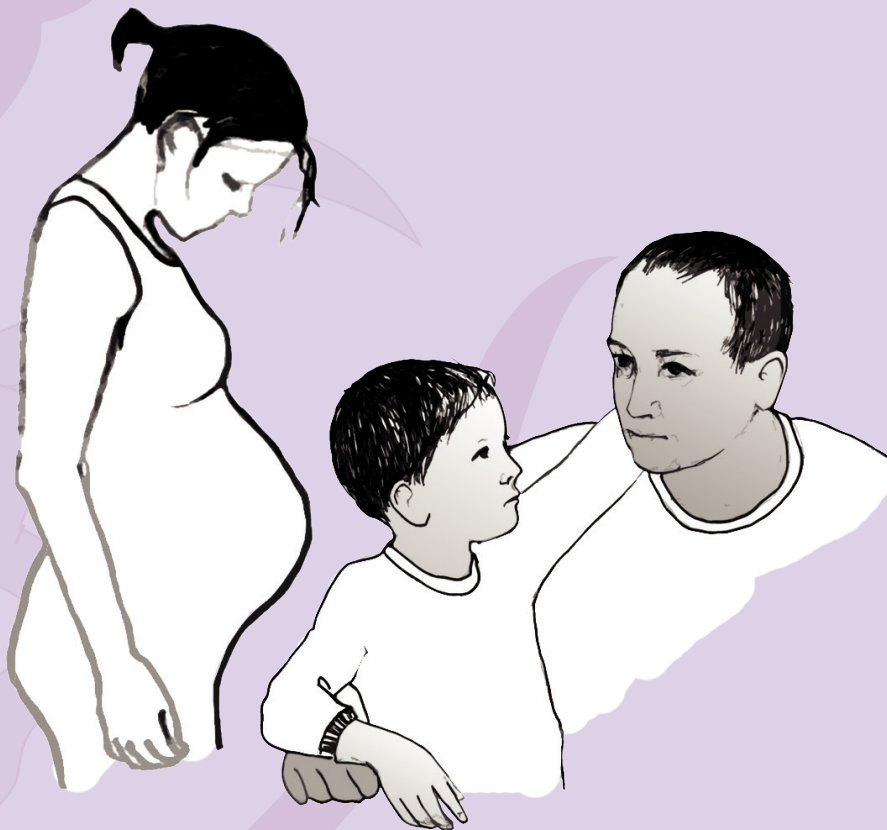


Maternal, Newborn and
Infant Clinical Outcome
Review Programme



MBRRACE-UK Perinatal Mortality Surveillance Report

UK Perinatal Deaths for Births from
January to December 2018



December 2020



Maternal, Newborn and Infant Clinical Outcome Review Programme



MBRRACE-UK Perinatal Mortality Surveillance Report

UK Perinatal Deaths for Births from
January to December 2018

Elizabeth S Draper, Ian D Gallimore, Lucy K Smith, Alan C Fenton,
Jennifer J Kurinczuk, Peter W Smith, Thomas Boby, Bradley N Manktelow

on behalf of the MBRRACE-UK collaboration

December 2020

Department of Health Sciences
University of Leicester
George Davies Centre
University Road
Leicester LE1 7RH



Funding

The Maternal, Newborn and Infant Clinical Outcome Review Programme, delivered by MBRRACE-UK, is commissioned by the Healthcare Quality Improvement Partnership (HQIP) as part of the National Clinical Audit and Patient Outcomes Programme (NCAPOP). 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. The Clinical Outcome Review Programmes, which encompass confidential enquiries, are designed to help assess the quality of healthcare, and stimulate improvement in safety and effectiveness by systematically enabling clinicians, managers, and policy makers to learn from adverse events and other relevant data. 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 Maternal, Newborn and Infant Clinical Outcome Review Programme is funded by NHS England, NHS Wales, the Health and Social Care division of the Scottish Government, the Northern Ireland Department of Health, and the States of Jersey, Guernsey, and the Isle of Man.

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

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

Cover Artist: Tana West

This report should be cited as:

Draper ES, Gallimore ID, Smith LK, Fenton AC, Kurinczuk JJ, Smith PW, Boby T, Manktelow BN, on behalf of the MBRRACE-UK Collaboration. MBRRACE-UK Perinatal Mortality Surveillance Report, UK Perinatal Deaths for Births from January to December 2018. Leicester: The Infant Mortality and Morbidity Studies, Department of Health Sciences, University of Leicester. 2020.

ISBN: 978-1-9999353-2-0

Published by: The Infant Mortality and Morbidity Studies

© 2020 Healthcare Quality and Improvement Partnership

Foreword

I am pleased to welcome this sixth MBRRACE-UK annual report on the death of babies before, during or soon after birth in 2018.

High quality data is vital to understand why babies have died and identify what needs to be done to reduce potentially avoidable deaths in the future. The 3,778 babies whose heart-breaking deaths comprise the numbers in this report are the motivation for paying attention to its findings. The stories of each baby and the bereaved families whose lives have been devastated by their child's death, motivate the work behind this report and the drive to ensure far fewer families face the same tragedy.

This report is published in 2020 – a year dominated by the COVID-19 pandemic. We do not yet know how its impact on maternity and neonatal services have affected the outcomes for families and babies. Looking back at 2018 is a reminder that the ambition to cut the number of baby deaths remains a fundamental public health priority. The themes in this report are entirely relevant in 2020-21.

There is some good news. The continued downward trend in perinatal deaths across the four nations of the UK is heartening, reflecting the impact of a range of national initiatives to address safety in maternity and neonatal care. Compared with 2013, there were 670 fewer baby deaths in 2018. Yet in order to achieve the accelerated fall in mortality needed across the UK, not least to meet the English government's target to cut deaths by 50% by 2025, there is still much further to go.

Inequalities in health and survival for babies are under the spotlight, and rightly so. Black and Black British, and Asian and Asian British babies are up to twice as likely to be stillborn or die neonatally. Rates of death are falling more slowly among these babies compared with White babies, suggesting national safety initiatives are failing to reach many women from higher risk ethnicities. The connection between risk and poverty is also clear, with women living in the most deprived areas at an 80% higher risk of their baby dying. These disparities are stark and unacceptable, yet they have been known about for years.

We welcome the report's recommendation to focus on identifying the needs of women and families at greater risk of their baby dying. Investment is urgently needed in new programmes that address the needs of pregnant Black and Asian women, ensuring the delivery of care is personalised and tailored to the needs of every woman and baby. Given the economic impact of COVID-19, the imperative to provide joined-up support for women from poorer households through pregnancy, birth and early parenting, is ever more urgent.

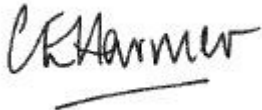
The fall in the number and rates of deaths overall, welcome though it is, is mainly among babies in late pregnancy. NHS interventions to improve safety in maternity initially focused on term babies because of the option to deliver the baby safely. Yet three out of four babies who died in 2018 were born before 37 week and UK pre-term birth rates are higher than for similar European countries. It is concerning that neonatal deaths continue to fall more slowly than stillbirths. The significant difference in survival rates of newborn babies between units offering the most specialist neonatal care, suggests there is more to do to understand where improvements in neonatal care could prevent newborns from dying. In 2019, the second iteration of the Saving Babies Lives Care Bundle in England introduced guidance on preterm and neonatal babies. Units need to be supported to embrace this and other safety programmes across all four nations, monitoring the impact of these improvements to care to understand if and how they are working.

Getting data to the national audit programme without delays is essential to understand, in the here and now, which deaths are occurring and why. So it is disappointing that in 2018 a third of baby deaths – around 1,200 - were not notified to MBRRACE within the 30-day benchmark. Without timely notification, the potential to respond rapidly to any emerging issues is lost. What is more, a review into the baby's death using the Perinatal Mortality Review Tool (PMRT), which will provide answers for parents about why their baby died, cannot be started. At the very least, Trusts and Health Boards should notify all baby deaths within seven days - and preferably within two days as is required for notifying neonatal deaths to the local Child Death Overview Panels (CDOPs). The

recently updated Maternity Incentive Scheme in England now requires prompt notification and we hope that translates into active real-time monitoring. We would like to see similar expectations set in the devolved nations.

Trusts and Health Boards must ensure the valuable MBRRACE-UK data is shared and used by those working on the ground. The MBRRACE-UK real-time data-monitoring (RTDM) tool, available since mid-2019, offers that opportunity. It allows units to analyse their own information about babies who are stillborn or die in their care, monitoring trends in deaths and the impact of their care. We endorse the report's recommendation that units use this tool to support the delivery of safer care.

The findings and recommendations in this report are of the utmost importance. Together with other national programmes, they support the possibility of real change. Amid the challenges of 2020 we must not lose sight of the ambition to act to reduce baby deaths. Bereaved parents and families expect no less.

A handwritten signature in black ink, appearing to read 'C Harmer', with a horizontal line underneath.

Dr Clea Harmer
CEO, Sands

Executive Summary

Introduction

MBRRACE-UK is 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 perinatal deaths from 22⁺⁰ weeks gestational age (including late fetal losses, stillbirths, and neonatal deaths) of babies born between 1st January and 31st December 2018.**

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 (from 20⁺⁰ weeks gestational age).
- 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. The information is presented in order to assist clinicians, commissioners, managers, parents, and the public in raising standards of maternity and neonatal care in order to reduce perinatal mortality across the UK.

The full set of data tables and figures, including mortality rates for Trusts and Health Boards, can be found in the accompanying Tables and Figures document. Full details of the MBRRACE-UK methodology, including case ascertainment and statistical methods, can be found in the accompanying Technical Document. All these documents are available for download from the MBRRACE-UK website (<http://www.npeu.ox.ac.uk/mbrance-uk/reports>).

Key findings

1. Extended perinatal mortality has reduced by 15% over five years, from 6.04 per 1,000 total births in 2013 to 5.13 per 1,000 total births in 2018, equivalent to approximately 670 fewer deaths in 2018.
2. Over a third of this reduction has occurred since 2017: this is likely to have resulted from various national initiatives to reduce perinatal mortality across the UK.
3. Stillbirth rates have reduced by just over 16% from 4.20 per 1,000 total births in 2013 to 3.51 per 1,000 total births in 2018, representing approximately 500 fewer stillbirths in 2018.
4. Neonatal mortality has reduced by 11% from 1.84 per 1,000 live births in 2013 to 1.64 deaths per 1,000 live births in 2018, representing approximately 170 fewer neonatal deaths in 2018.

5. The overall reduction in the stillbirth rate is mainly due to a reduction in the rate of term stillbirths of nearly a quarter (24%), from 1.6 per 1,000 total births in 2014 to 1.2 in 2018.
6. The largest reduction in the neonatal mortality rate is for late and moderately preterm births (32⁺⁰ to 36⁺⁶ weeks gestational age) of just under one fifth (19%) from 6.3 per 1,000 live births in 2014 to 5.1 in 2018.
7. Almost three-quarters of both stillbirths and neonatal deaths were for preterm births (<37 weeks gestational age): 75% and 71% respectively.
8. In 2018, 38% of stillbirths and 45% of neonatal deaths occurred in babies who were born extremely preterm (22+0 to 27+6 weeks gestational age).
9. Despite rates of stillbirth and neonatal mortality reducing over time, women living in the most deprived areas remain at 80% excess risk of stillbirth and neonatal death compared to women living in the least deprived areas; this remains fairly constant over the period from 2016 to 2018.
10. Mortality rates remain exceptionally high for babies of Black and Black British ethnicity: stillbirth rates are over twice those for babies of White ethnicity and neonatal mortality rates are 45% higher.
11. Similarly, mortality rates remain high for babies of Asian and Asian British ethnicity: stillbirth and neonatal mortality rates are both around 60% higher than for babies of White ethnicity.
12. After adjustment for risk factors and unit size, stillbirth rates show little variation between Trusts and Health Boards, with stabilised & adjusted rates for 83% of organisations falling within 5% of their comparator group average.
13. Stabilised & adjusted neonatal mortality rates for Trusts and Health which care for the most complex pregnancies and births show wide variation: only 13% of Trusts and Health Boards with a Level 3 Neonatal Intensive Care Unit (NICU) had a stabilised and adjusted neonatal mortality rate within 5% of their comparator group average.
14. Exclusion of deaths due to congenital anomalies removes variation in stabilised & adjusted stillbirth rates almost entirely, resulting in all Trusts and Health Boards falling within 5% of their comparator group average.
15. Variation in stabilised & adjusted neonatal mortality rates remains after exclusion of deaths due to congenital anomalies with only 17% of Trusts and Health Boards with a Level 3 Neonatal Intensive Care Unit (NICU) having a stabilised and adjusted neonatal mortality rate within 5% of their comparator group average.
16. Parents were offered a post-mortem for 97% of stillborn babies but only 84% of neonatal deaths in 2018.
17. Where a post-mortem was offered, half of the parents of stillborn babies and just over a third of the parents of neonates who died gave consent for full or limited post-mortem.
18. In 2018, 281 out of 378 neonatal deaths occurring on day one after birth or which were classified as intrapartum-related deaths (74%) had placental histology investigations carried out.
19. Approximately two-thirds of deaths were notified within the MBRRACE-UK benchmark time of 30 days: 69% of stillbirths and 64% of neonatal deaths (an increase from 58% of stillbirths and 52% of neonatal deaths in 2017).
20. There was no correlation between the total number of deaths per Trust or Health Board and the percentage of deaths notified within 30 days.
21. There is wide regional variation in the percentage of deaths notified within 30 days, from 71% of deaths in England to only 36% of deaths in Scotland.
22. Whilst the reporting of neonatal deaths in Scotland has improved, the reporting of Stillbirths continues to lag significantly behind the rest of the UK, with only 31% of stillbirths notified within 30 days.

