

**Maternal, Newborn and
Infant Clinical Outcome
Review Programme**



MBRRACE-UK Perinatal Mortality Surveillance Report

**UK Perinatal Deaths for Births from
January to December 2019**

October 2021



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October 2021

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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 2019.**

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.

Mortality rates for individual organisations, including Trusts and Health Boards, can be found online at: <http://www.npeu.ox.ac.uk/mbrance-uk/reports>. Additional tables and figures can 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: <http://www.npeu.ox.ac.uk/mbrance-uk/reports>.

Key findings

Perinatal mortality rates in the UK: 2019

1. Extended perinatal mortality has reduced by 18% over six years, from 6.04 per 1,000 total births in 2013 to 4.96 per 1,000 total births in 2019, equivalent to approximately 770 fewer deaths in 2019.
2. Over two-fifths 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.
3. Stillbirth rates have reduced by just over 20% from 4.20 per 1,000 total births in 2013 to 3.35 per 1,000 total births in 2019, representing approximately 610 fewer stillbirths in 2019.

4. Neonatal mortality has reduced by 12% from 1.84 per 1,000 live births in 2013 to 1.62 deaths per 1,000 live births in 2019, representing approximately 160 fewer neonatal deaths in 2019.

Mortality rates by gestational age

5. The overall reduction in the stillbirth rate is mainly due to a reduction in the rate of term stillbirths of one-fifth (19%), from 1.45 per 1,000 total births in 2015 to 1.17 in 2019.
6. The largest reduction in the neonatal mortality rate was for very preterm births (28⁺⁰ to 31⁺⁶ weeks gestational age) of one-seventh (14%) from 33.8 per 1,000 live births in 2015 to 28.9 in 2019.
7. Almost three-quarters of both stillbirths and neonatal deaths (including babies born at 22-23 weeks gestational age) were for preterm births (<37 weeks gestational age): 75% and 73% respectively.
8. In 2019, 38% of stillbirths and 46% of neonatal deaths occurred in babies who were born extremely preterm (22⁺⁰ to 27⁺⁶ weeks gestational age).

Effect of deprivation on perinatal mortality

9. Despite rates of stillbirth and neonatal mortality reducing over time, babies born to women living in the most deprived areas are twice as likely to be stillborn and at a 73% excess risk of neonatal death compared to babies born to women living in the least deprived areas; this excess risk has increased over the period from 2015 to 2019.

Effect of ethnicity on perinatal mortality

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 43% 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.

Effect of mother's age on perinatal mortality

12. The lowest stillbirth and neonatal mortality rates are for mothers aged 30 to 34 years: stillbirths, 3.15 per 1,000 total births and neonatal deaths, 1.50 per 1,000 live births.
13. The largest reductions in both stillbirth and neonatal mortality rates were for babies born to the oldest mothers.
14. Mothers aged under 20 are at a 33% increased risk of stillbirth and a 75% increased risk of neonatal death compared to mothers aged 30-34.
15. Mothers aged 40 and above are at a 41% increased risk of stillbirth and a 37% increased risk of neonatal death compared with mothers aged 30-34.

Multidimensional effects of ethnicity, deprivation and mother's age on perinatal mortality

16. Stillbirth and neonatal mortality rates increased with deprivation and were higher for mothers under 25 years and over 35 years across all ethnic groups.
17. Stillbirth rates and neonatal mortality rates were lowest for babies of White ethnicity born to mothers aged 25 to 34 living in the least deprived areas (2.61 to 2.76 stillbirths per 1,000 total births and 1.24 to 1.26 neonatal deaths per 1,000 live births).
18. The multiple impact of ethnicity, mother's age and deprivation is highlighted by a stillbirth rate of 10.54 and 6.91 per 1,000 total births for babies of Black and Black British ethnicity and Asian and Asian British ethnicity respectively born to mothers aged over 35 years living in the most deprived areas.

19. Neonatal mortality rates were over 3 per 1,000 live births for babies of Black and Black British ethnicity and Asian and Asian British ethnicity born to mothers under 25 years and over 35 years living in the most deprived areas.
20. Due to high proportions of babies of Black and Black British ethnicity being born to mothers living in deprived areas, they are disproportionately affected by the higher rates of stillbirth associated with deprivation.

Perinatal mortality rates for Trusts and Health Boards

21. After adjustment for risk factors and unit size, stillbirth rates show little variation between Trusts and Health Boards with stabilised & adjusted rates for almost all (97%) organisations falling within 5% of their comparator group average.
22. 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) and neonatal surgical provision had a stabilised and adjusted neonatal mortality rate within 5% of their comparator group average.
23. 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.
24. Exclusion of deaths due to congenital anomalies has little effect on the variation in stabilised & adjusted neonatal mortality rates, with only 12% of Trusts and Health Boards with a Level 3 Neonatal Intensive Care Unit (NICU) and neonatal surgical provision having a stabilised and adjusted neonatal mortality rate within 5% of their comparator group average.

Causes of perinatal death

25. Rates of stillbirth classified as of unknown cause have fallen by 8% between 2015 and 2019, much of which may be ascribed to the increasing proportions of stillbirths from placental causes.
26. Of the two-fifths of neonatal deaths attributed to neonatal causes, mortality rates have fallen over the 5 year period for extreme prematurity as well as the neurological and cardio-respiratory categories.
27. Congenital anomalies continue to contribute significantly to mortality rates, comprising around one-third of neonatal deaths and just under one-tenth of stillbirths.
28. Whilst almost all parents were offered a post-mortem for their stillborn baby (97%), only 85% of parents received an offer of a post-mortem following a neonatal death in 2019.
29. Where a post-mortem was offered following a stillbirth or neonatal death, half of parents gave consent for full or limited post-mortem.
30. In 2019, 78% of neonatal deaths occurring on day one after birth or which were classified as intrapartum-related deaths had placental histology investigations carried out.

Timeliness of notification of perinatal deaths

31. Timeliness of notification of deaths is improving. Approximately four-fifths of deaths were notified within the MBRRACE-UK benchmark time of 30 days: 80% of stillbirths and 76% of neonatal deaths (an increase from 69% of stillbirths and 64% of neonatal deaths in 2018).
32. There was no correlation between the total number of deaths per Trust or Health Board and the percentage of deaths notified within 30 days.
33. Variation between UK countries in the percentage of deaths notified within 30 days has reduced, from 35% variation between countries in 2017 (36% to 71% notified within 30 days) to 19% variation between countries in 2019 (63% to 82% notified within 30 days).

New recommendations

1. Enhance current programmes in order to accelerate the reduction of stillbirths and neonatal deaths to meet national targets, with an emphasis on reducing rates of preterm birth, particularly the most extreme preterm group. **ACTION: Policy Makers, UK Public Health Services.**
2. Continue to develop innovative new programmes of research into reducing preterm birth. **ACTION: Policy Makers, UK Public Health Services, Research Funders.**
3. Use the MBRRACE-UK guidance for the assessment of signs of life in births before 24⁺⁰ weeks gestational age. **ACTION: Trust and Health Board Directors, Clinical Directors, Heads of Midwifery, Health Professionals.**
4. Ensure the continuation of targeted initiatives with health education organisations not only aimed at reducing teenage pregnancy but also providing pre-conception advice. **ACTION: UK Government Education Departments, UK Public Health and Health Education Services, Primary Care Providers, Health Professionals.**
5. Provide pre- and post-conception information for women aged 35 and over, clarifying the risk of stillbirth and neonatal death associated with increased maternal age to empower their decision making throughout the care pathway. **ACTION: UK Health Education Services, Primary Care Providers, Trust and Health Board Directors, Clinical Directors, Heads of Midwifery, Health Professionals.**
6. Initiate a research programme to inform the development of effective interventions to address health inequalities and reduce stillbirth and neonatal mortality rates. **ACTION: Policy Makers, UK Public Health Services, Research Funders.**
7. Develop focused initiatives to reduce stillbirths and neonatal deaths among groups of mothers at the highest risk, informed by the multidimensional effects of ethnicity, deprivation and mother's age. **ACTION: Policy Makers, UK Public Health Services.**
8. Use the newly-developed MBRRACE-UK interactive maps and tables to compare stabilised and adjusted stillbirth, neonatal mortality and extended perinatal mortality rates between organisations. **ACTION: Service Commissioners, Trust and Health Board Directors, Clinical Directors, Heads of Midwifery, Health Professionals.**
9. Emphasise the importance of pre-conception health as a routine part of every health professional's interaction with women who have risk factors for congenital anomaly. **ACTION: UK Public Health Services, Primary Care Providers, Royal Colleges, Trust and Health Board Directors, Clinical Directors, Heads of Midwifery, Health Professionals.**
10. Notify all deaths via the MBRRACE-UK system within 2 working days of the death occurring. Incorporate mechanisms for timely notification into local processes. **ACTION: Trust and Health Board Directors, Clinical Directors, Heads of Midwifery, Health Professionals.**

Previous recommendations requiring improved implementation

- Develop public health initiatives to address issues linked to high risk populations. **ACTION: Policy Makers, UK Public Health Services.**
- 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.**
- 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.**
- 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.**
- 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.**
- 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.**
- 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.**
- 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.**

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Introduction

Deaths reported to MBRRACE-UK

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

- *late fetal losses*: a baby born between 22⁺⁰ and 23⁺⁶ weeks gestational age showing no signs of life, irrespective of when the death occurred;
- *stillbirths*: a baby born 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 2019 birth cohort

In this report rates of stillbirth, neonatal death and extended perinatal death are presented for births from 1 January 2019 to 31 December 2019; thus, neonatal deaths of babies born in December 2019 which occurred in January 2020 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, PHS, 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 seventh MBRRACE-UK Perinatal Mortality Surveillance Report. The main report is divided into nine 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; the effect of maternal age on perinatal mortality; multidimensional effects of ethnicity, deprivation and maternal age on perinatal mortality; variation in mortality rates for Trusts and Health Board comparator groups; causes of death; and the timeliness of notification of death.

Mortality rates for individual organisations, including Trusts and Health Boards, together with interactive maps, can be found online at: www.npeu.ox.ac.uk/mbrance-uk/reports. Additional tables and figures can 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.

Key to colour coding

Recommendations arising from existing national guidelines, initiatives or previous reports and the source of these recommendations are cited within green boxes. Example:

Recommendation A

Existing guidance requiring improved implementation is presented in green boxes.

NICE 2345

New recommendations which are not based on current national guidance and which have not been noted in previous reports or initiatives are shown in purple boxes. Example:

Recommendation B

N

New recommendations are presented in purple boxes with the character N in the corner.

Perinatal mortality rates in the UK: 2019

Key findings

- Extended perinatal mortality has reduced by 18% over six years, from 6.04 per 1,000 total births in 2013 to 4.96 per 1,000 total births in 2019, equivalent to approximately 770 fewer deaths in 2019.
- Over two-fifths 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 20% from 4.20 per 1,000 total births in 2013 to 3.35 per 1,000 total births in 2019, representing approximately 610 fewer stillbirths in 2019.
- Neonatal mortality has reduced by 12% from 1.84 per 1,000 live births in 2013 to 1.62 deaths per 1,000 live births in 2019, representing approximately 160 fewer neonatal deaths in 2019.

Data presented

1. **Rates of stillbirth, neonatal death, and extended perinatal death (stillbirth and neonatal deaths combined) for births that occurred in 2019 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 seven years of the MBRRACE-UK programme, 2013 to 2019.**

Results

Since 2015 there has been a steady reduction in the total number of births at 24⁺⁰ weeks or greater gestational age (excluding terminations of pregnancy) for the UK from 783,144 to 716,825 in 2019: an overall reduction of 66,319 (8.5%) births. Following the first report from MBRRACE-UK (2013) there has been a year on year reduction in both the total number of stillbirths and the total number of neonatal deaths, and this trend has continued in 2019: 2,399 stillbirths in 2019 compared with 2,579 in 2018 and 2,840 in 2017 and 1,158 neonatal deaths in 2019 compared with 1,199 in 2018 and 1,267 in 2017. The extended perinatal mortality rate for 2019 across the UK as a whole was 4.96 per 1,000 total births (5.13 in 2018), comprising 3.35 stillbirths per 1,000 total births (3.51 in 2018) and 1.62 neonatal deaths per 1,000 live births (1.64 in 2018).

Across the four UK, nations the lowest rate of both stillbirth and neonatal mortality in 2019 was in Scotland, although there was no overall change in the Scottish stillbirth rate which has remained at 3.22 per 1,000 total births since 2018 and the Scottish neonatal mortality rate has increased from 1.36 per 1,000 live births in 2018 to 1.49. For stillbirths the highest rate in 2019 was in Wales (4.02 per 1,000 total births, an increase from 3.76 in 2018) whilst the highest neonatal mortality rate was in Northern Ireland (2.85 per 1,000 live births, an increase from 2.05 in 2018). However, it is important to note that during this period stillbirth and, in particular neonatal mortality rates in Northern Ireland were influenced 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, decriminalising abortion in defined circumstances: this does not affect the data in this report as legislation governing the provision of abortion services did not come into force until 31st March 2020. 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 2019

Number [§]	UK [^]	England	Scotland	Wales	Northern Ireland [°]	Crown Dep.
Total births	716,825	612,522	49,737	29,815	22,548	2,122
Live births	714,426	610,482	49,577	29,695	22,475	2,118
Stillbirths	2,399	2,040	160	120	73	4
Antepartum	2,121	1,804	139	107	65	4
Intrapartum	183	160	10	7	6	0
Unknown timing	95	76	11	6	2	0
Neonatal deaths	1,158	948	74	69	64	3
Early neonatal deaths	769	615	53	50	50	1
Late neonatal deaths	389	333	21	19	14	2
Perinatal deaths	3,168	2,655	213	170	123	5
Extended perinatal deaths	3,557	2,988	234	189	137	7

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

[^] including the Crown Dependencies and mothers with unknown residency

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

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

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Table 2: Stillbirth, neonatal, and extended perinatal mortality rates (95% confidence intervals (CIs)) by country of residence: United Kingdom and Crown Dependencies, for births in 2019

