens & Knowsley Teaching Hospitals NHS Trust
Jacqui Kourellias	St Helens & Knowsley Teaching Hospitals NHS Trust
Julie Sanderson	St Helens & Knowsley Teaching Hospitals NHS Trust
Dawn Watterson	States of Guernsey Health & Social Services
Jan Auffret	States of Jersey Health & Social Services
Julie Mycock	States of Jersey Health & Social Services
Marie Dooley	Stockport NHS Foundation Trust
Julie Estcourt	Stockport NHS Foundation Trust
Amanda Killen	Stockport NHS Foundation Trust
Abdul Khader	Surrey & Sussex Healthcare NHS Trust
Sharmila Sivarajan	Surrey & Sussex Healthcare NHS Trust
Tracy Skinner	Surrey & Sussex Healthcare NHS Trust
Anne Haggerty	Tameside and Glossop Integrated Care NHS Foundation Trust

Name of lead reporter	Trust or Health Board
Sue Fulker	Taunton & Somerset NHS Foundation Trust
Julie Harland	Taunton & Somerset NHS Foundation Trust
Debra Young	Taunton & Somerset NHS Foundation Trust
Dawn Lewis	The Dudley Group NHS Foundation Trust
Bev Paterson	The Dudley Group NHS Foundation Trust
Tristan Bate	The Hillingdon Hospitals NHS Foundation Trust
Joanne Dunckley	The Hillingdon Hospitals NHS Foundation Trust
Ruma Dutta	The Hillingdon Hospitals NHS Foundation Trust
Eithne Harte	The Hillingdon Hospitals NHS Foundation Trust
Jidefor Menakaya	The Hillingdon Hospitals NHS Foundation Trust
Gergana Nikolova	The Hillingdon Hospitals NHS Foundation Trust
Ann Palmer	The Hillingdon Hospitals NHS Foundation Trust
Suetmei Yoon	The Hillingdon Hospitals NHS Foundation Trust
Beverley Gordon	The Ipswich Hospital NHS Trust
Lisa Barker	The Leeds Teaching Hospitals NHS Trust
Sharon Beanland	The Leeds Teaching Hospitals NHS Trust
Tracey Glanville	The Leeds Teaching Hospitals NHS Trust
Medha Rathod	The Leeds Teaching Hospitals NHS Trust
Nosheen Aslam	The Mid Yorkshire Hospitals NHS Trust
Lisa Dennison	The Mid Yorkshire Hospitals NHS Trust
David Gibson	The Mid Yorkshire Hospitals NHS Trust
Katy Harrison	The Mid Yorkshire Hospitals NHS Trust
Chitra Rajagopalan	The Mid Yorkshire Hospitals NHS Trust
Rhona Collis	The Newcastle upon Tyne Hospitals NHS Foundation Trust
Richard Hearn	The Newcastle upon Tyne Hospitals NHS Foundation Trust
Michaela Higson	The Newcastle upon Tyne Hospitals NHS Foundation Trust
Jenna Wall	The Newcastle upon Tyne Hospitals NHS Foundation Trust
Anan Boulos	The Pennine Acute Hospitals NHS Trust
Lydia Bowden	The Pennine Acute Hospitals NHS Trust
Susan Brierley	The Pennine Acute Hospitals NHS Trust
Caroline Rice	The Pennine Acute Hospitals NHS Trust
Kathryn Beechinor	The Portland (HCA Health Care)
Fiona Walkinshaw	The Portland (HCA Health Care)
Deborah Bridgewater	The Princess Alexandra Hospital NHS Trust
Jacqui Featherstone	The Princess Alexandra Hospital NHS Trust
Yvonne Fulcher	The Queen Elizabeth Hospital King's Lynn NHS Foundation Trust
Jodie Jupe	The Queen Elizabeth Hospital King's Lynn NHS Foundation Trust
Radhika Gosakan	The Rotherham NHS Foundation Trust
Kathryn Parke	The Rotherham NHS Foundation Trust
Clare Storer	The Rotherham NHS Foundation Trust
Jenny Turner	The Royal Bournemouth and Christchurch Hospitals NHS Foundation Trust
Babu Kumararatne	The Royal Wolverhampton Hospitals NHS Trust
Gillian Lyons	The Royal Wolverhampton Hospitals NHS Trust
Naomi McDermott	The Royal Wolverhampton Hospitals NHS Trust
Carole Sadler	The Royal Wolverhampton Hospitals NHS Trust

Name of lead reporter	Trust or Health Board
Bernie Williams	The Royal Wolverhampton Hospitals NHS Trust
Jan Latham	The Shrewsbury and Telford Hospital NHS Trust
Shiva Shankar	The Shrewsbury and Telford Hospital NHS Trust
Wendy Tyler	The Shrewsbury and Telford Hospital NHS Trust
Claire Jackson	Torbay and South Devon NHS Foundation Trust
Flo McGrattan	Torbay and South Devon NHS Foundation Trust
Margaret Crawford	United Lincolnshire Hospitals NHS Trust
Michelle Harkness	United Lincolnshire Hospitals NHS Trust
Nicky Kirk	United Lincolnshire Hospitals NHS Trust
Narasimharao Kollipara	United Lincolnshire Hospitals NHS Trust
Melanie Smith	United Lincolnshire Hospitals NHS Trust
Jude Wells	United Lincolnshire Hospitals NHS Trust
Lyn Gilbert	University College London Hospitals NHS Foundation Trust
Cherie Raphael	University College London Hospitals NHS Foundation Trust
Denise Symister	University College London Hospitals NHS Foundation Trust
Kim Allsop	University Hospital Southampton NHS Foundation Trust
Sarah Davidson	University Hospital Southampton NHS Foundation Trust
Robert Ironton	University Hospital Southampton NHS Foundation Trust
Mark Johnson	University Hospital Southampton NHS Foundation Trust
Victoria Puddy	University Hospital Southampton NHS Foundation Trust
Kate Blake	University Hospitals Coventry & Warwickshire NHST
Letoya Smith	University Hospitals Coventry & Warwickshire NHST
Ziju Elanjikal	University Hospitals of Bristol NHS Foundation Trust
Adele Farrow	University Hospitals of Bristol NHS Foundation Trust
Karen Luyt	University Hospitals of Bristol NHS Foundation Trust
Claire Stroud	University Hospitals of Bristol NHS Foundation Trust
Samantha Belton	University Hospitals of Leicester NHS Trust
Denise Brookes	University Hospitals of Leicester NHS Trust
Penny McParland	University Hospitals of Leicester NHS Trust
Julia Alcide	University Hospitals of Morecambe Bay NHS Foundation Trust
Rebecca Bleackley	University Hospitals of Morecambe Bay NHS Foundation Trust
Kath Granger	University Hospitals of Morecambe Bay NHS Foundation Trust
Sharon Perkins	University Hospitals of Morecambe Bay NHS Foundation Trust
Celia Sykes	University Hospitals of Morecambe Bay NHS Foundation Trust
Lee Abbott	University Hospitals of North Midlands NHS Trust
Elizabeth Jennings	University Hospitals of North Midlands NHS Trust
Sarah Lake	University Hospitals of North Midlands NHS Trust
Carol Hollington	Walsall Healthcare NHS Trust
Lisa Poston	Walsall Healthcare NHS Trust
Rita Arya	Warrington & Halton Hospitals NHS Foundation Trust
Ann Goodwin	Warrington & Halton Hospitals NHS Foundation Trust
Debra Yates	Warrington & Halton Hospitals NHS Foundation Trust
Justine Chung	West Hertfordshire Hospitals NHS Trust
Kate Flack	West Hertfordshire Hospitals NHS Trust
Renton L'Heureux	West Hertfordshire Hospitals NHS Trust

Name of lead reporter	Trust or Health Board
Sophie Bennett	West Suffolk NHS Foundation Trust
Abigail Buhagiar	West Suffolk NHS Foundation Trust
Lauri-Anne Croft	West Suffolk NHS Foundation Trust
Robyn Harris	West Suffolk NHS Foundation Trust
Justine Ladds	West Suffolk NHS Foundation Trust
Carly Strause	West Suffolk NHS Foundation Trust
Nick Brennan	Western Sussex Hospitals NHS Foundation Trust
Fiona Churchill	Western Sussex Hospitals NHS Foundation Trust
Susan McRae	Western Sussex Hospitals NHS Foundation Trust
Juliette Phelan	Western Sussex Hospitals NHS Foundation Trust
Zita Warren	Western Sussex Hospitals NHS Foundation Trust
Janice White	Western Sussex Hospitals NHS Foundation Trust
Lynn Woolley	Western Sussex Hospitals NHS Foundation Trust
Jane Laking	Whittington Health
Elizabeth Thomas	Whittington Health
Sri Babarao	Wirral University Teaching Hospital NHS Foundation Trust
Clare MacGlashan	Wirral University Teaching Hospital NHS Foundation Trust
Rajeshwari Myagerimath	Wirral University Teaching Hospital NHS Foundation Trust
Trudy Berlet	Worcestershire Acute Hospitals NHS Trust
Karen Kokoska	Worcestershire Acute Hospitals NHS Trust
Lakshmi Thirumalaikumar	Worcestershire Acute Hospitals NHS Trust
Julie Armstrong	Wrightington, Wigan & Leigh NHS Foundation Trust
Sue Orchard	Wrightington, Wigan & Leigh NHS Foundation Trust
Cathy Stanford	Wrightington, Wigan & Leigh NHS Foundation Trust
Maxine Chong	Wye Valley NHS Trust
Sabrina Haddock	Wye Valley NHS Trust
Wendy Huxley Marko	Wye Valley NHS Trust
Simon Meyrick	Wye Valley NHS Trust
Cathryn Seagrave	Wye Valley NHS Trust
Andrea Walker	Wye Valley NHS Trust
Lindsey Burningham	Yeovil District Hospital NHS Foundation Trust
Natalie Phips	Yeovil District Hospital NHS Foundation Trust
Helen Williams	Yeovil District Hospital NHS Foundation Trust
James Dwyer	York Teaching Hospital NHS Foundation Trust
Kirsten Mack	York Teaching Hospital NHS Foundation Trust
Rachel McCormack	York Teaching Hospital NHS Foundation Trust
Freya Oliver	York Teaching Hospital NHS Foundation Trust
Sundeep Sandhu	York Teaching Hospital NHS Foundation Trust
Louise Spicer	York Teaching Hospital NHS Foundation Trust

A3. Description of the data items reported to MBRRACE-UK

Woman's identifiers	Antenatal care provision	Baby/fetus outcomes (cont'd) ^a
Family name/surname	Number of antenatal appointments attended	Was active respiratory support provided?
Given name/first name	Documented poor appointment attender	Reason if no active respiratory support provided
Address	Intended type of unit at onset	Outcome if active respiratory support provided
Postcode	Intended type of care at onset	Minutes after which active respiratory support attempts were stopped
NHS/Community Health Index (CHI) number	Intended care provider at onset	Were there documented child protection issues?
Date of birth/Age	Reason if transfer of care (between booking and onset)	Was there documented history of domestic abuse?
Hospital number in this hospital	Actual type of unit at delivery	Gestational age at confirmation of death ^b
Woman's details	Actual type of care at delivery	Date death confirmed ^b
Ethnic category	Actual care provider at delivery	Was baby alive at onset of care process that led to delivery? ^b
Country of birth	Reason if transfer of care (post-onset)	Was baby admitted to a neonatal unit? ^c
Time resident in the UK at booking	Delivery and outcomes summary ^a	Was baby transferred to another organisation after birth? ^c
Documented communication difficulties?	Case definition	Primary reason for the first transfer ^c
Type of communication difficulties	Was this a termination?	Number of transfers ^c
Age at leaving full-time education	Reason for termination	Type of unit where death occurred ^c
Main support during pregnancy	Labour and delivery ^a	Care provider at time of death ^c
Employment status at booking	Onset of labour	Was the death unattended? ^c
Did woman have a partner?	Date of onset of care in labour	Date of death ^c
Partner's employment status at booking	Time of onset of care in labour	Time of death ^c
Blood relationship of woman to baby's father	Time of onset of labour	Cause of death ^a
Was woman refugee or asylum seeker?	Prolonged rupture of membranes (>24 hours)	Sources of information used to determine cause of death
Woman's health	Date of rupture	Was a mortality review undertaken for this case?
Pre-existing medical problems	Presentation at delivery	Types of mortality review that apply
Tobacco smoking status	Attempted modes of delivery	Cause of death as written in notes or on the death certificate
Electronic cigarette use	Final mode of delivery	Primary cause of death:
Breath carbon monoxide	Type of caesarean section	condition
Weekly alcohol consumption pre-pregnancy ^d	Primary indication for caesarean section	CODAC code
Weekly alcohol consumption at booking ^d	Was the baby born in water?	Baby/fetus associated condition:
Was there documented alcohol abuse?	Delivery complications	condition
Was there documented substance abuse?	Date of delivery/birth	CODAC code
Previous pregnancies ^a	Time of delivery/birth	Is this the final, agreed cause of death following any inquest and all requested investigations?
Outcome for fetus	Were blood gases done?	Post-mortem ^a
Birthweight	Source of the blood gases	Was a post-mortem offered?
Infant death	Arterial:	Was consent given for a post-mortem?
Year	Cord pH	Consented post-mortem procedures
Gestational age	Base excess/deficit	Was a post-mortem undertaken?
Fetal anomaly	Lactate	Undertaken procedures
Obstetric history	Venous:	Was the placenta sent for histology?
Number of previous pregnancies	Cord pH	Was the case discussed with a coroner/procurator fiscal
Previous pregnancy complications	Base excess/deficit	Was the case accepted as a corner/procurator fiscal's case?
Booking	Lactate	Clinicians
Intended type of unit at booking	Baby/fetus outcomes ^a	Obstetrician responsible for care
Intended type of care at booking	NHS/CHI number	Neonatologist/paediatrician responsible for care
Intended care provider at booking	Sex of baby/fetus	
Date of first booking appointment	Ethnic category	
Final estimated date of delivery (EDD)	Birth order	
Basis for EDD	Birthweight	
Number of fetuses present at booking/ultrasound	Gestational age at delivery	
Chorionicity	Was a heartbeat present in the first minute?	
Assisted conception	Heartbeat rate band	
Woman's height in cm	Was a cord pulse present in the first minute?	
Woman's first recorded weight in kg	Cord pulse rate band	
Was woman too heavy for hospital scales?	Active body movement in first minute	
First recorded BMI (if height/weight unavailable)	Respiratory activity in first minute	
Documented influenza vaccination in this pregnancy?	Appgar score at 1 minute	
Date of vaccination	Appgar score at 5 minutes	