23. The quality of data provided by Trusts and Health Boards to MBRRACE-UK is good, with many key variables achieving levels of over 95% completeness for stillbirths and neonatal deaths combined
24. A few key variables require more focus on completeness to achieve levels greater than 95%; in particular, smoking status (92%), date of first booking (94%) and whether the baby was alive at the onset of care in labour (87%).
25. There has been a continued improvement in the completeness of carbon monoxide monitoring data with rates of 56% in 2018, showing a steady increase from 43% and 47% in 2016 and 2017.

Recommendations

1. Develop public health initiatives to address issues linked to high risk populations. **ACTION: Policy Makers, UK Public Health Services.**
2. Ensure that healthcare providers have implemented national initiatives to reduce stillbirth and neonatal deaths and are monitoring their impact on reducing preterm birth. **ACTION: Service Commissioners, Trust and Health Board Directors, Clinical Directors.**
3. Ensure that there is a multi-agency targeted approach affecting women living in areas of high socio-economic deprivation across all points of the reproductive, pregnancy and neonatal healthcare pathway. **ACTION: Policy Makers, UK Public Health Services, Service Planners and Commissioners at local and national level.**
4. Identify the specific needs of Black and Asian populations and ensure that these are addressed as part of their reproductive and pregnancy healthcare provision. **ACTION: Service Planners, Service Commissioners, Health Professionals.**
5. Use the MBRRACE-UK real-time data monitoring tool as part of regular mortality meetings to help identify why an organisation's stabilised & adjusted stillbirth, neonatal mortality or extended perinatal mortality rate falls into the red or amber band. **ACTION: Trust and Health Board Directors, Clinical Directors, Heads Of Midwifery, Health Professionals.**
6. Investigate potential modifiable factors in the treatment of neonates when an organisation's stabilised and adjusted neonatal mortality rate falls into the red or amber bands after exclusion of deaths due to congenital anomalies. Ensure that this encompasses both local population characteristics and quality of care provision. **ACTION: Trust and Health Board Directors, Clinical Directors, Heads Of Midwifery.**
7. Explore local variation in post mortem uptake by different population groups, particularly by ethnicity and deprivation, and tailor training for consent takers based on the local population. **ACTION: Trust and Health Board Directors, Clinical Directors, Heads Of Midwifery, Health Professionals.**
8. Undertake placental histology for all babies admitted to a neonatal unit, preferably by a specialist perinatal pathologist. **ACTION: Trust And Health Board Directors, Clinical Directors, Heads Of Midwifery, Health Professionals.**
9. Notify all deaths via the MBRRACE-UK system within 7 working days of the death occurring, but with an aim to notify within 2 working days. Incorporate mechanisms for timely notification into local processes. **ACTION: Trust and Health Board Directors, Clinical Directors, Heads Of Midwifery, Health Professionals.**

10. Aim for completion of all surveillance data within 90 days to enable timely review with the PMRT and effective use of the MBRRACE-UK real-time data monitoring tool. Utilise the real-time data monitoring tool to ensure the data entered is complete and of high quality. **ACTION: Trust and Health Board Directors, Clinical Directors, Heads Of Midwifery, Health Professionals.**

Contents

Introduction	1
Perinatal mortality rates in the UK: 2018	3
Mortality rates by gestational age	7
Effect of deprivation on perinatal mortality	10
Effect of ethnicity on perinatal mortality	14
Mortality rates for Trusts and Health Boards	16
Offer of post-mortem examination	21
Timeliness of notification	24
Completeness of key data items	28
Definitions used in this report	31
Abbreviations	32
Acknowledgements.....	33
References	34



Introduction

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) 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.

The 2018 birth cohort

In this report rates of stillbirth, neonatal death and extended perinatal death are presented for births from 1 January 2018 to 31 December 2018; thus, neonatal deaths of babies born in December 2018 which occurred in January 2019 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.

Data sources

The data presented in this report is derived from a number of sources in addition to the information submitted via the MBRRACE-UK web-based reporting system: ONS, PDS, NRS, ISD, NISRA, Health and Social Services Department (Bailiwick of Guernsey), and the Health Intelligence Unit (Bailiwick of Jersey). Full details of all data sources and the case ascertainment procedure can be found in the accompanying Technical Document.

The UK total births 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.

Deaths included in reported mortality rates

This report focuses on **births from 24⁺⁰ weeks gestational age**, with the exception of the chapter on mortality rates by gestational age, which includes information on births at 22⁺⁰ to 23⁺⁶ weeks gestational age. **All terminations of pregnancy have been excluded from the mortality rates reported.** 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.

Report overview

This is the sixth MBRRACE-UK Perinatal Mortality Surveillance Report. This year the report has been reformatted in order to permit a clearer focus on key national issues. The main report is divided into eight sections: perinatal mortality rates in the UK; mortality rates by gestational age; the effect of deprivation on perinatal mortality; the effect of ethnicity on perinatal mortality; variation in mortality rates for Trusts and Health Board comparator groups; the offer of post-mortem examination; timeliness of notification of death; and the completeness of key data items.

The full set of data tables and figures, including mortality rates for Trusts and Health Boards, can now be found in the accompanying Tables and Figures document. This report should be read in conjunction with the accompanying Technical Document which contains full details of the MBRRACE-UK methodology, including case ascertainment and statistical methods.

All these documents are available for download from the MBRRACE-UK website (www.npeu.ox.ac.uk/mbrance-uk/reports).

Perinatal mortality rates in the UK: 2018

Key findings

- Extended perinatal mortality has reduced by 15% over five years, from 6.04 per 1,000 total births in 2013 to 5.13 per 1,000 total births in 2018, equivalent to approximately 670 fewer deaths in 2018.
- Over a third of this reduction has occurred since 2017: this increased trajectory is likely to have resulted from various national initiatives to reduce perinatal mortality across the UK.
- Stillbirth rates have reduced by just over 16% from 4.20 per 1,000 total births in 2013 to 3.51 per 1,000 total births in 2018, representing approximately 500 fewer stillbirths in 2018.
- Neonatal mortality has reduced by 11% from 1.84 per 1,000 live births in 2013 to 1.64 deaths per 1,000 live births in 2018, representing approximately 170 fewer neonatal deaths in 2018.

Data presented

1. **Rates of stillbirth, neonatal death, and extended perinatal death (stillbirth and neonatal deaths combined) for births that occurred in 2018 at 24⁺⁰ weeks gestational age or later (excluding terminations of pregnancy) for the UK and the devolved nations based on the mother's country of residence.**
2. **Trends in stillbirth, neonatal mortality and extended perinatal mortality rates for the UK and the devolved nations over the six years of the MBRRACE-UK programme, 2013 to 2018.**

Results

The total number of births at 24⁺⁰ weeks or greater gestational age (excluding terminations of pregnancy) in 2018 for the UK was 735,745, almost 25,000 less than in 2017 (760,169). There was a decrease in both the total number of stillbirths (2,579 in 2018 compared with 2,840 in 2017) and the total number of neonatal deaths (1,199 in 2018 compared with 1,267 in 2017). These reductions are reflected in a decrease in the reported mortality rates for 2018 across the UK as a whole; the extended perinatal mortality rate was 5.13 per 1,000 total births (5.40 in 2017), comprising 3.51 stillbirths per 1,000 total births (3.74 in 2017) and 1.64 neonatal deaths per 1,000 live births (1.67 in 2017).

There were no significant differences between the four countries of the UK in terms of their overall rates of stillbirth or stillbirth type. The lowest rate of both stillbirth and neonatal mortality in 2018 was in Scotland at 3.22 per 1,000 total births and 1.36 per 1,000 live births, respectively. For stillbirths the highest rate in 2018 was in Wales (3.76 per 1,000 total births) whilst the highest neonatal mortality rate was in Northern Ireland (2.05 per 1,000 live births). However, it is important to note that during this period stillbirth and neonatal mortality rates in Northern Ireland were 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. The law in Northern Ireland was changed on 21st October 2019 to allow abortion in defined circumstances: this does not affect the data in this report. As in previous years 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 2018

Number [§]	UK [^]	England	Scotland	Wales	Northern Ireland [°]	Crown Dep.
Total births	735,745	627,665	51,479	31,399	23,008	2,177
Live births	733,166	625,455	51,313	31,280	22,929	2,172
Stillbirths	2,579	2,210	166	119	79	5
Antepartum	2,258	1,939	144	103	68	4
Intrapartum	226	198	13	8	7	0
Unknown timing	95	73	9	8	4	1
Neonatal deaths	1,199	1,021	70	61	47	0
Early neonatal deaths	824	697	44	46	37	0
Late neonatal deaths	375	324	26	15	10	0
Perinatal deaths	3,403	2,907	210	165	116	5
Extended perinatal deaths	3,778	3,231	236	180	126	5

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

[^] including the Crown Dependencies

[°] during the period reported different laws existed in Northern Ireland for the termination of pregnancy

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

© 2020, re-used with the permission of NHS Digital. All rights reserved.

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 2018

Rate per 1,000 births [§]	UK [^]	England	Scotland	Wales	Northern Ireland [°]	Crown Dep.
Stillbirths[†]	3.51	3.52	3.22	3.79	3.43	2.30
	(3.37 to 3.64)	(3.37 to 3.67)	(2.73 to 3.71)	(3.11 to 4.47)	(2.68 to 4.19)	(0.29 to 4.31)
Antepartum [†]	3.07	3.09	2.80	3.28	2.96	1.84
	(2.94 to 3.2)	(2.95 to 3.23)	(2.34 to 3.25)	(2.65 to 3.91)	(2.25 to 3.66)	(0.04 to 3.64)
Intrapartum [†]	0.31	0.32	0.25	0.25	0.30	0.00
	(0.27 to 0.35)	(0.27 to 0.36)	(0.12 to 0.39)	(0.08 to 0.43)	(0.08 to 0.53)	(0.00 to 1.38)
Unknown timing [†]	0.13	0.12	0.17	0.25	0.17	0.46
	(0.10 to 0.16)	(0.09 to 0.14)	(0.06 to 0.29)	(0.08 to 0.43)	(0.00 to 0.34)	(0.00 to 1.36)
Neonatal deaths[‡]	1.64	1.63	1.36	1.95	2.05	0.00
	(1.54 to 1.73)	(1.53 to 1.73)	(1.04 to 1.68)	(1.46 to 2.44)	(1.46 to 2.64)	(0 to 1.38)
Early neonatal deaths [‡]	1.12	1.11	0.86	1.47	1.61	0.00
	(1.05 to 1.2)	(1.03 to 1.2)	(0.60 to 1.11)	(1.05 to 1.9)	(1.09 to 2.13)	(0.00 to 1.38)
Late neonatal deaths [‡]	0.51	0.52	0.51	0.48	0.44	0.00
	(0.46 to 0.56)	(0.46 to 0.57)	(0.31 to 0.7)	(0.24 to 0.72)	(0.17 to 0.71)	(0.00 to 1.38)
Perinatal deaths[†]	4.63	4.63	4.08	5.25	5.04	2.30
	(4.47 to 4.78)	(4.46 to 4.8)	(3.53 to 4.63)	(4.46 to 6.05)	(4.13 to 5.96)	(0.29 to 4.31)
Extended perinatal deaths[†]	5.13	5.15	4.58	5.73	5.48	2.30
	(4.97 to 5.3)	(4.97 to 5.32)	(4.00 to 5.17)	(4.90 to 6.57)	(4.52 to 6.43)	(0.29 to 4.31)

[†] per 1,000 total births

[‡] per 1,000 live births

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

[°] during the period reported different laws existed 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

© 2020, re-used with the permission of NHS Digital. All rights reserved.

