National Maternity and Perinatal Audit

Clinical Report 2021 - version 1.1

Based on births in NHS maternity services in England, Scotland and Wales between 1 April 2017 and 31 March 2018

&TROPICAL MEDICINE   Paediatrics and Child Health   Gynaecologists   Healthcare Quality Improvement Partnership

This report was prepared by the NMPA Project Team on behalf of the RCOG, RCM and RCPCH:

NMPA Project Team

Dr Fran Carroll, NMPA Research Fellow
Ms Megan Coe, NMPA Statistician
Mr George Dunn, NMPA Lead
Ms Alissa Frémeaux, NMPA Statistician
Dr Ipek Gurol-Urganci, NMPA Senior Methodological Advisor
Dr Tina Harris, NMPA Senior Clinical Lead (Midwifery)
Dr Jane Hawdon, NMPA Senior Clinical Lead (Neonatology)
Ms Emma Heighway, NMPA Administrator
Dr Amar Karia, NMPA Clinical Fellow (Obstetrics)
Professor Asma Khalil, NMPA Senior Clinical Lead (Obstetrics)
Mr Patrick Muller, NMPA Senior Methodologist
Ms Louise Thomas, RCOG Head of Quality Improvement
Ms Lara Waite, NMPA Clinical Fellow (Midwifery)
Ms Kirstin Webster, NMPA Clinical Fellow (Neonatology)
Professor Jan van der Meulen, NMPA Senior Methodologist (Chair)

Contents

Tables

Acknowledgements

We would like to express our sincere gratitude to the clinical and administrative staff who input data every day about the women and babies they care for in their electronic patient, maternity and neonatal systems. We are grateful to the NHS trusts and health boards in England, Scotland and Wales for submitting data through national data organisations, to the National Maternity and Perinatal Audit.

We are indebted to our colleagues from national data organisations: to NHS Digital, Public Health Scotland Data and Intelligence, and the National Welsh Informatics Service for their provision of data and internal linkage of hospital and maternity datasets.

We are also very appreciative to the members of the NMPA Women and Families Involvement Group, Clinical Reference Group and Sprint Audit Advisory Groups for their advice and input into the development of measures, the report and web pages.

Finally, we are grateful to all the women and birthing people,[*] and their families, for the inclusion of their data and their babies' data in the datasets used by the NMPA.

The NMPA Project Team and Board

---

* The term birthing people as well as women is used throughout this document. It is important to acknowledge that it is not only people who identify as women who need to access gynaecology and maternity services.

Foreword

The publication of the NMPA's third clinical report, for births occurring from 1 April 2017 to 31 March 2018, comes at a pivotal moment in the digital maternity landscape. For the first time, our report is based on centralised maternity datasets from all three countries, reflecting a long-term shift towards more efficient processing of maternity data. Specifically, the data used for births in England have changed from using maternity information system (MIS) data to the Maternity Services Data Set version 1.5 (MSDS v1.5), a centralised maternity dataset.

In the MSDS version used for this clinical report, completeness is relatively low when compared with maternity datasets analysed for previous years' reports. As a result, case ascertainment for England is considerably lower in this report than in the clinical report for 2016/17 births. This means that we are not able to report the mean for maternity outcomes across the three countries (the GB mean). We instead report means for Scotland, for Wales, and for a group of 51 NHS trusts in England. The NMPA asks readers to refrain from interpreting that aggregate trust and board mean as being representative of a GB mean. Data completeness is very high in later versions of the MSDS, and this will be reflected in future NMPA clinical reports.

While we acknowledge the current clinical report's limitations with respect to the data from England for the 2017/18 year, case ascertainment for Scotland and Wales remains high. Completeness for England is also expected to be considerably higher in future clinical reports, owing to improvements in the completeness of data in the MSDS over time.

The NMPA Project Team and Board

Abbreviations and glossary

Alongside midwifery unit	A maternity unit where midwives have primary responsibility for care during labour in women at low risk of complications and which is located on the same site as an obstetric unit so it has access to the same medical facilities if needed.
Apgar score	An Apgar score is determined by evaluating the baby's physiologic condition at specific time points - often 1-minute and 5-minutes. Five criteria (appearance, pulse, grimace, activity and respiration) are scored between zero and two, the resulting combined score ranges from zero to ten. A score of seven to ten is considered within the "normal range" and a score less than seven is a sign the baby needs medical attention.
Assisted vaginal birth	Birth with the assistance of either a ventouse cup or forceps. Also known as instrumental birth.
Birthing person/people	The term birthing people is used throughout this document. It is important to acknowledge that it is not only people who identify as women who need to access gynaecology and maternity services.
BMI	Body mass index, an estimate of body fat based on height and weight. Measured in kilograms of weight, divided by squared height in metres (kg/m^2).
Case mix	The demographic characteristics and state of health of the people using a particular health service.
Elective caesarean birth	Planned caesarean birth before labour onset.
Emergency caesarean birth	Unplanned caesarean birth (prior to, or during labour).
Episiotomy	A cut through the perineum and skin to facilitate birth of the baby.
Estimated due date (EDD)	The date given as an estimate for birth of the baby, calculated as 40 completed weeks of pregnancy. Methods for calculating are the addition of 280 days from the first day of the last menstrual period, or from early pregnancy ultrasound scan.
Freestanding midwifery unit	A maternity unit where midwives have primary responsibility for care during labour in women at low risk of complications and which is not located on the same site as an obstetric unit.
Forceps	An instrument to assist vaginal birth.
Great Britain (GB)	The island consisting of England, Scotland and Wales.
HES	Hospital Episode Statistics, a dataset containing information about individuals admitted to NHS hospitals in England.
HQIP	Healthcare Quality Improvement Partnership.
Index of multiple deprivation	A within-country measure of relative socio-economic deprivation.
Instrumental birth	Assisted vaginal birth.
Labour augmentation	A process where the progress of labour is enhanced by administration of an oxytocin infusion
MBRRACE-UK	Mothers and Babies: Reducing Risk through Audits and Confidential Enquiries across the UK; the collaboration appointed by the HQIP to run the national Maternal, Newborn and Infant Clinical Outcome Review Programme, conducting surveillance and investigating the causes of maternal deaths, stillbirths and infant deaths.
MIds	Maternity Indicators dataset, managed by NHS Wales Informatics Service. This captures a selected subset of data items from the maternity IT systems in Welsh health boards.
MSDS	Maternity Services Data Set, managed by NHS Digital. This gathers data about pregnancy and birth from maternity healthcare providers in England.

NCCHD	National Community Child Health Database (Wales).
NHS board/local health board	In Scotland and Wales, NHS services are provided by 14 NHS boards and seven local health boards respectively, which each include a number of hospitals and community services.
NHS trust	In England, NHS services are provided by NHS trusts (commissioned by clinical commissioning groups).
NHSE&I	NHS England and NHS Improvement.
NMPA	National Maternity and Perinatal Audit.
NNAP	National Neonatal Audit Programme.
NWIS	NHS Wales Informatics Service.
OASI	Obstetric anal sphincter injury.
Obstetric unit	A maternity unit where care is provided by a team of midwives and doctors to women at low and at higher risk of complications. All women will be cared for by midwives during pregnancy, birth and after the birth. Midwives have primary responsibility for providing care during and after labour to those at low risk of complications, while obstetricians have primary responsibility for those who are at increased risk of, or who develop, complications. Diagnostic and medical treatment services – including obstetric, neonatal and anaesthetic care – are available on site.
ONS	Office for National Statistics.
PEDW	Patient Episode Database for Wales, a routinely collected dataset of hospital care in Wales.
Perinatal	Related to events around the time of birth; may be used in general or in relation to pregnant and postpartum people, as in perinatal mental health, or to unborn and newborn babies, as in perinatal mortality and in the NMPA.
Primiparous	A primiparous woman is a woman having a first birth.
RCM	Royal College of Midwives.
RCOG	Royal College of Obstetricians and Gynaecologists.
RCPCH	Royal College of Paediatrics and Child Health.
Registrable birth	In UK law, a birth is registrable, meaning it will be recorded in national statistics and issued with a certificate of birth for live births, or stillbirth if the baby is born without signs of life after 24 completed weeks of gestation or with signs of life at any gestation.
Scottish Birth Record	A dataset recording all births in Scotland, managed by Public Health Scotland Data and Intelligence.
Secundiparous	A secundiparous woman is a woman having a second birth.
SGA	Small for gestational age, babies who are born with a birth weight less than the 10th centile for their gestational age at birth.
SMR-01	Scottish Morbidity Record 01, a dataset containing information about general/acute inpatient and day case admissions in Scotland, managed by Public Health Scotland Data and Intelligence.
SMR-02	Scottish Morbidity Record 02, a dataset containing information about maternity inpatient and day case admissions in Scotland, managed by Public Health Scotland Data and Intelligence.
Stillbirth	The birth of a baby without signs of life at or after 24 weeks of gestation.
Term gestation	Between 37^{+0} and 42^{+6} weeks of gestation, as used in this report.
Third and fourth degree tear	A tear from childbirth that extends into the anal sphincter (third degree tear) or mucosa (fourth degree tear).
VBAC	Vaginal birth after caesarean birth.
Ventouse	An instrument to assist vaginal birth using a vacuum cup applied to the baby's head.

Executive summary

Introduction

Maternity and perinatal services in the UK are currently subject to a number of maternity and neonatal review programmes, including quality monitoring and improvement initiatives. These programmes focus attention on the quality of care provided by maternity services in the UK at both a national level and the individual trust or board level.[1–3] In parallel to the improvement initiatives for clinical care, there are ongoing improvements in the collation and processing of maternity and neonatal data, including improved capture of detailed information about demographics of birthing people and care episodes occurring along the maternity continuum of care. These data are critical to enable evaluation and implementation of improvement strategies. The National Maternity and Perinatal Audit (NMPA) uses these data to produce information that can support the improvement of maternity and perinatal care. In this report, for the first time, the NMPA is using a new centralised data source (MSDS v1.5) for births in England, while continuing to use the established centralised maternity datasets in Scotland and Wales.

This report presents measures of maternity and perinatal care based on births in English, Scottish and Welsh NHS services between 1 April 2017 and 31 March 2018. The report also provides contextual information describing the characteristics of women and babies cared for during this time period and whose data have been included in this report.

The limitations of MSDS mean that for births in England the key findings and recommendations made in this report are specific to data quality only. There are insufficient data to draw clinical conclusions.

For births in Scotland and Wales, the consistency of the data sources used means that clinical key findings are possible in this report. However, clinical recommendations are avoided for all countries in this report. This is because the NMPA's next clinical report for births in 2018/19 is expected to be published in early 2022 and will use MSDS data with improved completeness; as a result, it will be able to provide a more comprehensive picture of variation of care across the three countries.

Throughout this document we use the term 'birthing people' as well as 'women'. It is important to acknowledge that it is not only people who identify as women who access maternity and gynaecology services.

Methods

The analysis in this report is based on 304 518 births in NHS maternity services in England, Scotland and Wales between 1 April 2017 and 31 March 2018.[*]

The report is estimated to have captured 41.5% of eligible births in this time period (34% of births in England, 97% of births in Wales and 100% of births in Scotland). The NMPA makes use of data collected electronically through healthcare information systems and national datasets.

Data for births in England are provided by NHS Digital's Maternity Services Data Set version 1.5 (MSDS v1.5) as well as by Hospital Episode Statistics (HES) records.

---

[*] The time lag between the period covered by this report and its publication is due to the delayed receipt of the MSDS dataset for England.

Data for births in Scotland are provided by Public Health Scotland Data and Intelligence (formerly the Information Services Division, ISD), based on data from the Scottish Birth Record and Scottish Morbidity Records (SMR-01 and SMR-02). Linkages to records from the National Records of Scotland (NRS) are also made for births, deaths and stillbirths.

