National Maternity and Perinatal Audit

Clinical report 2017

Based on births in NHS maternity services
between 1st April 2015 and 31st March 2016

LONDON SCHOOL of HYGIENE &TROPICAL MEDICINE

RCPCH Royal College of Paediatrics and Child Health
Leading the way in Children's Health

THE ROYAL COLLEGE OF MIDWIVES

Royal College of Obstetricians & Gynaecologists

HQIP Healthcare Quality Improvement Partnership

National Maternity and Perinatal Audit

Clinical report 2017

Based on births in NHS maternity services
between 1st April 2015 and 31st March 2016

Some of the figures in this report are in the process of being updated.
A revised version will be issued in early 2018.
Further information is available at:
http://www.maternityaudit.org.uk/Audit/Charting/Clinical

The National Maternity and Perinatal Audit is led by the Royal College of Obstetricians and Gynaecologists (RCOG) in partnership with the Royal College of Midwives (RCM), the Royal College of Paediatrics and Child Health (RCPCH) and the London School of Hygiene and Tropical Medicine (LSHTM)

This report was prepared by the NMPA project team:

Ms Andrea Blotkamp, NMPA Clinical Fellow (Midwifery)
Dr Fran Carroll, NMPA Research Fellow
Dr David Cromwell, NMPA Senior Methodological Advisor
Dr Ipek Gurol-Urganci, NMPA Senior Methodological Advisor
Dr Tina Harris, NMPA Senior Clinical Lead (Midwifery)
Dr Jane Hawdon, NMPA Senior Clinical Lead (Neonatology)
Dr Jen Jardine, NMPA Clinical Fellow (Obstetrics)
Ms Hannah Knight, NMPA Audit Lead
Dr Lindsey Macdougall, NMPA Data Manager
Ms Natalie Moitt, NMPA Statistician
Dr Dharmintra Pasupathy, NMPA Senior Clinical Lead (Obstetrics)
Prof Jan van der Meulen, NMPA Senior Methodologist (Chair)

Please cite as:

NMPA Project Team. National Maternity and Perinatal Audit: Clinical Report 2017.
RCOG London, 2017.

Contents

Tables and figures

Tables

Figures

Acknowledgements

We are very grateful to the midwives, doctors, maternity support workers, ward clerks, coders and data analysts who enter data into electronic maternity and patient systems on a daily basis. We are also grateful to all NHS trusts in England who submitted data directly to us for this project; the 96% submission rate is testament to the maternity services' commitment to improvement. In addition, we would like to thank the national data providers: the Information Services Division in Scotland, the National Welsh Informatics Service and NHS Digital for their help in supplying and linking the data. We would also like to thank maternity system suppliers for assisting trusts with extracting data in England.

The development of the NMPA measures and the drafting of this report owe much to the advice of the members of the NMPA Women and Families Involvement Group and the NMPA Clinical Reference Group (see Appendix 1). We are also grateful to the National Perinatal Epidemiology Unit for their scoping exercise prior to the commissioning of the audit, and to the Lindsay Stewart Centre at the Royal College of Obstetricians and Gynaecologists for their pilot work on the Maternity Indicators project.

Finally, we would like to thank again our colleagues who enter data about the women and babies they care for, often going above and beyond the time and tasks officially required. It is our hope that the use of these data on a national scale underscores their importance, and is of use in improving the care and outcomes for women and their babies.

The NMPA project team and board

Foreword

Some 700,000 babies are born each year in Britain and every birth is a unique experience for the mother, her family and her care providers. Pregnant women rightly expect to receive the highest standard of maternity care and that the risk of complications for themselves and their babies is minimised wherever they choose to give birth. In these challenging times for the NHS, understanding where variation in care and outcomes exists and what this variation means is more necessary than ever before, if the quality and safety of maternity services and the experience of mothers are to be improved.

Some variation is to be expected, but unwarranted variation requires investigation. We are therefore proud to introduce this first clinical report of the National Maternity and Perinatal Audit (NMPA), a ground-breaking collaboration between three Royal Colleges and the London School of Hygiene and Tropical Medicine. The audit, the largest of its kind in the world, presents a comprehensive overview of the state of maternity care across Britain. It has been developed using electronic data which midwives, doctors, other healthcare professionals and informatics departments enter as part of their everyday practice.

This audit makes it possible for the first time to compare the care that maternity units provide to women across England, Scotland and Wales. The publication of an interactive website makes accessing these results easy. The report clearly identifies priorities for improvement, where unexplained variation in outcomes for women and babies exists. It also identifies good practice, and detects gaps in policy and guidelines. Increasing pressures on the service from societal and behavioural factors are also highlighted, which have implications for outcomes, policy and service provision.

We are aware that this report comes at a time when there is national attention on maternity services. The recent government reviews, political change, and digital transformation present a strong opportunity to improve maternity services and we welcome the commitments already made to address quality, safety and experience. In order to maximise impact and improve outcomes for women and babies, collaborative working must be facilitated across the clinical, academic and advocacy communities.