Rate per 1,000 births [§]	UK [^]	England	Scotland	Wales	Northern Ireland [°]	Crown Dep.
Stillbirths[†]	3.35	3.33	3.22	4.02	3.24	1.89
	(3.21 to 3.48)	(3.19 to 3.47)	(2.72 to 3.71)	(3.31 to 4.74)	(2.5 to 3.98)	(0.04 to 3.73)
Antepartum [†]	2.96	2.95	2.79	3.59	2.88	1.89
	(2.83 to 3.08)	(2.81 to 3.08)	(2.33 to 3.26)	(2.91 to 4.27)	(2.18 to 3.58)	(0.04 to 3.73)
Intrapartum [†]	0.26	0.26	0.20	0.23	0.27	0.00
	(0.22 to 0.29)	(0.22 to 0.3)	(0.08 to 0.33)	(0.06 to 0.41)	(0.05 to 0.48)	(0.00 to 1.41)
Unknown timing [†]	0.13	0.12	0.22	0.20	0.09	0.00
	(0.11 to 0.16)	(0.10 to 0.15)	(0.09 to 0.35)	(0.04 to 0.36)	(0.00 to 0.21)	(0.00 to 1.41)
Neonatal deaths[‡]	1.62	1.55	1.49	2.32	2.85	1.42
	(1.53 to 1.71)	(1.45 to 1.65)	(1.15 to 1.83)	(1.78 to 2.87)	(2.15 to 3.54)	(0 to 3.02)
Early neonatal deaths [‡]	1.08	1.01	1.07	1.68	2.22	0.47
	(1 to 1.15)	(0.93 to 1.09)	(0.78 to 1.36)	(1.22 to 2.15)	(1.61 to 2.84)	(0.00 to 1.4)
Late neonatal deaths [‡]	0.54	0.55	0.42	0.64	0.62	0.94
	(0.49 to 0.6)	(0.49 to 0.6)	(0.24 to 0.6)	(0.35 to 0.93)	(0.3 to 0.95)	(0.00 to 2.25)
Perinatal deaths[†]	4.42	4.33	4.28	5.70	5.46	2.36
	(4.27 to 4.57)	(4.17 to 4.5)	(3.71 to 4.86)	(4.85 to 6.56)	(4.49 to 6.42)	(0.29 to 4.42)
Extended perinatal deaths[†]	4.96	4.88	4.70	6.34	6.08	3.30
	(4.8 to 5.12)	(4.7 to 5.05)	(4.1 to 5.31)	(5.44 to 7.24)	(5.06 to 7.09)	(0.86 to 5.74)

[†] 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

[^] including the Crown Dependencies and mothers with unknown residency

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

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The overall reduction in stillbirth, neonatal and extended perinatal mortality the UK since 2013 is presented in Table 3 and Figure 1. This shows a fall of 20% in the stillbirth rate, 12% in the neonatal mortality rate and 18% in the extended perinatal mortality rate, across the seven years of the MBRRACE-UK programme. As over 85% of UK births occur in England this overall pattern reflects a decline over the seven year period in England but less evidence of change over time in the remaining devolved nations where rates show more year on year variation 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 2019

Rate per 1,000 births [§]	2013	2014	2015	2016	2017	2018	2019
Stillbirths[†]	4.20	4.12	3.87	3.93	3.74	3.51	3.35
	(4.06 to 4.35)	(3.98 to 4.33)	(3.73 to 4.01)	(3.79 to 4.07)	(3.60 to 3.87)	(3.37 to 3.64)	(3.21 to 3.48)
Neonatal deaths[‡]	1.84	1.76	1.74	1.72	1.67	1.64	1.62
	(1.75 to 1.94)	(1.67 to 1.86)	(1.65 to 1.84)	(1.63 to 1.81)	(1.58 to 1.77)	(1.54 to 1.73)	(1.53 to 1.71)
Extended perinatal deaths[†]	6.04	5.88	5.61	5.64	5.40	5.13	4.96
	(5.87 to 6.21)	(5.71 to 6.04)	(5.44 to 5.77)	(5.48 to 5.28)	(5.24 to 5.57)	(4.97 to 5.30)	(4.8 to 5.12)

[§] 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

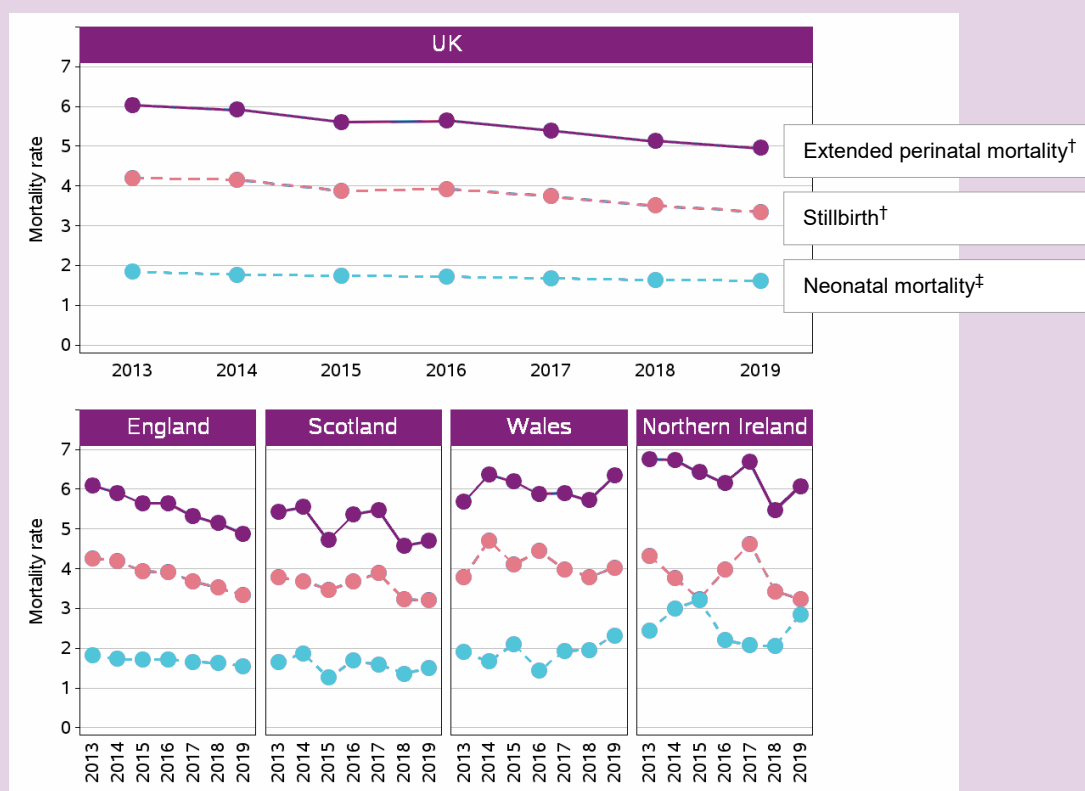
[†] per 1,000 total births

[‡] per 1,000 live births

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

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Figure 1: Stillbirth, neonatal, and extended perinatal mortality rates for the UK and by country of residence: United Kingdom, for births from 2013 to 2019



[†] 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, PHS, NIMATS, States of Guernsey, States of Jersey

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Implications

All four UK nations have initiatives in place to reduce perinatal mortality rates [1-4]. Although the initial target in England to reduce mortality rates by 20% by 2020 [2] has been met for stillbirths, the smaller reduction in neonatal mortality rates suggests that this target will not be met for neonatal deaths. Nevertheless even for stillbirths there is still much work to be done to achieve the English Department of Health's revised target of a 50% reduction in mortality 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, ensuring relevant current standards and guidance are followed throughout the care pathway, 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 Black, Asian and other ethnic minority populations;
- improved strategies to reduce obesity and smoking during pregnancy [5-8].

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 [9, 10] 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 [11], The Scottish Government's Best Start initiative [12], and other similar initiatives across the UK is therefore of major importance in the reduction of neonatal mortality rates.

Recommendation 1

N

Enhance current programmes in order to accelerate the reduction of stillbirths and neonatal deaths to meet national targets, with an emphasis on reducing rates of preterm birth, particularly the most extreme preterm group.

Recommendation requiring improved implementation

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

MBRRACE-UK 2020 [13]

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 one-fifth (19%), from 1.45 per 1,000 total births in 2015 to 1.17 in 2019.
- The largest reduction in the neonatal mortality rate was for very preterm births (28⁺⁰ to 31⁺⁶ weeks gestational age) of one-seventh (14%) from 33.8 per 1,000 live births in 2015 to 28.9 in 2019.
- Almost three-quarters of both stillbirths and neonatal deaths (including babies born at 22-23 weeks gestational age) were for preterm births (<37 weeks gestational age): 75% and 73% respectively.
- In 2019, 38% of stillbirths and 46% 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 (including late fetal losses), neonatal death, and extended perinatal death (stillbirth and neonatal deaths combined) for births that occurred from 2015 to 2019 at 22⁺⁰ weeks gestational age or later (excluding terminations of pregnancy) in the UK, by gestational age.**
2. **Trends in rates of stillbirth (including late fetal losses), neonatal death, and extended perinatal death (stillbirth and neonatal deaths combined) for births that occurred from 2015 to 2019 at 22⁺⁰ weeks gestational age or later (excluding terminations of pregnancy) in the UK, by gestational age.**

Births with missing gestational age information were excluded (n=22,918 in 2019; 3% of births).

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 2019 showing that almost three-quarters of stillbirths (including late fetal losses) and neonatal deaths were for births before 37 weeks gestational age (75% and 73% respectively). Including babies born at 22 to 23 weeks gestational age, almost two-fifths of stillbirths and just under half of neonatal deaths in 2019 were extremely preterm (<28 weeks gestational age): 38% and 46% respectively, once again emphasising the impact of preterm birth in the UK.

There have been reductions in extended perinatal mortality rates across all gestational age groups (Table 6), with the largest reduction in babies born at 37⁺⁰ to 41⁺⁶ weeks (16%). Excluding babies born at 42⁺⁰ weeks and over, who are most affected by short term variations because the number of deaths is extremely small, the largest reduction in deaths is seen for stillbirths at 37⁺⁰ to 41⁺⁶ weeks, with a fall in mortality rates of one-fifth (19%) over the most recent five year period. This is likely to reflect initiatives in place across the UK focusing on the reduction of term stillbirths. However, preterm stillbirth rates have also reduced over this five year period by 10% at 32⁺⁰ to 36⁺⁶ weeks, by 7% at 28⁺⁰ to 31⁺⁶ weeks and by 10% at 24⁺⁰ to 27⁺⁶ weeks. For neonatal deaths the largest reduction of one-eighth (12%) was seen at 28⁺⁰ to 32⁺⁶ weeks.

Table 4: Number and percentage of stillbirths and late fetal losses by gestational age at birth: United Kingdom and Crown Dependencies, for births from 2015 to 2019

Gestational age at birth (weeks)		2015	2016	2017	2018	2019
22 ⁺⁰ -23 ⁺⁶	Births [§]	1,001	1,040	1,078	1,022	1,039
	Late fetal losses N (%)	524 (14.7)	529 (14.7)	530 (15.7)	508 (16.5)	514 (17.7)
	Rates per 1,000 births [†]	523.5	508.7	491.7	497.1	494.7
24 ⁺⁰ -27 ⁺⁶	Births [§]	3,221	3,269	3,227	3,064	2,943
	Stillbirths N (%)	733 (20.6)	717 (19.9)	710 (21.1)	665 (21.6)	604 (20.7)
	Rates per 1,000 births [†]	227.6	219.3	220.0	217.0	205.2
28 ⁺⁰ -31 ⁺⁶	Births [§]	6,558	6,620	6,540	6,083	5,958
	Stillbirths N (%)	495 (13.9)	512 (14.2)	482 (14.3)	467 (15.1)	417 (14.3)
	Rates per 1,000 births [†]	75.5	77.3	73.7	76.8	70.0
32 ⁺⁰ -36 ⁺⁶	Births [§]	49,652	50,371	50,296	48,189	46,518
	Stillbirths N (%)	762 (21.4)	786 (21.9)	730 (21.7)	658 (21.3)	635 (21.8)
	Rates per 1,000 births [†]	15.3	15.6	14.5	13.7	13.7
37 ⁺⁰ -41 ⁺⁶	Births [§]	704,733	678,093	660,980	637,280	625,274
	Stillbirths N (%)	1025 (28.8)	1031 (28.7)	894 (26.5)	772 (25.0)	733 (25.2)
	Rates per 1,000 births [†]	1.45	1.52	1.35	1.21	1.17
≥42	Births [§]	18,980	18,277	16,212	14,307	13,214
	Stillbirths N (%)	15 (0.4)	19 (0.5)	22 (0.7)	15 (0.5)	8 (0.3)
	Rates per 1,000 births [†]	0.79	1.04	1.36	1.05	0.61
Total births		784,145	757,670	738,333	709,945	694,946

[§] excluding terminations of pregnancy and births with missing gestational age

[†] per 1,000 total births

[‡] per 1,000 live births

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

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Table 5: Number and percentage of neonatal deaths by gestational age at birth: United Kingdom and Crown Dependencies, for births from 2015 to 2019

Gestational age at birth (weeks)		2015	2016	2017	2018	2019
22 ⁺⁰ -23 ⁺⁶	Live births [§]	477	511	548	514	525
	Neonatal deaths N (%)	342 (20.1)	360 (21.3)	386 (23.4)	356 (22.9)	337 (22.6)
	Rates per 1,000 births [‡]	717.0	704.5	704.4	692.6	641.9
24 ⁺⁰ -27 ⁺⁶	Live births [§]	2,488	2,552	2,517	2,399	2,339
	Neonatal deaths N (%)	383 (22.5)	404 (23.9)	365 (22.2)	342 (22.0)	349 (23.4)
	Rates per 1,000 births [‡]	153.9	158.3	145.0	142.6	149.2
28 ⁺⁰ -31 ⁺⁶	Live births [§]	6,063	6,108	6,058	5,616	5,541
	Neonatal deaths N (%)	205 (12)	177 (10.5)	187 (11.4)	167 (10.8)	160 (10.7)
	Rates per 1,000 births [‡]	33.8	29.0	30.9	29.7	28.9
32 ⁺⁰ -36 ⁺⁶	Live births [§]	48,890	49,585	49,566	47,531	45,883
	Neonatal deaths N (%)	271 (15.9)	275 (16.2)	270 (16.4)	244 (15.7)	241 (16.2)
	Rates per 1,000 births [‡]	5.54	5.55	5.45	5.13	5.25
37 ⁺⁰ -41 ⁺⁶	Live births [§]	703,708	677,062	660,086	636,508	624,541
	Neonatal deaths N (%)	495 (29.1)	468 (27.6)	428 (26)	431 (27.8)	398 (26.7)
	Rates per 1,000 births [‡]	0.70	0.69	0.65	0.68	0.64
≥42	Births [§]	18,965	18,258	16,190	14,292	13,206
	Neonatal deaths N (%)	7 (0.4)	9 (0.5)	11 (0.7)	13 (0.8)	6 (0.4)
	Rates per 1,000 births [‡]	0.37	0.49	0.68	0.91	0.45
Total live births		780,591	754,076	734,965	706,860	692,035

[§] excluding terminations of pregnancy and births with missing gestational age

[†] per 1,000 total births

[‡] per 1,000 live births

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Table 6: Number and percentage of extended perinatal deaths by gestational age at birth: United Kingdom and Crown Dependencies, for births from 2015 to 2019