Data for births in Wales are provided by the Maternity Indicators dataset (MIds), a dataset managed by the NHS Wales Informatics Service (NWIS), as well as Admitted Patient Care (APC) records from the Patient Episode Database for Wales (PEDW), and some fields from the National Community Child Health Database (NCCHD).

In order to compare like with like, the majority of measures are restricted to singleton term births. As a general principle, the denominator for each measure is restricted to women or babies to whom the outcome or intervention of interest is applicable; for example, third or fourth degree tears are only measured among women who have experienced a vaginal birth. Rates of measures are also adjusted for risk factors that are beyond the control of the maternity service, such as age, parity, previous caesarean birth and clinical risk factors that may explain variation in results between organisations.

The NHS trusts and boards included in the audit provided intrapartum maternity care at one or more sites. Where possible, site-level results are available on the NMPA website.

Key findings

Data quality key findings

KF1   Many English NHS trusts are excluded from this report owing to poor quality and completeness of data submitted from MSDS v1.5.

KF2   There is variation between and within the three countries in the availability, quality and completeness of the data items used to generate the maternal and neonatal measures in this report. Some NHS trusts and boards are excluded from one or more measures owing to poor quality and completeness of data.

KF3a   Only a minority of trusts and boards submitted data of sufficient completeness and quality to be included in the measure of birth without intervention.

KF3b   The quality of data collected for measures related to smoking at booking and at the time of birth is insufficient in England and Scotland. This is concerning given the importance of smoking cessation as one of the initiatives to reduce stillbirth.

KF3c   The quality and completeness of some data items needed for the case-mix adjustment (BMI, previous caesarean birth, and smoking at booking and at the time of birth) is poor in England.

KF4   In England and Scotland it is not possible to align the data items from their centralised datasets to the NMPA technical specification needed to determine rates of majorpostpartum haemorrhage over 1500 ml.

Clinical key findings

KF5   The proportion of newborns born small for gestational age at term has declined in Scotland and Wales year-on-year since the NMPA clinical report for births in 2015/16, from 53.8% to 49.0% in Scotland, and from 62.2% to 57.7% in Wales.

KF6   The proportion of women in Scotland and Wales who experience induction of labour at term has increased since the NMPA clinical report for births in 2015/16, from 32.2% to 35.1% in Scotland, and from 32.1% to 34.1% in Wales.

KF7   The proportion of eligible women who attempt VBAC has declined in Wales year-on-year since the NMPA clinical report for births in 2015/16, from 52.5% to 39.0%. The proportion of women who attempt VBAC who then do give birth vaginally has also declined in Wales year-on-year since the NMPA clinical report for births in 2015/16, from 64.2% to 56.2%.

KF8   The proportion of babies born in Scotland and Wales with 5 minute Apgar score less than 7 has increased since the NMPA clinical report for births in 2015/16, from 1.3% to 1.53% in Scotland, and from 1.1% to 1.24% in Wales.

Conclusions

This third clinical report from the NMPA is the first using centralised maternity datasets from each participating country, with the development and use of the MSDS v1.5 in England. This is a positive step towards improved availability and quality of data. However, this report also demonstrates the challenges associated with using a new maternity dataset early in its development while case ascertainment is still low. While this report is not able to provide a comprehensive picture of maternity care in England, and therefore of Great Britain as a whole for services in 2017/18, the coverage of boards from Scotland and Wales remains high. Continued improvement in the recording of information on birth without intervention, smoking in pregnancy, andpostpartum haemorrhage of over 1500 ml is now needed across the three countries to allow robust intelligence for quality improvement.

Recommendations

It is anticipated that progress in relation to the following four recommendations will be evident for the 2022/23 birth cohort in centralised maternity datasets, provided data quality and data completeness is improved.

R1 **Maternity service providers, NHSE&I and national organisations responsible for collating and managing maternity datasets in England should work together to identify how to support individual NHS trusts to meet the criteria for complete monthly data submissions to MSDS.**

R2 **National organisations across England, Scotland and Wales that are responsible for collating and managing maternity datasets should work with NHSE&I, maternity information system suppliers and maternity services, as well as with organisations responsible for neonatal datasets, to improve capture and recording of maternal and neonatal data items.**

R3 **Where data sources have been insufficiently complete to report results, or where results suggest there may be data quality issues, maternity service providers, maternity information system suppliers, NHSE&I and those responsible for collating and managing maternity datasets should work together to improve completeness and accuracy of the data items required for these measures:**

- **birth without intervention**
- **smoking at booking and at the time of giving birth**
- **breast milk at first feed, and at discharge**
- **skin-to-skin contact at birth**

and for these data items used in the case-mix adjustment (English data only):

- **previous caesarean birth**
- **BMI**
- **smoking at booking and at the time of giving birth.**

R4 **Organisations responsible for collating and managing maternity datasets in England (NHS Digital) and Scotland (Public Health Scotland Data and Intelligence) should use the 'NMPA Measures - Technical Specification for births from 1 April 2017' to align data items (to 0-500 ml, 500-1000ml, 1000-1500 ml, >1500 ml) for postpartum blood loss to enable measurement of the rate of major postpartum haemorrhage of over 1500 ml.**

Introduction

The National Maternity and Perinatal Audit (NMPA) aims to produce high-quality information that can be used by providers, commissioners and birthing people to benchmark against national standards and recommendations where these exist, and to identify good practice and areas for improvement. The NMPA consists of:

- an organisational survey of maternity and neonatal care provision, and services available to families
- an annual clinical audit of a number of key measures to identify unexpected variation between maternity services
- a programme of sprint audits on specific topics related to maternity and neonatal care.

The NMPA has been commissioned by the Healthcare Quality Improvement Partnership (HQIP) since July 2016 and has published two previous clinical reports,[4,5] two organisational survey reports,[6,7] and five sprint audit reports.[8–12] The NMPA's Women and Families Involvement Group (WFIG), a group formed of individuals and organisations representing women and birthing people using maternity services, has been involved in the running of the audit and is consulted on the NMPA's priorities and outputs. The most recent previous clinical report, on births from 1 April 2016 to 31 March 2017, was published in 2019. Further information on the NMPA, including objectives of the audit, NMPA publications, and resources to examine national-level maternity data, can be found on the NMPA website.

What this report covers

This report presents measures of maternity and neonatal care based on births in English, Welsh and Scottish NHS services between 1 April 2017 and 31 March 2018. The characteristics of women and babies cared for by NHS maternity trusts and boards during this period are presented for each country. Adjusted results for measures of care before, during and after birth are reported for each country, with individual trust/board-level results being available on the NMPA website. Detail on the work to develop the list of measures is available in the first NMPA Clinical Report.[4] Two of the measures included in this latest report are treated as 'outlier' indicators, and represent adverse outcomes for birthing people or babies that have potential long-term effects:

- third and fourth degree tears
- newborn Apgar score of less than 7 at 5 minutes.

Trusts or boards where the risks of these are higher than would be expected by chance are usually notified and asked to investigate why this might be the case.[*]

The NMPA website also provides an overview of results per maternity service (and site where possible), including spine charts of clinical measures per service, and organisational information that may help those using the data to identify possible organisational factors influencing variation between units.

---

[*] The NMPA outlier policy, which provides further detail on outlier management, is available on the NMPA website.

What has changed from the previous report

In this report, the data source used to generate findings for English NHS trusts providing maternity services has changed from maternity information system (MIS) data to the Maternity Services Data Set version 1.5 (MSDS v1.5). Detailed information about MSDS v1.5 and the NMPA's use of the dataset for clinical audit is provided in Appendix 1.

Data quality and completeness limited the number of English trusts that could be included in this report. Therefore, it is not possible to report a mean that is representative of the three countries combined (the GB mean). Instead, the findings are presented for '51 English trusts', and for all NHS boards in Scotland and Wales. An aggregate mean result is calculated by combining all the trusts and boards included in the audit. The 'combined trusts and boards' level of reporting should be interpreted with caution and not assumed to be a true representation of the GB mean. A list of the trusts and boards included in this clinical report is provided in Appendix 2.

An overall reduction in data completeness and quality for English trusts for this period of reporting has also led to some changes to the variables included in the case-mix adjustment of the measures. An explanation of the case-mix factors is provided in NMPA Measures - Technical Specification for births from 1 April 2017 (which has been updated to reflect these changes). For this report, it is not possible to include BMI or smoking in the overall case mix because of low-quality data for some English trusts.

The case-mix adjustment in this report also does not include ethnicity or Index of Multiple Deprivation (IMD). This amendment, adopted for future NMPA clinical reports, is so that our results accurately show the inequalities in maternity outcomes and do not mask the variation in outcomes associated with differences in a birthing person's ethnic or sociodemographic background.

It is not possible to report on the indicator 'major postpartum haemorrhage over 1500 ml' for England or Scotland in this report owing to data-alignment issues with the NMPA technical specification, and therefore this indicator is not considered an 'outlier' indicator for this report. The NMPA has previously adopted the use of funnel plots as a graphical method to compare the performance of organisations. Because of the lower ascertainment of trusts and births for this report, presenting results in this way was not considered appropriate as the averages we calculated for the 51 trusts in England may be different to the true countrywide average and thus the plots would not be able to be used to test deviation from that average. In addition, the trusts included may have had differences in case mix and other factors from trusts that could not be included.

How to use this report and the NMPA website

Anyone using the NMPA data and findings should consider the set of measures as a means to examine how maternity services compare between trusts and boards within each respective country, without using the 'combined trust and board' level of reporting as an average or benchmark.

The consistency of data available from Scotland and Wales for this report and previous NMPA clinical reports means that it is possible for those using these data to make comparisons of findings to previous NMPA clinical reports for these countries while taking into consideration the differences in case-mix adjustment between reporting years. Anyone using English data for this 2017/18 reporting year should interpret both country- and trust-level data with caution because of the lower ascertainment of births in England in comparison with previous years' reporting. Anyone using this report and the NMPA website should consider the results of individual measures as presented, but also alongside other relevant programmes such as Mothers and Babies: Reducing Risk through Audits

and Confidential Enquiries across the UK (MBRRACE-UK) and their published reports on maternal mortality and morbidity in the UK[13] and the National Neonatal Audit Programme (NNAP).

The conclusions in this report also highlight the importance of accurate data capture at the point of care, strategies to improve data quality and completeness, and national-level initiatives to align centralised maternity datasets.

The findings for this audit can inform women and their families about rates for outcomes based on the locality of care (country-level and/or trust/board-level) knowing that other contributory factors for outcomes have been accounted for in the case-mix adjusted results. We encourage birthing people and clinicians to use the results in conversations in the clinical setting, incorporating them into personalised, holistic care planning.

The NMPA website has further resources presenting maternity data at both the level of individual services and nationally. A list of organisations and useful publications are also available within the NMPA Quality Improvement page to support those improving the quality of care locally. The NMPA is committed to engagement with anyone accessing the data and reports and welcomes feedback on how the audit outputs can be made more useful.

Methods

For more detail on the methods for the audit, see the NMPA website and the NMPA Clinical Report 2017.[4] The NMPA uses data routinely collected in the course of clinical care through electronic maternity and hospital records. Details of the data sources used in this report are provided in Appendix 3.

Analysis

Construction of audit measures

A detailed analysis plan for NMPA clinical reporting is documented in the NMPA Measures - Technical Specification for births from 1 April 2017. The statistics in this report are presented as the proportion of events occurring within a group of women or babies. The reference group of women or babies (the denominator) varies between audit measures (for example, the rates for third and fourth degree tears apply only to those who had a spontaneous or assisted vaginal birth), and a description of these groups is contained in the technical specification under each measure.

For measures related to maternal care, results are presented per woman giving birth. For measures related to the care of the baby, results are presented per baby born. In order to compare like with like, the majority of measures are restricted to singleton term births.