Stretched and understaffed services adversely affect the quality of care provided to mothers and babies. This audit emphasises the need for more investment in maternity services. When stretched as they are at present, the ability of staff to record data accurately and in a timely manner is also compromised, and morale falls. We therefore urge the UK governments to address the serious staffing and capacity issues without further delay.

Every maternity unit in Britain has participated in the NMPA, demonstrating a clear commitment to quality improvement. It is our hope and intention that they, supported by regulators and commissioners, will now consider and review these results and use them to develop their services. This will enable the best possible care to be delivered to women and their babies. All three of our Royal Colleges are committed to working together to implement the changes required to achieve sustainable improvement.

We offer our personal thanks to everyone involved in the NMPA, whose collaborative efforts are helping make this initiative a success.

Lesley Regan, President of the Royal College of Obstetricians and Gynaecologists
Gill Walton, Chief Executive of the Royal College of Midwives
Neena Modi, President of the Royal College of Paediatrics and Child Health

Every day, women in Britain make decisions about where and how to give birth. These decisions are supported by information from clinicians, from friends and family, and increasingly by information found online.

In order for women to make the best decisions for themselves and their families, it's essential that we have access to clear, up to date and accurate information about events around childbirth. This report, and its associated website, represents a fantastic leap forward in availability of such information. By giving women and their families direct access to this, we can empower them to ask questions of those who deliver, commission and plan services; to make choices about their place of birth; and to demand improvement.

It is only by working together that we will achieve services that safely deliver excellent maternity care that meets the needs of all women and their families. This project enables women to be equal partners with those delivering their care; I am proud to be a part of it.

Victoria Stakelum, Chair of the NMPA Clinical Reference Group and RCOG Women's Network Member

Executive summary

Introduction

The National Maternity and Perinatal Audit (NMPA) is a national audit of the NHS maternity services across England, Scotland and Wales, commissioned in July 2016 by the Healthcare Quality Improvement Partnership (HQIP) on behalf of NHS England, the Welsh Government and the Health Department of the Scottish Government. The NMPA is led by the Royal College of Obstetricians and Gynaecologists (RCOG) in partnership with the Royal College of Midwives (RCM), the Royal College of Paediatrics and Child Health (RCPCH) and the London School of Hygiene and Tropical Medicine (LSHTM).

The overarching aim of the NMPA is to produce high-quality information about NHS maternity and neonatal services which can be used by providers, commissioners and users of the services to benchmark against national standards and recommendations where these exist, and to identify good practice and areas for improvement in the care of women and babies. The NMPA consists of three separate but related elements:

- an organisational survey of maternity and neonatal care in England, Scotland and Wales providing an up-to-date overview of care provision, and services and options available to women
- a continuous clinical audit of a number of key measures to identify unexpected variation between service providers or regions
- a programme of periodic 'sprint' audits on specific topics

The NMPA measures a range of care processes and outcomes and provides these data to maternity providers to facilitate quality improvement. Not all measures are accompanied by a national standard or acceptable ranges, and the NMPA does not limit its set of audit measures to only those that have 'auditable standards'. Very few such standards exist in maternity that can be measured via a national audit.

The purpose of the continuous audit is to:

- stimulate thought among healthcare professionals, managers, commissioners and policy-makers
- lead people to ask challenging questions and discuss and reflect locally, regionally and nationally
- allow maternity services and commissioners to identify priority areas for improving outcomes and productivity.

Methods

The analysis in this report is based on data about 696,738 births in NHS maternity services in England, Scotland and Wales between 1st April 2015 and 31st March 2016. We used a different approach to data collection in each home nation, reflecting the status and maturity of centralised national maternity datasets:

- In Scotland, the data used for this report comprised an extract of Scottish Morbidity Record 02 (SMR02) records linked with the Scottish Birth Record and Scottish Morbidity Record 01 (SMR01).

- In Wales, an extract of the new Maternity Indicators data set (MIds) was linked at record level with Admitted Patient Care (APC) records from the Patient Episode Database for Wales (PEDW).
- In England, the NMPA requested an extract from each trust's individual electronic maternity information system. This was recoded internally and linked at record level to Hospital Episode Statistics (HES) inpatient records to allow longitudinal follow-up of mothers and babies.

The project is estimated to have captured 92% of births in England, Scotland and Wales during the time period, based on comparisons with hospital administrative and birth registration data for the reporting period.

The measures in this report were arrived at using an iterative process with consultation from external stakeholders through a Clinical Reference Group and members of the public through our Women and Families Involvement Group. They were evaluated for feasibility, data quality and statistical power, given the data that the NMPA has been able to collect and access in its first year.