^a recorded for each baby/fetus

^b stillbirth and late fetal losses only

^c live births only

^d collected until December 2016



A4. Further details of MBRRACE-UK data collection

A4.1 Approvals for collection of patient identifiable data

The necessary approvals obtained by the MNI-CORP programme prior to the start of the data collection process are listed below. These were applied for in order to collect patient identifiable data and access information collected by statutory organisations without consent.

Box 2: Approvals granted for UK collection of patient identifiable data and access to statutory data without consent

England and Wales

The Confidentiality Advisory Group of the Health Research Authority:

ECC 5-05 (f)/2012 (from 10.10.2012); 15/CAG/0119 (from 01.05.2015)

Health & Social Care Information Centre, Data Access Advisory Group: IC604DS

Scotland

The NHS Scotland Caldicott Guardian: 2014-62 MBRRACE-UK Programme – Update (2013-05)

The Privacy Advisory Committee, ISD, NHS National Services Scotland: PAC16/14

Northern Ireland

Due to the different data privacy arrangements in Northern Ireland only de-identified data is provided to the MNI-CORP programme and this is provided via the NIMACH office

A4.2 The system for online data submission

Security

Access to the MBRRACE-UK website is via the internet using the secure HTTPS protocol. The web and database servers are housed in a secure data centre with firewall protection. All staff requesting online access must be approved by their Trust or Health Board and log-in is only possible with either an NHS or UK university email address. When an approved reporter first accesses the website they are required to request an activation code. This is used as a one-time password which must be changed on first access. All passwords must meet a set of criteria which ensures all passwords accepted are 'strong': in addition, they must be changed at regular intervals and are stored securely. Reporters are assigned to a profile which restricts their access to only the appropriate parts of the website for their role (the system is used both to report deaths and to provide access to anonymised medical case notes for assessors taking part in MBRRACE-UK confidential enquiries).

All patient identifiers are encrypted before they are stored. Access to identifiable data is only allowed under very limited circumstances. Reporters may view the data from their own Trust or Health Board (subject to the use of a valid password) while access to identifiable data by MBRRACE-UK staff is subject to NHS information governance, security and confidentiality regulation (Box 2).

Data integrity and validation

Reporters wishing to report a new death or edit an existing death record are required to confirm the mother's details (NHS or CHI number, name, date of birth) on each occasion. The nationally defined algorithm for checking NHS and CHI numbers is used to ensure only valid numbers are entered.

Where appropriate, the information reported is checked against a range of acceptable values during the data entry process. For each such data item there is a range of expected values and an absolute range. If a value is outside the expected range the reporter is warned and informed of the range. If it is outside the absolute range

then the value cannot be entered and, additionally, the record cannot be closed. Before the reporter can close a record additional checks are carried out; for example, date values across the whole record are validated against each other to test for consistency.

In some circumstances there may be a small number of data items that are unavailable. In these situations reporters may indicate that an item is 'not known', with an opportunity to add the missing data at a later date,

For a significant number of deaths some of the data required will be held in more than one hospital, e.g. some aspects of maternal data after the death of a baby following postnatal transfer. If the additional information is held within the same Trust or Health Board but on a different site then reporters can access all the information they need in collaboration with obstetric, midwifery, neonatal or nursing colleagues. However, if the missing information is held by a different Trust or Health Board then the MBRRACE-UK system allows the reporter to temporarily assign ownership of the MBRRACE-UK record to the other Trust or Health Board who can then return it once the missing information has been provided.

Online help

Help is available on every data entry screen through FAQs. In addition, many of the variables have specific help available by clicking on the 'Help' icon. Also, on every screen of the website there is a function to allow the reporter to enter a help request. This is sent via email to the MBRRACE-UK office for attention by the technical, clinical or administrative staff, as appropriate.

Reports

The MBRRACE-UK online reporting system allows access to information relating to local deaths:

- the Trust/Health Board Reported Cases list provides abbreviated details of all deaths reported;
- the Trust/Health Board Summary provides the number of deaths by year, case-type and unit;
- the Trust/Health Board Case Review list provides the opportunity for local reporters to check the accuracy (within a fixed time frame) of the data reported by their organisation prior to the analysis for the report.

A 'sort' facility is available to facilitate the identification of deaths from a particular year or from a particular hospital, or to distinguish between cases of stillbirth and neonatal death. The display order of case lists can be changed by clicking on any of the headings.

Web browser compatibility

The security requirements of the NHS in relation to electronic data flows mandate that the highest levels of security be employed. In order for this to be achieved, those accessing the MBRRACE-UK reporting system need access to an up-to-date web browser compatible with these security specifications. Appropriate browsers are available to download free of charge, although the installation of such software may require the co-operation of local NHS IT departments.

A4.3 Ensuring all births for 2016 and extended perinatal deaths are identified

The sources of data used to ensure complete data collection of births in 2016 and extended perinatal deaths for this cohort are listed in Box 3. The combining and checking of this data is outlined below.

Box 3: Data sources for the ascertainment of UK births and perinatal deaths

England and Wales

Birth registration data – ONS

Death registration data – ONS

PDS data on all births – NHS Digital (PDS)

Scotland

Birth registration data – NRS

Death registration data – NRS

Maternity Inpatient and Day Case Dataset (SMR02) inpatient data - ISD, NHS National Statistics Scotland

Northern Ireland

Birth registration data - NIMACH, Health and Social Care Public Health Agency – derived from NIMATS

Death registration data - NIMACH, Health and Social Care Public Health Agency – derived from NIMATS

Inpatient data - NIMACH, Health and Social Care Public Health Agency – derived from NIMATS

Crown Dependencies

Birth registration data - Health and Social Services Department, States of Guernsey

Death registration data - Health and Social Services Department, States of Guernsey

Birth registration data - Health Intelligence Unit, Public Health Services, States of Jersey

Death registration data - Health Intelligence Unit, Public Health Services, States of Jersey

PDS data on all births, Isle of Man – NHS Digital (PDS)

Identifying all extended perinatal deaths

Statutorily registered deaths which meet the MBRRACE-UK reporting criteria are matched to the deaths reported to MBRRACE-UK in order to identify any stillbirths or neonatal deaths which have not been reported to MBRRACE-UK. Due to the different system of implementation in Northern Ireland, the NIMACH office staff ensured full ascertainment of their data on our behalf.

For England, Wales and Scotland the matching is performed using a combination of deterministic and probabilistic matching methods based on the mother's given name, mother's family name, postcode of residence at time of delivery, Trust or Health Board of birth, baby's NHS number (England – where available), CHI number (Scotland), gestational age at delivery, date of delivery and date of death.

Once the checking is complete the MBRRACE-UK Lead Reporters are notified of any known deaths that have occurred in their Trust or Health Board which could not be identified on the MBRRACE-UK system and asked to confirm that this was a death in their organisation and provide the missing information.

This checking for deaths missing from the MBRRACE-UK database cannot start until information on statutorily registered deaths are provided to MBRRACE-UK by ONS (England and Wales) and NRS (Scotland), meaning that we cannot inform MBRRACE-UK Lead Reporters of missing deaths until some months after the event. Although most missing deaths can be identified in this way, not all deaths to be reported to MBRRACE-UK are available from statutory sources in a timely manner:

1. A small percentage of statutorily registered deaths are registered only after considerable delay, most often because an inquest was being held.
2. Late fetal losses delivered at 22⁺⁰ to 23⁺⁶ weeks gestational age are not officially registered.
3. RCOG guidance [6, 7] is that stillbirths delivered at 24⁺⁰ weeks gestational age or greater where the death was confirmed before 24⁺⁰ weeks gestational age should not be registered as stillbirths; however, in order to investigate variations in the reporting of stillbirths occurring at around 24⁺⁰ weeks gestational age, these deaths should all be reported to MBRRACE-UK.

There are no timely and easily accessible data sources for the deaths that have not been officially registered and, therefore, it is not possible to ensure that all of these deaths have been reported to MBRRACE-UK.

Identifying all births in 2016

Individual information on all births in the UK and Crown Dependencies was obtained in order to generate mortality rates adjusted for maternal, baby, and socio-demographic risk factors. Information for England, Wales and the Isle of Man (PDS and ONS birth registration data), Scotland (NRS and ISD), Northern Ireland (NIMATS), Bailiwick of Guernsey (Health and Social Services Department) and the Bailiwick of Jersey (Health Intelligence Unit) were combined to give a single dataset of births for the whole UK and Crown Dependencies. This data was then combined with the information on the deaths to obtain the final data for analysis. See Appendix A4.4 for a more complete discussion of this process.

The allocation of births to an organisation is complex, given the wide variation in the recording of the notifying organisation, and it was not always possible to easily identify the place of birth from the data reported. In many cases this either required further detailed enquiry or correction of the place of birth, where an incorrect organisation had inadvertently been recorded. Complete and accurate recording is vital to enable MBRRACE-UK to allocate births to the appropriate Trust or Health Board for analysis and reporting.

Home births were allocated to the Trust or Health Board responsible for this service, whenever this was recorded, in order for the correct denominator(s) to be calculated. All Trusts and Health Boards in England, Wales and the Isle of Man completing information for the PDS should ensure that they are identified as the notifying organisation for all births related to their service.

A4.4 Generating the births dataset

The births and extended perinatal deaths identified using the sources and methods described in Appendix A4.3 were combined to generate a single dataset for analysis. Due to the variations in the data sources from the different countries, this was undertaken separately for each set of data sources as described below. Once the datasets had been generated for each country these were combined into a final, single dataset for analysis.

England and Wales

The complete dataset of births and extended perinatal deaths for England and Wales was generated using birth registration data (ONS), death registration data (ONS), PDS records, and MBRRACE-UK death notification records:

Step 1: All datasets were restricted to births in 2016.

Step 2: All records of births were combined into a single dataset (Figure 38): i.e. livebirth registrations (ONS); stillbirth registrations (ONS); PDS birth records; MBRRACE-UK notifications of late fetal loss. All of these datasets were used in order to obtain complete ascertainment of all births in England and Wales:

- late fetal losses are only recorded in the MBRRACE-UK death records;
- late birth registrations are captured by the PDS records;
- birth records removed from the PDS data because of patient opt-outs are captured by the ONS births records.

Step 3: Births at less than 22⁺⁰ weeks gestational age and pregnancies ended by a termination of pregnancy are removed from the dataset of births as these are not reported by MBRRACE-UK.

Step 4: Births at 22⁺⁰ to 23⁺⁶ weeks gestational age are removed from the dataset of births for the main tables and maps as these births are currently reported separately by MBRRACE-UK.

Step 5: All records of late fetal losses, stillbirths, and neonatal deaths were combined into a single dataset (Figure 39): i.e. death registrations (ONS); MBRRACE-UK death notifications. Both of these datasets are used in order to obtain complete ascertainment of all extended perinatal deaths in England and Wales.

Step 6: All deaths where the births occurred at less than 22⁺⁰ weeks gestational age and pregnancies ended by a termination of pregnancy are removed from the dataset of deaths as these are not reported by MBRRACE-UK.

Step 7: All deaths where the births occurred at less than 24⁺⁰ weeks gestational age are removed from the dataset of deaths for the main tables and maps as these deaths are currently reported separately by MBRRACE-UK.

Step 8: The dataset of deaths are merged into the dataset of births in order to create a single dataset for analysis.