Case-mix adjustment

The NMPA Measures - Technical Specification for births from 1 April 2017 provides information regarding the case-mix adjustment used in the analysis of outcome measures. Using a case-mix adjustment in the analysis means that clinical characteristics of women that have a relationship with the outcome measured and are outside the control of maternity services are accounted for in the findings.

Data quality

Key Findings and Recommendations

It is anticipated that progress in relation to the four recommendations will be evident for the 2022/23 birth cohort in centralised maternity datasets, provided data quality and data completeness is improved.

KF1 Many English NHS trusts are excluded from this report owing to poor quality and completeness of data submitted from MSDS v1.5.

R1 Maternity service providers, NHSE&I and national organisations responsible for collating and managing maternity datasets in England should work together to identify how to support individual NHS trusts to meet the criteria for complete monthly data submissions to MSDS.

KF2 There is variation between and within the three countries in the availability, quality and completeness of the data items used to generate the maternal and neonatal measures in this report. Some NHS trusts and boards are excluded from one or more measures owing to poor quality and completeness of data.

R2 National organisations across England, Scotland and Wales that are responsible for collating and managing maternity datasets should work with NHSE&I, maternity information system suppliers and maternity services, as well as with organisations responsible for neonatal datasets, to improve capture and recording of maternal and neonatal data items.

KF3a Only a minority of trusts and boards submitted data of sufficient completeness and quality to be included in the measure of birth without intervention.

KF3b The quality of data collected for measures related to smoking at booking and at the time of birth is insufficient in England and Scotland. This is concerning given the importance of smoking cessation as one of the initiatives to reduce stillbirth.

KF3c The quality and completeness of some data items needed for the case-mix adjustment (BMI, previous caesarean birth, and smoking at booking and at the time of birth) is poor in England.

R3 Where data sources have been insufficiently complete to report results, or where results suggest there may be data quality issues, maternity service providers, maternity information system suppliers, NHSE&I and those responsible for collating and managing maternity datasets should work together to improve completeness and accuracy of the data items required for these measures:

- **birth without intervention**
- **smoking at booking and at the time of giving birth**
- **breast milk at first feed, and at discharge**
- **skin-to-skin contact at birth**

and for these data items used in the case-mix adjustment (English data only):

- **previous caesarean birth**
- **BMI**
- **smoking at booking and at the time of giving birth.**

KF4   In England and Scotland it is not possible to align the data items from their centralised datasets to the NMPA technical specification needed to determine rates of major postpartum haemorrhage over 1500 ml.

R4   Organisations responsible for collating and managing maternity datasets in England (NHS Digital) and Scotland (Public Health Scotland Data and Intelligence) should use the 'NMPA Measures - Technical Specification for births from 1 April 2017' to align data items (to 0-500 ml, 500-1000ml, 1000-1500 ml, >1500 ml) for postpartum blood loss to enable measurement of the rate of major postpartum haemorrhage of over 1500 ml.

NHS Trusts and boards included in the audit

This report is for births in NHS maternity services in England, Scotland and Wales between 1 April 2017 and 31 March 2018. Data from 72 of 151 NHS trusts and boards are included in this report (Table 1). Trusts and boards providing maternity services will have one or more unit types at each of their sites, including obstetric units, alongside midwifery units and freestanding midwifery units.

Table 1 Trusts/boards included in the audit, 2017/18

	England	Scotland	Wales	GB total
Total number of trusts/boards	**132**	**14**	**7**	**153**
Total number of trusts/boards included in this report	51[a]	14	7	72
Proportion of trusts/boards included in this report	38.6%	100.0%	100.0%	47.1%

[a] Use of MSDS v1.5 resulted in the ability to report for 50 trusts (see Appendix 1). A further trust was included through the successful use of 'infilling data' from HES records.

Case ascertainment

For this report, the NMPA captured information for approximately 42% of all births that occurred in England, Scotland and Wales. Table 2 shows the estimated proportion of births captured by country.

Evaluation of case ascertainment for each country is performed by the NMPA. For births in Scotland, we compared the national number of births from National Records of Scotland (NRS) figures for live births and stillbirths over the financial year 2017/18. For births in England and Wales, we compared the national number of births with Office for National Statistics (ONS) figures for live births and stillbirths. As the NMPA reports by financial year and ONS reports by calendar year, the ONS figures for 2017 can only be used as an estimate of case ascertainment.

For England, figures only include trusts with 12 months of complete data submission to MSDS, that also passed minimum data quality criteria for 5 key variables (Appendix 1) and the case-mix variables. The original figure for England prior to these exclusions was 498 525 births, giving a case ascertainment of 77% compared to ONS data, and the remaining proportion of births included in this report for England following these exclusions is 34%.

Table 2 Estimated proportion of births captured, by country

Country	Births analysed by the NMPA		Total registrable births (from official national statistics)	Estimated proportion of births captured (%)
	Women who gave birth in 2017/18	Babies born in 2017/18		
England	217 240	220 525	649 473[a]	34.0%
Scotland	51 818	52 572	52 558[b]	100.0%
Wales	30 992	31 421	32 329[a]	97.2%
Combined	300 050	304 518	734 360	41.5%

[a] The total is calculated as the total number of registrable births in 2017/18. Tables for ONS data are available from the ONS website.
[b] The total is calculated as the total number of registrable births in 2017/18. Tables for NRS data are available from the PHS Scottish Health and Social Care Open Data platform.

How does the NMPA assess data quality?

Appendix 3 provides a description of the methods for obtaining data in each country. The NMPA Measures - Technical Specification for births from 1 April 2017 explains the standard criteria applied to data from each country to assess data quality. Further details on the approach for assessing data quality of the new dataset used for births in England (MSDS v1.5) are in Appendix 1.

Individual trust/board-level data quality results are available on the NMPA website.

The analysis in this report is restricted to:

- trusts/boards that passed the NMPA trust/board-level data quality checks, and
- birth records within those trusts/boards that contained the required data items to construct the measure, and
- birth records within those trusts/boards that contained the required data to construct case-mix adjusted results (where adjustment is applicable).

The number of trusts and boards for which results were available therefore varied from measure to measure, depending on the specific data requirements.

Variation in data quality

Variation in data quality between and within countries is evident, and particularly marked for England in the MSDS v1.5 dataset. Many English trusts could not be included in this report because of data completeness and quality issues. The data quality for NHS boards in Scotland and Wales for measures in this report has remained stable since previous reports. There are misalignments in the data sources to the NMPA technical specification to enable reporting on major postpartum haemorrhage of over 1500 ml (a key NMPA 'outlier' indicator) for England and Scotland, and so in this report that measure is reported for births in Wales only.

The NMPA Measures - Technical Specification for births from 1 April 2017 highlights key data items used in the production of this report. We recommend that, as systems change, trusts and boards focus on maintaining and improving data quality for these core data items, expanding the range of data items collected and ensuring correct mapping to central datasets.

Findings

Key Findings

KF5	The proportion of newborns born small for gestational age at term has declined in Scotland and Wales year-on-year since the NMPA clinical report for births in 2015/16, from 53.8% to 49.0% in Scotland, and from 62.2% to 57.7% in Wales.
KF6	The proportion of women in Scotland and Wales who experience induction of labour at term has increased since the NMPA clinical report for births in 2015/16, from 32.2% to 35.1% in Scotland, and from 32.1% to 34.1% in Wales.
KF7	The proportion of eligible women who attempt VBAC has declined in Wales year-on-year since the NMPA clinical report for births in 2015/16, from 52.5% to 39.0%. The proportion of women who attempt VBAC who then do give birth vaginally has also declined in Wales year-on-year since the NMPA clinical report for births in 2015/16, from 64.2% to 56.2%.
KF8	The proportion of babies born in Scotland and Wales with 5 minute Apgar score less than 7 has increased since the NMPA clinical report for births in 2015/16, from 1.3% to 1.53% in Scotland, and from 1.1% to 1.24% in Wales.

Characteristics of women giving birth

The characteristics of the birthing people included in the audit are listed in Table 3.

The age of women giving birth during this reporting period demonstrates a continuation of the trend showing that women are delaying childbirth.[14] Advancing maternal age is associated with an increased risk of complications during pregnancy,[15] and as the demographic of women and birthing people continues to change, maternity services are required to respond to meet these needs.

In the NMPA's clinical report on 2016/17 births, the proportion of women with a BMI of 25 kg/m^2 or above exceeded 50% for the first time.[5] In the current clinical report, there has been no reduction in this proportion. Women who have a BMI of 30 kg/m^2 or above during pregnancy are more likely to require an intervention or have an adverse outcome.[12] The NMPA's sprint audit NHS Maternity Care for Women with a Body Mass Index of 30 kg/m^2 or Above published in 2021 is available on the NMPA website, providing detailed analysis of the care and outcomes experienced by this group of women.[12]

Table 3 Characteristics of women and babies included in the audit

Characteristic	Combined trust and board total[a]		England (51 trusts)		Scotland		Wales	
Total number	**300 050**		**217 240**		**51 818**		**30 992**	
Age								
<16	188	0.1%	129	0.1%	26	0.1%	33	0.1%
16–19	9 172	3.1%	6 154	2.9%	1 683	3.3%	1 335	4.3%
20–24	43 168	14.6%	29 977	14.0%	7 502	14.8%	5 689	18.4%
25–29	82 516	27.8%	59 114	27.5%	14 084	27.7%	9 318	30.1%
30–34	94 879	32.0%	69 555	32.4%	16 253	32.0%	9 071	29.3%
35–39	54 239	18.3%	40 391	18.8%	9 300	18.3%	4 548	14.7%
40–44	11 450	3.9%	8 662	4.0%	1 862	3.7%	926	3.0%
45+	905	0.3%	714	0.3%	123	0.2%	68	0.2%
Ethnic origin[b]								
White	213 947	81.6%	151 656	78.1%	37 498	92.9%	24 793	89.3%
South Asian	25 516	9.7%	23 235	12.0%	1 371	3.4%	910	3.3%
Black	9 574	3.7%	8 592	4.4%	588	1.5%	394	1.4%
Mixed	5 030	1.9%	3 434	1.8%	218	0.5%	1 378	5.0%
Other	8 150	3.1%	7 168	3.7%	706	1.7%	276	1.0%
Index of multiple deprivation[c]								
1 = least deprived	48 401	16.3%	35 119	16.3%	8 516	16.8%	4 766	15.6%
2	54 238	18.3%	39 807	18.5%	9 408	18.5%	5 023	16.4%
3	58 465	19.7%	43 146	20.0%	9 291	18.3%	6 028	19.7%
4	66 645	22.5%	49 237	22.9%	10 699	21.1%	6 709	21.9%
5	68 874	23.2%	47 951	22.3%	12 838	25.3%	8 085	26.4%
BMI (kg/m^2)								
<18.5	7 246	2.8%	5 281	2.9%	1 312	2.8%	653	2.3%
18.5–24.9	120 698	46.3%	87 270	47.4%	21 352	44.9%	12 076	41.7%
25.0–29.9	73 710	28.3%	52 124	28.3%	13 335	28.1%	8 251	28.5%
30.0–34.9	35 645	13.7%	24 308	13.2%	6 821	14.4%	4 516	15.6%
35.0–39.9	15 107	5.8%	9 935	5.4%	3 062	6.4%	2 110	7.3%
≥ 40.0	8 331	3.2%	5 374	2.9%	1 637	3.4%	1 320	4.6%
Obstetric history								
Parity								
Primiparous	128 067	43.6%	93 310	43.9%	22 437	44.6%	12 320	39.8%
Multiparous	165 726	56.4%	119 184	56.1%	27 870	55.4%	18 672	60.2%
Previous caesarean birth among multiparous women								
Yes	39 816	24.3%	28 147	24.0%	7 107	25.5%	4 562	24.4%
Multiplicity								
Singleton	295 593	98.5%	213 919	98.5%	51 100	97.2%	30 574	97.3%
Twins	4 389	1.5%	3 269	1.5%	1 448	2.8%	820	2.6%
Triplets or more	53	0.0%	37	0.0%	24	0.0%	27	0.1%
Gestation at birth								
0–23 weeks	144	0.0%	119	0.1%	16	0.0%	9	0.0%
24–33 weeks	5 726	1.9%	4 011	1.9%	1 046	2.1%	669	2.2%
34–36 weeks	15 175	5.1%	10 727	5.0%	2 815	5.6%	1 633	5.3%
37–41 weeks	269 506	90.8%	196 175	91.1%	45 878	90.6%	27 453	88.7%
42+ weeks	6 422	2.2%	4 391	2.0%	861	1.7%	1 170	3.8%

[a] For each characteristic, the proportions of its categories are calculated only among records for which complete information about that characteristic is available.