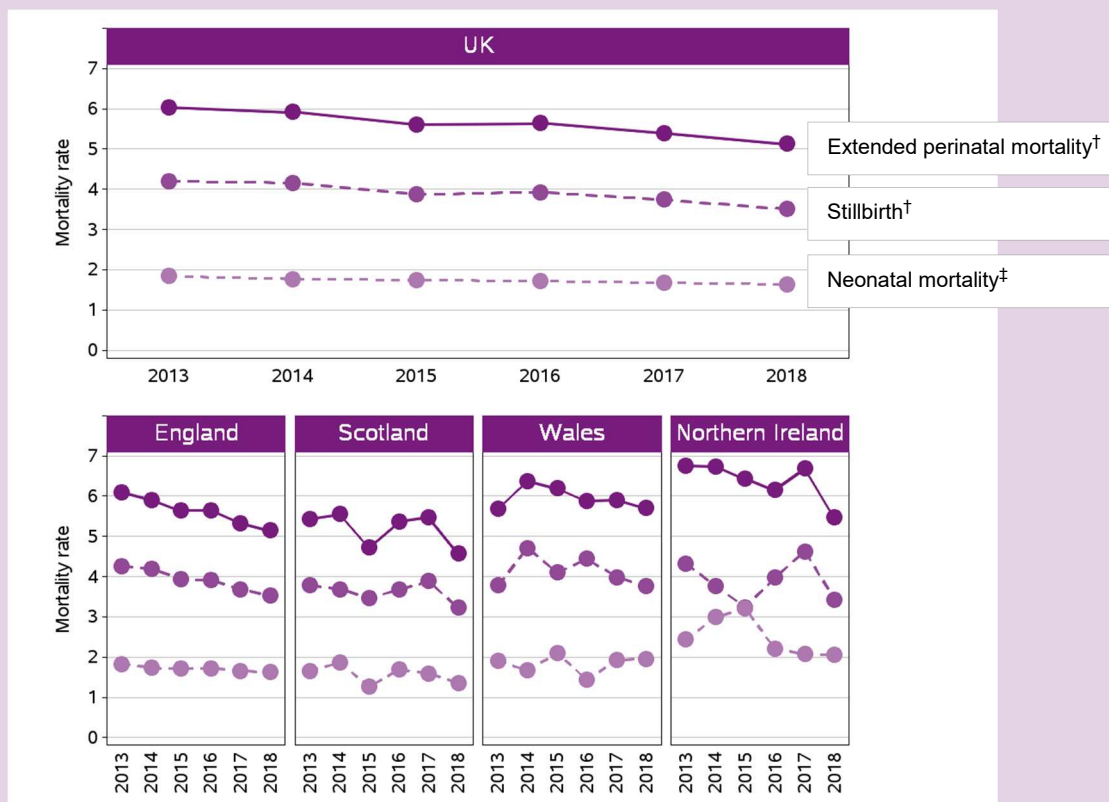
In the UK there has been a reduction in all three mortality rates (Table 3 and Figure 1), with a fall of 15% in the stillbirth rate, 11% in the neonatal mortality rate and 16% in the extended perinatal mortality rate, across the six years of the MBRRACE-UK programme. This overall pattern reflects a decline over the six year period in England but little evidence of change over time in the remaining devolved nations as their rates are more affected by short term variations due to their smaller population size.

Table 3: Stillbirth, neonatal, and extended perinatal mortality rates (95% confidence intervals (CIs)): United Kingdom and Crown Dependencies, for births from 2013 to 2018

Rate per 1,000 births [§]	2013	2014	2015	2016	2017	2018
Stillbirths[†]	4.20 (4.06 to 4.35)	4.12 (3.98 to 4.33)	3.87 (3.73 to 4.01)	3.93 (3.79 to 4.07)	3.74 (3.60 to 3.87)	3.51 (3.37 to 3.64)
Neonatal deaths[‡]	1.84 (1.75 to 1.94)	1.76 (1.67 to 1.86)	1.74 (1.65 to 1.84)	1.72 (1.63 to 1.81)	1.67 (1.58 to 1.77)	1.64 (1.54 to 1.73)
Extended perinatal deaths[†]	6.04 (5.87 to 6.21)	5.88 (5.71 to 6.04)	5.61 (5.44 to 5.77)	5.64 (5.48 to 5.28)	5.40 (5.24 to 5.57)	5.13 (4.97 to 5.30)

[§] excluding terminations of pregnancy and births <24⁺⁰ weeks gestational age
[°] during the period reported different laws existed 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
 © 2020, re-used with the permission of NHS Digital. All rights reserved.

Figure 1: Stillbirth, neonatal, and extended perinatal mortality rates for the UK and by country of residence: United Kingdom, for births from 2013 to 2018



[†] per 1,000 total births
[‡] per 1,000 live births
 Excluding terminations of pregnancy and births <24⁺⁰ weeks gestational age
 During the period reported different laws existed in Northern Ireland for the termination of pregnancy
 Data sources: MBRRACE-UK, PDS, ONS, NRS, ISD, NIMATS, States of Guernsey, States of Jersey
 © 2020, re-used with the permission of NHS Digital. All rights reserved.

Implications

All four UK nations have initiatives in place to reduce perinatal mortality rates [1-4] and this is reflected in the continuing downward trend in both stillbirth and neonatal mortality rates over the period from 2013 to 2018. Although the initial target in England to reduce mortality rates by 20% by 2020 [2] is on track for stillbirths, there is a smaller reduction in neonatal mortality rates. There is, however, still much work to be done to achieve the English Department of Health's revised target of a 50% reduction in these rates by 2025 which would result in more favourable comparisons with other similar high income countries. This will not only entail the provision of the highest quality of health service delivery but also initiatives addressing population socio-demographic and behavioural factors including:

- reduction of the wide inequalities in social deprivation,
- investigation of the causes of the excess perinatal mortality for BAME populations
- improved strategies to reduce obesity and smoking during pregnancy

Given the slower progress towards the reduction in neonatal mortality rates emphasis should be placed on reducing rates of preterm birth, particularly the most extreme preterm group. Whilst there is evidence that outcomes from very preterm births (<32 weeks gestational age) in the UK are similar to other European and high income countries [5, 6] the higher rate (and consequent numbers) of very preterm birth in the UK results in high neonatal mortality rates. The prediction and prevention of preterm birth element of the Saving Babies' Lives Care Bundle [7], The Scottish Government's Best Start initiative [8], and other similar initiatives across the UK is therefore of major importance in the reduction of neonatal mortality rates.

Recommendation 1

Develop public health initiatives to address issues linked to high risk populations.

Mortality rates by gestational age

Key findings

- The overall reduction in the stillbirth rate is mainly due to a reduction in the rate of term stillbirths of nearly a quarter (24%), from 1.6 per 1,000 total births in 2014 to 1.2 in 2018.
- The largest reduction in the neonatal mortality rate is for late and moderately preterm births (32⁺⁰ to 36⁺⁶ weeks gestational age) of just under one fifth (19%) from 6.3 per 1,000 livebirths in 2014 to 5.1 in 2018.
- Almost three-quarters of both stillbirths and neonatal deaths were for preterm births (<37 weeks gestational age): 75% and 71% respectively.
- In 2018, 38% of stillbirths and 45% of neonatal deaths occurred in babies who were born extremely preterm (22⁺⁰ to 27⁺⁶ weeks gestational age).

Data presented

1. **Rates of stillbirth, neonatal death, and extended perinatal death (stillbirth and neonatal deaths combined) for births that occurred in 2018 at 22⁺⁰ weeks gestational age or later (excluding terminations of pregnancy) in the UK, by gestational age.**
2. **Trends in rates of stillbirth, neonatal death, and extended perinatal death (stillbirth and neonatal deaths combined) for births that occurred from 2014 to 2018 at 22⁺⁰ weeks gestational age or later (excluding terminations of pregnancy) in the UK, by gestational age.**

Results

The data shows the marked impact of preterm birth in relation to both stillbirth and neonatal death rates in the UK, with data for 2018 showing that almost three-quarters of stillbirths and neonatal deaths were for births before 37 weeks gestational age (74.5% and 71.4% respectively). Including babies born at 22 to 23 weeks gestational age, almost two-fifths of stillbirths and just under half of neonatal deaths in 2018 were extremely preterm (<28 weeks gestational age): 38.1% and 44.9% respectively, once again emphasising the size of this problem in the UK.

There have been reductions in extended perinatal mortality rates across all gestational age groups from 22⁺⁰ to 41⁺⁶ weeks gestational age (Tables 4 to 6). This pattern is not seen for babies born at 42⁺⁰ weeks and over but this group are most affected by short term variations because the number of deaths is extremely small. Applying the rates observed in 2014 to the population of births in 2018 indicates that there were 577 fewer deaths of babies born from 24⁺⁰ weeks gestational age in 2018. Half of this reduction in deaths (49%) is associated with births at 37⁺⁰ to 41⁺⁶ weeks, 32% with those at 32⁺⁰ to 36⁺⁶ weeks, 7.5% with those at 28⁺⁰ to 31⁺⁶ weeks and 10% with those at 24⁺⁰ to 27⁺⁶ weeks.

The largest reduction in deaths is seen for stillbirths at 37⁺⁰ to 41⁺⁶ weeks, with a fall in mortality rates of almost one quarter (24.4%) over the five year period, and this is likely to reflect initiatives in place across the UK focusing on the reduction of term stillbirths. Stillbirths at 32⁺⁰ to 36⁺⁶ weeks have fallen by 16% and at 28⁺⁰ to 31⁺⁶ weeks by 7.5%. For neonatal deaths the largest reduction of almost one fifth (18.6%) was seen at 32⁺⁰ to 36⁺⁶ weeks whilst there was little reduction seen at term, at only 3%.

Table 4: Number and percentage of stillbirths by gestational age at birth: United Kingdom and Crown Dependencies, for births from 2014 to 2018

Gestational age at birth (weeks)		2014	2015	2016	2017	2018
22 ⁺⁰ -23 ⁺⁶	Births [§]	1,010	1,001	1,040	1,078	1,022
	Stillbirths N (%)	499 (13.4)	524 (14.7)	529 (14.7)	530 (15.7)	508 (16.5)
	Rates per 1,000 births [†]	494.1	523.5	508.7	491.7	497.1
24 ⁺⁰ -27 ⁺⁶	Births [§]	3,192	3,221	3,269	3,227	3,064
	Stillbirths N (%)	722 (19.4)	733 (20.6)	717 (19.9)	710 (21.1)	665 (21.6)
	Rates per 1,000 births [†]	226.2	227.6	219.3	220.0	217.0
28 ⁺⁰ -31 ⁺⁶	Births [§]	6,469	6,558	6,620	6,540	6,083
	Stillbirths N (%)	537 (14.4)	495 (13.9)	512 (14.2)	482 (14.3)	467 (15.1)
	Rates per 1,000 births [†]	83.0	75.5	77.3	73.7	76.8
32 ⁺⁰ -36 ⁺⁶	Births [§]	49,385	49,652	50,371	50,296	48,189
	Stillbirths N (%)	802 (21.5)	762 (21.4)	786 (21.9)	730 (21.7)	658 (21.3)
	Rates per 1,000 births [†]	16.2	15.3	15.6	14.5	13.7
37 ⁺⁰ -41 ⁺⁶	Births [§]	700,709	704,733	678,093	660,980	637,280
	Stillbirths N (%)	1143 (30.7)	1025 (28.8)	1031 (28.7)	894 (26.5)	772 (25)
	Rates per 1,000 births [†]	1.6	1.5	1.5	1.4	1.2
≥42	Births [§]	21,854	18,980	18,277	16,212	14,307
	Stillbirths N (%)	21 (0.6)	15 (0.4)	19 (0.5)	22 (0.7)	15 (0.5)
	Rates per 1,000 births [†]	1.0	0.8	1.0	1.4	1.1
Total births		782,619	784,145	757,670	738,333	709,945

[§] excluding terminations 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
 © 2020, re-used with the permission of NHS Digital. All rights reserved.

Table 5: Number and percentage of neonatal deaths by gestational age at birth: United Kingdom and Crown Dependencies, for births from 2014 to 2018

Gestational age at birth (weeks)		2014	2015	2016	2017	2018
22 ⁺⁰ -23 ⁺⁶	Live births [§]	511	477	511	548	514
	Neonatal deaths N (%)	376 (21.5)	342 (20.1)	360 (21.3)	386 (23.4)	356 (22.9)
	Rates per 1,000 births [‡]	735.8	717.0	704.5	704.4	692.6
24 ⁺⁰ -27 ⁺⁶	Live births [§]	2,470	2,488	2,552	2,517	2,399
	Neonatal deaths N (%)	384 (21.9)	383 (22.5)	404 (23.9)	365 (22.2)	342 (22.0)
	Rates per 1,000 births [‡]	155.5	153.9	158.3	145.0	142.6
28 ⁺⁰ -31 ⁺⁶	Live births [§]	5,932	6,063	6,108	6,058	5,616
	Neonatal deaths N (%)	182 (10.4)	205 (12)	177 (10.5)	187 (11.4)	167 (10.8)
	Rates per 1,000 births [‡]	30.7	33.8	29.0	30.9	29.7
32 ⁺⁰ -36 ⁺⁶	Live births [§]	48,583	48,890	49,585	49,566	47,531
	Neonatal deaths N (%)	305 (17.4)	271 (15.9)	275 (16.2)	270 (16.4)	244 (15.7)
	Rates per 1,000 births [‡]	6.3	5.5	5.5	5.4	5.1
37 ⁺⁰ -41 ⁺⁶	Live births [§]	699,566	703,708	677,062	660,086	636,508
	Neonatal deaths N (%)	493 (28.2)	495 (29.1)	468 (27.6)	428 (26)	431 (27.8)
	Rates per 1,000 births [‡]	0.7	0.7	0.7	0.6	0.7
≥42	Births [§]	21,833	18,965	18,258	16,190	14,292
	Neonatal deaths N (%)	10 (0.6)	7 (0.4)	9 (0.5)	11 (0.7)	13 (0.8)
	Rates per 1,000 births [‡]	0.5	0.4	0.5	0.7	0.9
Total births		782,619	784,145	757,670	738,333	709,945

[§] excluding terminations 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
 © 2020, re-used with the permission of NHS Digital. All rights reserved.