Gestational age at birth (weeks)		2015	2016	2017	2018	2019
22 ⁺⁰ -23 ⁺⁶	Births [§]	1,001	1,040	1,078	1,022	1,039
	Extended perinatal deaths N (%)	866 (16.5)	889 (16.8)	916 (18.3)	864 (18.6)	851 (19.3)
	Rates per 1,000 births [†]	865.1	854.8	849.7	845.4	819.1
24 ⁺⁰ -27 ⁺⁶	Births [§]	3,221	3,269	3,227	3,064	2,943
	Extended perinatal deaths N (%)	1116 (21.2)	1121 (21.2)	1075 (21.4)	1007 (21.7)	953 (21.6)
	Rates per 1,000 births [†]	346.5	342.9	333.1	328.7	323.8
28 ⁺⁰ -31 ⁺⁶	Births [§]	6,558	6,620	6,540	6,083	5,958
	Extended perinatal deaths N (%)	700 (13.3)	689 (13)	669 (13.3)	634 (13.7)	577 (13.1)
	Rates per 1,000 births [†]	106.7	104.1	102.3	104.2	96.8
32 ⁺⁰ -36 ⁺⁶	Births [§]	49,652	50,371	50,296	48,189	46,518
	Extended perinatal deaths N (%)	1033 (19.6)	1061 (20.1)	1000 (19.9)	902 (19.4)	876 (19.9)
	Rates per 1,000 births [†]	20.8	21.1	19.9	18.7	18.8
37 ⁺⁰ -41 ⁺⁶	Births [§]	704,733	678,093	660,980	637,280	625,274
	Extended perinatal deaths N (%)	1520 (28.9)	1499 (28.4)	1322 (26.4)	1203 (25.9)	1131 (25.7)
	Rates per 1,000 births [†]	2.16	2.21	2.00	1.89	1.81
≥42	Births [§]	18,980	18,277	16,212	14,307	13,214
	Extended perinatal deaths N (%)	22 (0.4)	28 (0.5)	33 (0.7)	28 (0.6)	14 (0.3)
	Rates per 1,000 births [†]	1.16	1.53	2.04	1.96	1.06
Total births		784,145	757,670	738,333	709,945	694,946

[§] excluding terminations of pregnancy and births with missing gestational age

[†] per 1,000 total births

[‡] per 1,000 live births

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

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Implications

As noted in our last report, 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 the impact of this work is reflected in the largest rate of reduction of stillbirths being in this group. Newer initiatives, e.g. version 2 of the Saving Babies' Lives Care Bundle which was launched in March 2019, were only in place for part of the year for the data presented in this report. Such initiatives have expanded their focus to include the prevention of neonatal deaths and preterm births. It is too early to assess the impact of these initiatives, although it is pleasing to note that preterm stillbirth rates are showing a small reduction. However, there is little evidence of a similar trend in neonatal mortality rates.

The high rates of preterm in birth in the UK compared to other European countries [14] 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 [15].

Recommendation 2

N

Continue to develop innovative new programmes of research into reducing preterm birth.

Recommendation 3**N**

Use the MBRRACE-UK guidance for the assessment of signs of life in births before 24⁺⁰ weeks gestational age.

Recommendation requiring improved implementation

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

MBRRACE-UK 2020 [13]

Effect of deprivation on perinatal mortality

Key findings

- Despite rates of stillbirth and neonatal mortality reducing over time, babies born to women living in the most deprived areas are twice as likely to be stillborn and at a 73% excess risk of neonatal death compared to babies born to women living in the least deprived areas; this excess risk has increased over the period from 2015 to 2019.

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 2015 to 2019, 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 2015 to 2019, 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 [16] based on the mother's postcode of residence at the time of birth.

Results

The direct relationship between increasing levels of socio-economic deprivation and increasing 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 least among babies born to women living in more deprived areas, with an 8% reduction in stillbirth rates from 5.05 to 4.67 per 1000 births between 2015 and 2019 for those living in the most deprived areas compared to a 22% reduction from 3.00 to 2.33 per 1000 births over the same period for those living in the least deprived areas. Similarly for neonatal mortality rates there was 9% reduction among babies born to women living in the most deprived areas between 2015 and 2019; from 2.28 to 2.07 per 1000 live births. This is compared to a 15% reduction in neonatal mortality over the same period among babies born to women living in the least deprived areas; from 1.41 to 1.20 per 1000 live births.

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 2015 to 2019. The increasing deprivation gap between the most affluent and most deprived women is particularly clear. The excess risk for babies born to women living in the most deprived quintile, compared to those living in the least deprived quintile, has increased from 68% to 100% for stillbirth (Table 9) and from 61% to 73% 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 2015 to 2019

Socio-economic deprivation quintile*		2015	2016	2017	2018	2019
1 - Least deprived	Stillbirths N (%)	464 (15.3)	456 (14.9)	424 (14.9)	387 (15.0)	330 (13.8)
	Rates per 1,000 births†	3.00	2.96	2.81	2.61	2.33
2	Stillbirths N (%)	513 (16.9)	546 (17.8)	471 (16.6)	400 (15.5)	387 (16.1)
	Rates per 1,000 births†	3.25	3.48	3.12	2.77	2.69
3	Stillbirths N (%)	570 (18.8)	608 (19.8)	545 (19.2)	504 (19.5)	478 (19.9)
	Rates per 1,000 births†	3.68	3.95	3.58	3.41	3.32
4	Stillbirths N (%)	690 (22.7)	671 (21.9)	660 (23.2)	596 (23.1)	528 (22.0)
	Rates per 1,000 births†	4.44	4.33	4.34	4.09	3.73
5 - Most deprived	Stillbirths N (%)	787 (25.9)	764 (24.9)	733 (25.8)	686 (26.6)	670 (27.9)
	Rates per 1,000 births†	5.05	4.91	4.84	4.68	4.67
Not known	Stillbirths N (%)	10 (0.3)	20 (0.7)	7 (0.2)	6 (0.2)	6 (0.25)
	Rates per 1,000 births†	2.09	4.33	2.74	2.40	2.43

§ 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

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Table 8: Neonatal mortality rates by mothers' socio-economic deprivation quintile of residence by year: United Kingdom and Crown Dependencies, for births in 2015 to 2019

Socio-economic deprivation quintile*		2015	2016	2017	2018	2019
1 - Least deprived	Neonatal deaths N (%)	218 (15.9)	186 (13.9)	199 (15.7)	182 (15.2)	169 (14.6)
	Rates per 1,000 births‡	1.41	1.21	1.32	1.23	1.20
2	Neonatal deaths N (%)	237 (17.3)	234 (17.5)	212 (16.7)	202 (16.8)	192 (16.6)
	Rates per 1,000 births‡	1.51	1.50	1.41	1.40	1.34
3	Neonatal deaths N (%)	247 (18.0)	257 (19.2)	230 (18.2)	235 (19.6)	230 (19.9)
	Rates per 1,000 births‡	1.60	1.68	1.52	1.59	1.60
4	Stillbirths N (%)	310 (22.6)	303 (22.7)	310 (24.5)	259 (21.6)	269 (23.2)
	Rates per 1,000 births‡	2.00	1.96	2.05	1.78	1.91
5 - Most deprived	Neonatal deaths N (%)	353 (25.7)	351 (26.3)	312 (24.6)	320 (26.7)	295 (25.5)
	Rates per 1,000 births‡	2.28	2.27	2.07	2.20	2.07
Not known	Neonatal deaths N (%)	8 (0.6)	6 (0.4)	4 (0.3)	1 (0.1)	3 (0.3)
	Rates per 1,000 births‡	1.68	1.31	1.57	0.40	1.22

§ 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, PHS, NIMATS, States of Guernsey, States of Jersey

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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 2015 to 2019

Socio-economic deprivation quintile*	Ratio of mortality rates (95% confidence intervals) [§]				
	Stillbirths				
	2015	2016	2017	2018	2019
1 - Least deprived	Reference	Reference	Reference	Reference	Reference
2	1.08 (0.96 to 1.23)	1.18 (1.08 to 1.28)	1.11 (1.01 to 1.22)	1.06 (0.96 to 1.17)	1.15 (1.04 to 1.28)
3	1.23 (1.09 to 1.39)	1.33 (1.23 to 1.45)	1.27 (1.17 to 1.39)	1.31 (1.19 to 1.43)	1.42 (1.30 to 1.56)
4	1.48 (1.31 to 1.66)	1.46 (1.35 to 1.58)	1.54 (1.43 to 1.67)	1.57 (1.44 to 1.7)	1.60 (1.47 to 1.75)
5 - Most deprived	1.68 (1.50 to 1.89)	1.66 (1.54 to 1.78)	1.72 (1.60 to 1.86)	1.79 (1.66 to 1.94)	2.00 (1.85 to 2.17)

[§] excluding terminations of pregnancy and births <24⁺ 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, PHS, NIMATS, States of Guernsey, States of Jersey

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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 2019

Socio-economic deprivation quintile*	Ratio of mortality rates (95% confidence intervals) [§]				
	Neonatal deaths				
	2015	2016	2017	2018	2019
1 - Least deprived	Reference	Reference	Reference	Reference	Reference
2	1.07 (0.89 to 1.28)	1.24 (1.08 to 1.42)	1.07 (0.93 to 1.23)	1.14 (0.99 to 1.31)	1.12 (0.96 to 1.29)
3	1.13 (0.94 to 1.36)	1.39 (1.22 to 1.58)	1.15 (1.01 to 1.32)	1.29 (1.13 to 1.48)	1.33 (1.16 to 1.53)
4	1.42 (1.19 to 1.68)	1.62 (1.44 to 1.82)	1.55 (1.38 to 1.74)	1.45 (1.27 to 1.64)	1.59 (1.40 to 1.80)
5 - Most deprived	1.61 (1.36 to 1.91)	1.88 (1.68 to 2.09)	1.57 (1.40 to 1.76)	1.79 (1.59 to 2.01)	1.73 (1.53 to 1.94)

[§] excluding terminations of pregnancy and births <24⁺ 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, PHS, NIMATS, States of Guernsey, States of Jersey

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Implications

Whilst there has been a reduction in the stillbirth and neonatal mortality rates across all levels of deprivation over the past five years, initiatives to reduce perinatal mortality do not appear to have been equally effective across those same groups, leading to a widening of the deprivation gap. This means that women living in the most deprived areas are now twice as likely to suffer a stillbirth as women living in the least deprived areas, and at over 70% excess risk of their baby dying during the neonatal period.

In order to have a major impact on these rates, public health, commissioning bodies and healthcare providers should co-ordinate intervention programmes 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 at the University of Leicester 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 requiring improved implementation

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.

MBRRACE-UK 2020 [13]

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 43% 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 2015 to 2019, 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 2015 to 2019, by babies' ethnicity, relative to White ethnicity.**

Results

A reduction in stillbirth rates over time can be seen for all ethnic groups (Table 11). There has been an overall decrease in the rate of stillbirth for babies of Black or Black British ethnicity of 11.5% over the five years shown, although the rate of decrease has slowed substantially with only a 3% decrease between 2017 and 2019 (from 7.46 in 2017 to 7.23 per 1,000 total births in 2019). However a much larger 14% decrease in the rate of stillbirth can be seen for babies of Asian or Asian British ethnicity, reducing from 5.88 to 5.05 per 1,000 total births over the 2015 to 2019 period. This is greater than the 9% decrease seen in the rate of stillbirth for babies of White ethnicity (3.55 to 3.22 per 1,000 total births).

Whilst there was a small 5% reduction in neonatal mortality rates, between 2015 and 2019, in babies of White ethnicity (from 1.71 to 1.62 per 1,000 live births) and babies of Black or Black British ethnicity (from 2.45 to 2.32 per 1,000 live births) there was an overall 3% increase in neonatal mortality rates for babies of Asian and Asian British ethnicity over the same period (Table 12). This is mainly due to the higher neonatal mortality rates seen in 2016 and 2017 following the lowest reported rate for this group over this period in 2015. Consequently there is little change in neonatal mortality rates for babies of Asian and Asian British ethnicity for 2015 and 2019.

Despite the reduction in both stillbirth and neonatal mortality rates over time across most groups, these reductions have not been the same across all ethnicities. As a result there has been a small increase in the ratio of stillbirth rates for babies of Black or Black British ethnicity compared to babies of White 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 (124% increased risk). Babies of Black or Black British ethnicity remain at 43% increased risk of neonatal mortality compared to babies of White ethnicity. 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. These marked differences in risk, particularly the risk of stillbirth, suggest that current interventions continue to have more impact on babies of White ethnicity.

Table 11: Stillbirth rates by babies' ethnicity by year: United Kingdom and Crown Dependencies, for births in 2015 to 2019

Baby's ethnicity		2015	2016	2017	2018	2019
White	Stillbirths N (%)	1,987 (65.5)	2,067 (67.4)	1,911 (67.3)	1,738 (67.4)	1,606 (66.9)
	Rates per 1,000 births [†]	3.55	3.74	3.59	3.39	3.22
Mixed	Stillbirths N (%)	162 (5.3)	164 (5.4)	184 (6.5)	170 (6.6)	146 (6.1)
	Rates per 1,000 births [†]	4.11	4.01	4.56	4.25	3.58
Asian, Asian British	Stillbirths N (%)	433 (14.3)	457 (14.9)	415 (14.6)	370 (14.3)	359 (15.0)
	Rates per 1,000 births [†]	5.88	6.09	5.70	5.31	5.05
Black, Black British	Stillbirths N (%)	269 (8.9)	275 (9.0)	239 (8.4)	226 (8.8)	220 (9.2)
	Rates per 1,000 births [†]	8.17	8.29	7.46	7.35	7.23
Other	Stillbirths N (%)	71 (2.3)	87 (2.8)	73 (2.6)	64 (2.5)	56 (2.3)
	Rates per 1,000 births [†]	3.56	4.14	3.68	3.29	2.95
Refused/Not Known	Stillbirths N (%)	112 (3.7)	15 (0.5)	18 (0.6)	11 (0.4)	12 (0.5)
	Rates per 1,000 births [†]					

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

[†] per 1,000 total births

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

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Table 12: Neonatal mortality rates by babies' ethnicity by year: United Kingdom and Crown Dependencies, for births in 2015 to 2019