[b] In this report the proportion of Black women included in the audit appears to be lower than in previous reports. However, this is due to a methodology change in the categorisation of ethnic groups between reports. For this clinical report, ethnicity is categorised according to the 2001 census (www.ethnicity-facts-figures.service.gov.uk/style-guide/ethnic-groups#2001-census), which has a 'Mixed' ethnicity category that was not present in previous reports. In addition, as only 51 trusts can be included in the audit for England, the proportions of ethnic groups reported here are not fully representative of the whole country.

[c] The index of multiple deprivation is derived from the recorded standardised socio-economic quintile of the individual's local area based on postcode (LSOA) in England, on postcode in Scotland and on GP cluster in Wales. As the areas used are of different granularity, with the smallest areas in Scotland and largest in Wales, these are not comparable between the three countries.

Measures of care before, during and after birth

This report covering births from 1 April 2017 to 31 March 2018 presents findings for each measure at:

- country level, by presenting combined trust/board results in each country (all NHS boards for Wales and Scotland, and 51 English trusts), adjusted[*]
- combined trust and board aggregate level, including results from all included trust/boards across each of the three countries included.

Anyone using this report should be mindful that there are no established rates for some measures in maternity care, and higher or lower rates than the 'combined trust and board rate' do not translate directly into bad or good care and outcomes, and for some measures the 'ideal rate' is unknown. In addition, a rate that is higher or lower than the average might indicate under or over diagnosis of a clinical outcome, for example a low third or fourth degree tear rate could be a sign that this outcome is not being recognised in the clinical setting. For this report, the English trusts included in the audit might have different characteristics to those that did not meet data completeness and quality standards, and are therefore not representative of England as a whole.

The findings are in four subsections: timing of birth, modes of birth, maternal measures and neonatal measures. More detail and explanation of historical trends for each measure included in this report is available in the NMPA Clinical Report 2019.[5]

Timing of birth

Induction of labour

What is measured: The proportion of women with a singleton baby between 37^{+0} and 42^{+6} weeks of gestation who have an induction of labour.

Table 4 Proportion of women with a singleton pregnancy at term who have an induction of labour

	'51 English trusts'	Scotland	Wales	Trust and board total
Number of trusts/boards included in analysis	44	12	6	62
Number of women included in analysis	153 460	46 289	28 031	227 780
Number of women who have induction of labour	49 039	15 755	9 397	74 191
Proportion of women who have induction of labour (adjusted)[a]	31.6%	35.1%	34.1%	32.6%

[a] Country-level results are adjusted for case mix (unadjusted rates can be obtained using the numerators and denominators provided in the table).

Small-for-gestational-age babies, who are born at or after their estimated due date

What is measured: Of term singleton babies born small for gestational age (defined as below the 10th birthweight centile using UK 1990 charts),[16] the proportion who are born at or after their estimated due date.

---

* Individual trust and board-level results are available on the NMPA website.

Table 5 Proportion of term singleton babies born small for gestational age at or after their estimated due date

	'51 English trusts'	Scotland	Wales	Trust and board total
Number of trusts/boards included in analysis	51	11	6	68
Number of babies included in analysis	13 442	2 008	1 689	17 139
Number of all term babies with birthweight <10th centile, who are born at or after their estimated due date	6 745	1 016	948	8 709
Proportion of term babies with birthweight <10th centile	6.8%	4.4%	6.0%	6.3%
Proportion of term babies with birthweight <2nd centile	0.9%	0.6%	1.0%	0.8%
Proportion of all term babies with birthweight <10th centile, who are born at or after their estimated due date (adjusted)[a]	50.2%	49.0%	57.7%	50.8%

[a] Country-level results are adjusted for case mix (unadjusted rates can be obtained using the numerators and denominators provided in the table).

Discussion

The Saving Babies' Lives initiative launched in 2016 includes identification and surveillance of growth-restricted babies as a priority in the care bundle to reduce stillbirth in England.[17] Reports on the implementation of the care bundle at 19 trusts demonstrated that antenatal detection of small-for-gestational-age (SGA) babies has improved,[18] and ongoing surveillance of these outcomes will continue with the mandatory roll-out of the Saving Babies' Lives version 2.0 (SBL v2) initiative across all English trusts since 2018.[19]

For births in Scotland and Wales, the findings suggest that the proportion of term SGA babies born at or after their due date is reducing. Using the NMPA's previous clinical reports for births in 2015/16 and in 2016/17 as comparison, the proportion of babies born SGA at or after their estimated due date in Scotland has reduced year-on-year from 53.8%,[4] to 52.3%,[5] to 49.0% in this report. The same emerging year-on-year trend is apparent for Wales too, where the proportion of babies born SGA at or after their estimated due date has reduced from 62.2%,[4] to 60.0%,[5] to 57.7% in this report. These findings may be early indications that antenatal detection and monitoring of and subsequent care planning (including earlier timing of birth) for these at-risk term SGA babies is becoming more appropriate, possibly as a result of stillbirth reduction initiatives in these countries. The Scottish Patient Safety Programme (SPSP) for maternity in conjunction with the Maternity and Children Quality Improvement Collaborative (MCQIC) have a targeted initiative that includes fetal growth surveillance to reduce stillbirth.[20] In Wales, the National Stillbirth Working Group (NSWG) endorses the implementation of the Welsh Initiative for Stillbirth Reduction, which also includes improved surveillance and monitoring of suspected SGA babies in its aims.[21] All three countries in the audit had representation in the Stillbirth Priority Setting Partnership in 2014,[22] and the initiatives in place to reduce stillbirth in all three countries are similar and include fetal growth monitoring.

The induction of labour rates for term pregnancies in Scotland have increased from 32.2%,[4] to 33.2%,[5] to 35.1% in this report, and in Wales the rates changed from 32.1%,[4] down to 30.1%,[5] rising to 34.1% in this report. These findings may indicate emergence of trends, and require ongoing monitoring.

It could be expected that the proportion of all birthing people experiencing an induction of labour will increase, partly attributable to the clinical response following increased identification and surveillance of babies thought to be SGA. Induction of labour, while not associated with any increase in adverse outcome,[23] may have implications for the birth experience, including limits regarding choice of place of birth and requiring interventions such as intravenous oxytocin and continuous fetal monitoring.[24] As trusts and boards further align their practice with stillbirth reduction initiatives and changes to national-level guidelines, monitoring the rates of babies born SGA at term and the rates

of induction of labour at term will be important for understanding the clinical impact and experiences of women and families and how any adverse impact or experience could be addressed.

Giving birth

Modes of birth

What is measured: Of women who give birth to a singleton baby between 37^{+0} and 42^{+6} weeks of gestation, the proportion with each mode of birth:

- spontaneous vaginal birth: vaginal birth without the use of instruments
- assisted vaginal birth: vaginal birth with the assistance of instruments
- caesarean birth (both elective[*] and emergency).

Table 6 Proportion of women giving birth to a singleton baby at term who have a spontaneous vaginal birth, assisted vaginal birth, or caesarean birth

		'51 English trusts'	Scotland	Wales	Trust and board total
Number of trusts/boards included in analysis		51	13	6	70
Number of women included in analysis		199 057	46 403	28 031	273 491
Number of women who have a spontaneous vaginal birth		120 953	26 093	18 032	165 078
Number of women who have an assisted vaginal birth		25 806	5 792	3 033	34 631
Number of women who have a caesarean birth		51 933	14 461	6 935	73 329
Overall rate (adjusted)[a]	Spontaneous vaginal birth	60.9%	56.8%	62.4%	60.4%
	Assisted vaginal birth	12.9%	12.3%	11.7%	12.7%
	Forceps	7.5%	9.2%	8.5%	7.9%
	Ventouse	5.4%	3.0%	3.3%	4.8%
	Caesarean birth	26.1%	30.6%[b]	25.7%	26.9%
	Elective caesarean birth	11.5%	13.9%	12.1%	12.0%
	Emergency caesarean birth	14.7%	16.4%	13.7%	14.9%
Rate in primiparous women (adjusted)[a]	Spontaneous vaginal birth	49.5%	46.7%	52.8%	49.3%
	Assisted vaginal birth	23.2%	22.2%	20.7%	22.8%
	Emergency caesarean birth	21.8%	24.4%	20.1%	22.1%
Rate in multiparous women (adjusted)[a]	Spontaneous vaginal birth	69.9%	64.7%	69.9%	69.0%
	Assisted vaginal birth	4.8%	4.6%	4.6%	4.7%
	Emergency caesarean birth	9.2%	9.6%	8.4%	9.2%

[a] Country-level results are adjusted for case mix (unadjusted rates can be obtained using the numerators and denominators provided in the table).
[b] The proportions of elective and emergency caesarean birth do not add up exactly to the overall proportion as some caesarean births in the dataset are not recorded as being elective or emergency.

---

[*] In this context, 'elective' means a planned operation. This can be for a broad variety of indications, including but not limited to placental problems such as placenta accreta, factors related to the baby such as breech presentation, previous caesarean birth or other operation on the womb, or maternal medical or psychological health conditions. A small proportion of 'elective' caesarean births are performed at the request of the woman without another medical, surgical or psychological indication.

Birth without intervention

What is measured: Of women who give birth to a singleton baby between 37^{+0} and 42^{+6} weeks of gestation, the proportion who have a birth without intervention, defined as a birth that meets the criteria for one or both of the following:

1   spontaneous onset, spontaneous labour and birth, without epidural/spinal/general anaesthesia or episiotomy

2   spontaneous onset and birth, without epidural/spinal/general anaesthesia or episiotomy.

The previous clinical report for 2016/17 births used MIS data sources for England, which meant that for some trusts it was possible to measure birth without intervention using definition 1. For the current clinical report, it is possible only to report on birth without intervention using definition 2. This is due to poor-quality data on spontaneous progress of labour, indicated via data items related to labour augmentation in all three countries.

Table 7 Proportion of women who give birth to a singleton baby at term without intervention (definition 2)

	'51 English trusts'	Scotland	Wales	Trust and board total
Number of trusts/boards included in analysis	17	12	2	31
Number of women included in analysis	45 270	41 087	6 104	92 461
Number of women who give birth without intervention	18 058	12 937	2 091	33 086
Rate of birth without intervention (adjusted)^a	39.2%	31.9%	35.3%	35.8%

^{a} Country-level results are adjusted for case mix (unadjusted rates can be obtained using the numerators and denominators provided in the table).

Vaginal birth after caesarean birth

What is measured: Of women having their second baby after having had a caesarean birth for their first baby,[*] the proportion who give birth to their second baby vaginally.

Table 8 Proportion of women giving birth to their second baby at term, who had their first baby by caesarean and their second vaginally

	'51 English trusts'	Scotland	Wales	Trust and board total
Number of trusts/boards included in analysis	51	11	6	68
Number of women eligible for VBAC and included in analysis	14 910	4 027	2 374	21 311
Number of women who gave birth vaginally	3 338	503	555	4 396
Rate of women who attempted VBAC (among those eligible; adjusted)^a	38.4%	31.5%	39.0%	37.1%
Rate of women who gave birth vaginally (among those who attempted VBAC; adjusted)^a	59.2%	45.5%	56.2%	56.5%
Overall VBAC rate (among those eligible; adjusted)^a	22.0%	14.1%	21.8%	20.6%

^{a} Country-level results are adjusted for case mix (unadjusted rates can be obtained using the numerators and denominators provided in the table).