Figure 38: Flowchart for combining data sources in order to generate dataset of births in England and Wales in 2016

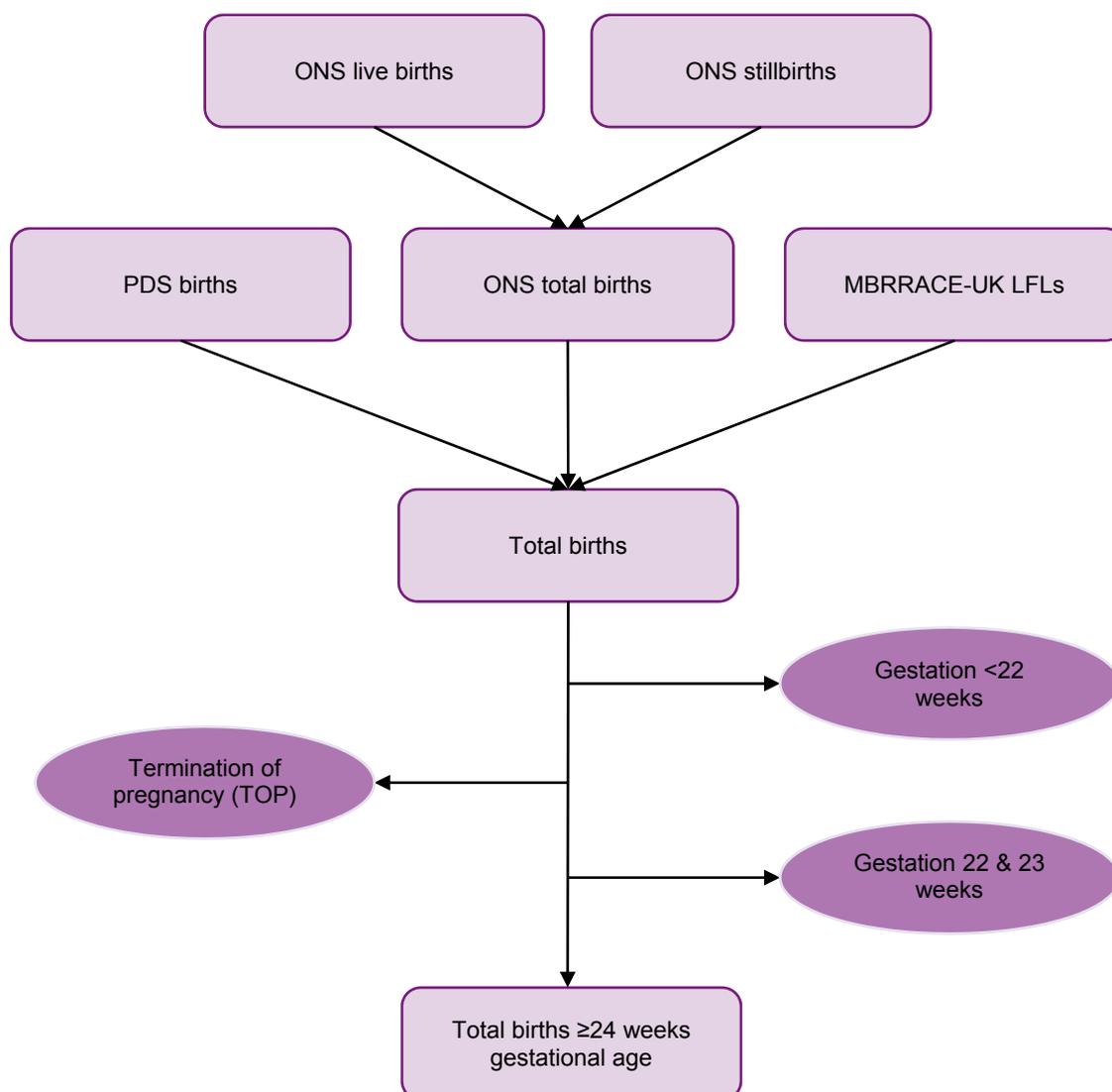
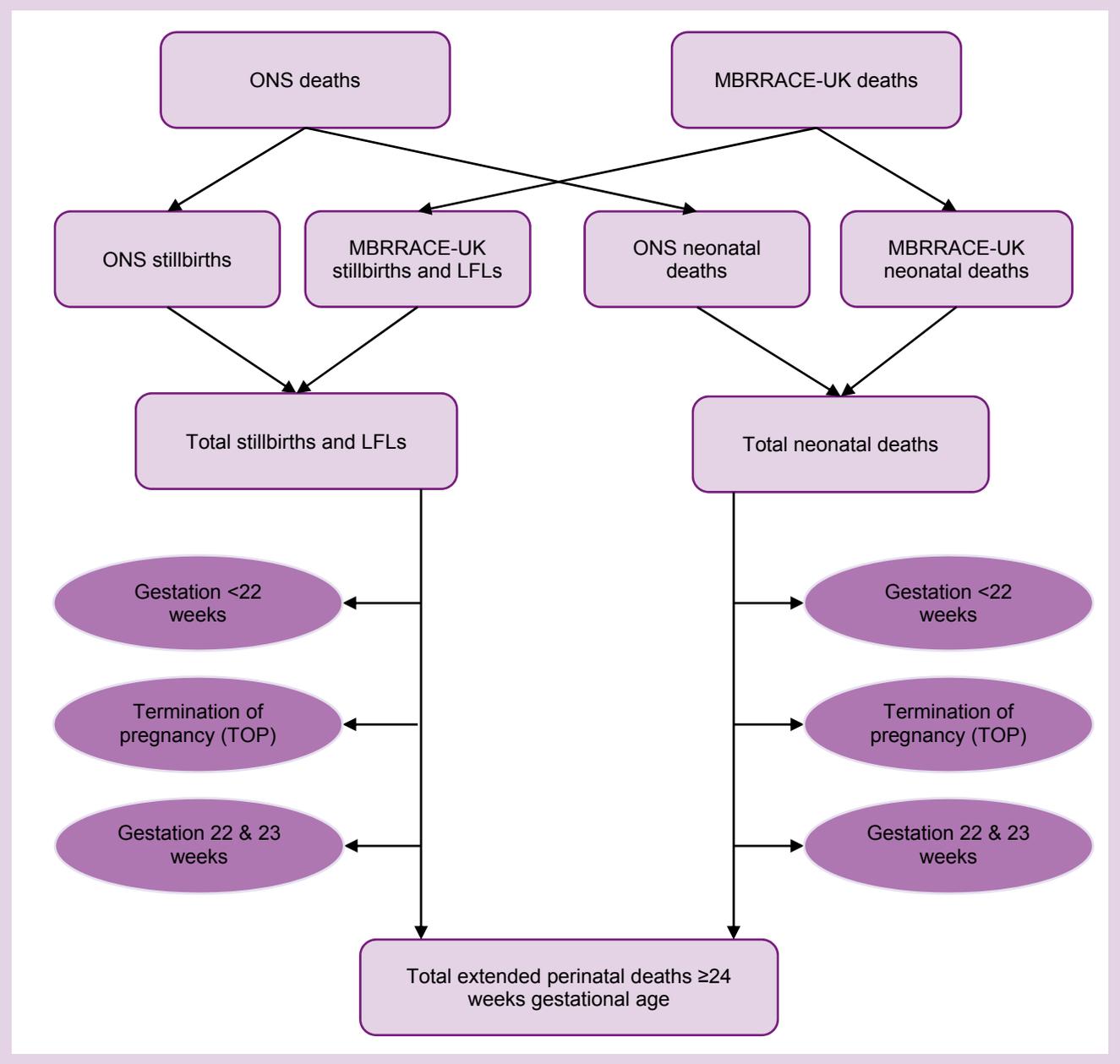


Figure 39: Flowchart for combining data sources in order to generate dataset of extended perinatal deaths for births in England and Wales in 2016



Scotland

The complete dataset of births and extended perinatal deaths for Scotland was generated using a similar approach to that used for England and Wales. For Scotland, data was obtained from birth registration data (NRS), death registration data (NRS), SMR02 Maternity Inpatient and Day Care Case records (ISD), and MBRRACE-UK death notification records. The birth registration data and the SMR02 data are merged before being released to MBRRACE-UK (ISD). The process undertaken by MBRRACE-UK was:

Step 1: All datasets were restricted to births in 2016.

Step 2: All records of births were combined into a single dataset (Figure 40): i.e. birth registrations/SMR02 (ISD); ISD notifications of late fetal losses; MBRRACE-UK notifications of late fetal loss. These datasets are used in order to obtain complete ascertainment of all births in Scotland:

Step 3: Births at less than 22⁺⁰ weeks gestational age and pregnancies ended by a termination of pregnancy are removed from the dataset of births as these are not reported by MBRRACE-UK.

Step 4: Births at 22⁺⁰ to 23⁺⁶ weeks gestational age are removed from the dataset of births for the main tables and maps as these births are currently reported separately by MBRRACE-UK.

Step 5: All records of late fetal losses, stillbirths, and neonatal deaths were combined into a single dataset (Figure 41): i.e. death registrations and SMR02 (ISD); MBRRACE-UK death notifications. Both of these datasets are used in order to obtain complete ascertainment of all extended perinatal deaths in Scotland.

Step 6: All deaths where the births occurred at less than 22⁺⁰ weeks gestational age and pregnancies ended by a termination of pregnancy are removed from the dataset of deaths as these are not reported by MBRRACE-UK.

Step 7: All deaths where the births occurred at less than 24⁺⁰ weeks gestational age are removed from the dataset of deaths for the main tables and maps as these deaths are currently reported separately by MBRRACE-UK.

Step 8: The dataset of deaths is merged into the dataset of births in order to create a single dataset for analysis.

Figure 40: Flowchart for combining data sources in order to generate dataset of births in Scotland in 2016

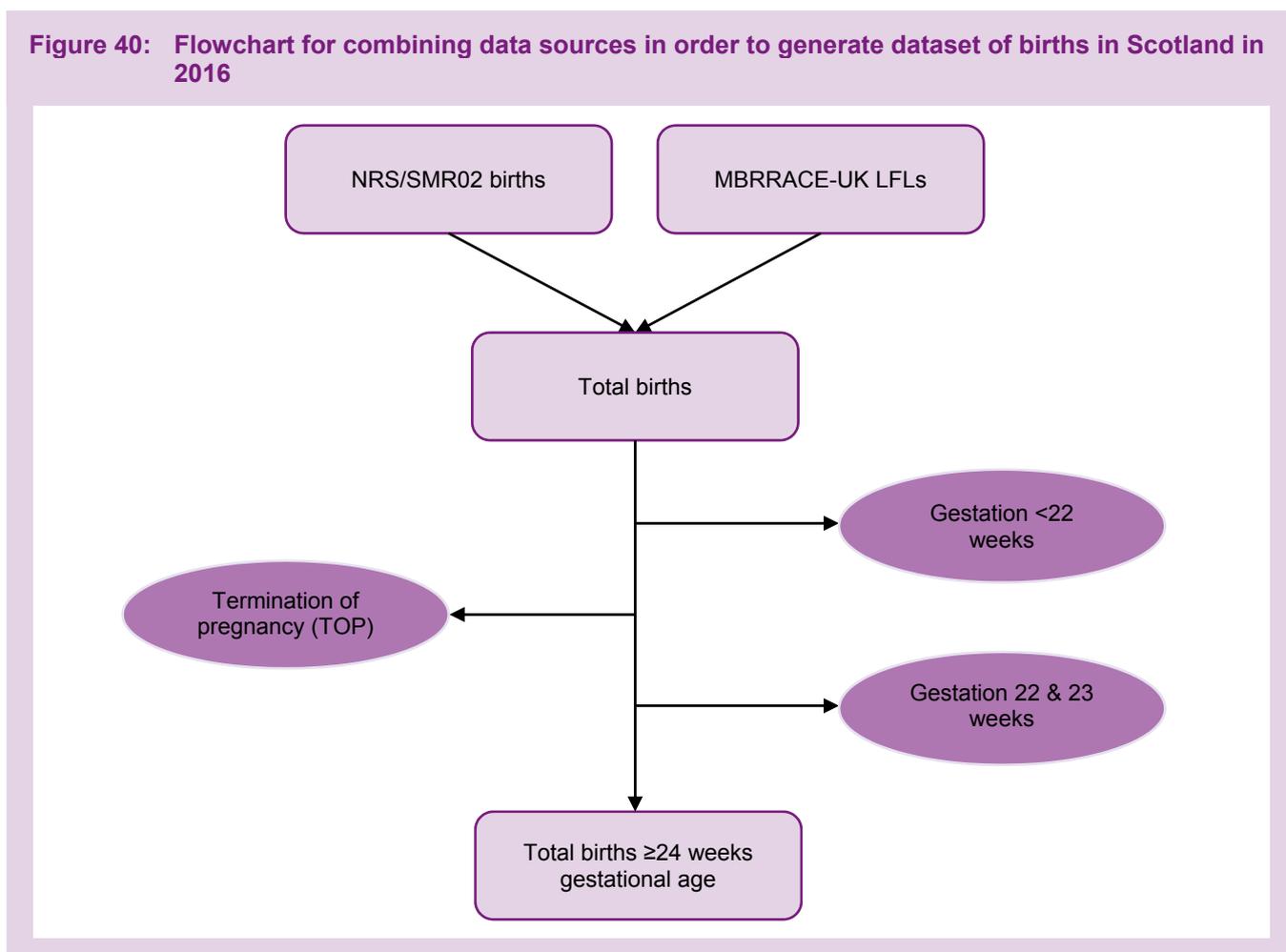


Figure 41: Flowchart for combining data sources in order to generate dataset of extended perinatal deaths for births in Scotland in 2016



Northern Ireland and the Crown Dependencies

Datasets of births and extended perinatal deaths for Northern Ireland, the Bailiwick of Guernsey, and the Bailiwick for Jersey are supplied to MBRRACE-UK as complete datasets from the appropriate national data providers. The birth records for the Isle of Man are obtained from the PDS records. In each case the birth and death records are then linked to the MBRRACE-UK records.