Table 6: Number and percentage of extended perinatal deaths by gestational age at birth: United Kingdom and Crown Dependencies, for births from 2014 to 2018

Gestational age at birth (weeks)		2014	2015	2016	2017	2018
22 ⁺⁰ -23 ⁺⁶	Births [§]	1,010	1,001	1,040	1,078	1,022
	Extended perinatal deaths N (%)	875 (16)	866 (16.5)	889 (16.8)	916 (18.3)	864 (18.6)
	Rates per 1,000 births [†]	866.3	865.1	854.8	849.7	845.4
24 ⁺⁰ -27 ⁺⁶	Births [§]	3,192	3,221	3,269	3,227	3,064
	Extended perinatal deaths N (%)	1106 (20.2)	1116 (21.2)	1121 (21.2)	1075 (21.4)	1007 (21.7)
	Rates per 1,000 births [†]	346.5	346.5	342.9	333.1	328.7
28 ⁺⁰ -31 ⁺⁶	Births [§]	6,469	6,558	6,620	6,540	6,083
	Extended perinatal deaths N (%)	719 (13.1)	700 (13.3)	689 (13)	669 (13.3)	634 (13.7)
	Rates per 1,000 births [†]	111.1	106.7	104.1	102.3	104.2
32 ⁺⁰ -36 ⁺⁶	Births [§]	49,385	49,652	50,371	50,296	48,189
	Extended perinatal deaths N (%)	1107 (20.2)	1033 (19.6)	1061 (20.1)	1000 (19.9)	902 (19.4)
	Rates per 1,000 births [†]	22.4	20.8	21.1	19.9	18.7
37 ⁺⁰ -41 ⁺⁶	Births [§]	700,709	704,733	678,093	660,980	637,280
	Extended perinatal deaths N (%)	1636 (29.9)	1520 (28.9)	1499 (28.4)	1322 (26.4)	1203 (25.9)
	Rates per 1,000 births [†]	2.3	2.2	2.2	2.0	1.9
≥42	Births [§]	21,854	18,980	18,277	16,212	14,307
	Extended perinatal deaths N (%)	31 (0.6)	22 (0.4)	28 (0.5)	33 (0.7)	28 (0.6)
	Rates per 1,000 births [†]	1.4	1.2	1.5	2.0	2.0
Total births		782,619	784,145	757,670	738,333	709,945

[§] excluding terminations 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

© 2020, re-used with the permission of NHS Digital. All rights reserved.

Implications

The large reduction in stillbirth rates for term births provides evidence of the successful implementation of targeted initiatives across the four nations of the UK. Most of this work was initially focused on reducing term stillbirths and is reflected in the rates presented, with the lowest rates of stillbirth reduction at the lowest gestational ages. Newer initiatives, e.g. version 2 of the Saving Babies' Lives Care Bundle which was launched in March 2019, were not in place for the data presented in this report. Such initiatives have expanded their focus to include the prevention of neonatal deaths and preterm births. The high rates of preterm in birth in the UK compared to other European countries [9] highlights the importance of intervention programmes to reduce preterm births and the need to use gestation specific mortality rates for international and between organisation comparisons. Furthermore, in order to ensure the standardised reporting of deaths before 24⁺⁰ weeks gestational age we would encourage healthcare professionals to use the MBRRACE-UK guidance for the assessment of signs of life in births before 24⁺⁰ weeks gestational age when it is published later this year.

Recommendation 2

Ensure that healthcare providers have implemented national initiatives to reduce stillbirth and neonatal deaths and are monitoring their impact on reducing preterm birth.

Effect of deprivation on perinatal mortality

Key findings

- Despite rates of stillbirth and neonatal mortality reducing over time, women living in the most deprived areas remain at 80% excess risk of stillbirth and neonatal death compared to women living in the least deprived areas; this remains fairly constant over the period from 2016 to 2018.

Data presented

1. **Rates of stillbirth and neonatal death for births in the UK at 24⁺⁰ weeks gestational age or later (excluding terminations of pregnancy) for the period 2016 to 2018, by socio-economic deprivation quintile of mothers' residence.**
2. **Mortality rate ratios for stillbirths and neonatal deaths for births in the UK at 24⁺⁰ weeks gestational age or later (excluding terminations of pregnancy) for the period 2016 to 2018, by socio-economic deprivation quintile of mothers' residence, relative to the least deprived group.**

Socio-economic deprivation is measured using the Children in Low-Income Families Local Measure [10] based on the mother's postcode of residence at the time of birth.

Results

The direct relationship between higher levels of socio-economic deprivation and higher stillbirth and neonatal mortality rates can be seen for all years (Table 7 and Table 8). While there is a decline in overall stillbirth rates over time, relative reductions have been less among babies born to women living in more deprived areas, with a 4% reduction in stillbirth rates from 4.91 to 4.68 per 1000 births for those living in the most deprived areas compared to a 13% reduction from 2.96 to 2.61 per 1000 births for those living in the least deprived areas. Rates for neonatal mortality show less marked change with inequalities remaining wide with rates of 2.20 per 1000 live births among babies born to women living in the most deprived areas to 1.23 per 1000 live births among those living in the least deprived areas.

Relative to the least deprived group, mortality rate ratios for the other four quintiles of socio-economic deprivation show an increased risk with increasing levels of deprivation throughout the period 2016 to 2018. However, there has been a reduction in these mortality rate ratios over time. The excess risk for babies born to women living in the most deprived quintile, compared to those living in the least deprived quintile, has reduced from 88% to 80% for stillbirth (Table 9) and from 88% to 79% for neonatal death (Table 10).

Table 7: Stillbirth rates by socio-economic deprivation quintile of residence by year: United Kingdom and Crown Dependencies, for births in 2016 to 2018

Socio-economic deprivation quintile*	Number (%) [§]						Rate per 1,000 births [§]		
	Stillbirths						Stillbirths [†]		
	2016		2017		2018		2016	2017	2018
1 - Least deprived	456	(14.9)	424	(14.9)	387	(15.0)	2.96	2.81	2.61
2	546	(17.8)	471	(16.6)	400	(15.5)	3.48	3.12	2.77
3	608	(19.8)	545	(19.2)	504	(19.5)	3.95	3.58	3.41
4	671	(21.9)	660	(23.2)	596	(23.1)	4.33	4.34	4.09
5 - Most deprived	764	(24.9)	733	(25.8)	686	(26.6)	4.91	4.84	4.68
Not known	20	(0.7)	7	(0.2)	6	(0.2)	4.33	2.74	2.40

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

[†] per 1,000 total births

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

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

© 2020, re-used with the permission of NHS Digital. All rights reserved.

Table 8: Neonatal mortality rates by mothers' socio-economic deprivation quintile of residence by year: United Kingdom and Crown Dependencies, for births in 2016 to 2018

Socio-economic deprivation quintile*	Number (%) [§]						Rate per 1,000 births [§]		
	Neonatal deaths						Neonatal deaths [†]		
	2016		2017		2018		2016	2017	2018
1 - Least deprived	186	(13.9)	199	(15.7)	182	(15.2)	1.21	1.32	1.23
2	234	(17.5)	212	(16.7)	202	(16.8)	1.50	1.41	1.40
3	257	(19.2)	230	(18.2)	235	(19.6)	1.68	1.52	1.59
4	303	(22.7)	310	(24.5)	259	(21.6)	1.96	2.05	1.78
5 - Most deprived	351	(26.3)	312	(24.6)	320	(26.7)	2.27	2.07	2.20
Not known	6	(0.4)	4	(0.3)	1	(0.1)	1.31	1.57	0.40

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

* based on mothers' postcodes at time of birth, 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

© 2020, re-used with the permission of NHS Digital. All rights reserved.

Table 9: Ratios of mortality rates for stillbirth by mothers' socio-economic deprivation quintile of residence by year: United Kingdom and Crown Dependencies, for births in 2016 to 2018

Socio-economic deprivation quintile*	Ratio of mortality rates (95% confidence intervals) [§]		
	Stillbirths		
	2016	2017	2018
1 - Least deprived	Reference	Reference	Reference
2	1.18 (1.1 to 1.26)	1.11 (1.01 to 1.22)	1.06 (0.96 to 1.17)
3	1.33 (1.25 to 1.42)	1.27 (1.17 to 1.39)	1.31 (1.19 to 1.43)
4	1.46 (1.38 to 1.55)	1.54 (1.43 to 1.67)	1.57 (1.44 to 1.7)
5 - Most deprived	1.88 (1.7 to 2.07)	1.72 (1.6 to 1.86)	1.79 (1.66 to 1.94)

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

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

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

© 2020, re-used with the permission of NHS Digital. All rights reserved.

Table 10: Ratios of mortality rates for neonatal death by mothers' socio-economic deprivation quintile of residence by year: United Kingdom and Crown Dependencies, for births in 2015 to 2017

Socio-economic deprivation quintile*	Ratio of mortality rates (95% confidence intervals) [§]		
	Neonatal deaths		
	2016	2017	2018
1 - Least deprived	Reference	Reference	Reference
2	1.24 (1.1 to 1.4)	1.07 (0.93 to 1.23)	1.14 (0.99 to 1.31)
3	1.39 (1.24 to 1.56)	1.15 (1.01 to 1.32)	1.29 (1.13 to 1.48)
4	1.62 (1.46 to 1.8)	1.55 (1.38 to 1.74)	1.45 (1.27 to 1.64)
5 - Most deprived	1.88 (1.7 to 2.07)	1.57 (1.4 to 1.76)	1.79 (1.59 to 2.01)

[§] excluding terminations of pregnancy and births <24⁰ weeks gestational age

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

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

© 2020, re-used with the permission of NHS Digital. All rights reserved.

Implications

Whilst there has been a reduction in the stillbirth and neonatal mortality rates across all levels of deprivation over the past three years, the excess risk of both stillbirth and neonatal death for women living in the most deprived areas remains high at around 80%. In order to have a major impact on these rates, public health, commissioning bodies and healthcare providers should work together to ensure maternity services are easily accessible by all women and to target interventions to try and reduce the impact of high socio-economic deprivation on women's health. A PhD studentship is currently underway to explore inequalities in adverse pregnancy outcome aiming to identify sub groups of women with multiple risk factors and their geographical distribution, to facilitate the development of focused intervention programmes.

Recommendation 3

Ensure that there is a multi-agency targeted approach affecting women living in areas of high socio-economic deprivation across all points of the reproductive, pregnancy and neonatal healthcare pathway.

Effect of ethnicity on perinatal mortality

Key findings

- Mortality rates remain exceptionally high for babies of Black and Black British ethnicity: stillbirth rates are over twice those for babies of White ethnicity and neonatal mortality rates are 45% higher.
- Similarly, mortality rates remain high for babies of Asian and Asian British ethnicity: stillbirth and neonatal mortality rates are both around 60% higher than for babies of White ethnicity.

Data presented

1. **Rates of stillbirth and neonatal death for births in the UK at 24⁺⁰ weeks gestational age or later (excluding terminations of pregnancy) for the period 2016 to 2018, by babies' ethnicity.**
2. **Mortality rate ratios for stillbirths and neonatal deaths for births in the UK at 24⁺⁰ weeks gestational age or later (excluding terminations of pregnancy) for the period 2016 to 2018, by babies' ethnicity, relative to White ethnicity.**

Results

A reduction in stillbirth rates over time can be seen for all ethnic groups apart from those of mixed ethnicity (Table 11). In 2017 it was highlighted that for the first time since 2013 there had been a decrease in the rate of stillbirth for babies of Black or Black British ethnicity [11] and this has continued with a decrease of 11.3% from 8.29 in 2016 to 7.35 per 1,000 total births in 2018. A similar decrease of 12.6% was seen in the rate of stillbirth for babies of Asian or Asian British ethnicity reducing from 6.09 to 5.32 per 1,000 total births. There was a smaller reduction in neonatal mortality rates across all ethnicities (Table 12): for babies of Black and Black British ethnicity a decrease of 6.3% from 2.55 in 2016 to 2.39 per 1,000 live births in 2018 and for babies of Asian or Asian British ethnicity a decrease of 7.0% from 2.83 to 2.63 per 1,000 live births.

Over the past three years the ratio of mortality rates for stillbirths and neonatal deaths has remained fairly constant over time in terms of ethnicity (Tables 13 and 14). Compared to babies of White ethnicity, babies of Black or Black British ethnicity remain at over twice the risk of stillbirth (117% increased risk) and 45% increased risk of neonatal mortality. However whilst both stillbirth and neonatal mortality rates have seen a reduction over time there has been a small increase in the ratio of mortality rates for babies of Black or Black British ethnicity compared to babies of White ethnicity suggesting that interventions are having more impact on the latter group. Babies of Asian or Asian British ethnicity are at 57% increased risk of stillbirth and 59% increased risk of neonatal mortality compared to babies of White ethnicity, with both mortality rates and ratios showing a small reduction over time.