Discussion

Mode of birth trends have over the past 30 years been observed to favour an increase in intervention, and in particular caesarean birth.[25] The mode of birth rates reported here remain

---

*   The measure is restricted to secundiparous women because of the limitations of historical records, and because this is the largest group of women considering VBAC (vaginal birth after caesarean birth). The rate presented here may therefore be smaller than other commonly reported VBAC rates, as it does not include those women who previously had a vaginal birth as well as a caesarean birth.

broadly consistent and in line with reports from previous NMPA clinical reports.[4,5] The mode of birth findings for the included English trusts are reassuring as to the validity of the MSDS dataset given that they are as would be expected considering historical data and trends that have been established.

The findings for births in Scotland and Wales show that there is variation in mode of birth outcomes between the two countries, and there are different emerging trends when compared with previous NMPA reports. In Wales, there seems to have been an increase in the overall caesarean birth rate from 24.3%[4] for births in 2015/16 to 25.7% for the births in 2017/18 in this report, largely explained by the increasing rate of elective caesarean birth (from 10.7% in 2015/16 to 12.1% in this report). The overall caesarean birth rate is Scotland appears to be stable in comparison with the previous NMPA report time points.

It is notable that the rates for VBAC are declining in Wales. This includes the proportion of eligible birthing people who attempt VBAC, and the proportion of those who then do give birth vaginally. Between NMPA reporting years, there has been a stepped decline from 52.5%[4] of eligible women attempting VBAC, to 43.3%,[5] to 39.0% in this report, and the same downward trend is seen for the proportion of women who attempt VBAC who then do give birth vaginally from 64.2%,[4] to 60.3%,[5] to 56.2% in this report. Given the marked increase in elective caesarean birth in Wales, it is reasonable to consider that changes in VBAC practice might be an explanation for this. In the absence of any indication that the proportion of women eligible to attempt VBAC is declining, the downward trend may be a reflection of the changing birth preferences of women and birthing people.[26]

The difficulty in fully reporting both definitions of birth without intervention in all three countries remains a pertinent issue for maternity service providers. Given the increased attention and reviews around care at the time of birth, action should be taken to improve data quality such that a comprehensive suite of measures can be reported.

It is of equal importance to identify those women who experience birth without intervention as those who experience birth with an intervention, so that perinatal outcomes and the varying experiences of women and birthing people, and their families, can be evaluated. For some women, a birth without intervention is a positive experience; for others, that will not be the case. As such, this measure is not intended to offer any judgement about the appropriateness of care or preferences of those giving birth – it simply adds to a more complete range of measures that the NMPA is able to produce to facilitate the evaluation of maternity care.

Maternal measures

Smoking cessation

What is measured: Of those women who are recorded as being current smokers at their booking visit, the proportion who are no longer smokers by the time of birth.[*]

Table 9 Proportion of women smoking at birth, and the proportion of women who stopped smoking during pregnancy

	'51 English trusts'	Wales	England and Wales
Number of trusts/boards included in smoking at birth analysis	19	7	26
Number of women included in smoking at birth analysis	76 831	29 476	106 307
Number of women smoking at birth	6 983	4 777	11 760
Proportion of women smoking at birth[a]	9.1%	16.2%	11.1%
Number of trusts/boards included in smoking cessation analysis	18	6	24
Number of women included in smoking cessation analysis	9 201	5 609	14 810
Number of women not smoking at birth, who were smoking at booking	3 417	1 073	4 490
Proportion of women not smoking at birth, among those who were smoking at booking	37.1%	19.1%	30.3%

[a] This was derived from smoking status in late pregnancy or at the time of birth, as available.

Episiotomy

What is measured: Of women who give birth vaginally to a singleton baby in the cephalic position between 37^{+0} and 42^{+6} weeks of gestation, the proportion who have an episiotomy.

Table 10 Proportion of women who have an episiotomy among those who have a vaginal birth of a singleton, cephalic baby at term

		'51 English trusts'	Scotland	Wales	Trust and board total
Number of trusts/boards included in analysis		18	13	6	37
Number of women included in analysis		49 535	31 369	20 181	101 085
Number of women who have an episiotomy		12 539	8 101	4 059	24 699
Episiotomy rate (adjusted)[a]	Overall	24.8%	25.5%	21.7%	24.4%
	Spontaneous vaginal birth	10.3%	10.6%	8.9%	10.1%
	Assisted vaginal birth	86.8%	92.2%	87.3%	88.6%

[a] Country-level results are adjusted for case mix (unadjusted rates can be obtained using the numerators and denominators provided in the table).

---

[*] In Scotland's central maternity data, smoking is recorded differently. Scotland could therefore not be included in this measure.

Third and fourth degree tears

What is measured: Of women who give birth vaginally to a singleton baby in the cephalic position between 37^{+0} and 42^{+6} weeks of gestation, the proportion who sustain a third or fourth degree tear.

Table 11 Proportion of women who sustain a third or fourth degree tear among those who have a vaginal birth of a singleton, cephalic baby at term

		'51 English trusts'	Scotland	Wales	Trust and board total
Number of trusts/boards included in analysis		51	11	5	67
Number of women included in analysis		146 388	31 721	16 616	194 725
Number of women sustaining third of fourth degree tear		4 862	1 182	532	6 576
Proportion overall sustaining third or fourth degree tear (adjusted)[a]		3.3%	3.6%	3.4%	3.4%
Primiparous women (adjusted)[a]	Spontaneous vaginal birth	4.9%	5.0%	5.1%	4.9%
	Assisted vaginal birth	7.0%	6.7%	8.4%	7.0%
Multiparous women (adjusted)[a]	Spontaneous vaginal birth	1.5%	1.9%	1.2%	1.5%
	Assisted vaginal birth	3.8%	5.5%	4.1%	4.1%

[a] Country-level results are adjusted for case mix (unadjusted rates can be obtained using the numerators and denominators provided in the table).

Postpartum haemorrhage of 1500 ml or more

What is measured: Of women who give birth to a singleton baby between 37^{+0} and 42^{+6} weeks of gestation, the proportion who experienced a major postpartum haemorrhage of 1500 ml or more.

Table 12 Proportion of women who have an postpartum haemorrhage of 1500 ml or more among those who have a singleton baby at term

	Wales
Number of trusts/boards included in analysis	6
Number of women included in analysis	27 424
Number of women having a haemorrhage ≥1500 ml	1 016
Overall proportion of women having a haemorrhage ≥1500 ml (adjusted)[a]	3.7%
Proportion among women who had a vaginal birth (adjusted)[a]	3.1%
Proportion among women who had a caesarean birth (adjusted)[a]	5.4%

[a] Country-level results are adjusted for case mix (unadjusted rates can be obtained using the numerators and denominators provided in the table).

Unplanned maternal readmission

What is measured: Of women giving birth to a singleton baby between 37^{+0} and 42^{+6} weeks of gestation, those who have an unplanned, overnight readmission to hospital within 42 days of giving birth, excluding those accompanying an unwell baby.

Table 13 Proportion of women who have an unplanned, overnight readmission to hospital within 42 days of giving birth to a singleton baby at term

	'51 English trusts'	Scotland	Wales	Trust and board total
Number of trusts/boards included in analysis	51	12	6	69
Number of women included in analysis	183 595	46 401	25 852	255 848
Number of women with unplanned maternal readmissions within 42 days	6 165	1 515	936	8 616
Overall rate (adjusted)[a]	3.3%	3.3%	3.7%	3.4%
Proportion among women who had a vaginal birth (adjusted)[a]	3.0%	2.8%	3.4%	3.0%
Proportion among women who had a caesarean birth (adjusted)[a]	4.4%	4.2%	4.5%	4.4%

[a] Country-level results are adjusted for case mix (unadjusted rates can be obtained using the numerators and denominators provided in the table).

Discussion

Variation in the availability of data for maternal measures is considerable across and within the three countries. The ability to report on measures related to smoking remains poor with the exception of Welsh boards. Trusts and boards should work to improve data capture of this measure in order to align themselves with the smoking cessation initiatives of Saving Babies' Lives version 2.0 and the NHS Long Term Plan.[17,27]

The RCOG's Obstetric Anal Sphincter Injury (OASI) project care bundle, which was implemented at 16 UK sites between 2016 and 2018, was found to be effective in reducing the rates of OASI without affecting episiotomy or caesarean birth rates, as well as being acceptable practice among clinicians and women.[28] Rates of third and fourth degree tears in Scotland and Wales remain steady with minimal fluctuation in rates since the first NMPA report time point. In both Scotland and Wales, the overall rate of episiotomy also remains stable. As roll-out of the OASI care bundle continues, further monitoring of the rates of third and fourth degree tears and episiotomy will be required to determine emergence of trends and evaluate the effect of change in practice over time.

For this report, major postpartum haemorrhage of over 1500 ml can only be measured in the Welsh dataset. For England, the inability to report on this measure is because of limitations of MSDS where the category for blood loss of 0–500 ml is missing. For Scotland, this is a result of the coding for blood loss in the centralised dataset, which does not match the NMPA's definition of the measure. Postpartum haemorrhage is an emergency event and remains one of the leading causes of maternal mortality and intensive care admissions,[13,29] with evidence to suggest variation in the prevalence of this outcome.[30] It is a limitation for the NMPA not to be able to report this important measure in all three countries. The Welsh data for this measure indicate no improvement in the rate of this event, in particular for vaginal births for which the proportion has increased from 1.5% in 2015/16,[4] to 2.7%,[5] to 3.1% in this report. This increase in rate is also observed for caesarean births, with a rise from 4.6%[4] to 5.4% in this report. Further monitoring of this measure is required in order to identify an emerging trend. Furthermore possible explanatory mechanisms for an increase in major postpartum haemorrhage should be investigated. Maternity service providers and organisations responsible for maternity datasets should focus on improving data quality and processes to enable appropriate monitoring of rates for this adverse outcome, and thus monitoring of the variation of these rates between and within countries.

Since the NMPA report on 2015/16 births,[4] the rate of unplanned maternal readmission has remained stable in Scotland and Wales for women who experience a vaginal birth. The rate for unplanned maternal readmission for women who experience a caesarean birth is higher than for women who experience a vaginal birth in both countries, explained by caesarean surgical site wound infections being a primary cause for maternal readmission.[31] The rate of maternal readmission in Scotland and Wales for birthing people who have a caesarean birth has fluctuated up and down since the first NMPA report on births in 2015/16.

Measures of care for the newborn baby

Skin-to-skin contact within 1 hour of birth

What is measured: Of liveborn babies born between 34^{+0} and 42^{+6} weeks of gestation, the proportion who received skin-to-skin contact within 1 hour of birth.

Table 14 Proportion of babies born between 34^{+0} and 42^{+6} weeks of gestation who receive skin-to-skin contact within 1 hour of birth

	'51 English trusts'[a]
Number of trusts/boards included in analysis	45
Number of babies included in analysis	187 346
Number of babies receiving skin-to-skin contact within 1 hour of birth	148 612
Proportion of babies receiving skin-to-skin contact within 1 hour of birth	79.3%
Proportion in babies born between 34^{+0} and 36^{+6} weeks of gestation	55.1%
Proportion in babies born between 37^{+0} and 42^{+6} weeks of gestation	80.7%

[a] Information about skin-to-skin contact is only available for babies born in England because it is not captured in the Scottish or Welsh national datasets.