Socio-economic deprivation quintile*		2015	2016	2017	2018	2019
White	Neonatal deaths N (%)	953 (69.4)	937 (70.1)	878 (69.3)	843 (70.3)	802 (69.3)
	Rates per 1,000 births [‡]	1.71	1.70	1.66	1.65	1.62
Mixed	Neonatal deaths N (%)	65 (4.7)	71 (5.3)	54 (4.3)	62 (5.2)	51 (4.4)
	Rates per 1,000 births [‡]	1.66	1.74	1.34	1.56	1.25
Asian, Asian British	Neonatal deaths N (%)	183 (13.3)	211 (15.8)	207 (16.3)	182 (15.2)	182 (15.7)
	Rates per 1,000 births [‡]	2.50	2.83	2.86	2.63	2.57
Black, Black British	Stillbirths N (%)	80 (5.8)	84 (6.3)	88 (6.9)	73 (6.1)	70 (6.0)
	Rates per 1,000 births [‡]	2.45	2.55	2.77	2.39	2.32
Other	Neonatal deaths N (%)	32 (2.3)	29 (2.2)	32 (2.5)	26 (2.2)	37 (3.2)
	Rates per 1,000 births [‡]	1.61	1.38	1.62	1.34	1.95
Refused/Not Known	Neonatal deaths N (%)	60 (4.4)	5 (0.4)	8 (0.6)	13 (1.1)	16 (1.4)
	Rates per 1,000 births [‡]					

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

[‡] per 1,000 live births

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

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Table 13: Ratios of mortality rates for stillbirth by babies' ethnicity by year: United Kingdom and Crown Dependencies, for births in 2015 to 2019

Socio-economic deprivation quintile*	Ratio of mortality rates (95% confidence intervals) [§]				
	Stillbirths				
	2015	2016	2017	2018	2019
White	Reference	Reference	Reference	Reference	Reference
Mixed	1.16 (0.99 to 1.36)	1.07 (0.92 to 1.25)	1.27 (1.10 to 1.47)	1.25 (1.08 to 1.46)	1.11 (0.94 to 1.31)
Asian, Asian British	1.66 (1.49 to 1.84)	1.63 (1.48 to 1.78)	1.59 (1.44 to 1.75)	1.57 (1.41 to 1.73)	1.57 (1.41 to 1.74)
Black, Black British	2.30 (2.03 to 2.61)	2.21 (1.97 to 2.49)	2.08 (1.83 to 2.36)	2.17 (1.90 to 2.47)	2.24 (1.96 to 2.56)
Other	1.00 (0.79 to 1.27)	1.10 (0.89 to 1.36)	1.02 (0.81 to 1.29)	0.97 (0.76 to 1.24)	0.91 (0.70 to 1.19)

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

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

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Table 14: Ratios of mortality rates for neonatal death by babies' ethnicity by year: United Kingdom and Crown Dependencies, for births in 2015 to 2019

Socio-economic deprivation quintile*	Ratio of mortality rates (95% confidence intervals) [§]				
	Neonatal deaths				
	2015	2016	2017	2018	2019
White	Reference	Reference	Reference	Reference	Reference
Mixed	0.97 (0.75 to 1.25)	1.02 (0.81 to 1.29)	0.81 (0.62 to 1.06)	0.94 (0.73 to 1.21)	0.78 (0.59 to 1.02)
Asian, Asian British	1.46 (1.25 to 1.71)	1.66 (1.45 to 1.90)	1.73 (1.50 to 1.98)	1.59 (1.37 to 1.84)	1.59 (1.38 to 1.84)
Black, Black British	1.43 (1.14 to 1.80)	1.50 (1.21 to 1.86)	1.67 (1.35 to 2.06)	1.45 (1.15 to 1.82)	1.43 (1.13 to 1.81)
Other	0.94 (0.66 to 1.34)	0.81 (0.56 to 1.17)	0.98 (0.69 to 1.38)	0.81 (0.55 to 1.19)	1.21 (0.88 to 1.67)

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

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

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Implications

Interventions to reduce stillbirth and neonatal mortality rates are leading to reductions in these rates across all ethnicities. Nevertheless 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 which needs to be addressed. As such 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 both the Black and Asian communities to facilitate the development of new intervention programmes for these populations. The current MBRRACE-UK confidential enquiry, which will report in 2022, is reviewing the quality of care provision provided for mothers and babies of Black and Black British ethnicity to identify areas where care could be improved and to assess whether the care provided for these communities is equitable. In the development of this enquiry we included key stakeholder groups to ensure that we considered those issues pertinent to Black and Black British women.

Recommendation requiring improved implementation

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

MBRRACE-UK 2020 [13]

Effect of mother's age on perinatal mortality

Key findings

- The lowest stillbirth and neonatal mortality rates are for mothers aged 30 to 34 years: stillbirths, 3.15 per 1,000 total births and neonatal deaths, 1.50 per 1,000 live births.
- The largest reductions in both stillbirth and neonatal mortality rates were for babies born to the oldest mothers.
- Mothers aged under 20 are at a 33% increased risk of stillbirth and a 75% increased risk of neonatal death compared to mothers aged 30-34.
- Mothers aged 40 and above are at a 41% increased risk of stillbirth and a 37% increased risk of neonatal death compared with mothers aged 30-34.

Data presented

1. **Rates of stillbirth and neonatal death for births in the UK at 24⁺ weeks gestational age or later (excluding terminations of pregnancy) for the period 2015 to 2019, by mother's age.**
2. **Mortality rate ratios for stillbirths and neonatal deaths for births in the UK at 24⁺ weeks gestational age or later (excluding terminations of pregnancy) for the period 2015 to 2019, by mother's age, relative to age 30-34.**

Results

A reduction in stillbirth rates over time can be seen for all age groups (Table 15), with the largest reductions seen in the oldest mothers. For mothers aged 35-39 there has been a 17% reduction in the stillbirth rate over the five year period (down from 4.36 to 3.61 per 1,000 total births), with a 21% reduction in the stillbirth rate for mothers aged 40 and over (down from 5.62 to 4.45 per 1,000 total births).

For neonatal mortality the picture is less clear, with more fluctuation in rates over time (Table 16). The largest reductions in mortality over the five years are again seen in babies born to the oldest mothers. For mothers aged 35-39 there has been a 15% reduction in the neonatal mortality rate over the five year period (down from 1.85 to 1.57 per 1,000 total births), with an 18% reduction in the neonatal mortality rate for mothers aged 40 and over (down from 2.52 to 2.06 per 1,000 total births).

Stillbirth and neonatal mortality rate ratios show some fluctuation over time across almost all age groups (Tables 17 and 18). The youngest and oldest groups of mothers remain at the highest risk of stillbirth and neonatal death compared to mothers aged 30-34. Mothers aged under 20 are at a 33% increased risk of stillbirth and a 75% increased risk of neonatal death compared to mothers aged 30-34. Mothers aged over 40 are at a 41% increased risk of stillbirth and a 37% increased risk of neonatal death compared with mothers aged 30-34.

Table 15: Stillbirth rates by mother's age by year: United Kingdom and Crown Dependencies, for births in 2015 to 2019

Mother's age		2015	2016	2017	2018	2019
<20	Stillbirths N (%)	122 (4.0)	125 (4.1)	120 (4.2)	109 (4.2)	82 (3.4)
	Rates per 1,000 births [†]	4.65	5.05	5.31	5.25	4.20
20-24	Stillbirths N (%)	500 (16.5)	539 (17.6)	464 (16.3)	420 (16.3)	362 (15.1)
	Rates per 1,000 births [†]	4.22	4.77	4.34	4.24	3.82
25-29	Stillbirths N (%)	804 (26.5)	799 (26.1)	762 (26.8)	631 (24.5)	618 (25.8)
	Rates per 1,000 births [†]	3.73	3.74	3.68	3.22	3.26
30-34	Stillbirths N (%)	858 (28.3)	832 (27.1)	788 (27.7)	735 (28.5)	719 (30.0)
	Rates per 1,000 births [†]	3.62	3.47	3.34	3.19	3.15
35-39	Stillbirths N (%)	573 (18.9)	560 (18.3)	541 (19.0)	520 (20.2)	476 (19.8)
	Rates per 1,000 births [†]	4.36	4.12	3.98	3.88	3.61
≥40	Stillbirths N (%)	175 (5.8)	210 (6.9)	165 (5.8)	163 (6.3)	141 (5.9)
	Rates per 1,000 births [†]	5.62	6.61	5.27	5.30	4.45
Not known	Stillbirths N (%)	2 (0.1)	0 (0.0)	0 (0.0)	1 (0.0)	1 (0.0)
	Rates per 1,000 births [†]	0.08	0.00	0.00	0.04	0.05

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

[†] per 1,000 total births

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Table 16: Neonatal mortality rates by mother's age by year: United Kingdom and Crown Dependencies, for births in 2015 to 2019

Mother's age		2015	2016	2017	2018	2019
<20	Neonatal deaths N (%)	77 (5.6)	80 (6.0)	67 (5.3)	51 (4.3)	51 (4.4)
	Rates per 1,000 births [‡]	2.95	3.25	2.98	2.47	2.62
20-24	Neonatal deaths N (%)	239 (17.4)	226 (16.9)	200 (15.8)	204 (17.0)	177 (15.3)
	Rates per 1,000 births [‡]	2.03	2.01	1.88	2.07	1.88
25-29	Neonatal deaths N (%)	360 (26.2)	340 (25.4)	329 (26.0)	315 (26.3)	317 (27.4)
	Rates per 1,000 births [‡]	1.68	1.60	1.59	1.61	1.68
30-34	Stillbirths N (%)	377 (27.5)	380 (28.4)	365 (28.8)	336 (28.0)	342 (29.5)
	Rates per 1,000 births [‡]	1.60	1.59	1.55	1.46	1.50
35-39	Neonatal deaths N (%)	242 (17.6)	226 (16.9)	231 (18.2)	222 (18.5)	206 (17.8)
	Rates per 1,000 births [‡]	1.85	1.67	1.71	1.66	1.57
≥40	Neonatal deaths N (%)	78 (5.7)	85 (6.4)	75 (5.9)	71 (5.9)	65 (5.6)
	Rates per 1,000 births [‡]	2.52	2.69	2.41	2.32	2.06
Not known	Neonatal deaths N (%)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
	Rates per 1,000 births [‡]	0.00	0.00	0.00	0.00	0.00

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

[‡] per 1,000 live births

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

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Table 17: Ratios of mortality rates for stillbirth by mother’s age by year: United Kingdom and Crown Dependencies, for births in 2015 to 2019

Mother’s age	Ratio of mortality rates (95% confidence intervals) [§]				
	Stillbirths				
	2015	2016	2017	2018	2019
<20	1.28 (1.06 to 1.55)	1.46 (1.22 to 1.74)	1.59 (1.33 to 1.90)	1.65 (1.36 to 1.99)	1.33 (1.07 to 1.66)
20-24	1.17 (1.04 to 1.30)	1.37 (1.26 to 1.5)	1.30 (1.19 to 1.42)	1.33 (1.21 to 1.46)	1.21 (1.09 to 1.35)
25-29	1.03 (0.94 to 1.13)	1.08 (1.00 to 1.16)	1.10 (1.03 to 1.18)	1.01 (0.93 to 1.09)	1.03 (0.96 to 1.12)
30-34	Reference	Reference	Reference	Reference	Reference
35-39	1.20 (1.08 to 1.34)	1.19 (1.09 to 1.29)	1.19 (1.09 to 1.30)	1.22 (1.11 to 1.33)	1.15 (1.05 to 1.26)
≥40	1.55 (1.32 to 1.82)	1.90 (1.66 to 2.18)	1.58 (1.35 to 1.84)	1.66 (1.42 to 1.94)	1.41 (1.20 to 1.67)

[§] excluding terminations of pregnancy and births <24⁺ weeks gestational age
 Data sources: MBRRACE-UK, PDS, ONS, NRS, PHS, NIMATS, States of Guernsey, States of Jersey
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Table 18: Ratios of mortality rates for neonatal death by mother’s age by year: United Kingdom and Crown Dependencies, for births in 2015 to 2019

Mother’s age	Ratio of mortality rates (95% confidence intervals) [§]				
	Neonatal deaths				
	2015	2016	2017	2018	2019
<20	1.85 (1.44 to 2.36)	2.04 (1.64 to 2.55)	1.92 (1.51 to 2.45)	1.69 (1.28 to 2.23)	1.75 (1.32 to 2.30)
20-24	1.27 (1.08 to 1.49)	1.26 (1.11 to 1.44)	1.21 (1.05 to 1.40)	1.42 (1.23 to 1.63)	1.25 (1.08 to 1.46)
25-29	1.05 (0.91 to 1.21)	1.08 (1.00 to 1.16)	1.10 (1.03 to 1.18)	1.01 (0.93 to 1.09)	1.03 (0.96 to 1.12)
30-34	Reference	Reference	Reference	Reference	Reference
35-39	1.16 (0.99 to 1.36)	1.05 (0.92 to 1.2)	1.10 (0.97 to 1.26)	1.14 (0.99 to 1.30)	1.05 (0.91 to 1.20)
≥40	1.58 (1.24 to 2.01)	1.69 (1.36 to 2.1)	1.55 (1.24 to 1.95)	1.59 (1.26 to 2.01)	1.37 (1.07 to 1.76)

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

The excess stillbirth and neonatal mortality rates associated with teenage pregnancy and older mothers (>40 years) has been known for many years [17-19]. Successful public health strategies to reduce the rate of conceptions for women aged <18 years are in place in all UK nations [20-24]. Recent data from the Office for National Statistic for England and Wales has shown that both the teenage conception and birth rates have declined year on year since 2007 [25]. However, despite this reduction, in 2018 over half of conceptions for women aged <18 years resulted in abortion suggesting that more work is needed to prevent unwanted pregnancies. Continuing efforts to reduce teenage pregnancy by improving sex education and access to sexual and reproductive health services, including health education, may also help reduce stillbirth and neonatal mortality rates for these women.

Numbers of births to older mothers aged 40 years or more increased steadily in the 1990s and 2000s up until 2012 and have remained fairly constant since then, despite the overall average age of mothers increasing to 30.7 years over the past decade [26]. Older women are more likely have one or more complication of pregnancy

such as hypertension, diabetes and placental problems as well as being at increased risk of their baby having a chromosomal anomaly. Adherence to standards and guidance developed by the RCOG and NICE [27, 28] with respect to screening and monitoring for these women is therefore important and should be regularly audited in an effort to reduce adverse outcomes such as preterm births and associated neonatal deaths as well as stillbirths. One particular area of concern is the increased risk of stillbirth at around term with advancing maternal age [29]. Older women in particular should therefore be counselled in order to inform decision making around birth.

Younger and older mothers require detailed information about the increased risks associated with their pregnancy to empower them to make informed decisions about their care.

Recommendation 4

N

Ensure the continuation of targeted initiatives with health education organisations not only aimed at reducing teenage pregnancy but also providing pre-conception advice.

Recommendation 5

N

Provide pre- and post-conception information for women aged 35 and over, clarifying the risk of stillbirth and neonatal death associated with increased maternal age to empower their decision making throughout the care pathway.