Table 11: Stillbirth rates by babies' ethnicity by year: United Kingdom and Crown Dependencies, for births in 2016 to 2018

Baby's ethnicity	Number (%) [§]						Rate per 1,000 births [§]		
	Stillbirths						Stillbirths [†]		
	2016		2017		2018		2016	2017	2018
White	2067	(67.4)	1,911	(67.3)	1,738	(67.4)	3.74	3.59	3.39
Mixed	164	(5.4)	184	(6.5)	170	(6.6)	4.01	4.56	4.25
Asian, Asian British	457	(14.9)	415	(14.6)	370	(14.3)	6.09	5.70	5.31
Black, Black British	275	(9.0)	239	(8.4)	226	(8.8)	8.29	7.46	7.35
Other	87	(2.8)	73	(2.6)	64	(2.5)	4.14	3.68	3.29
Refused/Not Known	15	(0.5)	18	(0.6)	11	(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

© 2020, re-used with the permission of NHS Digital. All rights reserved.

Table 12: Neonatal mortality rates by babies' ethnicity by year: United Kingdom and Crown Dependencies, for births in 2016 to 2018

Baby's ethnicity	Number (%) [§]						Rate per 1,000 births [§]		
	Neonatal deaths						Neonatal deaths [†]		
	2016		2017		2018		2016	2017	2018
White	937	(70.1)	878	(69.3)	843	(70.3)	1.70	1.66	1.65
Mixed	71	(5.3)	54	(4.3)	62	(5.2)	1.74	1.34	1.56
Asian, Asian British	211	(15.8)	207	(16.3)	182	(15.2)	2.83	2.86	2.63
Black, Black British	84	(6.3)	88	(6.9)	73	(6.1)	2.55	2.77	2.39
Other	29	(2.2)	32	(2.5)	26	(2.2)	1.38	1.62	1.34
Refused/Not Known	5	(0.4)	8	(0.6)	13	(1.1)			

[§] 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

© 2020, re-used with the permission of NHS Digital. All rights reserved.

Table 13: Ratios of mortality rates for stillbirth by babies' ethnicity by year: United Kingdom and Crown Dependencies, for births in 2016 to 2018

Baby's ethnicity	Ratio of mortality rates (95% confidence intervals) [§]		
	Stillbirths		
	2016	2017	2018
White	Reference	Reference	Reference
Mixed	1.07 (0.92 to 1.25)	1.27 (1.10 to 1.47)	1.25 (1.08 to 1.46)
Asian, Asian British	1.63 (1.48 to 1.78)	1.59 (1.44 to 1.75)	1.57 (1.41 to 1.73)
Black, Black British	2.21 (1.97 to 2.49)	2.08 (1.83 to 2.36)	2.17 (1.90 to 2.47)
Other	1.10 (0.89 to 1.36)	1.02 (0.81 to 1.29)	0.97 (0.76 to 1.24)

[§] 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

© 2020, re-used with the permission of NHS Digital. All rights reserved.

Table 14: Ratios of mortality rates for neonatal death by babies' ethnicity by year: United Kingdom and Crown Dependencies, for births in 2016 to 2018

Baby's ethnicity	Ratio of mortality rates (95% confidence intervals) [§]		
	Neonatal deaths		
	2016	2017	2018
White	Reference	Reference	Reference
Mixed	1.02 (0.81 to 1.29)	0.81 (0.62 to 1.06)	0.94 (0.73 to 1.21)
Asian, Asian British	1.66 (1.45 to 1.90)	1.73 (1.50 to 1.98)	1.59 (1.37 to 1.84)
Black, Black British	1.50 (1.21 to 1.86)	1.67 (1.35 to 2.06)	1.45 (1.15 to 1.82)
Other	0.81 (0.56 to 1.17)	0.98 (0.69 to 1.38)	0.81 (0.55 to 1.19)

[§] excluding terminations of pregnancy and births <24⁺ weeks gestational age
 Data sources: MBRRACE-UK, PDS, ONS, NRS, ISD, NIMATS, States of Guernsey, States of Jersey
 © 2020, re-used with the permission of NHS Digital. All rights reserved.

Implications

Although rates of stillbirth and neonatal death are decreasing across all ethnicities the small upturn in the ratio of mortality rates for babies of Black and Black British ethnicity compared to babies of White ethnicity suggests that current interventions are having a larger impact on outcomes of babies of White ethnicity: a more targeted approach is required for the Black and Black British population. Further work is required to investigate the high rates of stillbirth and neonatal death for Black and Asian communities to facilitate the development of new intervention programmes for these populations. The next MBRRACE-UK confidential enquiries in 2021/22 will be reviewing the quality of care provision provided for mothers and babies of Black and Black British and/or Asian and Asian British ethnicity to identify areas where care could be improved and to assess whether the care provided for these communities is equitable.

Recommendation 4

Identify the specific needs of Black and Asian populations and ensure that these are addressed as part of their reproductive and pregnancy healthcare provision.

Mortality rates for Trusts and Health Boards

Key findings

For Trusts and Health Boards:

- After adjustment for risk factors and unit size, stillbirth rates show little variation between organisations with stabilised & adjusted rates for 83% of organisations falling within 5% of their comparator group average.
- Stabilised & adjusted neonatal mortality rates for organisations which care for the most complex pregnancies and births show wide variation: only 13% of Trusts and Health Boards with a Level 3 Neonatal Intensive Care Unit (NICU) had a stabilised and adjusted neonatal mortality rate within 5% of their comparator group average.
- Exclusion of deaths due to congenital anomalies removes variation in stabilised & adjusted stillbirth rates almost entirely, resulting in all organisations falling within 5% of their comparator group average.
- Variation in stabilised & adjusted neonatal mortality rates remains after exclusion of deaths due to congenital anomalies with only 17% of Trusts and Health Boards with a Level 3 Neonatal Intensive Care Unit (NICU) having a stabilised and adjusted neonatal mortality rate within 5% of their comparator group average.

Data presented

Variation in stabilised and adjusted rates of stillbirth, neonatal death, and extended perinatal death (stillbirth and neonatal deaths combined) for births that occurred in 2018 at 24⁺⁰ weeks gestational age or later (excluding terminations of pregnancy) by Trust and Health Board, with and without deaths due to congenital anomalies.

To account for the wide variation in case-mix, Trusts and Health Boards were 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 order to compare Trusts and Health Boards more fairly, **stabilised & adjusted mortality rates** are calculated. 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. 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 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). A complete explanation of the MBRRACE-UK methodology, including statistical methods, can be found in the accompanying Technical Document.

Results

The extent to which the hierarchical classification of Trusts and Health Boards reflects the risk profiles of the different types of unit is presented in Figure 2. The average mortality rate for each comparator group is shown as a vertical black line, with an amber box representing up to 5% higher or up to 5% lower than the group average. Stabilised & adjusted stillbirth rates show little variation, with 83% of Trusts and Health Boards falling within 5% of their comparator group average. This is not the case for the stabilised & adjusted rate of neonatal mortality where only 31% of Trusts and Health Boards fall within 5% of their comparator group average. This wide variation is particularly apparent between Trusts and Health Boards with a level 3 NICU, both with and without surgical provision, where only 13% of Trusts and Health Boards fall within 5% of their comparator group average.

Overall stabilised & adjusted stillbirth rates for Trusts and Health Boards across the UK ranged from 3.46 to 4.26 per 1,000 total births for those with a level 3 NICU and neonatal surgery and from 2.29 to 2.41 for Trusts and Health Boards with under 2,000 births per annum.

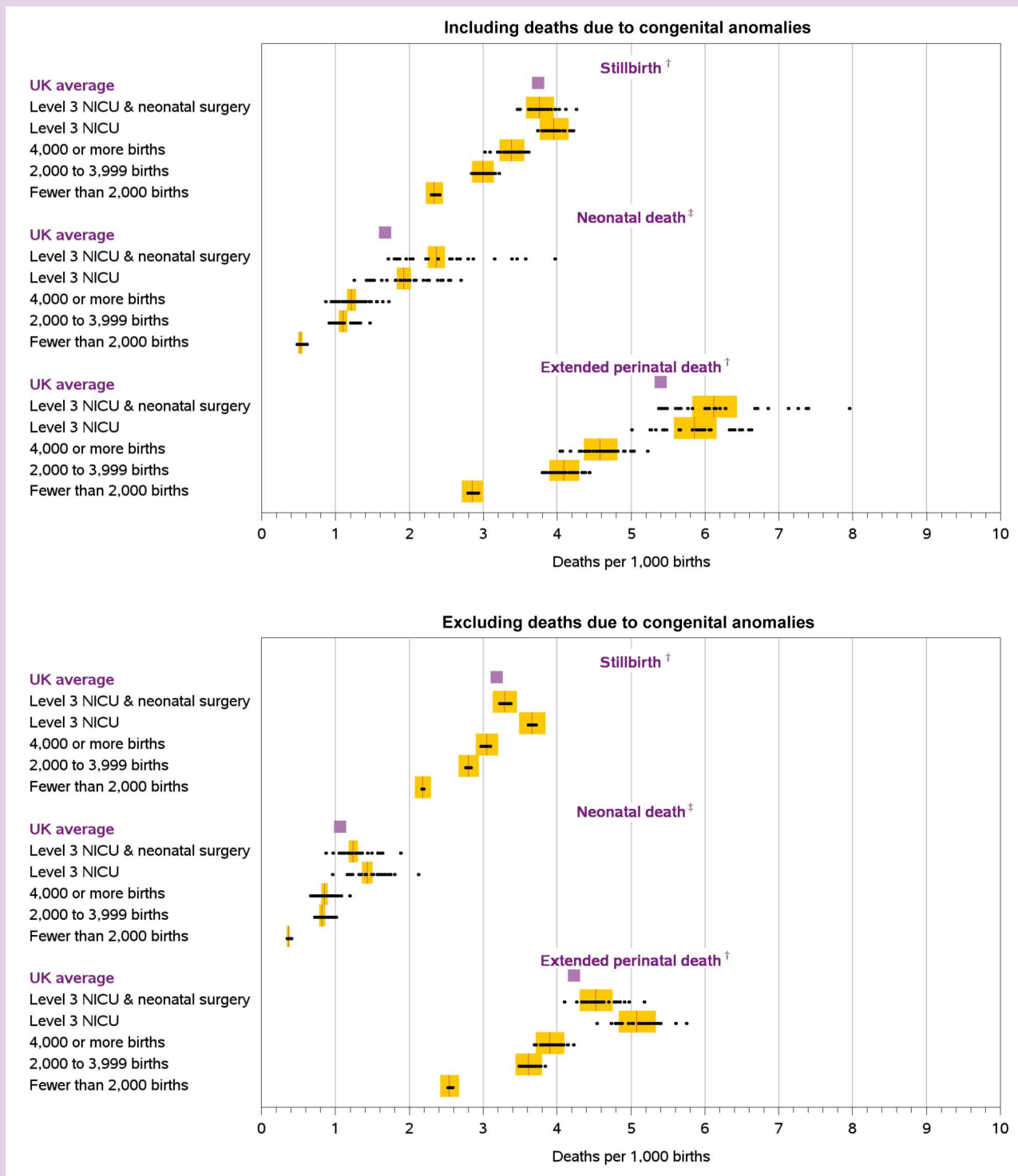
Stabilised & adjusted neonatal mortality rates for Trusts and Health Boards across the UK ranged from 1.71 to 3.97 per 1,000 live births for those with a level 3 NICU and neonatal surgery and from 0.48 to 0.61 for Trusts and Health Boards with under 2,000 births per annum.

Exclusion of deaths due to congenital anomalies has the effect of almost entirely removing variation in stabilised & adjusted stillbirth rates compared to the comparator group average, with all Trusts and Health Boards falling within 5% of the group average (range 2.17 to 3.71 per 1,000 total births). Overall stabilised & adjusted stillbirth rates excluding deaths due to congenital anomalies ranged from 3.26 to 3.34 per 1,000 births for those with a level 3 NICU and neonatal surgery and from 2.17 to 2.19 for Trusts and Health Boards with less than 2,000 births per annum.

In comparison, exclusion of deaths due to congenital anomalies has little impact on the variation in stabilised & adjusted neonatal mortality rates compared to the comparator group average (Table 15). Once deaths due to congenital anomalies are excluded only 17% of Trusts and Health Boards with a Level 3 NICU, both with and without surgical provision, fall within 5% of their group average (range 0.87 to 2.13 per 1,000 live births). Fifty-six Trusts and Health Boards had a neonatal mortality rate over 5% higher than the comparator average irrespective of whether congenital anomalies are excluded.

Crude and stabilised & adjusted rates for individual Trusts and Health Boards, with and without deaths due to congenital anomalies, can be found in the accompanying Tables and Figures document.

Figure 2: Stabilised & adjusted mortality rates including and excluding congenital anomalies 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 2018



The amber band represents up to 5% higher or up to 5% lower than the comparator group average mortality rate

† per 1,000 total births

‡ per 1,000 live births

§ 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

Note: during the period reported different laws existed in Northern Ireland for the termination of pregnancy

© 2020, re-used with the permission of NHS Digital. All rights reserved.