Data cleaning, linking and derived variables

Where information on a variable is available from more than one source a 'best value' algorithm was applied in order to obtain the value to be included in the analyses. The algorithm chosen was:

- where available, the value recorded in the MBRRACE-UK death record was used as the prime source;
- if unavailable (e.g. the baby survived the neonatal period) the value recorded in the statutory birth or death registration record was taken as the secondary source;

- for England and Wales, the value recorded in the PDS record was used as the third source: the gestational age at delivery is only available from the PDS records.

A4.5 Location of mother's residence

The postcode of the mother's residence at the time of delivery was used to identify the country, CCG (England), Health Board (Scotland and Wales), Health and Social Care Trust (Northern Ireland), Crown Dependency, and Local Authority of reporting using postcode linked data supplied as part of GridLink. In addition, it was used to obtain the appropriate value for the child poverty index.

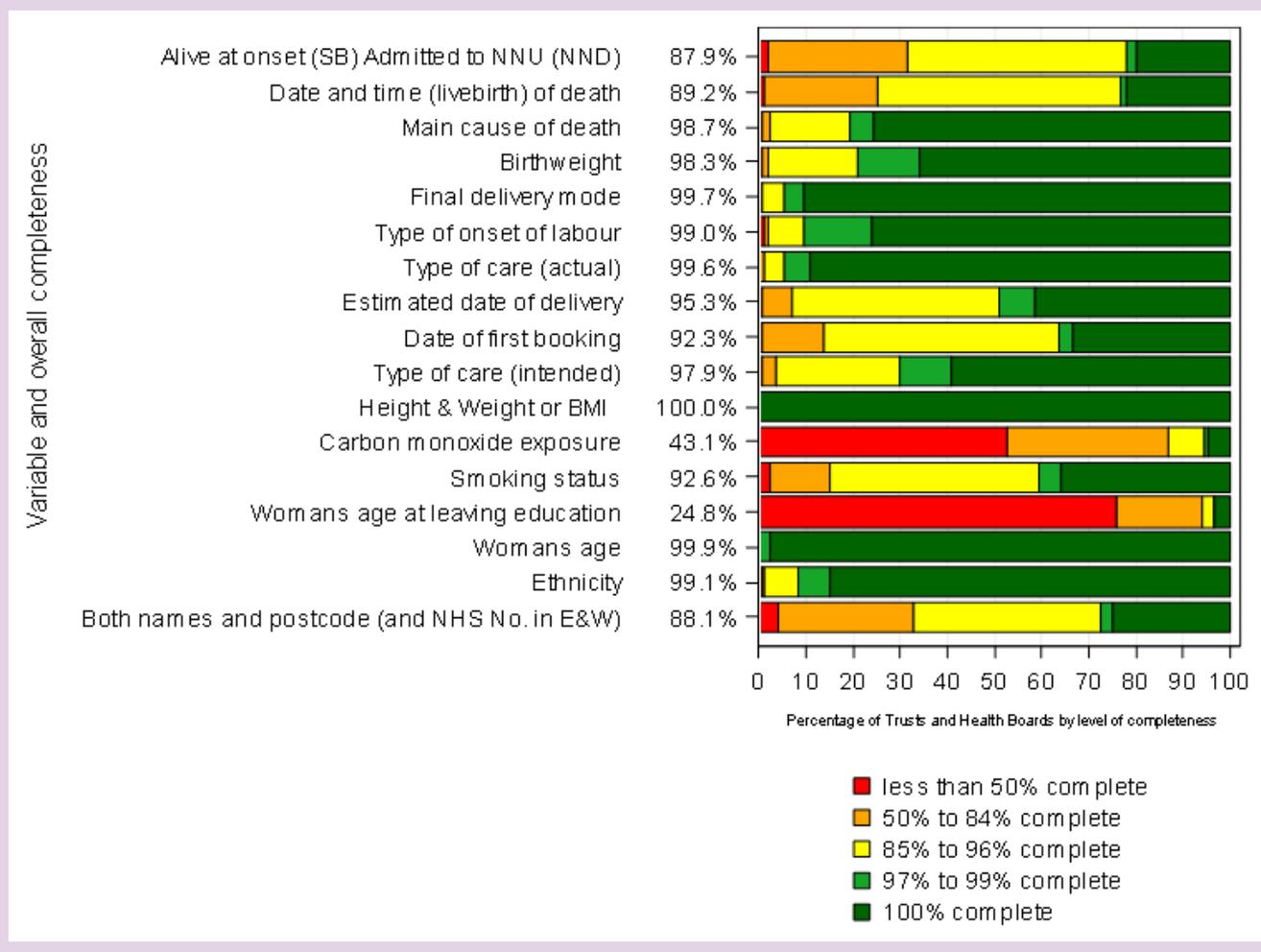
The Trust or Health Board of birth was derived using the most appropriate source from all available datasets. For England and Wales the recorded Communal Establishment Code in the ONS birth records was used as the primary source the location of the birth. When the place of birth could not be located from the ONS records (e.g. births at home and in-transit) the location was derived from the PDS record. If neither record provided a clear Trust or Health Board of birth then an estimate was made based on the postcode of birth.

The Trust or Health Board of death was obtained directly from the MBRRACE-UK death record.

A5. Completeness of the data reported to MBRRACE-UK

One aspect of data quality is the completeness of the data. In Figure 42, the overall completeness of selected key variables is shown together with the percentage of Trusts of Health Boards achieving different levels of completeness for their data.

Figure 42: Level of completeness of data reported by Trusts and Health Boards: United Kingdom and Crown Dependencies, for births in 2016



The completeness for groups of key data items reported to MBRRACE-UK for those deaths used in Chapter 3 is shown in Table 35, by reporting Trust and Health Board. The percentage shown is the combined percentage for all of the items in each group:

1. Mother's details: given name (not Northern Ireland); family name (not Northern Ireland); postcode of residence at time of delivery (not Northern Ireland); NHS Number (not Scotland or Northern Ireland); ethnicity; age, age at leaving full-time education.
2. Booking information: smoking status; breath carbon monoxide; BMI.
3. Antenatal care: intended type of care at booking; intended place of delivery at booking; EDD.
4. Delivery and baby's characteristics for stillbirths: actual place of delivery; date and time of delivery; final delivery mode; type of onset of labour; birthweight; gestational age at delivery.
5. Delivery and baby's characteristics for neonatal deaths: actual place of delivery; date and time of delivery; final delivery mode; type of onset of labour; birthweight; gestational age at delivery.

6. Baby's outcome: date death confirmed (stillbirths only); whether alive at onset of care in labour (stillbirths only), whether admitted to neonatal unit (neonatal deaths only); main cause of death.

The colours in Table 35 represent the level of data completeness for each Trust and Health Board:

- **red**: less than 70.0% complete;
- **amber**: 70.0% to 84.9% complete;
- **yellow**: 85.0% to 96.9% complete;
- **light green**: 97.0% to 99.9% complete;
- **dark green**: 100.0% complete.

Table 35: Completeness of selected data items reported to MBRRACE-UK by NHS Trust (England), Health Board (Scotland and Wales), Health and Social Care Trust (Northern Ireland), and Crown Dependency: United Kingdom and Crown Dependencies, for births in 2016

Trust or Health Board	Mother's details	Booking information	Antenatal care	Delivery and Baby's characteristics for Stillbirths	Delivery and Baby's characteristics for Neonatal deaths	Baby's outcome
ENGLAND						
Airedale NHS Foundation Trust	72.7	75.8	100	100	*	93.9
Ashford and St Peter's Hospital NHS Foundation Trust	73.6	75.7	90.1	100	99	93.7
Barking, Havering and Redbridge University Hospitals NHS Trust	70.3	86.8	93.7	99.5	96.7	84.3
Barnsley Hospital NHS Foundation Trust	88.5	87.2	89.7	98.6	100	100
Barts Health NHS Trust	78.4	79.3	99.4	99.8	100	88.2
Basildon and Thurrock University Hospitals NHS Foundation Trust	70.8	86.1	95.8	96.1	100	84.7
Bedford Hospital NHS Trust	90.9	84.8	97	100	100	97
Birmingham Women's and Children's NHS Foundation Trust	78.5	88	96.2	100	96.7	93.9
Blackpool Teaching Hospitals NHS Foundation Trust	90	88.9	93.3	96.3	100	97.8
Bolton NHS Foundation Trust	77.2	72.6	97.8	99.4	97	89.6
Bradford Teaching Hospitals NHS Foundation Trust	76.6	96.2	96.8	100	98.6	96.8
Brighton and Sussex University Hospitals NHS Trust	78.7	86.4	91.4	98.7	97.2	85.2
Buckinghamshire Healthcare NHS Trust	83.3	81.5	96.3	98.8	100	92.6
Burton Hospitals NHS Foundation Trust	75	66.7	95.5	100	100	97
Calderdale and Huddersfield NHS Foundation Trust	75	75.2	95.2	98.6	97.6	87.6
Cambridge University Hospitals NHS Foundation Trust	72.1	62.8	91	98.8	99.1	94.9
Chelsea and Westminster Hospital NHS Foundation Trust	74.2	71.7	93.4	99.6	91.7	92.9
Chesterfield Royal Hospital NHS Foundation Trust	71.3	80	100	100	100	83.3
City Hospitals Sunderland NHS Foundation Trust	69.2	64.1	97.4	100	100	84.6
Colchester Hospital University NHS Foundation Trust	68.8	97.6	98.8	100	100	83.3
Countess of Chester Hospital NHS Foundation Trust	75	100	100	100	100	100
County Durham and Darlington NHS Foundation Trust	76.1	85.5	91.3	100	100	84.1
Croydon Health Services NHS Trust	77.4	68.3	92.1	100	94.4	85.7
Dartford and Gravesham NHS Trust	97.3	97.3	94.6	100	100	91.9
Derby Teaching Hospitals NHS Foundation Trust	73.3	76.8	98.9	100	100	93.8
Doncaster and Bassetlaw Hospitals NHS Foundation Trust	91.7	95.2	96.8	99	100	92.1

Trust or Health Board	Mother's details	Booking information	Antenatal care	Delivery and Baby's characteristics for Stillbirths	Delivery and Baby's characteristics for Neonatal deaths	Baby's outcome
Dorset County Hospital NHS Foundation Trust	57.1	81	100	100	100	100
East Cheshire NHS Trust	70.8	94.4	94.4	97.2	*	100
East Kent Hospitals University NHS Foundation Trust	73	70.7	94.6	98.1	100	95.2
East Lancashire Hospitals NHS Trust	69.9	81.9	98	99.6	98.7	88.2
East Sussex Healthcare NHS Trust	87.5	83.3	88.1	97	*	88.1
East and North Hertfordshire NHS Trust	78.8	66.7	98.3	100	100	86.7
Epsom and St Helier University Hospitals NHS Trust	72.7	72.7	98.5	100	100	86.4
Frimley Health NHS Foundation Trust	83.3	78.4	97.7	100	100	94.2
Gateshead Health NHS Foundation Trust	72.5	56.7	90	97.6	100	93.3
George Eliot Hospital NHS Trust	100	84.8	97	100	100	90.9
Gloucestershire Hospitals NHS Foundation Trust	78.1	79.2	98.6	100	96.7	97.2
Great Western Hospitals NHS Foundation Trust	72.2	81.5	100	100	100	88.9
Guy's and St Thomas' NHS Foundation Trust	72	67.1	95.5	100	97.8	91.1
Hampshire Hospitals NHS Foundation Trust	76.9	62.8	96.2	100	100	100
Harrogate and District NHS Foundation Trust	95.8	77.8	83.3	97.2	*	94.4
Heart of England NHS Foundation Trust	77.3	76.2	94.8	98.8	99.5	93.8
Homerton University Hospital NHS Foundation Trust	73.9	80.4	97.1	100	100	95.7
Hull and East Yorkshire Hospitals NHS Trust	78.2	74.5	95.7	99.5	100	92.2
Imperial College Healthcare NHS Trust	85.9	74.7	90.1	99.1	100	91
Isle of Wight NHS Trust	75	66.7	83.3	94.4	100	100
James Paget University Hospitals NHS Foundation Trust	89.3	54.8	100	100	100	95.2
Kettering General Hospital NHS Foundation Trust	70.2	84.1	100	100	100	85.7
King's College Hospital NHS Foundation Trust	71.3	74	90.7	99.6	99.2	91.5
Kingston Hospital NHS Foundation Trust	73.9	71.2	98.5	100	95.8	84.8
Lancashire Teaching Hospitals NHS Foundation Trust	81.9	78.2	97.7	99	100	92
Lewisham and Greenwich NHS trust	75	71.2	96.6	99.3	96.7	94.9
Liverpool Women's NHS Foundation Trust	72.8	75.3	94.7	99.5	100	94.7
London North West University Healthcare NHS Trust	70.1	66.7	99.1	100	87.5	91.7
Luton and Dunstable University Hospital NHS Foundation Trust	73.8	68.3	95.2	99.2	99	95.2