Multidimensional effects of ethnicity, deprivation and mother's age on perinatal mortality

Key findings

- Stillbirth and neonatal mortality rates increased with deprivation and were higher for mothers under 25 years and over 35 years across all ethnic groups.
- Stillbirth rates and neonatal mortality rates were lowest for babies of White ethnicity born to mothers aged 25 to 34 living in the least deprived areas (2.61 to 2.76 stillbirths per 1,000 total births and 1.24 to 1.26 neonatal deaths per 1,000 live births).
- The multiple impact of ethnicity, mother's age and deprivation is highlighted by a stillbirth rate of 10.54 and 6.91 per 1,000 total births for babies of Black and Black British ethnicity and Asian and Asian British ethnicity respectively born to mothers aged over 35 years living in the most deprived areas.
- Neonatal mortality rates were over 3 per 1,000 live births for babies of Black and Black British ethnicity and Asian and Asian British ethnicity born to mothers under 25 years and over 35 years living in the most deprived areas.
- Due to high proportions of babies of Black and Black British ethnicity being born to mothers living in deprived areas, they are disproportionately affected by the higher rates of stillbirth associated with deprivation.

Data presented

Rates of stillbirth and neonatal death for births in the UK at 24⁺ weeks gestational age or later (excluding terminations of pregnancy) for the period 2015 to 2019, by baby's ethnicity, mother's age and mother's socio-economic deprivation quintile of residence.

This chapter focuses on four main categories of ethnicity: Black, Asian, White and Mixed; Other and Unknown categories have been excluded. Due to small numbers issues maternal age has been categorised into four groups for this chapter: <25 years, 25-29 years, 30 to 34 years and 35+ years. Socio-economic deprivation is measured using the Children in Low-Income Families Local Measure [16] based on the mother's postcode of residence at the time of birth.

Results

Rates should be considered in combination with the accompanying birth numbers (Tables 21 and 22). Rates for some combinations of age, ethnicity and deprivation **must be treated with extreme caution** due to small numbers. More detailed population characteristics information is available in the accompanying Tables and Figures document (available at: <https://www.npeu.ox.ac.uk/mbrrace-uk/reports>).

Exploring stillbirth rates in a multidimensional way shows wide inequalities by baby's ethnicity, deprivation and mother's age, with rates for the five year period 2015 to 2019 varying between 1.55 and 10.78 stillbirths per 1,000 total births. For all ethnicities, rates of stillbirth generally increased with increasing deprivation and were higher for mothers aged under 25 and over 35.

For babies of White ethnicity stillbirth rates varied from 2.61 per 1,000 total births for babies born to mothers aged 30 to 34 living in the least deprived quintile, to 5.79 per 1,000 total births for mothers over 35 in the most

deprived quintile. Rates of stillbirth for babies of mixed or multiple ethnicity were extremely similar to those of White ethnicity ranging between 1.95 and 6.29 per 1,000 total births.

For babies of Asian and Asian British ethnicity, rates of stillbirth ranged between 3.00 and 7.88 per 1,000 total births. Based on the comparison outlined for babies of White ethnicity, rates were 3.61 per 1,000 total births for babies born to mothers aged 25 to 29 and living in the least deprived areas compared to 6.91 per 1,000 total births for babies born to mothers aged over 35 living in the most deprived areas.

Rates were highest for babies of Black and Black British ethnicity with the majority of stillbirth rates by deprivation quintile and mother's age exceeding the highest stillbirth rate of 5.79 per 1,000 total births seen for babies of White ethnicity. As a comparison, rates were 6.30 per 1,000 total births for Black and Black British babies born to mothers aged 30 to 34 and living in the least deprived areas compared to 10.54 per 1,000 total births for babies born to mothers aged over 35 living in the most deprived areas.

Table 19: Stillbirths rates by baby's ethnicity, mother's age and mother's socio-economic deprivation quintile of residence: United Kingdom and Crown Dependencies, for births in 2015 to 2019

Baby's ethnicity	Mother's age	Rate per 1,000 total births					
		Socio-economic deprivation quintile*					
		1 - Least deprived	2	3	4	5 - Most deprived	All quintiles
White	<25	3.56	3.75	4.22	4.37	4.90	4.30
	25-29	2.76	2.87	3.07	3.62	4.27	3.31
	30-34	2.61	2.72	2.93	3.52	4.16	3.06
	35+	2.95	3.57	3.58	4.03	5.79	3.69
	All ages	2.84	3.11	3.35	3.84	4.65	
Mixed	<25	5.43	3.25	4.05	4.25	6.29	4.86
	25-29	2.32	2.90	3.70	3.91	4.42	3.62
	30-34	1.95	3.73	2.74	4.00	4.97	3.46
	35+	3.56	3.69	5.60	5.77	5.72	4.76
	All ages	2.92	3.47	3.97	4.44	5.31	
Asian	<25	6.51	3.00	7.88	6.50	6.19	6.35
	25-29	3.50	4.61	5.52	5.87	5.52	5.35
	30-34	3.61	4.41	5.03	5.55	5.84	5.09
	35+	4.97	4.71	6.76	7.70	6.91	6.47
	All ages	4.13	4.44	5.84	6.22	6.00	
Black	<25	1.55	10.78	10.25	7.18	8.76	8.43
	25-29	6.09	4.30	6.45	5.85	6.53	6.10
	30-34	6.30	6.24	5.93	6.66	8.05	6.98
	35+	6.79	8.96	8.04	10.33	10.54	9.66
	All ages	6.05	7.06	7.22	7.61	8.43	
All 4 ethnicities	<25	3.72	3.80	4.62	4.65	5.26	
	25-29	2.82	3.03	3.54	4.13	4.64	
	30-34	2.69	3.00	3.34	4.16	4.93	
	35+	3.15	3.81	4.40	5.48	6.73	

§ 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

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For neonatal mortality the picture is similar with, for all ethnic groups, a general trend of increasing rates of neonatal mortality with increasing deprivation and for babies born to mothers aged under 25 and over 35.

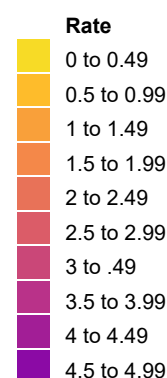
For babies of White ethnicity the lowest neonatal mortality rates were for babies born to mothers aged 25 to 29 living in the least deprived quintile (1.24 per 1,000 live births) and aged 30 to 34 living in the second least deprived quintile (1.21 per 1,000 live births). The highest rates of neonatal mortality for this group of babies were for those born to mothers over 35 and under 25 in the most deprived quintile (2.43 and 2.44 per 1,000 live births

respectively). Again, rates of neonatal death for babies of Mixed or multiple ethnicity were extremely similar to those of White ethnicity ranging between 0.65 and 2.65 per 1,000 live births.

For babies of Asian and Asian British ethnicity, rates of neonatal death ranged between 1.76 per 1,000 live births for babies born to mothers aged 25 to 29 living in the least deprived areas to 3.74 and 3.45 per 1,000 live births for babies born to mothers over 35 living in the second most and most deprived quintiles respectively. Rates of neonatal mortality were similarly high for babies of Black and Black British ethnicity, with rates over 3 per 1,000 live births for babies born to mothers of all ages except those aged 25 to 29 living in the most deprived quintile.

Table 20: Neonatal mortality rates by baby's ethnicity, mother's age and mother's socio-economic deprivation quintile of residence: United Kingdom and Crown Dependencies, for births in 2015 to 2019

Baby's ethnicity	Mother's age	Rate per 1,000 live births					
		Socio-economic deprivation quintile*					
		1 - Least deprived	2	3	4	5 - Most deprived	All quintiles
White	<25	1.81	1.92	2.00	2.31	2.44	2.17
	25-29	1.24	1.43	1.41	1.86	2.02	1.59
	30-34	1.26	1.21	1.31	1.64	1.96	1.41
	35+	1.33	1.69	1.86	1.80	2.43	1.70
	All ages	1.33	1.49	1.58	1.90	2.19	
Mixed	<25	0.68	0.65	1.60	1.56	1.75	1.44
	25-29	1.55	1.58	1.11	1.71	1.40	1.46
	30-34	1.14	0.92	1.80	1.42	2.10	1.47
	35+	1.24	0.79	2.00	2.65	1.68	1.64
	All ages	1.22	1.00	1.65	1.81	1.73	
Asian	<25	2.19	4.38	4.61	2.89	3.00	3.40
	25-29	1.76	2.32	2.22	2.60	2.78	2.46
	30-34	2.07	1.97	2.38	2.69	3.07	2.52
	35+	2.22	2.21	2.38	3.74	3.45	2.92
	All ages	2.05	2.30	2.54	2.90	3.04	
Black	<25	4.65	0.00	2.74	1.31	3.75	2.60
	25-29	2.04	2.02	1.87	2.26	2.05	2.08
	30-34	3.01	2.83	1.91	2.06	3.06	2.53
	35+	3.60	2.03	2.46	2.75	3.10	2.81
	All ages	3.10	2.11	2.17	2.22	2.89	
All 4 ethnicities	<25	1.80	1.92	2.17	2.26	2.49	
	25-29	1.29	1.52	1.51	2.00	2.09	
	30-34	1.33	1.29	1.52	1.84	2.28	
	35+	1.40	1.68	1.97	2.29	2.65	



§ excluding terminations of pregnancy and births <24⁺ 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, PHS, NIMATS, States of Guernsey, States of Jersey

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Table 21: Total births by baby's ethnicity, mother's age and mother's socio-economic deprivation quintile of residence: United Kingdom and Crown Dependencies, for births in 2015 to 2019

Baby's ethnicity	Mother's age	Total births					
		Socio-economic deprivation quintile*					
		1 - Least deprived	2	3	4	5 - Most deprived	All quintiles
White	<25	55,348	82,142	101,146	116,597	147,572	502,805
	25-29	135,302	157,577	154,639	145,676	145,960	739,154
	30-34	222,352	198,773	163,535	133,653	112,383	830,696
	35+	179,390	139,576	106,575	82,134	63,851	571,526
	All ages	592,392	578,068	525,895	478,060	469,766	2,174,415
Mixed	<25	2,948	4,620	6,911	9,648	12,090	36,217
	25-29	6,476	8,264	9,990	11,767	12,888	49,385
	30-34	12,286	12,060	12,792	12,744	11,469	61,351
	35+	12,932	11,393	11,081	10,231	8,392	54,029
	All ages	34,642	36,337	40,774	44,390	44,839	200,982
Asian	<25	1,842	3,664	7,873	11,839	12,114	37,332
	25-29	8,562	13,885	25,354	32,540	29,694	110,035
	30-34	15,496	20,428	31,192	35,145	29,812	132,073
	35+	10,869	13,175	18,652	21,032	18,663	82,391
	All ages	36,769	51,152	83,071	100,556	90,283	361,831
Black	<25	646	1,392	3,316	6,131	8,332	19,817
	25-29	1,969	3,485	6,980	12,489	16,685	41,608
	30-34	3,014	4,970	8,935	15,172	18,758	50,849
	35+	2,799	4,465	8,208	14,327	16,975	46,774
	All ages	8,428	14,312	27,439	48,119	60,750	159,048
All 4 ethnicities	<25	60,784	91,818	119,246	144,215	180,108	596,171
	25-29	152,309	183,211	196,963	202,472	205,227	940,182
	30-34	253,148	236,231	216,454	196,714	172,422	1,074,969
	35+	205,990	168,609	144,516	127,724	107,881	754,720

* based on mothers' postcodes at time of birth, using the Children in Low-Income Families Local Measure
 Data sources: MBRRACE-UK, PDS, ONS, NRS, PHS, NIMATS, States of Guernsey, States of Jersey
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Table 22: Live births by baby's ethnicity, mother's age and mother's socio-economic deprivation quintile of residence: United Kingdom and Crown Dependencies, for births in 2015 to 2019

Baby's ethnicity	Mother's age	Total live births					
		Socio-economic deprivation quintile*					
		1 - Least deprived	2	3	4	5 - Most deprived	All quintiles
White	<25	55,151	81,834	100,719	116,088	146,849	500,641
	25-29	134,929	157,125	154,164	145,149	145,337	736,704
	30-34	221,771	198,232	163,056	133,182	111,915	828,156
	35+	178,860	139,078	106,193	81,803	63,481	569,415
	All ages	590,711	576,269	524,132	476,222	467,582	2,634,916
Mixed	<25	2,932	4,605	6,883	9,607	12,014	36,041
	25-29	6,461	8,240	9,953	11,721	12,831	49,206
	30-34	12,262	12,015	12,757	12,693	11,412	61,139
	35+	12,886	11,351	11,019	10,172	8,344	53,772
	All ages	34,541	36,211	40,612	44,193	44,601	200,158
Asian	<25	1,830	3,653	7,811	11,762	12,039	37,095
	25-29	8,532	13,821	25,214	32,349	29,530	109,446
	30-34	15,440	20,338	31,035	34,950	29,638	131,401
	35+	10,815	13,113	18,526	20,870	18,534	81,858
	All ages	36,617	50,925	82,586	99,931	89,741	359,800
Black	<25	645	1,377	3,282	6,087	8,259	19,650
	25-29	1,957	3,470	6,935	12,416	16,576	41,354
	30-34	2,995	4,939	8,882	15,071	18,607	50,494
	35+	2,780	4,425	8,142	14,179	16,796	46,322
	All ages	8,377	14,211	27,241	47,753	60,238	157,820
All 4 ethnicities	<25	60,558	91,469	118,695	143,544	179,161	593,427
	25-29	151,879	182,656	196,266	201,635	204,274	936,710
	30-34	252,468	235,524	215,730	195,896	171,572	1,071,190
	35+	205,341	167,967	143,880	127,024	107,155	751,367

* based on mothers' postcodes at time of birth, using the Children in Low-Income Families Local Measure
 Data sources: MBRRACE-UK, PDS, ONS, NRS, PHS, NIMATS, States of Guernsey, States of Jersey
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Implications

This multidimensional analysis provides additional information for public health specialists, commissioners and service providers to develop initiatives targeted at those groups of mothers at the highest risk of having a baby stillborn or who dies within the neonatal period.

Due to the increased proportion of babies of Black and Black British ethnicity and to a slightly lesser extent babies of Asian and Asian British ethnicity being born to mothers living in more deprived areas they are disproportionately experiencing the higher rates observed with increasing deprivation compared to babies born to mothers of White ethnicity who were more likely to be living in less deprived areas. Only 5% of babies of Black and Black British ethnicity and 10% of babies of Asian and Asian British ethnicity were born to mothers living in the least deprived quintile compared to 22% of babies of White ethnicity. Conversely 38% of babies Black and Black British ethnicity and 25% of babies of Asian and Asian British ethnicity were born to mothers living in the most deprived quintile compared to 18% of babies of White ethnicity. This differential in the distribution of births across the quintiles of deprivation should be taken into consideration when comparing the mortality rates for babies born to Black and Black British mothers or Asian and Asian British mothers with those for babies born to White mothers.