Breast milk at first feed, and at discharge

What is measured: Of liveborn babies born between 34^{+0} and 42^{+6} weeks of gestation, the proportion who receive any breast milk for their first feed, and at discharge from the maternity unit.[*]

Table 15 Proportion of babies born between 34^{+0} and 42^{+6} weeks of gestation who receive breast milk at their first feed and at discharge

		'51 English trusts'	Scotland	Wales[a]	Trust and board total
Number of trusts/boards included in analysis		41	10	7	58
Number of babies included in breast milk at first feed analysis		147 560	26 225	28 022	201 807
Number of babies receiving breast milk at first feed		110 268	17 814	16 938	145 020
Number of babies included in breast milk at discharge analysis		145 262	48 464	N/A	193 726
Number of babies receiving breast milk at discharge		100 904	27 701	N/A	128 605
Overall proportion receiving breast milk at first feed		74.7%	67.9%	60.4%	71.9%
Overall proportion receiving breast milk at discharge		69.5%	57.2%	N/A	66.4%
Proportion of babies born between 37^{+0} and	At first feed	75.3%	68.5%	60.9%	72.5%
42^{+6} weeks of gestation who receive breast milk	At discharge	70.0%	57.6%	N/A	66.9%
Proportion of babies born between 34^{+0} and	At first feed	62.2%	57.2%	53.4%	60.1%
36^{+6} weeks of gestation who receive breast milk	At discharge	59.1%	49.3%	N/A	56.2%

[a] Breast milk at discharge information is not recorded in the Welsh datasets, and therefore cannot be measured.

---

[*] This measure uses only data available from the maternity dataset and does not include additional information that may be available for babies admitted to a neonatal unit.

5 minute Apgar score of less than 7

What is measured: Of liveborn, singleton babies born between 37[+0] and 42[+6] weeks of gestation, the proportion who are assigned an Apgar score of less than 7 at 5 minutes of age.

Table 16 Proportion of singleton babies born at term assigned an Apgar score of <7 at 5 minutes of age

	'51 English trusts'	Scotland	Wales	Trust and board total
Number of trusts/boards included in analysis	51	11	6	68
Number of babies included in analysis	192 184	45 409	27 833	265 426
Number of babies with Apgar score <7 at 5 minutes	2 164	694	349	3 207
Proportion of babies with Apgar score <7 at 5 minutes (adjusted)[a]	1.13%	1.53%	1.24%	1.21%

[a] Country-level results are adjusted for case mix (unadjusted rates can be obtained using the numerators and denominators provided in the table).

Discussion

There is considerable variation in the availability of data between countries for the measures related to care of the newborn baby, owing in part to the limited data items that maternity datasets contain specific to the care episodes of the baby. The interpretation of the findings presented for these measures is therefore limited.

It is concerning that in both Scotland and Wales there is an emerging trend for an increase in rate of 5 minute Apgar score less than 7. In Scotland since the NMPA report on 2015/16 births, the rates have increased each year of NMPA reporting from 1.3%,[4] to 1.4%,[5] to 1.53% in this report. For Wales the rates have fluctuated from 1.1%,[4] to 1.0%,[5] to 1.24% in this report. A 5 minute Apgar score of less than 7 is an important proxy for quality of care prior to and around the time of birth, and one that is relatively well reported as these babies are more likely to require specialist neonatal care. The Saving Babies' Lives version 2.0 care bundle and the Scottish Patient Safety Programme (SPSP) maternity initiative to reduce stillbirth draw attention to effective fetal monitoring in labour as one element of care to improve perinatal outcomes.[19,20] As maternity services implement these initiatives, ongoing monitoring of 5 minute Apgar score of less than 7 alongside other measures of neonatal morbidity and mortality (such as those reported by NNAP) will be required.

The UK is reported to have one of the lowest breastfeeding rates in Europe[32] despite the benefits of breastfeeding being well documented and including reduction of health inequalities.[33] The RCPCH endorses breastfeeding initiatives that increase initiation and continuation of breastfeeding.[34] Initiatives to support improvement in breastfeeding rates include the Scottish Government's 'Improving Maternal and Infant Nutrition' framework,[35] and Unicef UK's 'Baby Friendly Initiative' (BFI), for which English and Welsh trusts and boards can apply for accreditation.[36] Breastfeeding rates in Scotland have since the NMPA report for births in 2015/16 remained essentially unchanged overall for breast milk at first feed with unadjusted rates of 67.2%,[4] 67.3%,[5] and 67.9% in this report, and rates for breast milk at discharge at 56.8%,[4] 57.5%,[5] and 57.2% in this report. For the first time, the NMPA can report breast milk at first feed for births in Wales, with a rate of 60.4%, demonstrating the presence of between-country variation. As more NHS trusts and boards enter the BFI accreditation programme, or become aligned with breastfeeding initiatives, variation between countries and trusts/boards for skin-to-skin contact at birth and measures related to breastfeeding should, in theory, narrow.

Conclusion

For this report on births occurring from 1 April 2017 to 31 March 2018, there remains apparent variation in the care and outcomes experienced by birthing people and babies in NHS maternity services. For births in England, following the change in source of data from MIS to MSDS v1.5, it is difficult to identify trends in the findings with confidence given the lower ascertainment of births reported. This limitation in the English MSDS also has a detrimental effect on the ability to draw conclusions at a higher geographical level, such as reporting of a representative GB mean.

The NMPA can, however, confirm that the quality and completeness of data received from centralised maternity datasets in Scotland and Wales remain high and consistent with previous NMPA clinical reports. This means that for these countries it is possible to make comparisons to findings previously reported by the NMPA and thus to begin to discuss emerging trends over time.

For some measures, such as the proportion of term SGA babies who are born at or after their estimated due date, there are positive signs in Scottish and Welsh data that care may be becoming more in alignment with national recommended practice, as the proportion has reduced between the NMPA clinical reporting years. However, there is a need to explore further measures relating to birth. The findings in this report for Scotland and Wales suggest that care around the time of birth is changing towards increased intervention. Between NMPA reporting years for births in 2015/16 and this report, there has been a rise in induction of labour in both Scotland (32.2% to 35.1%) and Wales (32.1% to 34.1%); in Wales there has been a decline in spontaneous vaginal birth rates (64.7% to 62.4%), and an increase in both assisted vaginal birth (10.9% to 11.7%) and caesarean birth (24.3% to 25.7%). The care for women who are eligible for VBAC also appears to be changing, with a decline in the proportion of women attempting VBAC, and in the proportion of those women then giving birth vaginally. It is important to understand the implications of changes in trends of these interrelated measures for women and birthing people, babies, and demands on maternity services.

In addition, measures that relate to morbidity for women and babies such as third and fourth degree tears, 5 minute Apgar score less than 7 and major postpartum haemorrhage over 1500 ml (NMPA 'outlier' indicators) require ongoing monitoring as indicators of quality of care. In this report, it is concerning to observe an year increase since the first NMPA clinical report in the proportion of babies with a 5 minute Apgar score less than 7, in both Scotland and Wales. The proportion of women who experience a major postpartum haemorrhage over 1500 ml has also increased year-on-year in Wales from 2.3% in 2015/16 to 3.7% in this report. Both of these measures relate to serious outcomes for birthing people and babies, and therefore it is important to measure for variation in care to identify and learn from trusts and boards who are demonstrating improvements in these measures.

In the absence of being able to comment on trends for the findings at a GB level, we can instead draw attention to those areas that require further monitoring and those where data quality needs to be improved. An important focus for maternity services, maternity information system suppliers and organisations collating national maternity data should be the improvement of data capture related to the measure of birth without intervention, which has poor reporting ability in each country. Better data here would provide an opportunity to identify any relationships between this and other measures (such as neonatal morbidity) to explore the outcomes and experience of this care. Reporting on birth without intervention adds to the existing suite of NMPA measures, enabling a broader picture of maternity care, and is important considering it is an area of increased attention and high-profile maternity review, both nationally and for individual trusts.

Additionally, organisations responsible for centralised maternity datasets in England and Scotland need to align their data items for postpartum blood loss with the NMPA technical specification. This will enable the NMPA to accurately determine rates of major postpartum haemorrhage over 1500 ml for these countries.

Furthermore, the poor completeness of some data items in the English dataset, which has affected the case-mix adjustment for this report, needs to be addressed; these data items are previous caesarean birth, BMI, and smoking at booking and at the time of giving birth.

A crucial element in improving maternity and neonatal services is capturing accurate and complete data and evaluating that data in a timely manner. The preparation and publication of this report has been significantly delayed by the late receipt of the English dataset. However, the change to using centralised datasets means that, for future NMPA work, data availability and the associated clinical reporting should happen very much sooner after the completion of each time period.

The variations and gaps in the data are limitations for the work of the NMPA. The number of measures that can be reported and equitable representation of births in the three countries have reduced compared with previous NMPA clinical reports mainly because of a change to MSDS for the English data source. While the move to using centralised datasets from each country is a step worth celebrating, ongoing momentum is required to align these datasets and improve the coverage and capture of data items. The NMPA anticipates improved coverage of births and completeness of data items in newer versions of MSDS, and alongside the established Scottish and Welsh centralised datasets this will allow for greater certainty and depth of findings and will mean that variation in maternity and neonatal care between NHS trusts and boards can be examined in a more meaningful way.

Appendix 1

Using Maternity Services Data Set version 1.5 for clinical audit: an approach by the National Maternity and Perinatal Audit

What does this documentation cover?

For the first time, the NMPA is using maternity data from Maternity Services Data Set (MSDS), a centralised dataset managed by NHS Digital. Previous NMPA reports have used maternity information system (MIS) data for which individual trusts in England were required to submit data extracts directly to the NMPA. This document provides a description of MSDS v1.5 and of the methods used by the NMPA to generate clinical audit findings from this source for births taking place in England between 1 April 2017 and 31 March 2018.

Maternity Services Data Set

MSDS v1.5 is a national-level electronic dataset that collates data inputted into patient information systems and clinical information systems at the point of care in NHS-funded maternity care providers in England. MSDS is designed to capture episodes of care whereby there is an electronic maternity record created by a care provider or hospital administrator on hospital information systems according to a national data standard. The MSDS Technical Output Specification and the MSDS User Guidance describe the data items that are required from providers at the local level and how these map to MSDS data flows.[37,38] These documents detail the groupings that data output can take (described as data tables), and the expected format and values the data tables contain. This guides providers on how to submit information from local clinical systems to a format accepted by MSDS.

Trusts are required to submit to MSDS on a monthly basis, and this process has been mandated since April 2015. The individual data tables (of which there are 42) that form a submission are either mandatory, required, optional or pilot (submitted at NHS Digital's request *ad hoc*). The three mandatory tables that are required for a submission to be accepted are: Mother's Demographics (MAT001), GP Practice Registration (MAT003), and Booking Appointment Details (MAT101).[39] A 'Unique patient ID' for the mother and for the baby are separate mandatory requirements for all data tables (with the exception of maternal sexual health data tables) to enable linkage.

In December 2020, the NMPA received an MSDS v1.5 dataset containing data for births in England that occurred between 1 April 2017 and 31 March 2018. In the following sections, we describe the case ascertainment and data quality of this dataset and the processes in place for the derivation of trust-level measures reported in the NMPA's annual clinical audit.

Case ascertainment

Following a process of deduplication, the MSDS held data for **498 525 births from 132 NHS trusts** occurring in this 2017/18 period**,** covering 80% of the 626 203 births recorded in HES for the same period and as reported by NHS Digital.[40]

The NMPA's clinical audit measures are derived from annual data for each provider in England, Scotland and Wales. For 2017/18, English trusts that had not submitted monthly data for all 12 months, or whose submissions were not complete (i.e. not capturing all or the majority of the births for that month), were excluded. Following this restriction, **313 198 births from 73 NHS trusts** were taken forward for data quality assessment of key variables.

Data quality assessment: 'key variables'

The NMPA Measures - Technical Specification for births from 1 April 2017 describes the parameters that determine whether individual trusts meet the requirement for completeness and distribution of 'key variables' which are used to report characteristics of births, and to derive NMPA measures. These parameters identify when individual trusts are not meeting data quality standards needed to enable confident reporting of findings without potential bias. Table 17 shows the key variables and the number of trusts and births meeting the requirements in MSDS v1.5 for the 2017/18 reporting period. Out of the 73 trusts and 313 198 births that met the complete submission criteria, **50 trusts and 216 830 births** passed the data quality assessment of 'key variables' and form the cohort of births for England in the NMPA's clinical audit report.