Trust or Health Board	Mother's details	Booking information	Antenatal care	Delivery and Baby's characteristics for Stillbirths	Delivery and Baby's characteristics for Neonatal deaths	Baby's outcome
Maidstone and Tunbridge Wells NHS Trust	71.6	66.7	100	100	100	90.8
Manchester University NHS Foundation Trust	80.5	71.5	92.4	98.6	99.3	95.1
Medway NHS Foundation Trust	79.8	84.6	98.7	100	100	83.3
Mid Cheshire Hospitals NHS Foundation Trust	80	96.7	90	98.3	*	100
Mid Essex Hospital Services NHS Trust	79.6	85.2	100	99.2	100	92.6
Milton Keynes University Hospital NHS Foundation Trust	81	69.8	95.2	98.8	100	93.7
Norfolk and Norwich University Hospitals NHS Foundation Trust	83.1	79.4	100	100	100	99
North Bristol NHS Trust	75	84.8	97	99.3	96.7	92.9
North Cumbria University Hospitals NHS Trust	68.8	69.4	100	97.6	100	69.4
North Middlesex University Hospital NHS Trust	71.6	70.3	93.7	99.4	83.3	89.2
North Tees and Hartlepool NHS Foundation Trust	72.4	87.4	97.7	100	100	85.1
North West Anglia NHS Foundation Trust	80.1	81.8	100	99.4	100	86.4
Northampton General Hospital NHS Trust	80.8	69.2	97.4	99	100	94.9
Northern Devon Healthcare NHS Trust	85	86.7	100	100	100	100
Northern Lincolnshire and Goole Hospitals NHS Foundation Trust	75	81.7	100	98.8	100	96.7
Northumbria Healthcare NHS Foundation Trust	78.8	87.2	97.4	100	100	100
Nottingham University Hospitals NHS Trust	85.7	82.9	99.5	100	100	90.5
Oxford University Hospitals NHS Trust	80.4	68.9	95	97.6	100	95.9
Plymouth Hospitals NHS Trust	75	82.4	99.1	100	100	98.1
Poole Hospital NHS Foundation Trust	75	81	96.8	99.1	100	93.7
Portsmouth Hospitals NHS Trust	84.4	65.6	97.9	100	100	84.4
RAF Lakenheath (48th Medical Group)	100	100	100	*	100	66.7
Royal Berkshire NHS Foundation Trust	81.1	81.8	93.9	99.3	100	89.9
Royal Cornwall Hospitals NHS Trust	77.5	73.3	95	100	100	95
Royal Devon and Exeter NHS Foundation Trust	75	95.6	97.8	100	100	91.1
Royal Free London NHS Foundation Trust	73.9	65.2	91.7	100	100	95.5
Royal Surrey County Hospital NHS Foundation Trust	73.3	53.3	97.8	100	*	95.6
Royal United Hospitals Bath NHS Foundation Trust	95.2	93.7	100	100	100	100
Salisbury NHS Foundation Trust	80	93.3	100	100	100	100

Trust or Health Board	Mother's details	Booking information	Antenatal care	Delivery and Baby's characteristics for Stillbirths	Delivery and Baby's characteristics for Neonatal deaths	Baby's outcome
Sandwell and West Birmingham Hospitals NHS Trust	85.5	89.3	95.3	98	100	92
Sheffield Teaching Hospitals NHS Foundation Trust	75.3	81.7	91.9	100	100	95.6
Sherwood Forest Hospitals NHS Foundation Trust	78.6	87.3	95.2	99	100	93.7
South Devon Healthcare NHS Foundation Trust	85.7	81	81	100	*	76.2
South Tees Hospitals NHS Foundation Trust	69	87.4	96.6	100	100	86.2
South Tyneside NHS Foundation Trust	65	73.3	80	100	100	60
South Warwickshire NHS Foundation Trust	65	76.7	96.7	100	100	90
Southend University Hospital NHS Foundation Trust	92.4	68.1	100	100	100	91.3
Southport & Ormskirk Hospital NHS Trust	88.6	81.8	97	100	100	87.9
St George's University Hospitals NHS Foundation Trust	74.4	75.8	88.3	99.2	97.8	97.5
St Helens and Knowsley Teaching Hospitals NHS Trust	72.6	90.5	95.2	100	100	88.9
Stockport NHS Foundation Trust	69.4	79.6	96.3	100	100	88.9
Surrey and Sussex Healthcare NHS Trust	75	66.7	100	100	*	97.8
Tameside Hospital NHS Foundation Trust	70	93.3	100	100	94.4	100
Taunton and Somerset NHS Foundation Trust	87.5	96.3	100	100	100	100
The Dudley Group NHS Foundation Trust	73.5	90.2	91.2	100	100	84.3
The Hillingdon Hospitals NHS Foundation Trust	81.7	85.6	97.8	100	100	90
The Ipswich Hospital NHS Trust	67.6	68.6	100	100	100	84.3
The Leeds Teaching Hospitals NHS Trust	81.7	81.6	80.5	99.7	99.3	94.8
The Mid Yorkshire Hospitals NHS Trust	65	86.7	94.3	96.9	100	93.3
The Newcastle upon Tyne Hospitals NHS Foundation Trust	73.1	77.4	96.9	99.1	100	96.2
The Pennine Acute Hospitals NHS Trust	82.2	72	99.5	99.6	100	92.8
The Portland Hospital for Women and Children	91.7	77.8	88.9	100	100	100
The Princess Alexandra Hospital NHS Trust	89.6	94.4	100	100	*	94.4
The Queen Elizabeth Hospital King's Lynn NHS Foundation Trust	72.9	66.7	83.3	100	100	97.2
The Rotherham NHS Foundation Trust	98.2	85.7	92.9	98.8	*	95.2
The Royal Wolverhampton NHS Trust	80.1	88	99.1	98.8	100	91.5
The Shrewsbury and Telford Hospital NHS Trust	70.7	96.2	98.1	100	100	90.5
United Lincolnshire Hospitals NHS Trust	85.6	84.6	100	100	100	88.5

Trust or Health Board	Mother's details	Booking information	Antenatal care	Delivery and Baby's characteristics for Stillbirths	Delivery and Baby's characteristics for Neonatal deaths	Baby's outcome
University College London Hospitals NHS Foundation Trust	91.7	97.9	95.8	100	99	87.5
University Hospital Southampton NHS Foundation Trust	85.4	67.8	86.7	100	99.4	98.9
University Hospitals Bristol NHS Foundation Trust	71.4	67.3	84.5	100	99.5	95.2
University Hospitals Coventry and Warwickshire NHS Trust	84.5	84.7	96.3	100	100	90.5
University Hospitals of Leicester NHS Trust	74.5	73.3	97	98.9	99.5	89.4
University Hospitals of Morecambe Bay NHS Foundation Trust	73.3	68.9	93.3	100	91.7	80
University Hospitals of North Midlands NHS Trust	79.8	73	95.2	99.1	100	91.3
Walsall Healthcare NHS Trust	95.2	92.5	100	100	100	95.7
Warrington and Halton Hospitals NHS Foundation Trust	92.9	95.2	100	100	100	90.5
West Hertfordshire Hospitals NHS Trust	72.4	71.3	100	100	100	90.8
West Suffolk NHS Foundation Trust	71.7	88.9	95.6	100	*	88.9
Western Sussex Hospitals NHS Foundation Trust	76.9	70.5	97.4	98.4	91.7	93.6
Weston Area Health NHS Trust	75	66.7	0	83.3	*	100
Whittington Health	87.5	96.2	100	100	100	89.7
Wirral University Teaching Hospital NHS Foundation Trust	83.9	75.3	94.6	97.6	100	92.5
Worcestershire Acute Hospitals NHS Trust	85	86.7	95.6	100	100	87.8
Wrightington, Wigan and Leigh NHS Foundation Trust	80	66.7	93.3	100	91.7	95.6
Wye Valley NHS Trust	87.5	64.6	100	100	100	87.5
Yeovil District Hospital NHS Foundation Trust	83.3	94.4	94.4	100	100	100
York Teaching Hospital NHS Foundation Trust	78.1	94.4	98.6	100	100	79.2
SCOTLAND						
NHS Ayrshire & Arran	79.8	92.3	97.4	100	100	78.2
NHS Borders	75	100	100	100	*	100
NHS Dumfries & Galloway	75	91.7	100	100	100	94.4
NHS Fife	75.8	97.9	96.9	100	100	94.8
NHS Forth Valley	75	98.7	96.2	100	100	89.7
NHS Grampian	77.6	87.4	95.4	98.7	100	83.9
NHS Greater Glasgow and Clyde	80.6	84.5	95.5	99.7	100	90.6
NHS Highland	75	93.3	100	100	100	80

Trust or Health Board	Mother's details	Booking information	Antenatal care	Delivery and Baby's characteristics for Stillbirths	Delivery and Baby's characteristics for Neonatal deaths	Baby's outcome
NHS Lanarkshire	75	80.2	96.3	99.2	100	93.8
NHS Lothian	73.6	92	96.3	98.7	100	96.3
NHS Tayside	75.8	89.2	95.7	98.9	95	86
NHS Western Isles	100	100	100	100	*	55.6
WALES						
Abertawe Bro Morgannwg University Health Board	71.1	81.3	94.8	97.7	100	83.3
Aneurin Bevan University Health Board	84.7	79.6	95.7	99	100	86
Betsi Cadwaladr University Health Board	73.1	77.5	90.8	100	100	93.3
Cardiff and Vale University Health Board	71	77.3	99.3	99.1	100	93.3
Cwm Taf University Health Board	61.4	93.9	97	100	*	98.5
Hywel Dda University Health Board	71.3	64.2	96.3	100	100	85.2
Powys Teaching Health Board	87.5	66.7	50	50	100	66.7
NORTHERN IRELAND						
Belfast Health and Social Care Trust	85.4	62	88.4	98.9	99.5	93.5
Northern Health and Social Care Trust	90	56.7	96.7	100	100	94.4
South Eastern Health and Social Care Trust	80.2	68.1	100	100	100	94.4
Southern Health and Social Care Trust	87	64.2	95.1	100	97.6	95.1
Western Health and Social Care Trust	77.1	65.3	94.4	100	95.8	95.8
CROWN DEPENDENCIES						
States of Guernsey Health & Social Services	53.6	61.9	100	100	100	100
Isle of Man Department of Health and Social Care	100	100	100	100	100	100
States of Jersey Health & Social Services	50	33.3	100	100	*	100

* no stillbirths or neonatal deaths for this organisation

A6. Statistical methods to calculate stabilised & adjusted mortality rates

The stabilised & adjusted mortality rate for each organisation (m_j) is calculated by multiplying the appropriate 'comparator' mortality rate UK (M) by an organisation-specific standardised mortality ratio (SMR_j) calculated from the data, i.e.:

$$m_j = M \times SMR_j$$

where m_j is the estimated stabilised & adjusted mortality rate for organisation j

M is the appropriate comparator mortality rate

SMR_j is the estimated SMR for organisation j : $SMR_j = \frac{(\text{No. observed deaths})}{(\text{No. expected deaths})}$

Currently, for all organisations, except for the Trusts and Health Boards of birth, the comparator mortality rate is the overall mortality rate for the whole of the UK and Crown Dependencies. For the Trusts and Health Boards of birth the comparator mortality rate is the overall rate for Trusts and Health Boards in the same comparator group (described below). The SMR is estimated using a multilevel logistic regression model:

$$\text{logit} \left[P_{ij} (Y_{ij} = 1 | \mathbf{x}_{ij}) \right] = \alpha + \beta \mathbf{x}_{ij} + \Gamma \mathbf{z}_j + \delta_j$$

where Y_{ij} is the indicator variable of death for the i^{th} baby in the j^{th} organisation:

$Y_{ij} = 1$ if a death, 0 otherwise

x_{ij} is the vector of risk-adjustment factors for the i^{th} baby in the j^{th} organisation

z_j is the vector of risk-adjustment factors for the j^{th} organisation

δ_j is the random term representing organisation j : $\delta \sim \text{Normal}(0, \sigma^2)$

A multilevel model is used as it can accommodate the hierarchical structure of the data through the random term; that is, births clustered within organisations. These models also allow the calculation of stabilised (also known as 'shrunk' or 'smoothed') estimates of the organisation-specific terms, which reduce the likelihood of organisations being falsely identified as outliers by chance alone.