This analysis highlights that babies of Black and Black British and Asian and Asian British mothers are not only at increased risk of being stillborn or dying in the neonatal period but they are also more likely to experience multiple other risk factors such as maternal age and deprivation. This is further confirmation that inequalities lead to an increase in the risk of stillbirth or neonatal death relating to ethnicity, deprivation and maternal age.

Further exploration of these factors to help inform effective interventions is currently being finalised to be submitted for publication.

If the English Department of Health is to achieve its target of reducing stillbirth and neonatal mortality rates by 50% by 2025 [2] then more research is needed to develop effective interventions to address these issues.

Recommendation 6

N

Initiate a research programme to inform the development of effective interventions to address health inequalities and reduce stillbirth and neonatal mortality rates.

Recommendation 7

N

Develop focused initiatives to reduce stillbirths and neonatal deaths among groups of mothers at the highest risk, informed by the multidimensional effects of ethnicity, deprivation and mother's age.

Perinatal mortality rates for Trusts and Health Boards

Key findings

- After adjustment for risk factors and unit size, stillbirth rates show little variation between Trusts and Health Boards with stabilised & adjusted rates for almost all (97%) 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) and neonatal surgical provision 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 Trusts and Health Boards falling within 5% of their comparator group average.
- Exclusion of deaths due to congenital anomalies has little effect on the variation in stabilised & adjusted neonatal mortality rates, with only 12% of Trusts and Health Boards with a Level 3 Neonatal Intensive Care Unit (NICU) and neonatal surgical provision 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 2019 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. In 2019 the variation in stabilised & adjusted stillbirth rates showed little variation, with 97% of Trusts and Health Boards falling within 5% of their comparator group average, increased from 85% in 2018. However, as in previous years this is not the case for the stabilised & adjusted rate of neonatal mortality where only 26% of Trusts and Health Boards fall within 5% of their comparator group average (31% in 2018). This continuing wide variation is particularly apparent between Trusts and Health Boards with a level 3 NICU and neonatal surgery, where only 15% 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 3.43 to 3.73 per 1,000 total births for those with a level 3 NICU and neonatal surgery and from 3.08 to 3.20 for Trusts and Health Boards with under 2,000 births per annum.

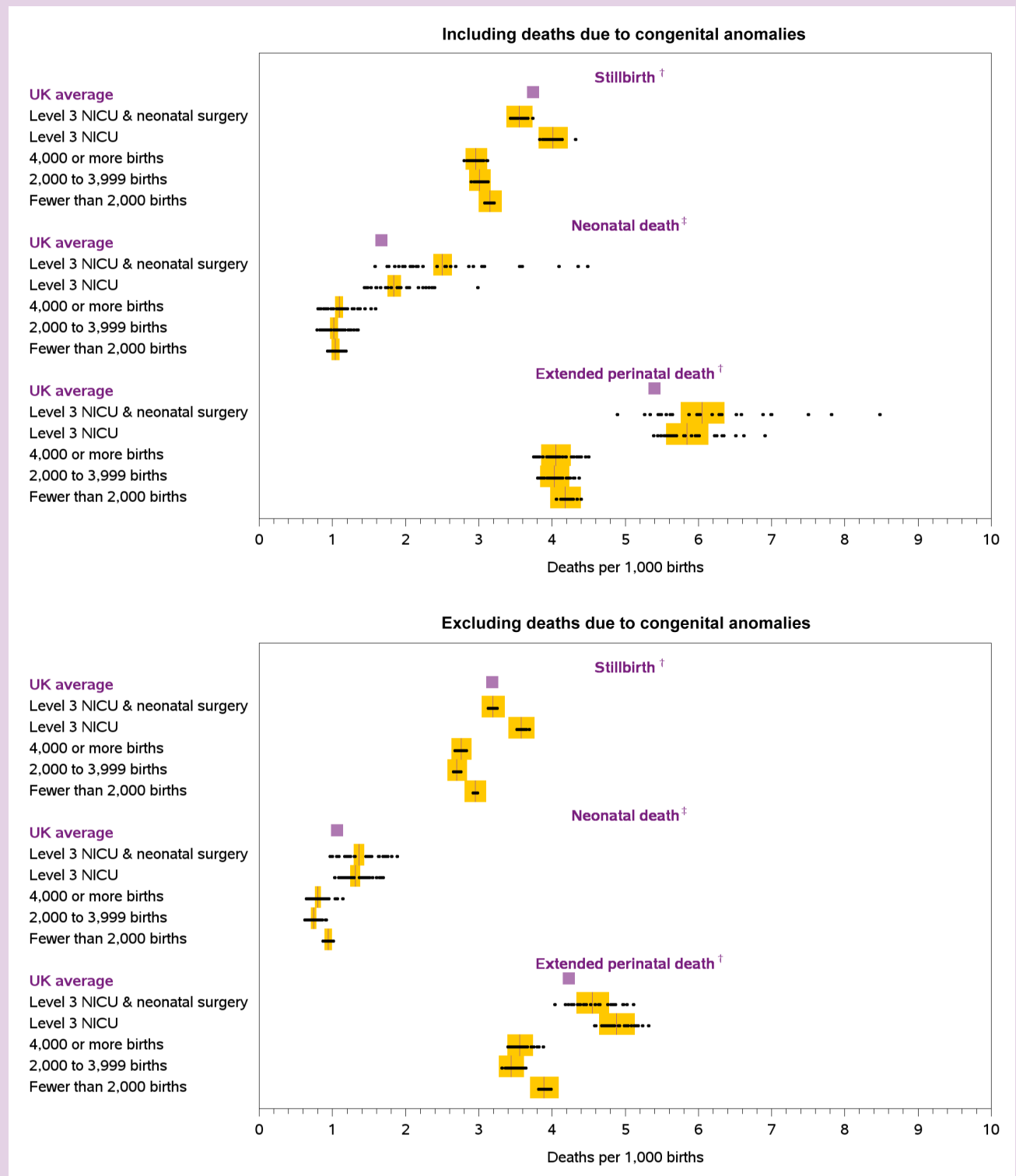
Stabilised & adjusted neonatal mortality rates for Trusts and Health Boards across the UK ranged from 1.58 to 4.49 per 1,000 live births for those with a level 3 NICU and neonatal surgery and from 0.93 to 1.18 for Trusts and Health Boards with under 2,000 births per annum.

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 2.66 to 3.69 per 1,000 total births across all types of unit). Overall stabilised & adjusted stillbirth rates excluding deaths due to congenital anomalies ranged from 3.52 to 3.69 per 1,000 births for those with a level 3 NICU without neonatal surgery and from 2.66 to 2.75 for Trusts and Health Boards with between 2,000 and 3,999 births per annum.

In comparison, as shown in our last report [13] exclusion of deaths due to congenital anomalies has little impact on the variation in stabilised & adjusted neonatal mortality rates, with only 30% of Trusts and Health Boards having a rate within 5% of their comparator group average (Table 15). Once deaths due to congenital anomalies are excluded only 12% of Trusts and Health Boards with a Level 3 NICU and neonatal surgery fall within 5% of their group average (range 0.97 to 1.88 per 1,000 live births). Overall, one-third of eligible Trusts and Health Boards (54 out of 155) had a neonatal mortality rate over 5% higher than the comparator average when 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 interactive maps and tables available at: www.npeu.ox.ac.uk/mbrrace-uk/reports.

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 2019



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, PHS, NIMATS, States of Guernsey, States of Jersey

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

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Table 23: Stabilised & adjusted neonatal mortality rate colour band for Trusts and Health Boards by comparator group, including and excluding deaths due to congenital anomalies: 2019

Comparator group		Number of organisations in colour band (%)*							
		● Green		● Yellow		● Amber		● Red	
Level 3 NICU and neonatal surgery	Including congenital anomalies	9	(34.6%)	3	(11.5%)	4	(15.4%)	10	(38.5%)
	Excluding congenital anomalies	5	(19.2%)	6	(23.1%)	3	(11.5%)	12	(46.2%)
Level 3 NICU	Including congenital anomalies	6	(20.0%)	8	(26.7%)	5	(16.7%)	11	(36.7%)
	Excluding congenital anomalies	3	(10.7%)	8	(28.6%)	6	(21.4%)	11	(39.3%)
4,000 or more births	Including congenital anomalies	7	(16.7%)	8	(19.0%)	12	(28.6%)	15	(35.7%)
	Excluding congenital anomalies	4	(9.5%)	12	(28.6%)	10	(23.8%)	16	(38.1%)
2,000-3,999 births	Including congenital anomalies	6	(15.4%)	9	(23.1%)	7	(17.9%)	17	(43.6%)
	Excluding congenital anomalies	1	(2.6%)	11	(28.2%)	14	(35.9%)	13	(33.3%)
Under 2,000 births	Including congenital anomalies	0	(0.0%)	3	(15.0%)	13	(65.0%)	4	(20.0%)
	Excluding congenital anomalies	0	(0.0%)	3	(15.0%)	15	(75.0%)	2	(10.0%)
All groups	Including congenital anomalies	1	(0.8%)	31	(23.8%)	41	(31.5%)	57	(43.8%)
	Excluding congenital anomalies	13	(8.4%)	40	(25.8%)	48	(31.0%)	54	(34.8%)

* 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, PHS, NIMATS, States of Guernsey, States of Jersey
 Note: during the period reported different laws existed in Northern Ireland for the termination of pregnancy
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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. As noted in previous years, 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. Overall, for neonatal mortality wide variation persists despite the exclusion of congenital anomalies. This variation is mainly focused in those units with level 3 NICUs, with or without neonatal surgery, where babies at highest risk of mortality are treated. Investigations into the reasons for this wide variation should be carried out at local, organisation and population levels to determine whether this is due to local population characteristics including deprivation and ethnicity [30] or quality of care provision.

Recommendation 8

N

Use the newly-developed MBRRACE-UK interactive maps and tables to compare stabilised and adjusted stillbirth, neonatal mortality and extended perinatal mortality rates between organisations.

Recommendation requiring improved implementation

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.

MBRRACE-UK 2020 [13]

Recommendation requiring improved implementation

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.

MBRRACE-UK 2020 [13]

Causes of perinatal death

Key findings

- Rates of stillbirth classified as of unknown cause have fallen by 8% between 2015 and 2019, much of which may be ascribed to the increasing proportion of stillbirths from placental causes.
- Of the two-fifths of neonatal deaths attributed to neonatal causes, mortality rates have fallen over the 5 year period for extreme prematurity as well as the neurological and cardio-respiratory categories.
- Congenital anomalies continue to contribute significantly to mortality rates, comprising around one-third of neonatal deaths and just under one-tenth of stillbirths.
- Whilst almost all parents were offered a post-mortem for their stillborn baby (97%) only 85% of parents received an offer of a post-mortem following a neonatal death in 2019.
- Where a post-mortem was offered following a stillbirth or neonatal death, half of parents gave consent for a full or limited post-mortem.
- In 2019, 78% of neonatal deaths occurring on day one after birth or which were classified as intrapartum-related deaths had placental histology investigations carried out.

Data presented

1. **The number and proportion 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 2015 to 2019, by cause of death .**
2. **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 2015 to 2019, by cause of death.**
3. **The number and proportion of stillbirths and neonatal deaths where there was an offer of post-mortem and whether consent was obtained, in 2019.**
4. **The number and proportion of stillbirths and neonatal deaths where a placental histology examination was carried out, in 2019.**

Causes of death are reported to MBRRACE-UK using the Cause of Death & Associated Conditions (CODAC) classification system [31]. The CODAC system has a three level hierarchical tree for the coding of both the primary cause of death and any associated conditions. The CODAC level 1 classification is presented for all stillbirths and neonatal deaths. For neonatal deaths having a CODAC level 1 “neonatal” cause the CODAC level 2 classification is also reported.

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

Results

The reported proportions and rates by CODAC level 1 cause of death for all stillbirths over the period 2015 to 2019 are presented in Tables 24 and 26 and in Figure 3. Over this period, the proportion of stillbirths classified

as unknown cause of death has fallen from 39.5% in 2015 to 31.5% in 2019. This is reflected in a reduction in the rate of stillbirth with unknown cause of death from 1.53 to 1.05 per 1,000 total births. Stillbirths ascribed to a placental cause show the opposite, with an increasing proportion over time: 27.1% in 2015 to 33.3% in 2019 mirrored by an increasing rate: 1.05 in 2015 to 1.12 in 2019. The proportion of stillbirths due to congenital anomalies has remained fairly constant over the period: 9.3% in 2019, a rate of 0.31 per 1,000 total births. Stillbirths due to intrapartum causes have shown a reduction in both the proportion and rates over the period: 2.8% to 1.3% and 0.11 to 0.04 per 1,000 total births, respectively.

For neonatal deaths the reported proportions and rates by CODAC level 1 and level 2 cause of death over the period 2015 to 2019 are presented in Tables 25 and 27 and in Figures 4 and 5. In part due to how the CODAC system is structured, once deaths due to congenital anomalies are excluded most neonatal deaths are coded within the “Neonatal” category at level 1. Around two-fifths of neonatal deaths are attributed to neonatal causes (40.3% in 2019) with decreasing rates over the five year period: 0.77 to 0.65 per 1,000 live births. Within the “Neonatal” category the majority of CODAC level 2 causes have shown little overall change. However the mortality rates for the three largest CODAC level 2 neonatal causes have all fallen over the 5 year period: extreme prematurity from 0.25 to 0.19 per 1,000 live births, neurological from 0.23 to 0.17 per 1,000 live births and cardio-respiratory 0.19 to 0.15 per 1,000 live births. Just over one third of neonatal deaths are due to congenital anomalies; 35.1% in 2019 and with rates remaining fairly static over the period: 0.57 per 1,000 live births in 2019. The rate and proportion of neonatal deaths attributed to intrapartum causes remains low at around 2.2% and 0.04 per 1,000 live births in 2019. Contrary to the findings for stillbirths the proportion and rate of neonatal deaths of unknown cause also remain low 5.1% and 0.08 per 1,000 live births in 2019.