Table 17 Trust-level MSDS data quality for key variables used in NMPA clinical reports

Key variable	Data quality completeness check	Data quality distribution check	Number of trusts passing data quality check (N_{max} = 73)	Number of births passing data quality check (%) (N_{max} = 313 198)
Birthweight	≥70% complete	Birthweight between 2500 g and 4500 g in ≥80% of infants born between 37 and 42 weeks (inclusive)	71	297 294 (95%)
Gestation	If trust has at least one obstetric unit (OU): ● ≥70% complete within vaginal births ● ≥70% complete within caesarean births ● ≥70% complete overall If trust has no OUs: ● ≥70% complete overall	If trust has at least one OU: ● gestational age at birth is between 37 and 42 weeks (inclusive) in ≥70% of births If trust has no OUs: ● gestational age at birth is between 37 and 42 weeks (inclusive) in ≥90% of births	69	288 267 (92%)
Parity	≥70% complete	Proportion of births to primiparous women ≥20% and ≤70%	56	245 038 (78%)
Method of delivery	≥70% complete	If trust has at least one OU: ● caesarean section rate is between ≥5% and ≤50% ● spontaneous vaginal birth rate >40% If trust has no OUs: ● caesarean section rate is <5% ● spontaneous vaginal birth rate is ≥90%	69	289 901 (93%)
Fetus outcome	≥70% complete	If trust has at least one OU: ● more than one stillbirth was recorded	67	279 838 (89%)
Passing all above			50	216 830 (69%)
Not passing 1 or more of above			23	96 368 (31%)

The distributions of key variables from the 50 trusts passing data quality checks, as compared with distributions reported by ONS,[41] and/or the NMPA 2016/17 reporting period using MIS data,[5] is provided in Table 18. The key variable distributions for birthweight, gestational age, parity and method of delivery are similar to those reported for England ONS or NMPA for the previous reporting period. The stillbirth rate of 4 per 1000 births is also aligned with ONS births statistics for the 2017 calendar year.[42] The cohort of **216 830 births from 50 NHS trusts** is taken forward for further data quality assessment to determine to what extent the NMPA clinical audit measures could be derived for reporting.

Table 18 Key variable distributions in MSDS

Key variable	Number of births in MSDS 2017/18[a]	Proportions of births in England in 2017 as reported by ONS[a]	Proportion of births in England as reported in NMPA clinical report for 2016/17 births[a]
Birthweight			
<2500g	15 293 (7.2%)	7.0%	
≥2500g	197 958 (92.8%)	93.0%	
Missing (*n* = 3 576; 1.6%)			
Gestational age			
<24 weeks	127 (0.1%)	0.1%	
24–36 weeks	16 093 (7.6%)	7.8%	
37–42 weeks	192 534 (90.4%)	89.9%	
>42 weeks	4 228 (2.0%)	2.2%	
Missing (*n* = 3 848; 1.8%)			
Parity			
Primiparous	92 846 (43.9%)	42.3%	42.1%
Multiparous	118 596 (56.1%)	57.7%	57.9%
Missing (*n* = 5 388; 2.5%)			
Method of delivery			
Spontaneous vaginal	125 267 (60.0%)		61.9%
Assisted vaginal birth	23 553 (11.3%)		12.6%
Elective caesarean	27 381 (13.1%)		11.0%
Emergency caesarean	32 613 (15.6%)		14.4%
Missing (*n* = 7 159; 3.3%)			
Fetus outcome			
Live birth	213 491 (99.6%)	99.6%	
Stillbirth	827 (0.4%)	0.4%	
Other	38 (0.02%)		
Missing (*n* = 2 474; 1.1%)			

[a] Percentages calculated based on non-missing values.

Derivation of NMPA measures

The carefully constructed NMPA measures enable audit of defined clinical outcomes, and of the care that women and babies receive. The criteria required for each measure are detailed in the NMPA Measures - Technical Specification for births from 1 April 2017. Table 19 shows the number of trusts for which it is possible to measure rates for a selection of individual variables, and these variables (where applicable) are used to create the NMPA measures.

The NMPA's clinical report includes three potential 'outlier' indicators – these are NMPA measures that undergo formal analysis to identify services where results are higher or lower than the average. These measures act as a proxy for quality of care at individual services. The three 'outlier' indicators are 5 minute Apgar score of less than 7, third and fourth degree tears, and postpartum haemorrhage of 1500 ml or more. Using MSDS v.1.5 for the 2017/18 reporting period, 5 minute Apgar score of less than 7 can be measured for all 50 trusts and third and fourth degree tears can be measured for 31 trusts. Postpartum haemorrhage of 1500 ml or more cannot be measured for any trust owing to coding limitations in the MSDS where the category for blood loss of 0–500 ml is not present.

For the other NMPA measures, mode of birth can be measured for 50 trusts. Owing to poor data quality for variables related to skin-to-skin contact, breast milk at first feed and vaginal birth after caesarean (VBAC), it is not possible to report on these measures for some trusts. Induction of labour at term cannot be reported for any trust using MSDS owing to 'mode of labour onset' being absent from the dataset.

Table 19 Trust-level MSDS data quality for indicators and measures reported in NMPA clinical reports

Indicator	Data quality check	Number of trusts passing data quality check (N_{max} = 50)	Number of births passing data quality check (N_{max} = 216 830)
Potential outlier indicator measures			
5 minute Apgar score less than 7	Key variables + Apgar score variable data quality check *Apgar scores less than 7 at 5 minutes rate is ≥0.5%*	50	216 830 (100%)
Third or fourth degree tear	Key variables + perineal tears, and fetal presentation variables data quality check *Third or fourth degree tear rate is ≥0.1% and ≤10%*	31	126 565 (58%)
Postpartum haemorrhage of ≥1500 ml	Key variables + estimated blood loss variable data quality check *Blood loss ≥1500 ml rate is ≥0.5% and ≤20% of births*	0	0 (0%)
Other measures			
Induction of labour at term	Key variables + mode of labour onset variable data quality check *Induction of labour rate is ≥5% and ≤55%*	0	0 (0%)
Mode of birth	Key variables + method of delivery data quality check *Caesarean section rate is ≥5% and ≤50%,* *Spontaneous vaginal rate is ≥20%, and ≤95%* *Assisted vaginal rate is ≥4% and ≤50%*	50	216 830 (100%)
Breast milk at first feed	Key variables + breast milk at first feed variable data quality check *Breast milk at first feed rate is ≥25%*	41	166 338 (77%)
Skin-to-skin contact within 1 hour of birth	Key variables + skin-to-skin contact variable data quality check *Skin-to-skin contact within 1 hour of birth rate is <40%*	43	192 200 (89%)
VBAC	Key variables + previous caesarean section variable data quality check *VBAC rate is ≥5% and ≤80%*	47	198 342 (91%)

Discussion and conclusion

The case ascertainment for births at English trusts using MSDS v1.5 is 80% for the 2017/18 reporting period. This is a marked decline in case ascertainment for English trusts compared with previous NMPA clinical reports using MIS data. Application of the NMPA Measures - Technical Specification for births from 1 April 2017 and quality checks reduced the number of births for which a selection of measures could be derived to 216 830, equal to 43.5% of births captured in MSDS.

The coverage of births captured in England using MSDS v1.5 is not sufficient to be able to report findings for clinical audit at a national level or – as has been done for previous NMPA reports – to report an average for measures across the three countries (the GB mean) without potentially introducing high levels of uncertainty and bias. The findings generated by the NMPA using MSDS are only meaningful when reported at trust level where users can compare variation with other trusts included in the audit only.

MSDS v1.5 is an archived dataset, as it has been replaced by MSDS v2.0 (used for births from 1 April 2019 until present). While recommendations for MSDS v1.5 are redundant, the use of v1.5 for purposes of the NMPA's clinical report captures the challenges of using a new centralised dataset and highlights where improvement efforts should be focused for future versions of the dataset. The NMPA supports the continued momentum to improve data capture and quality within the maternity landscape, as defined by the Maternity Transformation Programme.[43]

Appendix 2

Trusts and boards whose data are included in the NMPA clinical audit for 2017/18

Individual trust/board and site-level results can be found on the NMPA website.
Trusts and boards below reflect those in existence during 2017/18.

England
Barking, Havering and Redbridge University Hospitals NHS Trust
Barnsley Hospital NHS Foundation Trust
Bedford Hospital NHS Trust
Blackpool Teaching Hospitals NHS Foundation Trust
Cambridge University Hospitals NHS Foundation Trust
Chelsea and Westminster Hospital NHS Foundation Trust
Colchester Hospital University NHS Foundation Trust
Dartford and Gravesham NHS Trust
Doncaster and Bassetlaw Teaching Hospitals NHS Foundation Trust
Dorset County Hospital NHS Foundation Trust
East Cheshire NHS Trust
East Kent Hospitals University NHS Foundation Trust
East Sussex Healthcare NHS Trust
Frimley Health NHS Foundation Trust
Gateshead Health NHS Foundation Trust
Hampshire Hospitals NHS Foundation Trust
Harrogate and District NHS Foundation Trust
Homerton University Hospital NHS Foundation Trust
Kingston Hospital NHS Foundation Trust
London North West University Healthcare NHS Trust
Luton and Dunstable University Hospital NHS Foundation Trust
Maidstone and Tunbridge Wells NHS Trust
North Bristol NHS Trust
North West Anglia NHS Foundation Trust
Royal Cornwall Hospitals NHS Trust
Royal Devon and Exeter NHS Foundation Trust
Royal Surrey County Hospital NHS Foundation Trust
Royal United Hospitals Bath NHS Foundation Trust
Sandwell and West Birmingham Hospitals NHS Trust
Sherwood Forest Hospitals NHS Foundation Trust
South Tees Hospitals NHS Foundation Trust
South Warwickshire NHS Foundation Trust
Southport and Ormskirk Hospital NHS Trust
St George's University Hospitals NHS Foundation Trust
Stockport NHS Foundation Trust
Tameside and Glossop Integrated Care NHS Foundation Trust
The Dudley Group NHS Foundation Trust
The Mid Yorkshire Hospitals NHS Trust
The Shrewsbury and Telford Hospital NHS Trust
University Hospital Southampton NHS Foundation Trust

University Hospitals Bristol NHS Foundation Trust
University Hospitals Coventry and Warwickshire NHS Trust
University Hospitals of Leicester NHS Trust
University Hospitals Plymouth NHS Trust
Walsall Healthcare NHS Trust
Warrington and Halton Hospitals NHS Foundation Trust
West Hertfordshire Hospitals NHS Trust
West Suffolk NHS Foundation Trust
Whittington Health NHS Trust
Wirral University Teaching Hospital NHS Foundation Trust[*]
Wrightington, Wigan and Leigh NHS Foundation Trust
York Teaching Hospital NHS Foundation Trust

Scotland

NHS Ayrshire and Arran
NHS Borders
NHS Dumfries and Galloway
NHS Fife
NHS Forth Valley
NHS Grampian
NHS Greater Glasgow and Clyde
NHS Highland
NHS Lanarkshire
NHS Lothian
NHS Orkney
NHS Shetland
NHS Tayside
NHS Western Isles

Wales

Abertawe Bro Morgannwg University Health Board
Aneurin Bevan Health Board
Betsi Cadwaladr University Health Board
Cardiff and Vale University Health Board
Cwm Taf University Health Board
Hywel Dda Health Board
Powys Teaching Health Board

---

* Owing to poor data quality of the case-mix variable 'previous caesarean', this trust is only included in unadjusted results presented on the NMPA website.