Various approaches to calculating a SMR from a multilevel logistic model have been proposed [24]. The method used for the MBRRACE-UK report "... is determined by dividing the smoothed, risk-adjusted, provider-specific estimate of mortality by the estimate of expected mortality obtained using the average intercept for all ... providers" [25]. In this approach, the observed number of deaths is replaced by a model-based predicted number reflecting sampling variation in the observed deaths; that is, a stabilised observed number of deaths is estimated for each organisation. Hence, the SMR is the ratio of the stabilised number of deaths to the deaths that would be expected if the organisation's patients were from an 'average' organisation:

$$SMR_j = \frac{\sum_{i=1}^{n_j} \frac{\exp[\alpha + \beta \mathbf{x}_{ij} + \Gamma \mathbf{z}_j + \delta_j]}{(1 + \exp[\alpha + \beta \mathbf{x}_{ij} + \Gamma \mathbf{z}_j + \delta_j])}}{\sum_{i=1}^{n_j} \frac{\exp[\alpha + \beta \mathbf{x}_{ij} + \Gamma \mathbf{z}_j]}{(1 + \exp[\alpha + \beta \mathbf{x}_{ij} + \Gamma \mathbf{z}_j])}} \quad \text{and} \quad m_j = M \times \frac{\sum_{i=1}^{n_j} \frac{\exp[\alpha + \beta \mathbf{x}_{ij} + \Gamma \mathbf{z}_j + \delta_j]}{(1 + \exp[\alpha + \beta \mathbf{x}_{ij} + \Gamma \mathbf{z}_j + \delta_j])}}{\sum_{i=1}^{n_j} \frac{\exp[\alpha + \beta \mathbf{x}_{ij} + \Gamma \mathbf{z}_j]}{(1 + \exp[\alpha + \beta \mathbf{x}_{ij} + \Gamma \mathbf{z}_j])}}$$

Risk-adjustment factors

The multilevel logistic regression model outlined in the previous section includes patient-level and organisation-level factors to adjust for differences in key factors which are known to increase the risk of stillbirth and neonatal mortality. The factors which can be included in the model are limited to those that are routinely collected for all

births across the whole UK. For this report the patient-level risk-adjustment factors included in the statistical model were:

- mother's age (<20 years, 20-24 years, 25-29 years, 30-34 years, 35-39 years, ≥40 years);
- child poverty (measured by Children in Low Income Families Local Measure [19] based on mother's residence (quintiles with approximately equal number of total births);
- baby's ethnicity (White, mixed or multiple ethnicity, Asian or Asian British, Black or Black British, other);
- baby's sex (male, non-male);
- multiple birth (singleton, multiple);
- interaction between child poverty and baby's ethnicity;
- interaction between child poverty and mother's age;
- gestational age at birth for neonatal death rates only (24⁺⁰ to 27⁺⁶ weeks, 28⁺⁰ to 31⁺⁶ weeks, 32⁺⁰ to 33⁺⁶ weeks, 34⁺⁰ to 36⁺⁶ weeks, 37⁺⁰ to 41⁺⁶ weeks, ≥42⁺⁰ weeks).

The only organisation-level factor (z_j) currently included in the MBRRACE-UK analysis is a marker for the 'comparator group' of each organisation responsible for delivering maternity care. In the absence of detailed clinical data, to help account for the variation between organisations due to their differences in risk profile, all of the Trusts and Health Boards have been classified hierarchically into five mutually exclusive comparator groups based on their level of service provision. They are then compared to the average mortality rate within their comparator group. The five comparator groups are:

1. Availability of Level 3 NICU and Neonatal Surgery;
2. Availability of Level 3 NICU;
3. 4,000 or more births per annum at 24 weeks or later;
4. 2,000-3,999 births per annum at 24 weeks or later;
5. Under 2,000 births per annum at 24 weeks or later.

Statistical models

Two multilevel logistic regression models were used, one for the stillbirths as outcome and the other model for neonatal deaths. The reference group for the both models is the births surviving at least 28 days from birth. The multilevel logistic regression model for stillbirth compared to survival to the end of the neonatal period is:

$$\text{logit}[P_{(SB)ij}(Y_{(SB)ij} = 1 | \mathbf{x}_{ij})] = \alpha_{(SB)} + \boldsymbol{\beta}_{(SB)} \mathbf{x}_{ij} + \boldsymbol{\Gamma}_{(SB)} \mathbf{z}_j + \delta_{(SB)j}$$

where $Y_{(SB)ij}$ is the indicator variable of stillbirth for the i^{th} baby in the j^{th} organisation:

$Y_{(SB)ij} = 1$ if stillbirth; 0 if survivor to end of neonatal period; missing if neonatal death;

\mathbf{x}_{ij} is the vector of risk adjustment factors for the i^{th} baby in the j^{th} organisation;

\mathbf{z}_j is the vector of risk adjustment factors for the j^{th} organisation;

$\delta_{(SB)j}$ is the random term representing organisation j : $\delta \sim \text{Normal}(0, \sigma^2)$.

A similar model was estimated for neonatal deaths:

$$\text{logit}[P_{(NND)ij}(Y_{(NND)ij} = 1 | \mathbf{x}_{ij})] = \alpha_{(NND)} + \boldsymbol{\beta}_{(NND)} \mathbf{x}_{ij} + \boldsymbol{\Gamma}_{(NND)} \mathbf{z}_j + \delta_{(NND)j}$$

where $Y_{(NND)ij}$ is the indicator variable of neonatal death for the i^{th} baby in the j^{th} organisation:

$Y_{(NND)ij} = 1$ if neonatal death; 0 if survivor to end of neonatal period; missing if stillbirth;

x_{ij} is the vector of risk adjustment factors for the i^{th} baby in the j^{th} organisation;

z_{ij} is the vector of risk adjustment factors for the j^{th} organisation;

$\delta_{(NND)j}$ is the random term representing organisation j : $\delta \sim \text{Normal}(0, \sigma^2)$.

The SMR for stillbirth is then given by combining these two models:

$$SMR_{(SB)j} = \frac{\sum_{i=1}^{n_j} \left[\frac{\exp(\alpha_{(SB)} + \beta_{(SB)}x_{ij} + \Gamma_{(SB)}z_j + \delta_{(SB)j})}{1 + \exp(\alpha_{(SB)} + \beta_{(SB)}x_{ij} + \Gamma_{(SB)}z_j + \delta_{(SB)j}) + \exp(\alpha_{(NND)} + \beta_{(NND)}x_{ij} + \Gamma_{(NND)}z_j + \delta_{(NND)j})} \right]}{\sum_{i=1}^{n_j} \left[\frac{\exp(\alpha_{(SB)} + \beta_{(SB)}x_{ij} + \Gamma_{(SB)}z_j)}{1 + \exp(\alpha_{(SB)} + \beta_{(SB)}x_{ij} + \Gamma_{(SB)}z_j)} + \exp(\alpha_{(NND)} + \beta_{(NND)}x_{ij} + \Gamma_{(NND)}z_j)} \right]}$$

The SMR for neonatal deaths is derived directly from the second multilevel logistic regression model since stillbirths are not included in the calculation of neonatal death rates:

$$SMR_{(NND)j} = \frac{\sum_{i=1}^{n_j} \left[\frac{\exp(\alpha_{(NND)} + \beta_{(NND)}x_{ij} + \Gamma_{(NND)}z_j + \delta_{(NND)j})}{1 + \exp(\alpha_{(NND)} + \beta_{(NND)}x_{ij} + \Gamma_{(NND)}z_j + \delta_{(NND)j})} \right]}{\sum_{i=1}^{n_j} \left[\frac{\exp(\alpha_{(NND)} + \beta_{(NND)}x_{ij} + \Gamma_{(NND)}z_j)}{1 + \exp(\alpha_{(NND)} + \beta_{(NND)}x_{ij} + \Gamma_{(NND)}z_j)} \right]}$$

The SMR for the extended perinatal deaths is obtained by combining the results of both models:

$$SMR_{(EPD)j} = \frac{\sum_{i=1}^{n_j} \left[\frac{\exp(\alpha_{(SB)} + \beta_{(SB)}x_{ij} + \Gamma_{(SB)}z_j + \delta_{(SB)j}) + \exp(\alpha_{(NND)} + \beta_{(NND)}x_{ij} + \Gamma_{(NND)}z_j + \delta_{(NND)j})}{1 + \exp(\alpha_{(SB)} + \beta_{(SB)}x_{ij} + \Gamma_{(SB)}z_j + \delta_{(SB)j}) + \exp(\alpha_{(NND)} + \beta_{(NND)}x_{ij} + \Gamma_{(NND)}z_j + \delta_{(NND)j})} \right]}{\sum_{i=1}^{n_j} \left[\frac{\exp(\alpha_{(SB)} + \beta_{(SB)}x_{ij} + \Gamma_{(SB)}z_j) + \exp(\alpha_{(NND)} + \beta_{(NND)}x_{ij} + \Gamma_{(NND)}z_j)}{1 + \exp(\alpha_{(SB)} + \beta_{(SB)}x_{ij} + \Gamma_{(SB)}z_j) + \exp(\alpha_{(NND)} + \beta_{(NND)}x_{ij} + \Gamma_{(NND)}z_j)} \right]}$$

95% confidence intervals

The reported 95% confidence intervals for the stabilised & adjusted mortality rate are obtained through bootstrap methods [26]:

1. J organisations are sampled with replacement (where J is the total number of organisations).
2. The multilevel model is estimated for the sample, keeping each appearance of an organisation distinct if it is sampled more than once.
3. The estimated value, and prediction error, of the random term is obtained for each organisation: δ_j and $\text{erfor}(\delta_j)$ - if an organisation is sampled more than once then a single set of values is selected at random.
4. The bootstrap estimates for the fixed terms are noted (α^* , β^* and Γ^*).
5. A new value (δ_j^*) for the organisation-specific random term is sampled, where $\delta_j^* \sim N(\delta_j, \text{erfor}[\delta_j])$.
6. The bootstrap stabilised & adjusted mortality rate (m_j^*) is obtained by substituting α^* , β^* , Γ^* and δ_j^* for α , β , Γ and δ_j as appropriate.
7. This is repeated 1,500 times, giving approximately 1,000 values for the bootstrap stabilised &

adjusted mortality rate for each organisation since organisations are not necessarily included in each bootstrap sample.

8. The lower and upper limits of the 95% confidence interval are obtained for each organisation from the 2.5th and 97.5th percentiles respectively of the distribution the bootstrap stabilised & adjusted mortality rates.

Probability of falling above a benchmark

The statistical methodology used allows the calculation of empirical Bayes posterior probabilities to estimate the probability that the underlying mortality rate for an organisation falls above (or below) a specified benchmark; for example, it would be possible to report the probability that the underlying stabilised & adjusted mortality rate for organisation j is greater than 6 per 1,000 births ($m_j > 6.0$). In this report, organisations have been identified when the probability that they fall above, or below, a specified benchmark is greater than 0.5; that is, 'it is more likely than not' that their underlying mortality rate falls outside the benchmark.

Missing data

Where information was unavailable for the risk-adjustment factors because it was missing from the routine data source, in order to allow all appropriate births to be included in the analyses the missing values were assumed to fall into the following categories:

- mother's age - 30 to 34 years (unknown for 2.7% of births in 2016);
- socio-economic deprivation - middle quintile (unknown for 0.6% of births in 2016);
- baby's ethnicity - white (unknown for 7.4% of births in 2016);
- baby's sex - male (unknown for <0.1% of births in 2016);
- multiple birth - singleton (unknown for 0.1% of births in 2016);
- gestational age at birth - 37⁺⁰ to 41⁺⁶ weeks (unknown for 3.0% of births in 2016).

Since missing observations are imputed with values generally representing low risk groups, stabilised & adjusted mortality rates are potentially overestimated for those organisations with missing data. However, as the proportion of missing data is low, and the effect of adjustment is relatively small, any overestimation will be small and unlikely to change any conclusions inferred from the reported rates.

A7. Individual Trust and Health Board report sample

Maternal, Newborn and Infant
Clinical Outcome Review Programme



Name of NHS Trust or Health Board

MBRRACE-UK perinatal mortality report: 2016 births

This report concerns stillbirths and neonatal deaths among the 5,200 babies born within your Trust in 2016, EXCLUDING births before 24 weeks gestational age and all terminations of pregnancy. Neonatal deaths are reported by place of birth irrespective of where death occurred.

Perinatal mortality

Type of death	Number	Crude rate	Stabilised & adjusted rate (95% C.I.)	Comparison to the average for similar Trusts & Health Boards
Stillbirth	18	3.46	3.77 (3.15 to 4.50)	● Up to 10% lower
Neonatal	7	1.35	1.31 (0.79 to 1.80)	● Up to 10% higher
Extended perinatal	25	4.81	5.05 (4.39 to 6.29)	● Up to 10% higher

The crude mortality rate is the observed rate for your Trust and is a snapshot of mortality for births in 2016. The stabilised & adjusted mortality rate gives a more reliable estimate of the underlying mortality rate taking into account key factors known to increase the risk of stillbirth and neonatal mortality as well as the effects of chance variation, particularly where the number of deaths was small. While it is not possible to adjust for all potential risk factors, these measures do provide an important insight into the perinatal mortality for births within your Trust in 2016.