Table 15: Stabilised & adjusted mortality rate colour rating for Trusts and Health Boards by comparator group, including and excluding deaths due to congenital anomalies: neonatal deaths, 2018

Comparator group		Number of organisations in colour band (%)*							
		● Green		● Yellow		● Amber		● Red	
Level 3 NICU and neonatal surgery	Including congenital anomalies	8	(30.8%)	5	(19.2%)	2	(7.7%)	12	(42.3%)
	Excluding congenital anomalies	3	(11.5%)	8	(30.8%)	5	(19.2%)	10	(38.5%)
Level 3 NICU	Including congenital anomalies	8	(28.6%)	3	(10.7%)	5	(17.9%)	12	(42.9%)
	Excluding congenital anomalies	8	(28.6%)	3	(10.7%)	4	(14.3%)	13	(46.4%)
4,000 or more births	Including congenital anomalies	6	(13.0%)	8	(17.4%)	15	(32.6%)	17	(37.0%)
	Excluding congenital anomalies	5	(10.9%)	13	(28.3%)	10	(21.7%)	18	(39.1%)
2,000-3,999 births	Including congenital anomalies	3	(7.7%)	11	(28.2%)	11	(28.2%)	14	(35.9%)
	Excluding congenital anomalies	0	(0.0%)	12	(30.8%)	15	(38.5%)	12	(30.8%)
Under 2,000 births	Including congenital anomalies	0	(0.0%)	3	(14.3%)	15	(71.4%)	3	(14.3%)
	Excluding congenital anomalies	0	(0.0%)	1	(4.8%)	17	(81.0%)	3	(14.3%)
All groups	Including congenital anomalies	25	(14.4%)	30	(19.4%)	48	(30.6%)	57	(35.6%)
	Excluding congenital anomalies	16	(10.0%)	37	(23.1%)	51	(31.9%)	56	(35.0%)

* Colours represent variation from comparator group average neonatal mortality rate:

- Green: more than 15% lower than the average
- Yellow: more than 5% and up to 15% lower than the average
- Amber: up to 5% higher or up to 5% lower than the average
- Red: more than 5% higher than the average

Data sources: MBRRACE-UK, PDS, ONS, NRS, ISD, NIMATS, States of Guernsey, States of Jersey
 Note: during the period reported different laws existed in Northern Ireland for the termination of pregnancy
 © 2020, re-used with the permission of NHS Digital. All rights reserved.

Implications

Stabilised and adjusted stillbirth and neonatal mortality rates for five different categories of Trusts and Health Boards have been produced to allow for a more fair comparison between similar units, both accounting for unit size and also for the case mix of the population served by each hospital. Once congenital anomalies are excluded there is little variation in stillbirth rates within each of the five categories of Trusts and Health Boards, suggesting equitable healthcare provision across providers. This is not the case for neonatal mortality where variation persists despite the exclusion of congenital anomalies. Whether this is due to local population characteristics including deprivation and ethnicity [12] or care provision requires further investigation at both local, organisational and population levels

Recommendation 5

Use the MBRRACE-UK real-time data monitoring tool as part of regular mortality meetings to help identify why an organisation's stabilised & adjusted stillbirth, neonatal mortality or extended perinatal mortality rate falls into the red or amber band.

Recommendation 6

Investigate potential modifiable factors in the treatment of neonates when an organisation's stabilised and adjusted neonatal mortality rate falls into the red or amber bands after exclusion of deaths due to congenital anomalies. Ensure that this encompasses both local population characteristics and quality of care provision.

Offer of post-mortem examination

Key findings

- Parents were offered a post-mortem for 97% of stillborn babies but only 84% of neonatal deaths in 2018.
- Where a post-mortem was offered, half of the parents of stillborn babies and just over a third of the parents of neonates who died gave consent for full or limited post-mortem.
- In 2018, 281 out of 378 neonatal deaths occurring on day one after birth or which were classified as intrapartum-related deaths (74%) had placental histology investigations carried out.

Data presented

1. The number and proportion of stillbirths and neonatal deaths where there was an offer of post-mortem and whether consent was obtained, in 2018.
2. The number and proportion of stillbirths and neonatal deaths where a placental histology examination was carried out, in 2018.

Results

Parents were offered a post-mortem for almost all stillborn babies (97.1% including 0.2% referred to the coroner) and just over four-fifths of neonatal deaths (84.6% including 3.8% referred to the coroner). Where a post-mortem was offered, half of the parents of stillborn babies and just over a third of the parents of neonates who died gave consent for a full or limited post-mortem.

Table 16: 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 2018

Post-mortem status*	Stillbirths [§]		Neonatal deaths [§]		Extended perinatal deaths [§]	
	Number	(%)	Number	(%)	Number	(%)
Not offered	26	(1.0)	71	(5.9)	97	(2.6)
Not known if offered	50	(1.9)	113	(9.4)	163	(4.3)
Offered but no consent	1211	(47.0)	600	(50.0)	1811	(47.9)
Offered but unknown consent	28	(1.1)	21	(1.8)	49	(1.3)
Offered and limited consent	137	(5.3)	26	(2.2)	163	(4.3)
Offered and full consent	1122	(43.5)	322	(26.9)	1444	(38.2)
Not offered but discussed with / accepted by coroner or procurator fiscal	5	(0.2)	46	(3.8)	51	(1.3)

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

A lower proportion of stillbirths had placental histology examination carried out in 2018 (89.5%) than in 2017 (91.2%), stalling the steady increase observed in these procedures over recent years. For neonatal deaths occurring on the first day of life or of an intrapartum-related cause, 74.3% had placental histology carried out, a small increase from 2017 (73.7%).

Table 17: Number and percentage of placental histology examinations by type of death (stillbirths and intrapartum-related or first day neonatal deaths): United Kingdom and Crown Dependencies, for births in 2018

Placental histology status	Stillbirths [§]		Neonatal deaths ^{§‡}	
	Number	(%)	Number	(%)
With placental histology	2306	(89.4)	281	(74.1)
Without placental histology	272	(10.6)	98	(25.9)

[§] Excluding terminations of pregnancy and births <24⁰ weeks gestational age

[‡] Neonatal deaths on day 1 of life or with an intrapartum cause of death

Data source: MBRRACE-UK

Implications

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. At this extremely difficult time for parents they need complete and comprehensible information, provided in a sensitive and respectful manner. This should include the potential benefits of post-mortem and placental histology results for the management of any future pregnancies, in order to allow them to make an informed choice. Obstetricians and neonatologists should acknowledge both the potential benefits and limitations of a post-mortem examination and involve pathologists in communicating the findings with parents [13, 14].

The Human Tissue Authority's (HTA) Code of Practice (and Health Improvement Scotland's Management of Post-Mortem Examinations Standards where the baby dies in Scotland) mandates that anyone involved in seeking consent for a post-mortem receives training in consent taking. However, there are currently no agreed standards that consent training must meet, other than addressing the requirements of the Human Tissue Act and the appropriate national guidance. The Sands Guide for Consent Takers, as endorsed by the HTA, may therefore serve as a useful basis for local training [15].

Consideration should also be given to the possible influence of local factors on post-mortem uptake, particularly in areas where deprivation and ethnicity may account for reduced rates of post-mortem consent. Previous analysis of MBRRACE-UK data indicates that parents from the most deprived areas were 24% less likely to consent to post-mortem examination than those from the least deprived areas. Rates of consent were also significantly lower for parents of Asian Pakistani and Asian Bangladeshi babies, where consent to post-mortem was 56% and 61% less likely compared to White British [16]. Research has described a number of potential barriers to post-mortem uptake, including communication and understanding of the process as well as parental dislike of invasive procedures [17-19]. Training may therefore need to be tailored appropriately to account for local population differences, without making assumptions about parental choices. The availability of less invasive procedures should also be considered.

In 2018 the offer of post-mortem was recorded for almost all stillbirths. However, in the case of many neonatal deaths where the clinical team may consider the cause of death to be known and that therefore 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. Low post-mortem uptake for neonatal deaths, together with reduced rates of consent in areas of high deprivation and amongst parents of particular ethnicities, means that current strategies for reducing perinatal deaths are likely to be limited by a lack of post-mortem information.

Abnormalities of the placenta, cord or membranes identified during placental histology are suggested as a cause or contributory factor in 11% to 65% of stillbirths [20, 21]. Placental histology can also provide insight into the underlying cause of conditions for babies and therefore should also be requested for live born babies where there is an anticipated high risk of death, i.e. those with a potential intrapartum cause or who die on the first day of life. In addition, placental histology can help diagnose any conditions that may have affected the outcome for the woman and baby in this pregnancy, as well as providing information for counselling women for future

pregnancies [22]. In order to ensure optimal pathological analysis and interpretation, placental histology should if possible be undertaken for all stillbirths and indicated neonatal deaths by a specialist pathologist.

Recommendation 7

Explore local variation in post mortem uptake by different population groups, particularly by ethnicity and deprivation, and tailor training for consent takers based on the local population.

Recommendation 8

Undertake placental histology for all babies admitted to a neonatal unit, preferably by a specialist perinatal pathologist.

Timeliness of notification

Key findings

- Approximately two-thirds of deaths were notified within the MBRRACE-UK benchmark time of 30 days: 69% of stillbirths and 64% of neonatal deaths (an increase from 58% of stillbirths and 52% of neonatal deaths in 2017).
- There was no correlation between the total number of deaths per Trust or Health Board and the percentage of deaths notified within 30 days.
- There is wide regional variation in the percentage of deaths notified within 30 days, from 71% of deaths in England to only 36% of deaths in Scotland.
- Whilst the reporting of neonatal deaths in Scotland has improved, the reporting of Scottish stillbirths continues to lag significantly behind the rest of the UK, with only 31% of stillbirths notified within 30 days.

Data presented

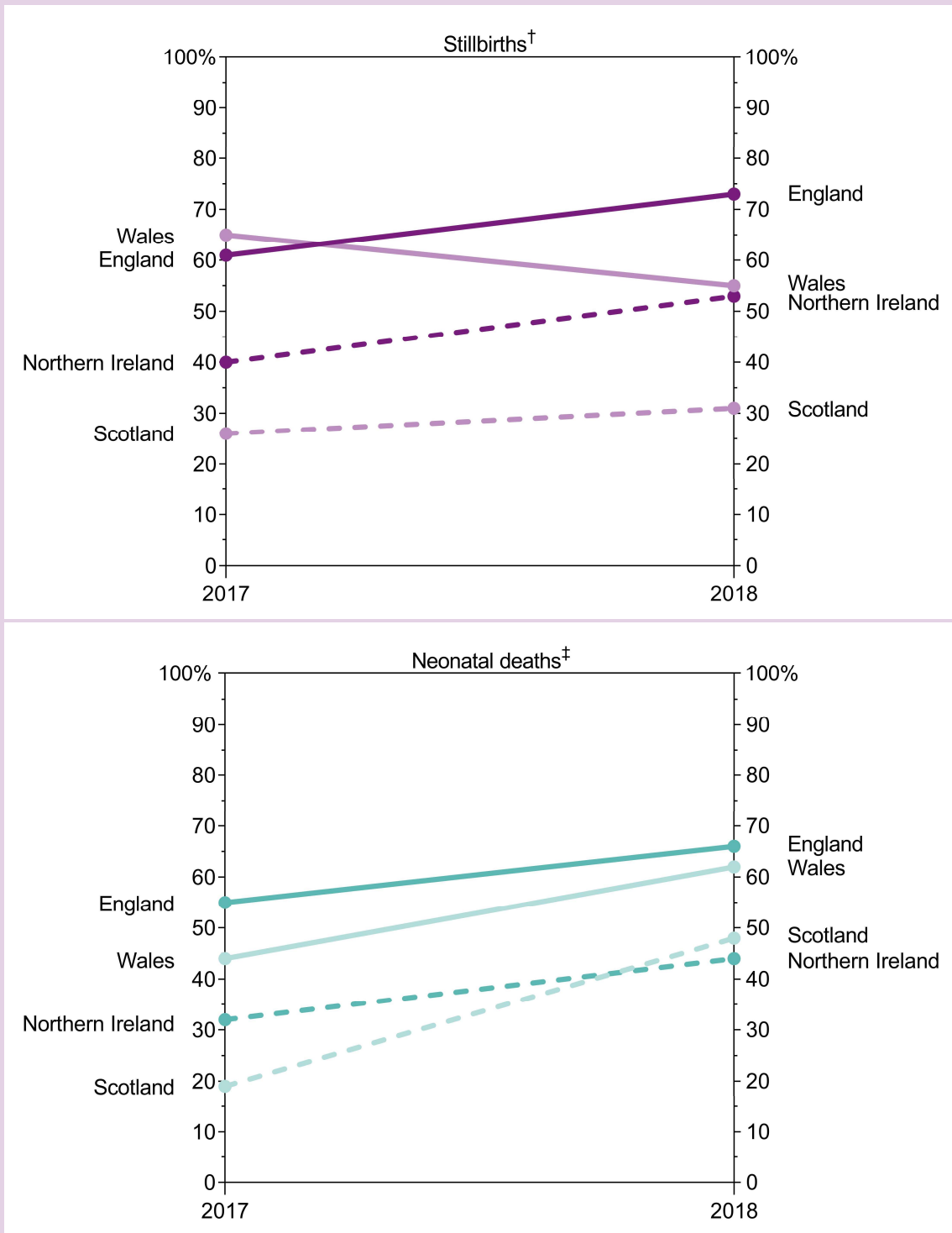
1. **Percentage of deaths notified within 30 days.**
2. **Regional variation in the timing of the notification of perinatal deaths.**

The data shown in Figures 3 and 4 below is derived from information submitted via the MBRRACE-UK web-based reporting system.