Table 24: Stillbirths by CODAC level 1 cause of death: United Kingdom and Crown Dependencies, for births in 2015 to 2019

CODAC cause of death: level 1	2015	2016	2017	2018	2019
	N (%)	N (%)	N (%)	N (%)	N (%)
Infection	116 (3.8)	108 (3.5)	121 (4.3)	101 (3.9)	94 (3.9)
Neonatal	45 (1.5)	42 (1.4)	41 (1.4)	42 (1.6)	39 (1.6)
Intrapartum	84 (2.8)	71 (2.3)	51 (1.8)	53 (2.1)	30 (1.3)
Congenital anomaly	268 (8.8)	280 (9.1)	262 (9.2)	249 (9.7)	223 (9.3)
Fetal	150 (4.9)	149 (4.9)	113 (4.0)	109 (4.2)	93 (3.9)
Cord	140 (4.6)	130 (4.2)	148 (5.2)	127 (4.9)	128 (5.3)
Placenta	822 (27.1)	882 (28.8)	904 (31.8)	780 (30.2)	800 (33.3)
Maternal	129 (4.3)	122 (4.0)	103 (3.6)	88 (3.4)	94 (3.9)
Unknown	1197 (39.5)	1145 (37.4)	982 (34.6)	853 (35.1)	756 (31.5)
Missing	83 (2.7)	136 (4.4)	115 (4)	177 (6.9)	142 (5.9)

Excluding terminations of pregnancy and births <24⁰ weeks gestational age

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Table 25: Neonatal deaths by CODAC level 1 and level 2 cause of death: United Kingdom and Crown Dependencies, for births in 2015 to 2019

CODAC cause of death	2015	2016	2017	2018	2019
	N (%)	N (%)	N (%)	N (%)	N (%)
Infection	97 (7.1)	101 (7.6)	95 (7.5)	84 (7.0)	101 (8.7)
Neonatal	603 (43.9)	586 (43.8)	517 (40.8)	491 (41)	467 (40.3)
Unspecified or other	36 (2.6)	29 (2.2)	19 (1.5)	24 (2.0)	34 (2.9)
Extreme prematurity	194 (14.1)	210 (15.7)	155 (12.2)	154 (12.8)	136 (11.7)
Neurological	177 (12.9)	157 (11.7)	139 (11)	136 (11.3)	121 (10.4)
Cardio-respiratory	148 (10.8)	127 (9.5)	119 (9.4)	109 (9.1)	107 (9.2)
Gastrointestinal	62 (4.5)	43 (3.2)	57 (4.5)	31 (2.6)	41 (3.5)
Multi-organ failure	33 (2.4)	16 (1.2)	20 (1.6)	28 (2.3)	17 (1.5)
Trauma or suffocation	2 (0.1)	4 (0.3)	7 (0.6)	7 (0.6)	10 (0.9)
Inadequate care	1 (0.1)	0 (0.0)	1 (0.1)	2 (0.2)	1 (0.1)
Intrapartum	34 (2.5)	27 (2.0)	46 (3.6)	25 (2.1)	26 (2.2)
Congenital anomaly	454 (33.1)	448 (33.5)	458 (36.1)	426 (35.5)	407 (35.1)
Fetal	35 (2.5)	49 (3.7)	40 (3.2)	40 (3.3)	36 (3.1)
Cord	5 (0.4)	2 (0.1)	1 (0.1)	3 (0.3)	4 (0.3)
Placenta	40 (2.9)	31 (2.3)	25 (2.0)	36 (3.0)	27 (2.3)
Maternal	2 (0.1)	5 (0.4)	4 (0.3)	5 (0.4)	8 (0.7)
Unknown	55 (4.0)	65 (4.9)	49 (3.9)	58 (4.8)	59 (5.1)
Missing	48 (3.5)	23 (1.7)	32 (2.5)	31 (2.6)	23 (2.0)

Excluding terminations of pregnancy and births <24⁺⁰ weeks gestational age
 Data sources: MBRRACE-UK, PDS, ONS, NRS, PHS, NIMATS, States of Guernsey, States of Jersey
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Table 26: Stillbirth rates by CODAC level 1 cause of death: United Kingdom and Crown Dependencies, for births in 2015 to 2019

CODAC cause of death: level 1	Rate per 1,000 total births				
	2015	2016	2017	2018	2019
Infection	0.15	0.14	0.16	0.14	0.13
Neonatal	0.06	0.05	0.05	0.06	0.05
Intrapartum	0.11	0.09	0.07	0.07	0.04
Congenital anomaly	0.34	0.36	0.34	0.34	0.31
Fetal	0.19	0.19	0.15	0.15	0.13
Cord	0.18	0.17	0.19	0.17	0.18
Placenta	1.05	1.13	1.19	1.06	1.12
Maternal	0.16	0.16	0.14	0.12	0.13
Unknown	1.53	1.47	1.29	1.16	1.05
Missing	0.11	0.17	0.15	0.24	0.20

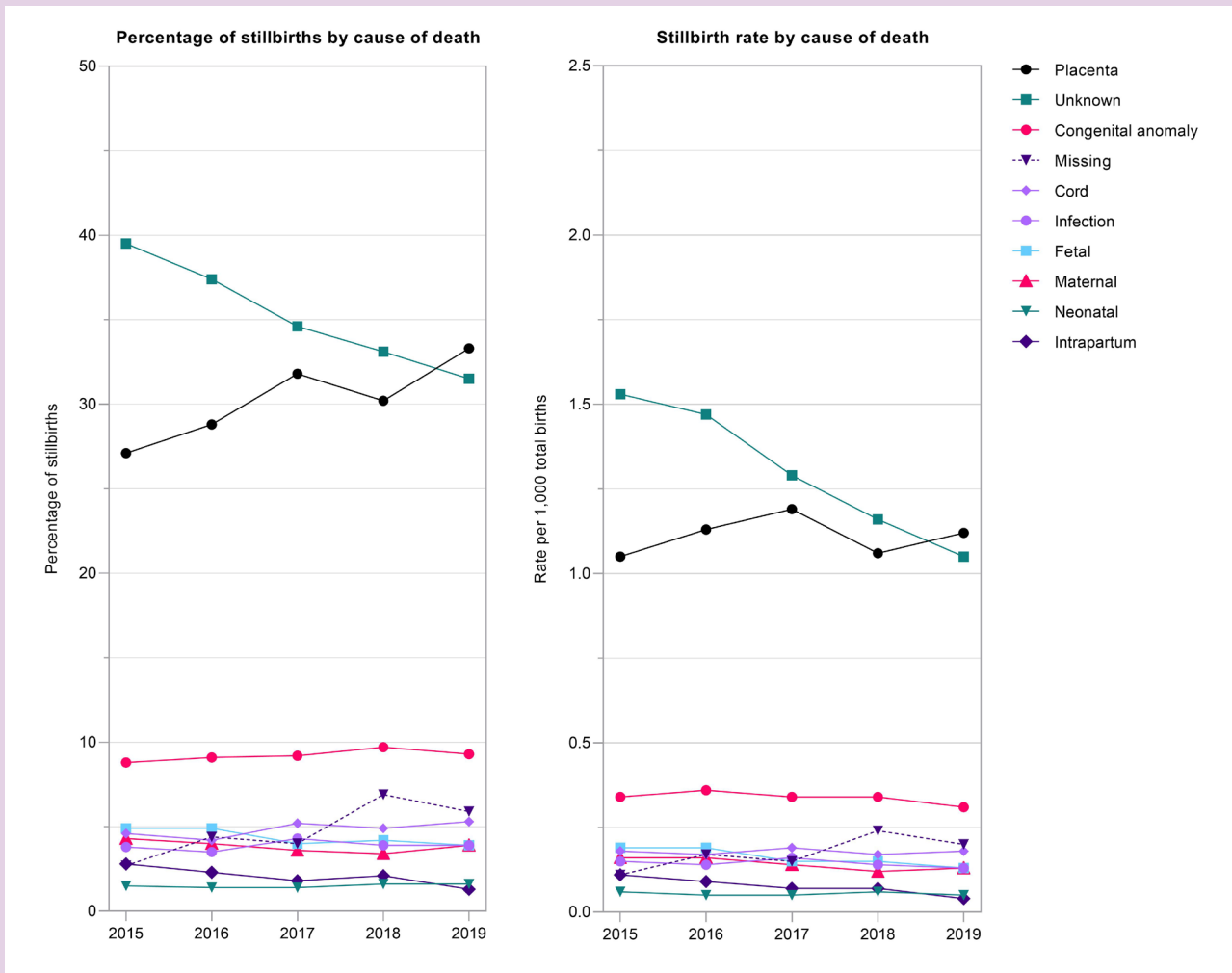
Excluding terminations of pregnancy and births <24⁺⁰ weeks gestational age
 Data sources: MBRRACE-UK, PDS, ONS, NRS, PHS, NIMATS, States of Guernsey, States of Jersey
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Table 27: Neonatal mortality rates by CODAC level 1 and level 2 cause of death: United Kingdom and Crown Dependencies, for births in 2015 to 2019

CODAC cause of death	Rate per 1,000 live births				
	2015	2015	2015	2015	2015
Infection	0.12	0.13	0.13	0.11	0.14
Neonatal	0.77	0.75	0.68	0.67	0.65
Unspecified or other	0.05	0.04	0.03	0.03	0.05
Extreme prematurity	0.25	0.27	0.20	0.21	0.19
Neurological	0.23	0.20	0.18	0.19	0.17
Cardio-respiratory	0.19	0.16	0.16	0.15	0.15
Gastrointestinal	0.08	0.06	0.08	0.04	0.06
Multi-organ failure	0.04	0.02	0.03	0.04	0.02
Trauma or suffocation	0.00	0.01	0.01	0.01	0.01
Inadequate care	0.00	0.00	0.00	0.00	0.00
Intrapartum	0.04	0.03	0.06	0.03	0.04
Congenital anomaly	0.58	0.58	0.60	0.58	0.57
Fetal	0.04	0.06	0.05	0.05	0.05
Cord	0.01	0.00	0.00	0.00	0.01
Placenta	0.05	0.04	0.03	0.05	0.04
Maternal	0.00	0.01	0.01	0.01	0.01
Unknown	0.07	0.08	0.06	0.08	0.08
Missing	0.06	0.03	0.04	0.04	0.03

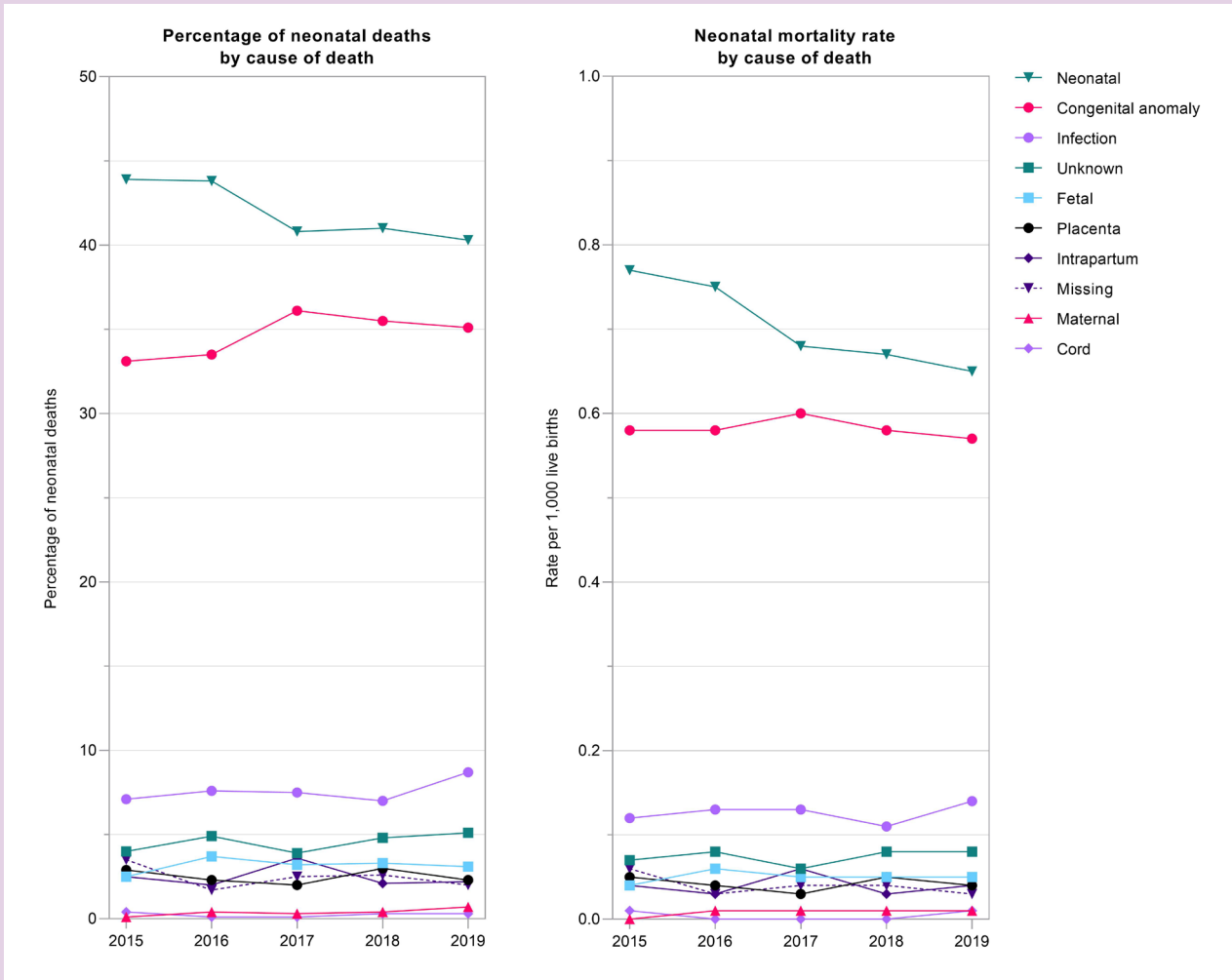
Excluding terminations of pregnancy and births <24⁺⁰ weeks gestational age
 Data sources: MBRRACE-UK, PDS, ONS, NRS, PHS, NIMATS, States of Guernsey, States of Jersey
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Figure 3: Stillbirths by CODAC level 1 cause of death: United Kingdom and Crown Dependencies, for births in 2015 to 2019



Excluding terminations of pregnancy and births <24⁺⁰ weeks gestational age
 Data sources: MBRRACE-UK, PDS, ONS, NRS, PHS, NIMATS, States of Guernsey, States of Jersey
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Figure 4: Neonatal deaths by CODAC level 1 cause of death: United Kingdom and Crown Dependencies, for births in 2015 to 2019