As two of the stabilised & adjusted mortality rates shown here are high compared with similar Trusts and Health Boards (see page 7 for more details), it is important to: a) review the data that was entered locally about your Trust to ensure it is accurate and complete; and b) review existing records regarding the deaths to ensure any avoidable factors have been identified and appropriate changes to care implemented.

Important reporting issues

It is vital that complete, accurate data is reported to MBRRACE-UK. For births in 2015, we received 99% of information on key data items for the deaths which occurred within your Trust.

Deaths relating to births before 24 weeks gestational age have been reported separately as there is variation across the UK as to whether babies at this gestation are reported as a late fetal loss or a neonatal death which biases mortality rates. Please continue to ensure that all late fetal losses at 22 to 23 weeks gestational age are reported to MBRRACE-UK.

About this report

MBRRACE-UK

This report presents one element of the work of MBRRACE-UK, a collaboration led from the National Perinatal Epidemiology Unit at the University of Oxford with members from the University of Leicester (who lead the perinatal aspects of the work), University of Liverpool, University of Birmingham, Bradford Institute for Health Research, Sands (Stillbirth and neonatal death charity) and a general practitioner from Oxford.

MBRRACE-UK is commissioned by the Healthcare Quality Improvement Partnership (HQIP) on behalf of NHS England, NHS Wales, the Scotland Government Health and Social Care Directorate, the Northern Ireland Department of Health, Social Services and Public Safety (DHSSPS), the States of Guernsey, the States of Jersey, and the Isle of Man Government.

Introduction

This is the fourth MBRRACE-UK perinatal mortality surveillance report produced for Trusts and Health Boards across the UK. It includes details of the late fetal losses (22⁺⁰ to 23⁺⁶ weeks gestational age), stillbirths and neonatal deaths for births that occurred in your Trust in 2016, as well as background information on all births. Neonatal deaths are reported by place of birth, irrespective of where the death occurred, as denominator data on the place of care is not available for all births.

Methods

Deaths were reported to MBRRACE-UK by the Trust or Health Board where the death occurred. The information about births was obtained from routine sources – the Office for National Statistics (ONS), Personal Demographics Service (PDS), National Records of Scotland (NRS), Information Services Division (ISD), Northern Ireland Maternal and Child Health (NIMACH), States of Guernsey Health and Social Services Department, and States of Jersey Health Intelligence Unit. Home births are reported where the birth was registered via a Trust or Health Board. Births and deaths are attributed according to the configuration of Trusts and Health Boards on 1 September 2017.

Deaths from all causes except termination of pregnancy are reported, including those resulting from congenital anomalies. The information in this report may not match other local or national reported rates as births before 24 weeks gestational age have been excluded from most tables due to the known poor reporting of such births by some Trusts and Health Boards in previous years. Further details on the methods we have used are available from the [MBRRACE-UK website](#).

Nationally recommended actions

Trusts and Health Boards whose mortality rates are marked ● or ● should carry out an initial investigation of their data quality and possible contributing local factors that might explain the high rate. Irrespective of where they fall in the spectrum of national performance all Trusts and Health Boards should use the national PMRT to review all their stillbirths and neonatal deaths.

Definitions

<i>Late fetal loss:</i>	A baby delivered between 22 ⁺⁰ and 23 ⁺⁶ weeks gestational age showing no signs of life, irrespective of when the death occurred.
<i>Stillbirth:</i>	A baby delivered at or after 24 ⁺⁰ weeks gestational age showing no signs of life, irrespective of when the death occurred.
<i>Neonatal death:</i>	A live born baby who died before 28 completed days after birth.
<i>Extended perinatal death:</i>	A stillbirth or neonatal death.



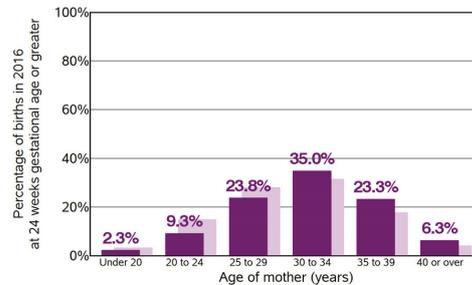
Your births

■ Your Trust □ UK-wide

Age of mother

The proportion of mothers aged 35 years old or older was considerably higher than that of the UK as a whole: 29.7% versus 22.1%.

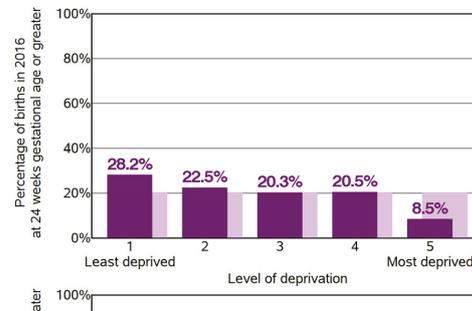
Across the UK the mothers were: 3.3% under 20; 14.9% 20 to 24; 28.2% 25 to 29; 31.6% 30 to 34; 17.9% 35 to 39; 4.2% 40 and over.



Socio-economic deprivation

This graph shows the distribution of births by level of deprivation, based on the postcode of the mother's residence and using the [Children in Low-Income Families Local Measure](#).

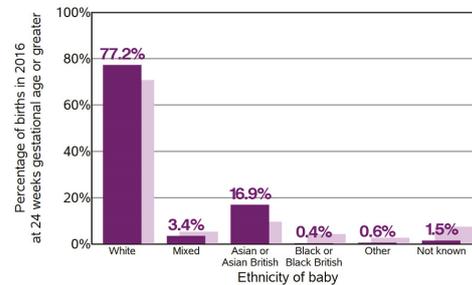
The mothers giving birth in your Trust were considerably less likely to live in areas of high deprivation than those giving birth across the UK as a whole.



Ethnicity of baby

The proportion of babies of Asian or Asian British ethnicity was higher than that of the UK as a whole: 16.9% versus 9.6%.

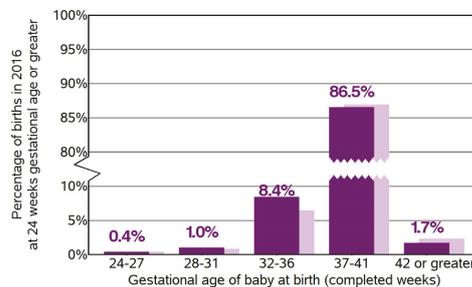
In the national MBRRACE-UK Perinatal Mortality Surveillance Report it was shown that mortality rates were higher for babies of Asian, Asian British, Black and Black British ethnicity compared with babies of White ethnicity.



Gestational age

In your Trust, 21 babies (0.4%) were born at 24 to 27 weeks gestational age, similar to the 0.4% seen in the UK as a whole. The percentage of babies born at 28 to 31 weeks was also similar to the national average: 1.0% versus 0.8%.

In addition, 88 babies (1.7%) were born post-term (42 weeks or greater), a lower percentage than the UK average of 2.3%.

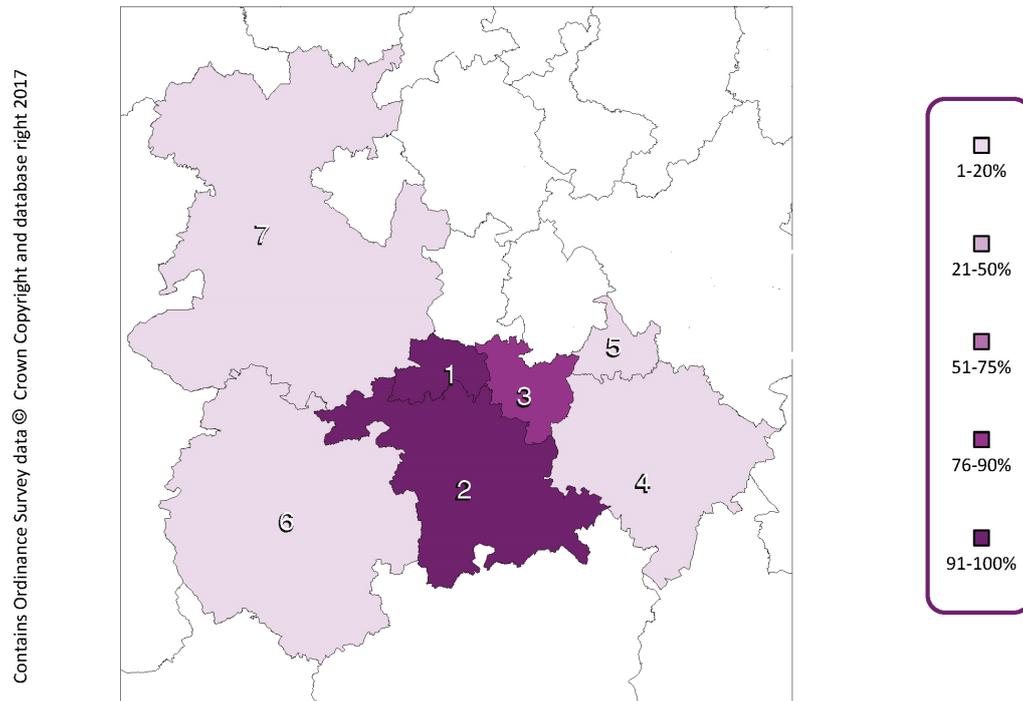


Your births *continued*

Percentage of births taking place in your Trust by commissioning organisation

The map below shows those commissioning organisations for which over 1% of their births at 24 weeks gestational age or later occurred within your Trust. These organisations are Clinical Commissioning Groups (CCGs) in England, Health Boards in Scotland and Wales and Local Commissioning Groups (LCGs) in Northern Ireland.

On the map, the area covered by each organisation is shaded according to the percent of their births which occurred within your Trust. In total, the births from these organisations accounted for 98.5% of your births at 24 weeks gestational age or later in 2016.



The table below provides the percentage and number of births in your Trust at 24 weeks gestational age or later from each of the commissioning organisations.

Commissioning organisation	% Births (N)		
1. First CCG	95.3% (1770)	2. Second CCG	92.6% (1099)
3. Third CCG	82.6% (1481)	4. Fourth CCG	42.0% (488)
5. Fifth CCG	8.4% (134)	6. Sixth CCG	8.3% (130)
7. Seventh CCG	2.5% (190)		

Your perinatal deaths

Deaths of babies born within your Trust

The crude mortality rates reported here are for babies born within your Trust, excluding births before 24 weeks gestational age and all terminations of pregnancy, together with the equivalent UK-wide rates.

These rates are subject to random variation, especially when the number of deaths is small. Stabilised & adjusted mortality rates are presented on page 7 which provide more reliable estimates of the underlying (long-term) mortality rates for your Trust.

Rates per 1,000 births		Stillbirths			Neonatal Deaths		Extended perinatal deaths
		Antepartum	Intrapartum	Unknown	Early	Late	
Your Trust	Rate (N)	3.0 (16)	0.0 (0)	0.4 (2)	1.1 (6)	0.2 (1)	4.7 (25)
UK-wide	Rate	3.6	0.4	0.2	1.2	0.5	5.9

The rates of extended perinatal death are shown below for your Trust by gestational age at delivery. Equivalent UK-wide rates are also shown for comparison.

Rates per 1,000 births		Extended perinatal deaths by gestational age				
		24 ⁺⁰ – 27 ⁺⁶	28 ⁺⁰ – 31 ⁺⁶	32 ⁺⁰ – 36 ⁺⁶	37 ⁺⁰ – 41 ⁺⁶	≥ 42 ⁺⁰
Your Trust	Rate (N)	650.0 (13)	129.0 (4)	10.9 (3)	1.0 (5)	0.0 (0)
UK-wide	Rate	346.5	111.1	22.4	2.3	1.4

Cause of death

The tables below describe the cause of death reported to MBRRACE-UK for stillbirths which occurred in your Trust and for neonatal deaths of babies who were born in your Trust. They are listed by the primary categories of the 'Cause Of Death & Associated Conditions' (CODAC) system of death classification.

Congenital anomaly is reported as the cause of death for all deaths where a congenital anomaly is coded as either the primary cause of death or an associated condition.

In your Trust, 55.5% of stillbirths were reported as having an Unknown or Missing cause of death, which is higher than the UK average. In order to ensure accurate, consistent reporting using the CODAC system of death classification, Trust and Health Board Perinatal Review groups should focus on the quality of cause of death coding.