Results

The number of deaths notified within 30 days for England and Northern Ireland across all types of death has shown a substantial increase, with 70.8% of deaths in England and 49.7% of deaths in Northern Ireland notified within 30 days (compared with 58.6% and 37.1% respectively for 2017; Figure 3). Data entry is carried out centrally in Northern Ireland by the NIMACH office, which contributes to an initial delay in notification of deaths. For Scotland, although there is a large increase in the percentage of neonatal deaths notified within 30 days (from 18.8% in 2017 to 47.8% in 2018) this is not reflected in the notification rate for stillbirths which only increased from 26.1% in 2017 to 30.7% in 2018. For Wales the percentage of neonatal deaths meeting the 30 day benchmark for notification increased from 44.1% in 2017 to 61.7% 2018. However there was a marked decrease in the percentage of notifications for stillbirths in Wales meeting the benchmark (down from 65.0% in 2017 to 54.7% in 2018). There was no correlation between the total number of deaths per Trust or Health Board and the percentage of deaths notified within 30 days (Figure 4). Only 12 Trusts and Health Boards notified all of their deaths within 30 days.

Figure 3: Percentage of stillbirths and neonatal deaths notified to MBRRACE-UK within 30 days, by country: 2017 and 2018



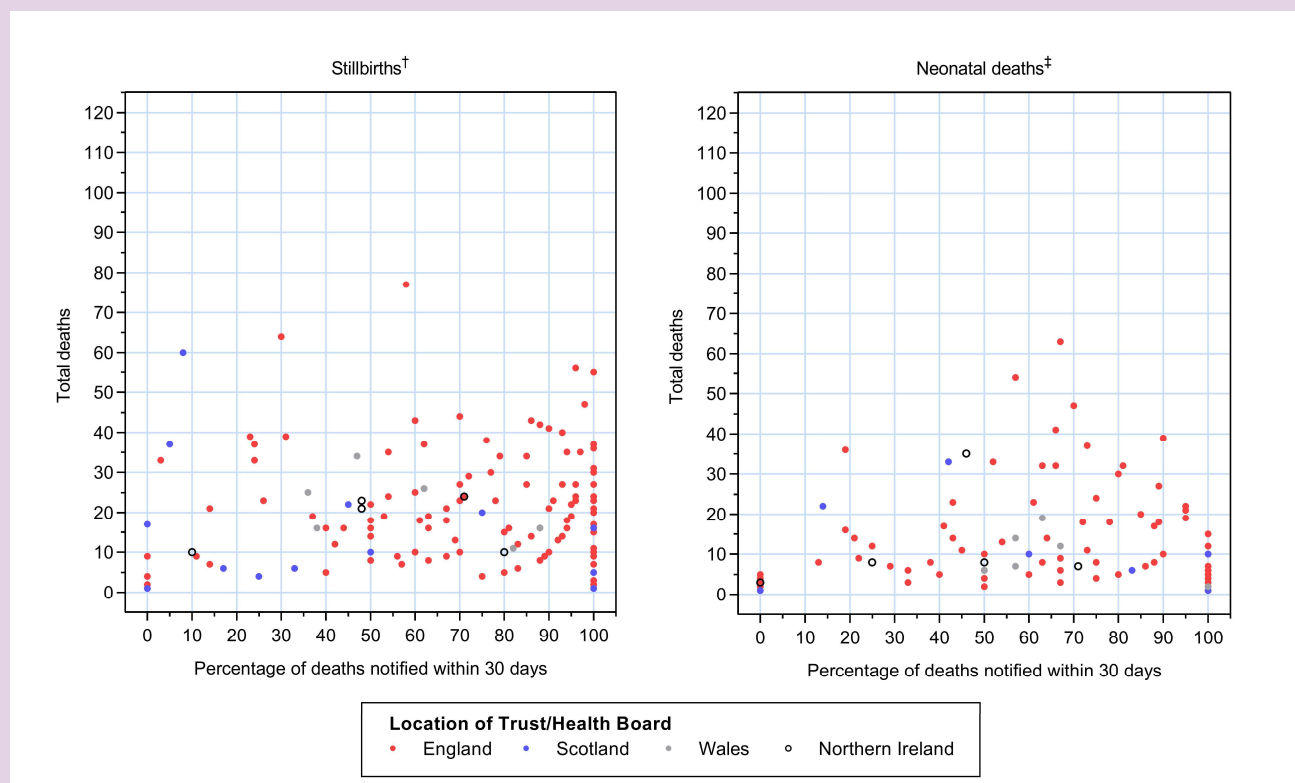
[†] Includes late fetal losses at 22-23 weeks gestational age

[‡] From 22⁺⁰ weeks gestational age at birth

Excluding terminations of pregnancy

Data source: MBRRACE-UK

Figure 4: Percentage of stillbirths and neonatal deaths notified to MBRRACE-UK within 30 days, by Trust and Health Board: 2018



[†] Includes late fetal losses at 22-23 weeks gestational age

[‡] From 22⁺ weeks gestational age at birth

Excluding terminations of pregnancy

Data source: MBRRACE-UK

The number of days taken to notify deaths ranged from zero to 660 (UK-wide average 52 days). Most late notifications (more than six months after the death) are the result of newly identified deaths via the case ascertainment/validation process undertaken by MBRRACE-UK using routine data sources, which are subsequently highlighted to Trusts and Health Boards as “missing” cases. A small proportion of late notifications were due to deaths which occurred outside a clinical setting where the maternity or neonatal team were not aware of the death and which were identified later by MBRRACE-UK. However, this does not account for the 143 deaths which were notified more than a year after the death occurred.

Implications

For the vast majority of stillbirths and neonatal deaths there is no clear reason why such deaths cannot be notified to MBRRACE-UK in a timely fashion, and certainly within 30 days. Most neonatal deaths are already subject to rapid notification, with the CDOP process in England requiring notification within 48 hours. As a matter of good practice, Trusts and Health Boards should incorporate MBRRACE-UK notification within this process and implement a similar standard for the notification of stillbirths. The information required to complete the initial notification is minimal and should be easily available at the time of death.

When a death occurs outside of the maternity or neonatal unit setting, such as in A&E or a hospice, there may be a delay in notification as details about the death may not always be relayed to the appropriate person in the maternity or neonatal team. Such delays are usually extremely rare occurrences and can be avoided in future by ensuring there are clear lines of communication between A&E, local hospices, and those responsible for notifying deaths to MBRRACE-UK. However, when deaths are routinely notified later than 30 days after they occurred Trusts and Health Boards should consider whether there are particular local factors which may be impacting on the timely notification of deaths, such as resourcing issues, inadequate staffing or time allocation, or a more systemic problem.

The MBRRACE-UK case ascertainment process ensures that, ultimately, all deaths are identified and included in the annual surveillance report. Deaths identified in routine data sources which have not been reported to MBRRACE-UK are flagged as “missing” cases for Trusts and Health Boards to report. However, it is important to note that the identification of missing cases is delayed by the availability of the routine data, and it may therefore be six to nine months before an unreported death is identified by MBRRACE-UK.

The introduction of the Perinatal Mortality Review Tool has reduced the amount of time taken for most deaths to be notified, as notification forms a mandatory part of the review process. This is particularly apparent in England, where the Maternity Incentive Scheme makes timely notification of critical importance if review standards are to be met. However, for the devolved nations without this incentive, the improvements are slower and less significant. The time taken to notify deaths by Scottish Health Boards continues to be poor.

Surveillance data feeds directly into the MBRRACE-UK real-time data monitoring tool available to all registered users of the MBRRACE-UK online reporting system. The tool allows Trusts and Health Boards to monitor and analyse their perinatal deaths, but its effectiveness is dependent on the timeliness and quality of the data feeding into it from Trusts and Health Boards. Substantial delays in notification of deaths and completion of the surveillance data may therefore be a missed opportunity for prompt action to prevent deaths and to monitor the effects of any interventions.

Recommendation 9

Notify all deaths via the MBRRACE-UK system within 7 working days of the death occurring, but with an aim to notify within 2 working days. Incorporate mechanisms for timely notification into local processes.

Completeness of key data items

Key findings

- The quality of data provided by Trusts and Health Boards to MBRRACE-UK is good, with many key variables achieving levels of over 95% completeness for stillbirths and neonatal deaths combined.
- A few key variables require more focus on completeness to achieve levels greater than 95%; in particular, smoking status (92%), date of first booking (94%) and whether the baby was alive at the onset of care in labour (87%).
- There has been a continued improvement in the completeness of carbon monoxide monitoring data with rates of 56% in 2018, showing a steady increase from 43% and 47% in 2016 and 2017.

Data presented

Level of completeness of selected key data items for extended perinatal deaths reported to MBRRACE-UK by Trusts and Health Boards, for births in 2016 to 2018.

Results

Information concerning BMI (or height and weight) and final mode of birth was recorded for all extended perinatal deaths across the UK. In addition levels of completeness of data for ethnicity, actual and intended type of care, type of onset of labour, main cause of death, maternal age and estimated date of delivery were all in excess of 95%. However, disappointingly some of these variables were less complete than in the previous year: for example, maternal age completeness was only 96% in 2018 compared to 100% in both 2016 and 2017, and small reductions were also seen for actual and intended type of care and main cause of death.

In order to achieve levels of completeness of 95% or more Trusts and Health Boards should pay particular attention to the collection of smoking status (92% in 2018, a small reduction from 93% in 2017), date of first booking (94%), date of first booking (a slight improvement on 2017 at 94% in 2018) and whether the baby was alive at the onset of labour (87% in 2018 compared to 88% in 2017). There has been a continued improvement in the completeness of carbon monoxide monitoring data in line with the Saving Babies' Lives Care Bundle [7] in England that recommends that all women are offered CO monitoring as part of antenatal care and similar initiatives across the developed nations, with rates of 56% in 2018, a steady increase from 43% and 47% in 2016 and 2017. MBRRACE-UK includes age at leaving full time education in the data collection to facilitate any international comparisons requiring a standardised measure of social factors, but to date completeness of this variable remains low at 28% in 2018.

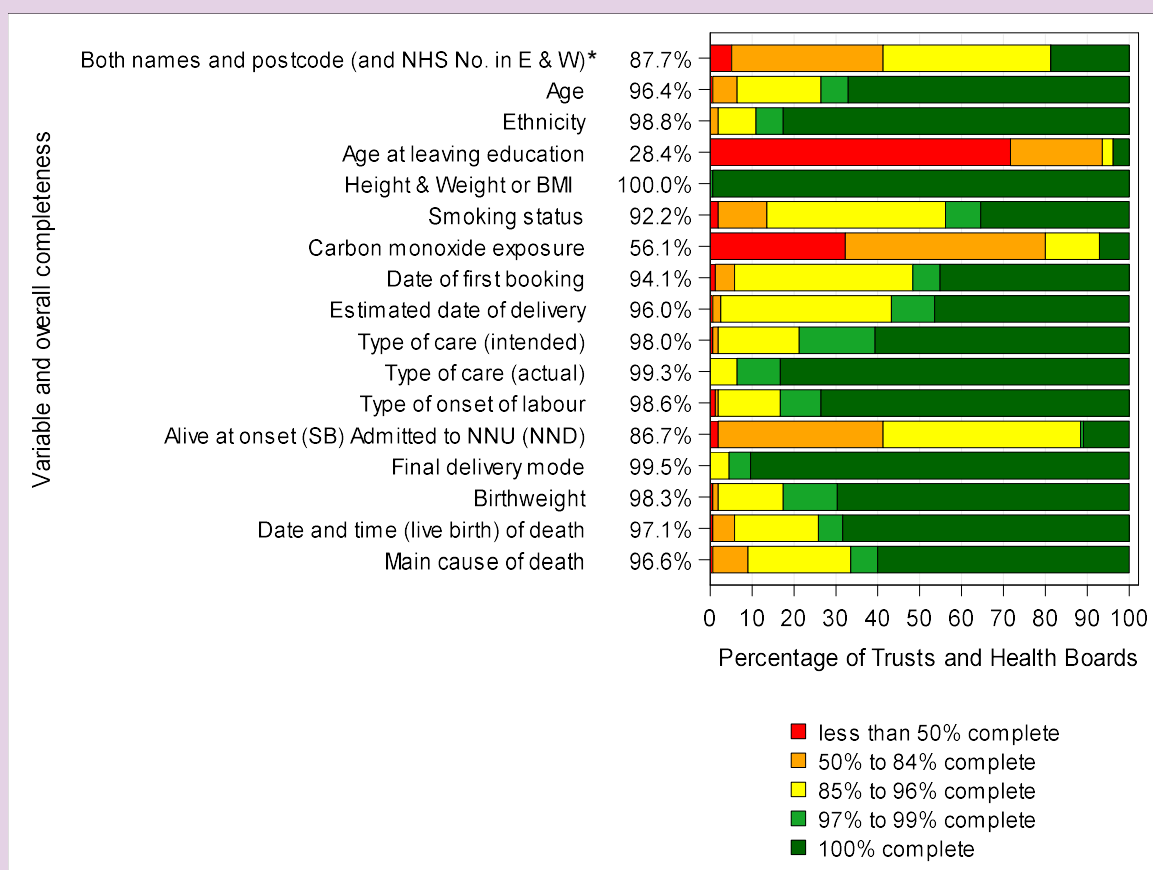
In Figure 6, the overall completeness of selected key variables is shown together with details of the proportion of Trusts and Health Boards achieving different levels of completeness for their data. The variation in the completeness of key variables varies widely between Trusts and Health Boards with 100% completeness achieved by some for each of the listed variables including age at leaving full time education for a small proportion of units, whilst others record many variables for under half of their stillbirths or neonatal deaths. Data completeness for individual Trusts and Health Boards can be found in the accompanying Tables and Figures document.