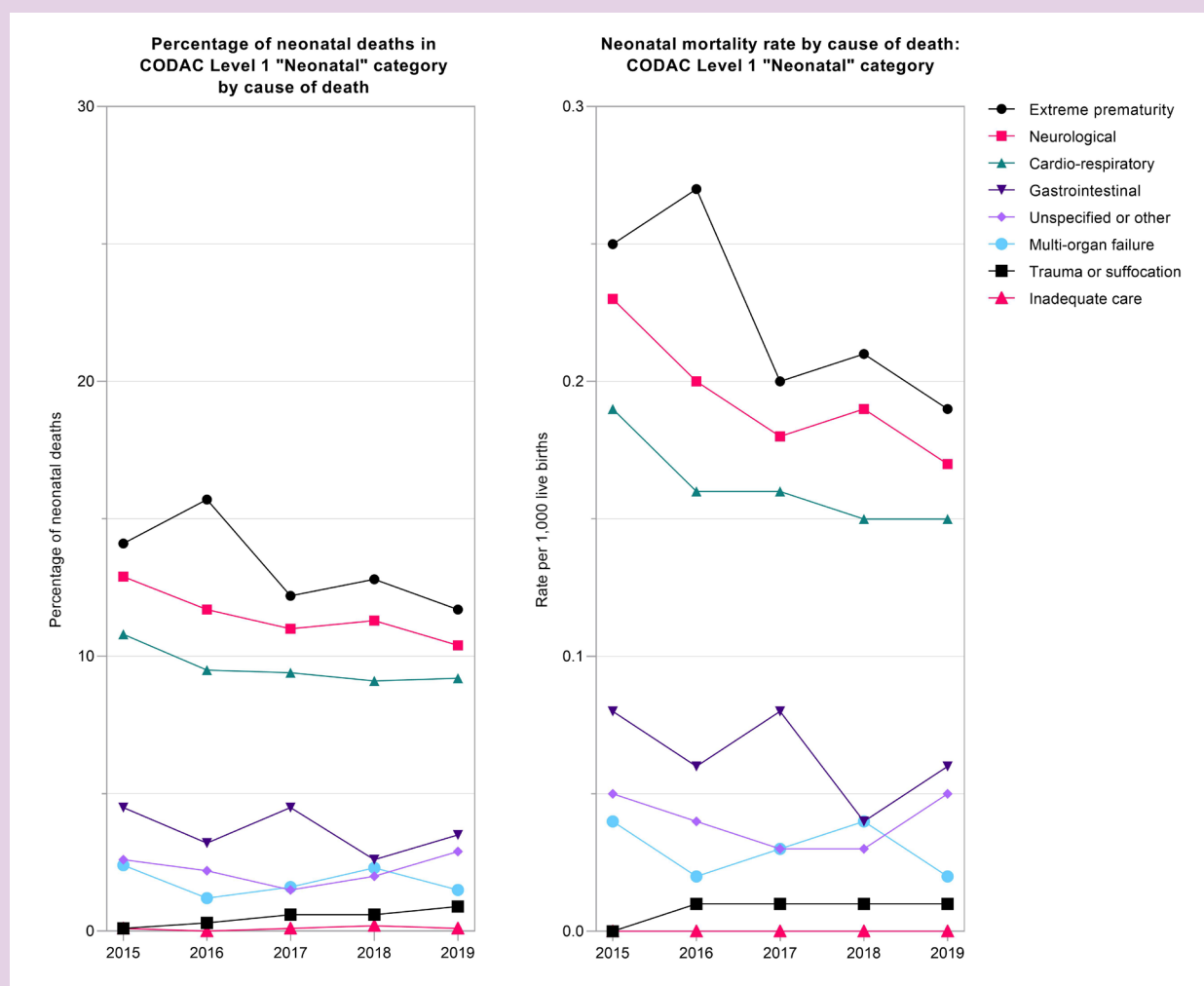


Excluding terminations of pregnancy and births <24⁺⁰ weeks gestational age

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

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Figure 5: Neonatal deaths in CODAC level 1 “Neonatal” category by CODAC level 2 cause of death: United Kingdom and Crown Dependencies, for births in 2015 to 2019



Excluding terminations of pregnancy and births <24⁺⁰ weeks gestational age
 Data sources: MBRRACE-UK, PDS, ONS, NRS, PHS, NIMATS, States of Guernsey, States of Jersey
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Parents were offered a post-mortem for almost all stillborn babies (97%) and just over four-fifths of neonatal deaths (85%). For around half of deaths a post-mortem was declined when offered.

A higher proportion of stillbirths had placental histology examination carried out in 2019 (93%) than in 2018 (90%), continuing the steady increase observed in these procedures over recent years. A similar small increase was noted for neonatal deaths occurring on the first day of life or of an intrapartum-related cause, 78% had placental histology carried out in 2019 (74% in 2018).

Implications

The proportion of stillbirths classified as being of unknown cause continues to fall, probably reflecting the concomitant increase in identification of placental causes. Congenital anomalies continue to contribute a significant, unchanging proportion to overall stillbirth rates. The downward trends in both maternal and intrapartum causes of stillbirth are encouraging and may reflect lessons learned from both local and national mortality review processes.

The overall reduction in neonatal mortality is less than that for stillbirths. Neonatal mortality attributed to extreme prematurity has fallen, but from a clinical and family standpoint does not include post-neonatal mortality prior to discharge home in this group of infants. National guidance on the management of extreme preterm infants [32],

introduced in October 2019, has led to an increase in the numbers of infants <24⁺⁰ weeks gestational age offered neonatal intensive care and the contribution of these infants to overall neonatal mortality may need to be considered in future years.

Congenital anomalies contribute significantly to neonatal mortality as well as to stillbirth rates. Many of these anomalies, once established, are not amenable to intervention, which has major implications for nationally-stated targets for reductions in overall perinatal mortality rates. To realise these goals will require concerted efforts to achieve and maintain consistent improvements for all other causes of perinatal mortality, in addition to increasing focus on pre-conception care for women with risk factors for congenital anomaly. A deep-dive into the effects of different types of congenital anomaly on perinatal mortality, and possible intervention strategies, will form part of the next MBRRACE-UK Perinatal Mortality Surveillance Report.

Post-mortem examination remains an important tool in determining cause of death. We have previously discussed the difference between the offer of post-mortem and consent to undertaking the examination [13]. It is likely that wider uptake by families may provide further insight into causes of perinatal mortality with consequent impact on treatment.

Recommendation 9

N

Emphasise the importance of pre-conception health as a routine part of every health professional's interaction with women who have risk factors for congenital anomaly.

Recommendation requiring improved implementation

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.

MBRRACE-UK 2020 [13]

Recommendation requiring improved implementation

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

MBRRACE-UK 2020 [13]

Timeliness of notification of perinatal deaths

Key findings

- Timeliness of notification of deaths is improving. Approximately four-fifths of deaths were notified within the MBRRACE-UK benchmark time of 30 days: 80% of stillbirths and 76% of neonatal deaths (an increase from 69% of stillbirths and 64% of neonatal deaths 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.
- Variation between UK countries in the percentage of deaths notified within 30 days has reduced, from 35% variation between countries in 2017 (36% to 71% notified within 30 days) to 19% variation between countries in 2019 (63% to 82% notified within 30 days).

Data presented

1. **Percentage of deaths of babies born from 22⁺⁰ weeks gestational age notified within 30 days, from 2017 to 2019.**
2. **Regional variation in the timing of the notification of perinatal deaths.**

The data shown in Figures 6 and 7 below is derived from information submitted via the MBRRACE-UK web-based reporting system.

Results

The number of deaths notified within 30 days across all types of death has again shown a substantial increase across most of the countries of the UK, with variation between countries being greatly reduced (Figure 6). Whilst English Trusts continue to be the most timely notifiers of both stillbirths and neonatal deaths, the most obvious improvement is in the notification of perinatal deaths by Scottish Health Boards. Over the period 2017 to 2019 the percentage of Scottish stillbirths notified within 30 days has increased from 26% to 60%. Whilst this is a substantial improvement over previous years, it is important to note that the timeliness of notification of stillbirths by Scottish Health Boards still lags behind the 84% notified by English Trusts by some margin. However, for neonatal deaths in Scotland the improvement is even more pronounced; the percentage of neonatal deaths notified by Scottish Health Boards within 30 days has increased from 19% to 76%, meaning that Scotland was the second most timely notifier of neonatal deaths in 2019 after England (78%). This improvement is despite the continued slow reporting by one large unit. For Wales the percentage of neonatal deaths meeting the 30 day benchmark for notification increased from 62% in 2018 to 70% in 2019. However, there was only a slight increase in the percentage of notifications for stillbirths in Wales meeting the benchmark (from 55% in 2017 to 59% in 2018), again falling well below the standard of English Trusts. Data entry is carried out centrally in Northern Ireland by the NIMACH office, which contributes to an initial delay in notification of deaths. Despite this procedural delay timeliness of notification continues to improve, and for the first time more than half of stillbirths and neonatal deaths in Northern Ireland were notified within 30 days (66% and 61% respectively).

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 7). Only 34 Trusts and Health Boards notified all of their deaths within 30 days.

Figure 6: Percentage of deaths notified to MBRRACE-UK within 30 days, by country: 2017 to 2019



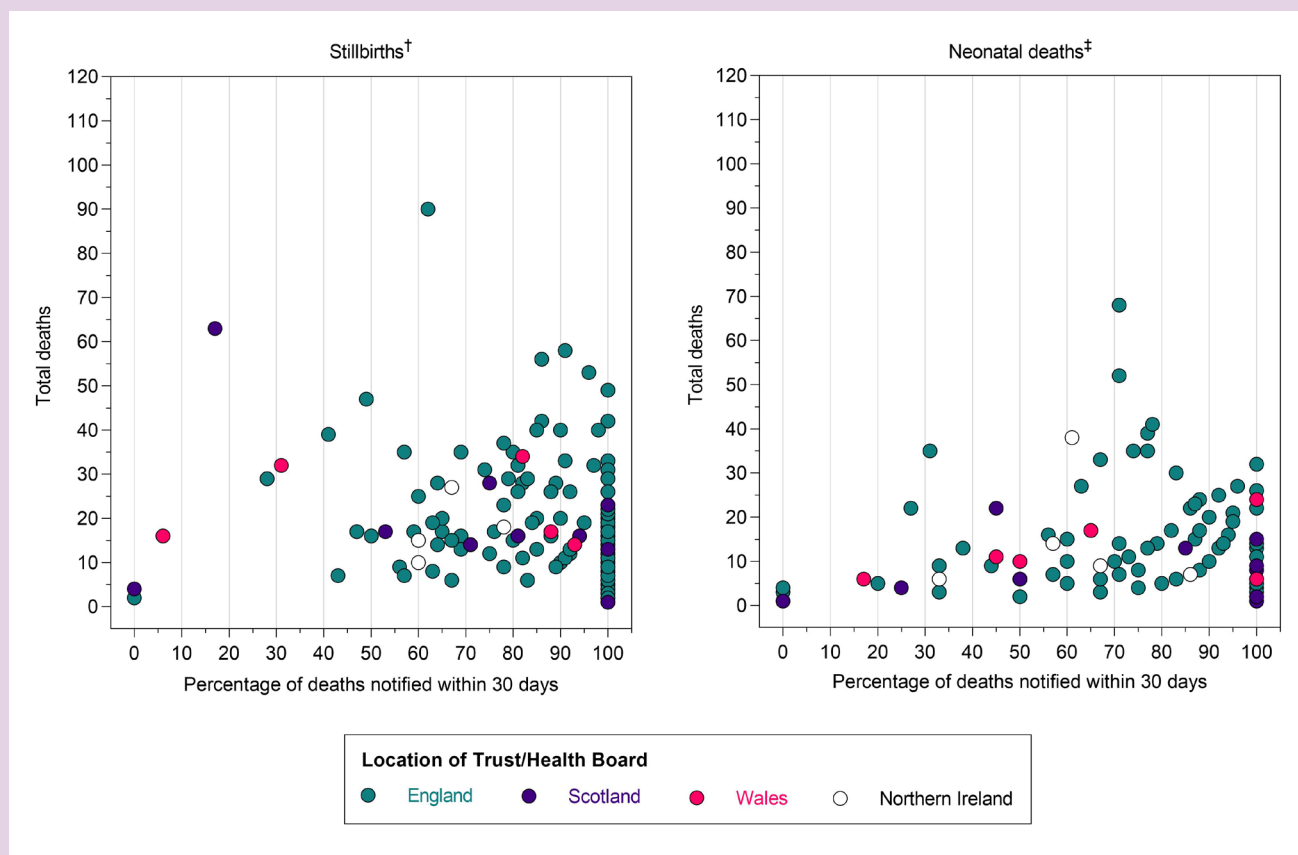
[†] Includes late fetal losses at 22-23 weeks gestational age

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

Excluding terminations of pregnancy

Data source: MBRRACE-UK

Figure 7: Percentage of deaths notified to MBRRACE-UK within 30 days, by Trust and Health Board: 2019



† 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

The number of days taken to notify deaths ranged from zero to 652 for stillbirths (UK-wide average 28 days) and zero to 630 days for neonatal deaths (UK-wide average 40 days). Most late notifications (more than six months after the death) are deaths identified by MBRRACE-UK via the case ascertainment/validation process using routine data sources, which are subsequently highlighted to Trusts and Health Boards as “missing” cases. As in previous years, a very 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 85 deaths which were notified more than a year after the death occurred (down from 143 deaths in 2018).

Implications

In the previous report MBRRACE-UK recommended that Trusts and Health Boards should notify all perinatal deaths within 7 working days, but with an aim to notify within 2 working days [13]. Whilst all of the deaths included in this year’s report were notified before this particular recommendation was published it is encouraging to note that for 2019 more than half of English stillbirths and around half of English and Scottish neonatal deaths were notified within 7 days. The similar requirement for all English Trusts to notify deaths within a specific time frame as part of the Maternity Incentive Scheme (7 working days in Year 3 and 2 working days in Year 4), together with the alignment of data submission to the National Child Mortality Database (NCMD) and Perinatal Mortality Review Tool (PMRT), should ensure that in future the vast majority of perinatal deaths continue to be notified in a much more timely manner than in previous years.

However, the discrepancy between reporting requirements for stillbirths and neonatal deaths cannot go unnoticed. Notification of stillbirths within 7 working days is still a substantial delay when compared to the rapid statutory notification already required for most neonatal deaths (within 48 hours for the CDOP process in England), and the revised Maternity Incentive Scheme standards will remove that gap for most deaths. As we noted in the previous report, as a matter of good practice Trusts and Health Boards should incorporate MBRRACE-UK notification within local processes for all perinatal deaths and implement a similar standard for the notification of stillbirths as is already required for neonatal deaths.

The effects of the Perinatal Mortality Review Tool on notification time continue to be seen, particularly in England where the Maternity Incentive Scheme makes timely notification of critical importance. However, for the devolved nations, and Scotland in particular, improvements have been made without such financial incentive.

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.

Regular late notification should prompt Trusts and Health Boards to 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. Delays caused by rare occurrences, such as deaths outside of the hospital setting, 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

Recommendation 10

N

Notify all deaths via the MBRRACE-UK system within 2 working days of the death occurring. Incorporate mechanisms for timely notification into local processes.

Definitions used in this report

Late fetal loss	A baby born between 22 ⁺⁰ and 23 ⁺⁶ weeks gestational age showing no signs of life, irrespective of when the death occurred.
Stillbirth	A baby born 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 born 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 born 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
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
PHS	Public Health Scotland
PMRT	Perinatal Mortality Review Tool
RCOG	Royal College of Obstetricians and Gynaecologists
STP	Sustainability and Transformation Partnership

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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

Public Health 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

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