Appendix 3

Data sources used by the NMPA

The NMPA uses data routinely collected in the course of maternity care and links these datasets together to produce a central maternity and neonatal dataset. A different approach to obtaining data was used in each participating country, reflecting the status and maturity of centralised national maternity datasets.

Scotland

The Scottish Morbidity Record 02 (SMR-02) contains information on clinical and demographic characteristics and outcomes for all women admitted as inpatients or day cases to Scottish maternity units. The register is subjected to regular quality assurance checks. The extract used for this report comprised SMR-02 records linked with the Scottish Birth Record and Scottish Morbidity Record 01 (SMR-01). Linkages to records from the National Records of Scotland (NRS) are also made for births, deaths and stillbirths.

Wales

In Wales, the Maternity Indicators dataset (MIds) captures a selected subset of data items from the maternity IT systems in Welsh health boards. The dataset is managed by the NHS Wales Informatics Service (NWIS), which provided an extract of MIds booking and birth data and some information from the National Community Child Health Database (NCCHD) to the NMPA. These data were then linked at record level with Admitted Patient Care (APC) records from the Patient Episode Database for Wales (PEDW).

England

The English Maternity Services Data Set (MSDS), managed by NHS Digital, is the most recently developed central maternity dataset. More information on the dataset is available in Appendix 1. MSDS birth records were linked to Hospital Episode Statistics (HES) inpatient records.

References

1. Kirkup, B. *The Report of the Morecambe Bay Investigation.* 2015 [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/408480/47487_MBI_Accessible_v0.1.pdf].
2. Dyer, C. Maternity care: services across England require "immediate and essential actions." *BMJ*, 2020;371:m4797.
3. Ockenden, D. *Ockenden Report. Emerging Findings and Recommendations from the Independent Review of Maternity Services at the Shrewsbury and Telford Hospital NHS Trust*. 2020 [https://www.donnaockenden.com/downloads/news/2020/12/ockenden-report.pdf].
4. NMPA Project Team. *National Maternity and Perinatal Audit: Clinical Report 2017 – Revised Version. Based on births in NHS maternity services between 1st April 2015 and 31st March 2016*. London: RCOG; 2018 [https://maternityaudit.org.uk/pages/reports].
5. NMPA Project Team. *National Maternity and Perinatal Audit: Clinical Report 2019. Based on births in NHS maternity services between 1 April 2016 and 31 March 2017*. London: RCOG; 2019 [https://maternityaudit.org.uk/pages/reports].
6. NMPA Project Team. *National Maternity and Perinatal Audit: Organisational Report 2017*. London: RCOG; 2017 [https://maternityaudit.org.uk/pages/reports].
7. A Blotkamp, NMPA Project Team. *National Maternity and Perinatal Audit: Organisational Report 2019*. London: RCOG; 2019 [https://maternityaudit.org.uk/pages/reports].
8. Aughey H, NMPA Project Team. *Technical Report: Linking the National Maternity and Perinatal Audit Data Set to the National Neonatal Research Database for 2015/16*. London: RCOG; 2019 [https://maternityaudit.org.uk/pages/sprintpub].
9. Jardine J, NMPA Project Team. *Maternity Admissions to Intensive Care in England, Wales and Scotland in 2015/16: A Report from the National Maternity and Perinatal Audit*. London: RCOG; 2019 [https://maternityaudit.org.uk/pages/sprintpub].
10. Langham J, NMPA Project Team. *National Maternity and Perinatal Audit: Technical Report. Feasibility of evaluating perinatal mental health services using linked national maternity and mental health data sets, based on births between 1 April 2014 and 31 March 2017 in Scotland*. London: NMPA; 2021 [https://maternityaudit.org.uk/pages/sprintpub].
11. Relph S, NMPA Project Team. *NHS Maternity Care for Women with Multiple Births and Their Babies: A study on feasibility of assessing care using data from births between 1 April 2015 and 31 March 2017 in England, Wales and Scotland*. London: RCOG; 2020 [https://maternityaudit.org.uk/pages/sprintpub].
12. Relph S, NMPA Project Team. *NHS Maternity Care for Women with a Body Mass Index of 30 kg/m^2 or Above: Births between 1 April 2015 and 31 March 2017 in England, Wales and Scotland*. London: RCOG; 2021 [https://maternityaudit.org.uk/pages/sprintpub].
13. Knight M, Bunch K, Tuffnell D, Shakespeare J, Kotnis R, Kenyon S, Kurinczuk JJ, editors on behalf of MBRRACE-UK. *Saving Lives, Improving Mothers' Care: Lessons learned to inform maternity care from the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2016–18*. Oxford: National Perinatal Epidemiology Unit, University of Oxford; 2020 [www.npeu.ox.ac.uk/mbrrace-uk/reports].
14. Office for National Statistics. *Statistical Bulletin. Births by parents' characteristics in England and Wales: 2016.* 2017 [www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/livebirths/bulletins/birthsbyparentscharacteristicsinenglandandwales/2016].
15. Khalil A, Syngelaki A, Maiz N, Zinevich Y, Nicolaides KH. Maternal age and adverse pregnancy outcome: a cohort study. *Ultrasound Obstet Gynecol* 2013;42(6):634–43 [https://doi.org/10.1002/uog.12494].
16. Cole TJ, Williams AF, Wright CM. Revised birth centiles for weight, length and head circumference in the UK-WHO growth charts. *Ann Hum Biol*, 2011;38(1):7–11.
17. NHS England. *Saving Babies' Lives: A Care Bundle for Reducing Stillbirth*. 2016 [www.england.nhs.uk/wp-content/uploads/2016/03/saving-babies-lives-car-bundl.pdf].
18. Widdows K, Roberts S, Camacho E, Heazell A. *Evaluation of the Implementation of the Saving Babies' Lives Care Bundle in Early Adopter NHS Trusts in England*. Manchester: Maternal and Fetal Health Research Centre, University of Manchester. 2018 [www.e-lfh.org.uk/wp-content/uploads/2020/02/SPiRE-evaluation.pdf].

19. NHS England. *Saving Babies' Lives Version Two: A Care Bundle for Reducing Perinatal Mortality*. 2019 [www.england.nhs.uk/wp-content/uploads/2019/07/saving-babies-lives-care-bundle-version-two-v5.pdf].

20. Health Improvement Scotland. *Scottish Patient Safety Programme and Maternity and Children Quality Improvement Collaborative: Reducing Stillbirth in Scotland*. 2021 [https://ihub.scot/improvement-programmes/scottish-patient-safety-programme-spsp/spsp-programmes-of-work/maternity-and-children-quality-improvement-collaborative-mcqic/maternity-care/stillbirth].

21. Welsh Government. *Response to recommendations from the Health & Social Care Committee: One-day inquiry into stillbirth in Wales*. 2013 [https://senedd.wales/laid%20documents/cr-ld9306%20-%20welsh%20government%20response%20to%20recommendations%20from%20the%20health%20and%20social%20care%20committee%20one-day%20inqu-30042013-245775/cr-ld9306-e-english.pdf]

22. Stillbirth Priority Setting Partnership. *Stakeholders*. 2014 [www.stillbirthpsp.org.uk/stakeholders.htm].

23. Middleton P, Shepherd E, Morris J, Crowther CA, Gomersall JC. Induction of labour at or beyond 37 weeks' gestation. *Cochrane Database Syst Rev* 2020;7(7):CD004945.

24. National Institute for Health and Care Excellence. *Inducing Labour*. Clinical guideline CG70. NICE; 2008 [www.nice.org.uk/guidance/cg70].

25. Betrán AP, Ye J, Moller AB, Zhang J, Gülmezoglu AM, Torloni MR. The increasing trend in caesarean section rates: global, regional and national estimates: 1990–2014. *PLoS ONE* 2016;11(2):e0148343 [https://doi.org/10.1371/journal.pone.0148343].

26. Birthrights. *Maternal Request Caesarean*. 2018 [https://birthrights.org.uk/wp-content/uploads/2018/08/Final-Birthrights-MRCS-Report-2108-1.pdf].

27. NHS. *The NHS Long Term Plan.* 2019 [www.longtermplan.nhs.uk/publication/nhs-long-term-plan].

28. Gurol-Urganci I, Bidwell P, Sevdalis N, Silverton L, Novis V, Freeman R, Hellyer A, van der Meulen J, Thakar R. Impact of a quality improvement project to reduce the rate of obstetric anal sphincter injury: a multicentre study with a stepped-wedge design. *BJOG* 2021;128(3):584–592 [www.ncbi.nlm.nih.gov/pmc/articles/PMC7818460].

29. Green L, Knight M, Seeney FM, Hopkinson C, Collins PW, Collis RE, Simpson N, Weeks A, Stanworth SS. The epidemiology and outcomes of women with postpartum haemorrhage requiring massive transfusion with eight or more units of red cells: a national cross-sectional study. *BJOG* 2016;123(13):2164–70.

30. Calvert C, Thomas SL, Ronsmans C, Wagner KS, Adler AJ, Filippi V. Identifying regional variation in the prevalence of postpartum haemorrhage: a systematic review and meta-analysis. *PLoS ONE* 2012;7(7):e41114 [https://doi.org/10.1371/journal.pone.0041114]

31. Wloch C, Wilson J, Lamagni T, Harrington P, Charlett A, Sheridan, E. Risk factors for surgical site infection following caesarean section in England: results from a multicentre cohort study. *BJOG* 2012;119(11):1324–33.

32. Victora CG, Bahl R, Barros AJD, França GVA, Horton S, Krasevec J, Murch S, Sankar MJ, Walker N, Rollins NC, Lancet Breastfeeding Series Group. Breastfeeding in the 21st century: epidemiology, mechanisms, and lifelong effect. *Lancet* 2016;387(10017):475–90.

33. Robertson A, on behalf of the World Health Organization. *Breastfeeding Initiation at Birth Can Help Reduce Health Inequalities.* 2006 [www.euro.who.int/__data/assets/pdf_file/0005/277736/Breastfeeding-initiation-at-birth-can-help-reduce-health-inequalities.pdf].

34. Royal College Paediatrics and Child Health. *Breastfeeding in the UK – position statement*. 2017 [www.rcpch.ac.uk/resources/breastfeeding-uk-position-statement].

35. The Scottish Government. *Improving Maternal and Infant Nutrition: A Framework for Action*. Edinburgh; 2011 [www.gov.scot/publications/improving-maternal-infant-nutrition-framework-action].

36. Unicef UK. *Guide to the Unicef UK Baby Friendly Initiative Standards.* 2017 [www.unicef.org.uk/babyfriendly/baby-friendly-resources/implementing-standards-resources/guide-to-the-standards].

37. NHS Digital. *Maternity Services Data Set (MSDS) Technical Guidance.* 2017 [https://digital.nhs.uk/data-and-information/data-collections-and-data-sets/data-sets/maternity-services-data-set/archived-guidance-documents].

38. NHS Digital. *Maternity Services Data Set User Guidance*. 2017. [https://digital.nhs.uk/data-and-information/data-collections-and-data-sets/data-sets/maternity-services-data-set/archived-guidance-documents].

39. NHS Digital. *Maternity Services Data Set (MSDS) Data Model v1.5*. 2015. [https://digital.nhs.uk/data-and-information/data-collections-and-data-sets/data-sets/maternity-services-data-set/archived-guidance-documents].

40. NHS Digital. *NHS Maternity Statistics 2017-18.* 2018 [https://files.digital.nhs.uk/C3/47466E/hosp-epis-stat-mat-summary-report 2017-18.pdf].

41. Office for National Statistics. *Birth Characteristics 2017*. 2019 [www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/livebirths/datasets/birthcharacteristicsinenglandandwales].
42. Office for National Statistics. *Births in England and Wales: summary tables 2017*. 2019 [www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/livebirths/datasets/birthsummarytables]
43. NHS England. *NHS England Maternity Transformation Programme*. 2019 [www.england.nhs.uk/mat-transformation]