			Infection	Neonatal	Intra-partum	Congenital anomaly	Fetal
Stillbirths	Your Trust	% (N)	16.7% (3)	0.0% (0)	0.0% (0)	11.1% (2)	0.0% (0)
	UK-wide	%	3.1%	1.4%	5.8%	6.4%	4.6%
Neonatal Deaths	Your Trust	% (N)	14.3% (1)	71.4% (5)	0.0% (0)	0.0% (0)	0.0% (0)
	UK-wide	%	7.3%	44.1%	4.8%	27.9%	4.8%

			Cord	Placental	Maternal	Unknown	Missing
Stillbirths	Your Trust	% (N)	5.6% (1)	11.1% (2)	0.0% (0)	44.4% (8)	11.1% (2)
	UK-wide	%	4.0%	21.9%	3.5%	46.0%	3.4%
Neonatal Deaths	Your Trust	% (N)	0.0% (0)	0.0% (0)	14.3% (1)	0.0% (0)	0.0% (0)
	UK-wide	%	0.1%	1.7%	0.3%	5.1%	3.8%

Your perinatal deaths *continued*

Place of neonatal death by gestational age

In the table below, information is shown that differentiates between the neonatal deaths of live born babies who were born and subsequently died within your Trust and those who were born within your Trust but died elsewhere. The percentage and number of babies in each group is shown by gestational age at birth.

Place of Death		Gestational group				
		24 ⁺⁰ – 27 ⁺⁶	28 ⁺⁰ – 31 ⁺⁶	32 ⁺⁰ – 36 ⁺⁶	37 ⁺⁰ – 41 ⁺⁶	≥ 42 ⁺⁰
Within your Trust	% (N)	60% (3)	50% (1)	(0)	(0)	(0)
Outside your Trust	% (N)	40% (2)	50% (1)	(0)	(0)	(0)

Post-mortem

The percentage of stillbirths and neonatal deaths for which parents were offered a post-mortem examination is given below, differentiating between those who were born and subsequently died within your Trust and those who were born within your Trust but died elsewhere.

For births within your Trust, a post-mortem was offered for 100% of stillbirths and 71% of neonatal deaths, compared with 96% and 91% UK-wide.

Place of Death		Post-mortem offered (as % of deaths)	
		Stillbirths	Neonatal Deaths
Within your Trust	% (n/N)	100% (18/18)	75% (3/4)
Outside your Trust	% (n/N)		67% (2/3)
UK-wide	%	96%	91%

The percentage of post-mortems offered or for which consent was obtained and where the cause of death was reported to MBRRACE-UK as Unknown is shown below. You are encouraged to update the reported cause of death on the MBRRACE-UK data reporting system once the post-mortem results are known.

Unknown cause of death	% (N)	Post-mortem	
		Offered	Consent obtained
		100% (8/8)	0% (0/8)

Babies born at 22 to 23 weeks gestation

It is vital for MBRRACE-UK to be able to present perinatal mortality rates from 22 weeks gestational age onwards, as recommended by the World Health Organization, in order that UK rates can be compared internationally. As there is no statutory registration of late fetal losses at 22 and 23 weeks gestational age, it is vital that your Trust ensures that there is a rigorous system for reporting these deaths to MBRRACE-UK.

The number of late fetal losses at 22 and 23 weeks gestational age reported by your Trust for babies born in 2016 was 3. Please continue to review this information in order to ensure that all late fetal losses are reported to MBRRACE-UK.

Your Trust	N	Deaths at 22 ⁺⁰ to 23 ⁺⁶ weeks gestational age	
		Late fetal losses	Neonatal deaths
		3	1



Your perinatal deaths *continued*

Comparisons with similar Trusts, Health Boards and the UK average

The mortality rates are reported for babies born within your Trust at 24 weeks gestational age or later, excluding terminations of pregnancy. A 'crude' rate and a 'stabilised & adjusted' rate are presented for stillbirths, neonatal deaths and extended perinatal deaths. The **crude mortality rate** is the number of deaths for every 1,000 births (or 1,000 live births for neonatal mortality) and is a snapshot of mortality for your organisation for births in 2016. However, this can be misleading as a measure of the underlying (or long-term) mortality rate due to chance variation and differences between Trusts and Health Boards in the proportion of high risk pregnancies.

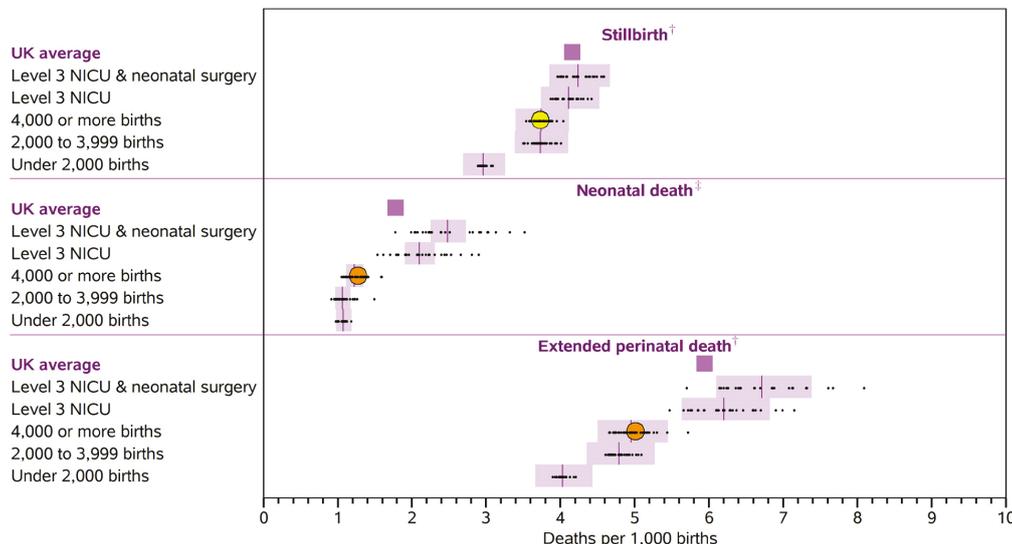
The **stabilised & adjusted mortality rate** is also reported which provides a more reliable estimate of the underlying mortality rate, accounting for mother's age, socio-economic deprivation, baby's sex and ethnicity, multiplicity, and (for neonatal deaths only) gestational age at birth. In addition, to account for the wide variation in case-mix, all Trusts and Health Boards have been classified hierarchically into five comparator groups: (i) Level 3 Neonatal Intensive Care Unit (NICU) and surgical provision (units routinely accepting for birth babies with a known congenital anomaly likely to require surgery in the neonatal period); (ii) Level 3 NICU; (iii) 4,000 or more births per annum at 22 weeks or later; (iv) 2,000-3,999 births per annum at 22 weeks or later; (v) under 2,000 births per annum at 22 weeks or later. Your Trust has been included in the comparator group with 4,000 or more births per annum.

	Mortality rate per 1,000 births [§] (95% confidence interval)		
	Stillbirth [†]	Neonatal [‡]	Extended perinatal [‡]
Crude	3.46	1.35	4.81
Stabilised & adjusted [§]	3.77 (3.15 to 4.50)	1.31 (0.79 to 1.80)	5.05 (4.39 to 6.29)

[§] excluding terminations of pregnancy and births <24th; [†] per 1,000 total births; [‡] per 1,000 live births.

Your estimated stabilised & adjusted mortality rate for each type of death has been compared with the average mortality rate for Trusts and Health Boards in the same comparator group and is shown below as a circle:

- more than 10% lower than the average for the group
- up to 10% lower than the average for the group
- up to 10% higher than the average for the group
- more than 10% higher than the average for the group

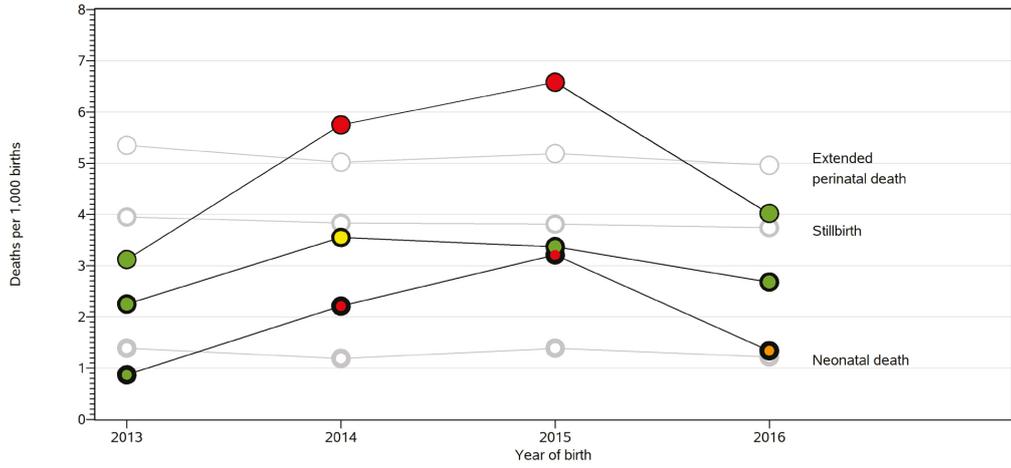


Mortality rates over time

Crude mortality by year of birth

Crude mortality rates for each type of death compared to the average mortality rate for Trusts and Health Boards in the same comparator group (shown in grey) by year of birth.

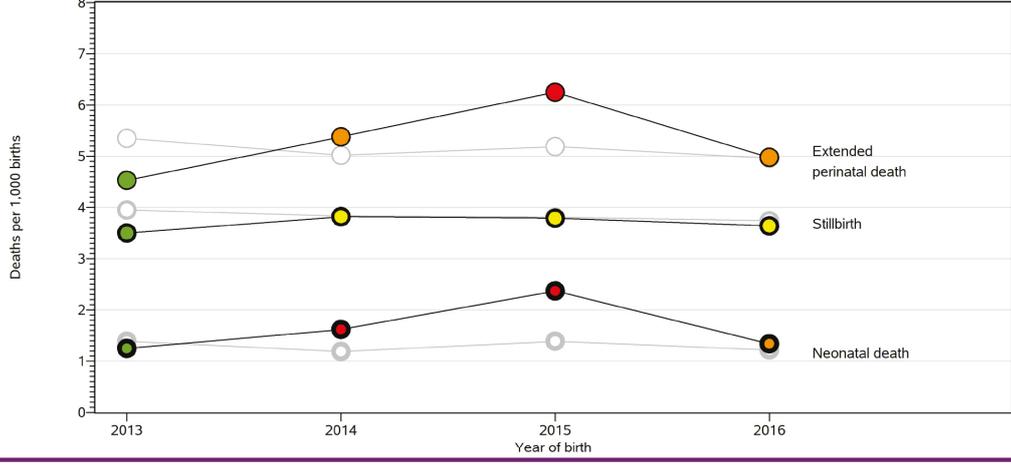
Due to updates to the data, these results might differ slightly from those in previous reports.



Stabilised & adjusted mortality by year of birth

Stabilised & adjusted mortality rates for each type of death compared to the average mortality rate for Trusts and Health Boards in the same comparator group (shown in grey) by year of birth.

Due to updates to the data and improvements to the statistical methodology used, these results might differ slightly from those in previous reports.



Data reporting

Completeness of key data items for DEATHS AT YOUR TRUST

The tables below provide details of completeness for key items in the data collection form. While the rest of this report concerns babies born within your Trust, these tables show the overall completeness of data for **deaths at your Trust no matter where they were born**. The percentage of data reported is given for each item, together with a coloured diamond denoting the level of completeness:

- ◆ less than 70.0% complete
- ◆ 70.0% to 84.9% complete
- ◆ 85.0% to 96.9% complete
- ◆ 97.0% to 99.9% complete
- ◆ 100% complete

These data items have been assessed as they are all readily available and essential to the accurate reporting of extended perinatal mortality for your Trust. For those items scoring red, orange or yellow it is essential that completeness is improved. Achieving this may well require collaboration with receiving and referring units.

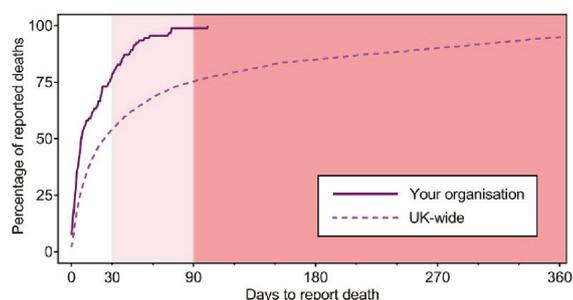
Mother's details	Completeness	Birth	Completeness
Name	100.0% ◆	Type of onset of labour	100.0% ◆
Postcode of residence	100.0% ◆	Actual place of birth	100.0% ◆
Ethnicity	100.0% ◆	Date and time of birth	100.0% ◆
Age	100.0% ◆	Final mode of birth	97.2% ◆

Booking and antenatal care [†]	Completeness	Baby's outcome	Completeness
Smoking	97.2% ◆	Date death confirmed [‡]	100.0% ◆
Body mass index	100.0% ◆	Whether alive at onset of care [‡]	96.8% ◆
Intended type of care at booking	94.5% ◆	Whether admitted to NNU [§]	100.0% ◆
Estimated date of delivery	97.2% ◆	Main cause of death	97.2% ◆

Baby's characteristics	Completeness
Birth weight	100.0% ◆
Gestational age at birth	97.2% ◆

[†] excluding mothers reported as never booked; [‡] this data item is collected for stillbirths only; [§] this data item is collected for neonatal deaths only.

Timing of reporting against 30 and 90 day benchmarks



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