Table 18: Level of completeness of data reported by Trusts and Health Boards (extended perinatal deaths): United Kingdom and Crown Dependencies, 2016 to 2018

Data item	Overall completeness (%)		
	2016	2017	2018
Both names and postcode (and NHS no. in England & Wales)*	88	88 ↔	88 ↔
Age	100	100 ↔	96 ↘
Ethnicity	99	99 ↔	99 ↔
Age at leaving full-time education	25	28 ↗	28 ↔
Height & weight or BMI	100	100 ↔	100 ↔
Smoking status	93	93 ↔	92 ↘
Carbon monoxide exposure	43	47 ↗	56 ↗
Date of first booking	92	93 ↗	94 ↗
Estimated date of delivery	95	96 ↗	96 ↔
Type of care (intended)	98	99 ↗	98 ↘
Type of care (actual)	100	100 ↔	99 ↘
Type of onset of labour	99	99 ↔	99 ↔
Alive at onset of care (SB), Admitted to NNU (NND)	88	88 ↔	87 ↘
Final mode of birth	100	100 ↔	100 ↔
Birthweight	98	98 ↔	98 ↔
Date and time of death (NND)	100	100 ↔	97 ↘
Main cause of death	99	99 ↔	97 ↘
↗ Increase since previous year ↔ No change since previous year ↘ Decrease since previous year			

* Postcode only in Northern Ireland as mother's name is not reported to MBRRACE-UK
 Data source: MBRRACE-UK

Figure 5: Level of completeness of data reported by Trusts and Health Boards for extended perinatal deaths: United Kingdom and Crown Dependencies, for births in 2018



* Postcode only in Northern Ireland as mother's name is not reported to MBRRACE-UK
Data source: MBRRACE-UK

Implications

Data quality (in terms of both accuracy and completeness) is of the utmost importance in the production of accurate risk-adjusted mortality rates and for data sharing with the Perinatal Mortality Review Tool. MBRRACE-UK is continuing to monitor the completeness of this data for both stillbirths and neonatal deaths and the proportion of missing data for neonatal deaths due to difficulties accessing the maternal notes is being gradually reduced over time.

Surveillance data also feeds directly into the MBRRACE-UK real-time data monitoring tool available to all registered users of the MBRRACE-UK online reporting system. As well as enabling Trusts and Health Boards to monitor ongoing trends in mortality and to analyse their perinatal deaths, because the tool uses live data it also allows users to immediately identify gaps and inaccuracies in their submitted data. However, the effectiveness of the tool is dependent on the timeliness and quality of the data feeding into it from Trusts and Health Boards. By using the tool to monitor data quality users can increase the tool's utility. Incomplete or inaccurate surveillance data may lead to missed opportunities for prompt action to prevent deaths and to monitor the effects of any interventions.

Recommendation 10

Aim for completion of all surveillance data within 90 days to enable timely review with the PMRT and effective use of the MBRRACE-UK real-time data monitoring tool. Utilise the real-time data monitoring tool to ensure the data entered is complete and of high quality.

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.

Abbreviations

BMI	Body Mass Index
CCG	Clinical Commissioning Group
CDOP	Child Death Overview Panel
HQIP	Healthcare Quality Improvement Partnership
ISD	Information Services Division (Scotland)
LFL	Late Fetal Loss
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
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
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. A full list can be found in the accompanying Tables and Figures document.

Members of the MBRRACE-UK collaboration

Members of the Leicester based MBRRACE-UK team

Members of the Oxford based MBRRACE-UK team

Office for National Statistics

National Records of Scotland

Information Services Division Scotland, NHS National Services Scotland

Health Improvement Scotland

Northern Ireland Maternal and Child Health, HSC Public Health Agency

Health and Social Services Department, States of Guernsey

Health Intelligence Unit, Public Health Services, Jersey

Noble's Hospital, Isle of Man

NHS Digital

The Maternal, Newborn and Infant Clinical Outcome Review Independent Advisory Group

Healthcare Quality Improvement Partnership

MBRRACE-UK Third Sector Stakeholder Group Representatives

MBRRACE-UK Royal College and Professional Association Stakeholder Group Representatives

Reporters at all UK Trusts and Health Boards

References

1. Maternity and Children Quality Improvement Collaborative. Scottish Patient Safety Programme MCQIC Maternity Care Core Measurement Plan. MCQIC, 2018. Available online at: <https://ihub.scot/media/5691/2018-19-core-measurement-plan-mat-final-v10.pdf>.
2. Maternity Safety Programme Team, Department of Health. Safer Maternity Care: Next steps towards the national maternity ambition. Department of Health: London, 2016. Available online at: www.gov.uk/government/publications/safer-maternity-care.
3. NHS England. The NHS Long Term Plan. NHS England, 2019. Available online at: www.longtermplan.nhs.uk/online-version/chapter-3-further-progress-on-care-quality-and-outcomes/a-strong-start-in-life-for-children-and-young-people/maternity-and-neonatal-services/.
4. Welsh Government. Maternity Care in Wales: A five year vision for the future (2019-2024). Welsh Government, 2019. Available online at: <https://gov.wales/maternity-services-strategy-2019-2024>.
5. Draper ES, Zeitlin J, Fenton AC, Weber T, Gerrits J, Martens G, Misselwitz B, Bréart G. Investigating the variations in survival rates for very preterm infants in 10 European regions : the MOSAIC birth cohort. Archives of Disease in Childhood - Fetal and Neonatal Edition 2009, 94(3), F158-F163. Available online at: <https://fn.bmj.com/content/94/3/F158>.
6. Santhakumaran S, Statnikov Y, Gray D, Battersby C, Ashby D, Modi N. Survival of very preterm infants admitted to neonatal care in England 2008–2014: time trends and regional variation. Archives of Disease in Childhood - Fetal and Neonatal Edition 2018, 103(3), F208-F215. Available online at: <https://fn.bmj.com/content/fetalneonatal/103/3/F208.full.pdf>.
7. NHS England. Saving Babies' Lives Care Bundle Version 2. NHS England: Leeds, 2019. Available online at: www.england.nhs.uk/publication/saving-babies-lives-version-two-a-care-bundle-for-reducing-perinatal-mortality/.
8. Scottish Government. The Best Start: A Five Year Forward-Plan for Maternity and Neonatal Care in Scotland, 2017. Available online at: <https://www.gov.scot/publications/best-start-five-year-forward-plan-maternity-neonatal-care-scotland/>.
9. Delnord M, Hindori-Mohangoo A, Smith L, Szamotulska K, Richards J, Deb-Rinker P, Rouleau J, Velebil P, Zile I, Sakkeus L, Gissler M, Morisaki N, Dolan S, Kramer M, Kramer M, Zeitlin J, the Euro-Peristat Scientific Committee. Variations in very preterm birth rates in 30 high-income countries: are valid international comparisons possible using routine data? BJOG: An International Journal of Obstetrics and Gynaecology 2017, 124(5), 785-794. Available online at: <https://obgyn.onlinelibrary.wiley.com/doi/abs/10.1111/1471-0528.14273>.
10. HM Revenue and Customs. Personal tax credits: Related statistics - Children in Low-Income Families Local Measure. HM Government, 2014. Available online at: <https://webarchive.nationalarchives.gov.uk/20140109155255tf/http://www.hmrc.gov.uk/statistics/child-poverty-stats.htm>.
11. Manktelow B N, Smith L K, Prunet C, Smith P W, Boby T, Hyman-Taylor P, Kurinczuk J J, Field DJ, Draper ES, on behalf of the MBRRACE-UK collaboration,. MBRRACE-UK Perinatal Mortality Surveillance Report: UK Perinatal deaths for births from January to December 2015. The Infant Mortality and Morbidity Studies, Department of Health Sciences, University of Leicester: Leicester, 2017. Available online at: <https://www.npeu.ox.ac.uk/mbrrace-uk/reports/perinatal-mortality-surveillance>.

12. Smith LK, Budd JLS, Field DJ, Draper ES. Socioeconomic inequalities in outcome of pregnancy and neonatal mortality associated with congenital anomalies: population based study. *British Medical Journal* 2011, 343, d4306. Available online at: <https://www.bmj.com/content/bmj/343/bmj.d4306.full.pdf>.
13. Kulkarni A, Pallaniappan N, Evans M. Placental Pathology and Stillbirth: A Review of the Literature and Guidelines for the Less Experienced. *Journal of Fetal Medicine* 2017, 4(4), 177-185. Available online at: <https://link.springer.com/article/10.1007/s40556-017-0133-3>.
14. Pinar H, Goldenberg RL, Koch MA, Heim-Hall J, Hawkins HK, Shehata B, Abramowsky C, Parker CB, Dudley DJ, Silver RM, Stoll B, Carpenter M, Saade G, Moore J, Conway D, Varner MW, Hogue CJR, Coustan DR, Sbrana E, Thorsten V, Willinger M, Reddy UM. Placental findings in singleton stillbirths. *Obstetrics and Gynecology* 2014, 123(2 Pt 1), 325-336. Available online at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3948332/>.
15. Sands. Guide for consent takers: seeking consent for the post mortem examination of a baby. Sands, 2013. Available online at: <https://www.sands.org.uk/professionals/bereavement-care/sands-post-mortem-consent-package>.
16. Evans MJ, Draper ES, Smith LK. Impact of sociodemographic and clinical factors on offer and parental consent to postmortem following stillbirth or neonatal death: a UK population-based cohort study. *Archives of Disease in Childhood - Fetal and Neonatal Edition* 2020. Available online at: <https://fn.bmj.com/content/fetalneonatal/early/2020/01/22/archdischild-2019-318226.full.pdf>.
17. Heazell A E P, McLaughlin M J, Schmidt E B, Cox P, Flenady V, Khong T Y, Downe S. A Difficult Conversation? The views and experiences of parents and professionals on the consent process for perinatal postmortem after stillbirth. *BJOG: An International Journal of Obstetrics and Gynaecology* 2012, 119(8), 987-997. Available online at: <http://onlinelibrary.wiley.com/doi/10.1111/j.1471-0528.2012.03357.x/full>.
18. Lewis C, Hill M, Arthurs OJ, Hutchinson C, Chitty LS, Sebire NJ. Factors affecting uptake of postmortem examination in the prenatal, perinatal and paediatric setting. *BJOG: An International Journal of Obstetrics and Gynaecology* 2018, 125(2), 172-181. Available online at: <https://obgyn.onlinelibrary.wiley.com/doi/abs/10.1111/1471-0528.14600>.
19. Spierson H KS, Storey C, Heazell AEP. Professionals' Practices and Views regarding Neonatal Postmortem: Can We Improve Consent Rates by Improving Training? *Neonatology* 2019, 115(4), 341-345. Available online at: <https://pubmed.ncbi.nlm.nih.gov/30879004/>.
20. Khong T Y, Mooney E E, Ariel I, Balmus N C, Boyd T K, Brundler M A, Derricott H, Evans M J, Faye-Peterson O M, Gillan J E, Heazell A E, Heller D S, Jacques S M, Keating S, Kelehan P, Maes A, McKay E M, Morgan T K, Nikkels P G, Parks W T, Redline R W, Scheimberg I, Schoots M H, Sebire N J, Timmer A, Turowski G, van der Voorn J P, van Lijnschoten I, Gordijn S J. Sampling and Definitions of Placental Lesions: Amsterdam Placental Workshop Group Consensus Statement. *Archives of Pathology and Laboratory Medicine* 2016, 140(7), 698-713. Available online at: <https://www.ncbi.nlm.nih.gov/pubmed/27223167>.
21. Ptacek I, Sebire N J, Man J A, Brownbill P, Heazell A E P. Systematic Review of Placental Pathology Reported in Association with Stillbirth. *Placenta* 2014, 35(8), 552-562. Available online at: www.sciencedirect.com/science/article/pii/S0143400414002240?via%3Dihub.
22. Redline R W. Classification of Placental Lesions. *American Journal of Obstetrics and Gynecology* 2015, 213(4 Suppl), S21-S28. Available online at: www.ncbi.nlm.nih.gov/pubmed/26428500.