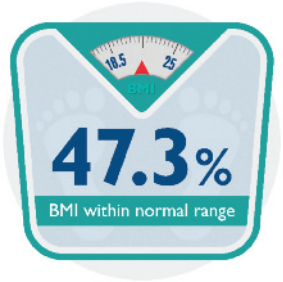
In order to compare like with like, the majority of measures are restricted to singleton, term births. We plan to analyse a set of key measures for preterm and multiple births and to publish this separately. As a general principle, the denominator for each measure is restricted to women or babies to whom the outcome or intervention of interest is applicable. For example, the measure of the 'proportion of women with a third or fourth degree tear' is restricted to women who gave birth vaginally. Rates of measures are also adjusted for risk factors which are beyond the control of the maternity service, such as age, ethnicity, level of socio-economic deprivation and clinical risk factors that may explain variation in results between organisations.

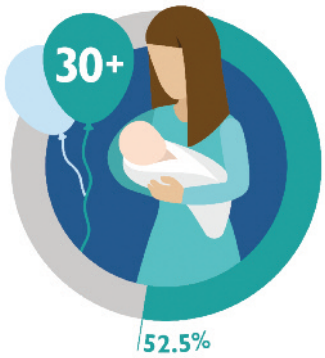
Data in this report are presented at site level, which is currently the lowest level of granularity the NMPA is able to report at.

Key messages

Clinical findings

Fewer than half of pregnant women (47.3%) have a body mass index within the normal range (BMI between 18.5 and 25) and 21.3% have a booking BMI of 30 or over. The high level of maternal obesity has implications for maternity and neonatal service provision.

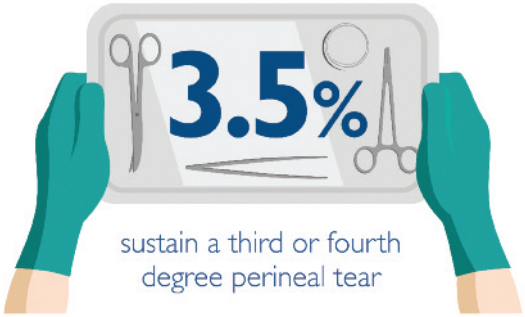




Overall, 52.5% of women giving birth are aged 30 or over and in England and Scotland, at 2.7%, the proportion of women having their first baby at the age of 40 or over is higher than the proportion having their first baby before age 18. Increasing maternal age has implications for clinical outcomes and maternity service provision.

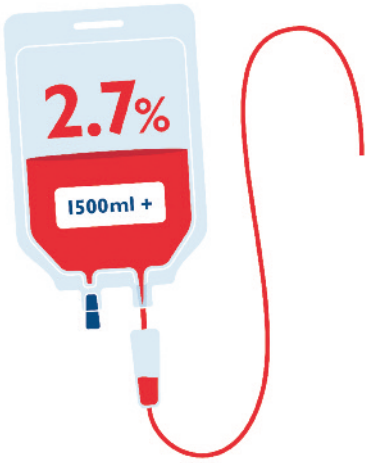
Increasing access to midwife-led birth settings is a national priority and although the majority of obstetric units are co-located with an alongside midwifery unit in England, only around 13% of women give birth in a midwife-led setting.

Allowing for data quality issues, there is extremely wide variation in the proportion of women who quit smoking during pregnancy, which is not related to the number of births in a site or trust.



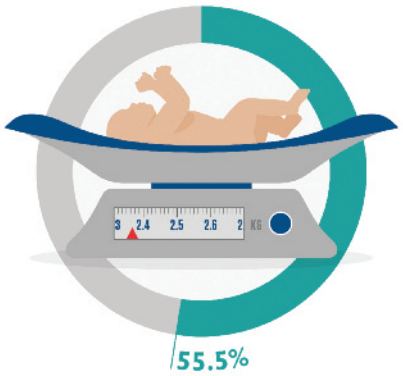
Among women giving birth vaginally to a singleton, term baby, 3.5% sustain a third or fourth degree perineal tear, which can give rise to long term continence problems. The proportion of women affected varies from 0.6% to 6.5% between maternity services, even after adjustment for case mix.

2.7% of women giving birth to a singleton, term baby in England and Wales have a haemorrhage of 1500ml or more. The proportion of this varies between maternity services, from 1.1% to 5.6%, even after case mix adjustment. Obstetric haemorrhage is associated with risk of maternal illness and death.



1.2% of babies born at term in Britain have an Apgar score of less than 7 at five minutes of age, which is associated with short and long term morbidity. This proportion varies between maternity services, from 0.3% to 3.5%, despite adjustment for case mix.

Over half of all babies born small for gestational age (below the 10th centile) at term are born after their due date. This would suggest that these babies are currently not identified by local or national guidelines in use. Better identification of these babies has the potential to reduce stillbirth and severe neonatal complications.



28.7% of women having an elective delivery at 37 or 38 weeks gestation currently have no documented clinical indication; this rate is higher in Wales and Scotland than in England. Delivery in the early term period increases the risk of illness for the baby.

Although some services achieve high rates, there is extremely wide variation in the proportion of babies receiving skin to skin contact within the first hour after birth, which has been shown to improve the rates of women starting and continuing to breastfeed, and in the proportion of babies receiving breast milk for their first feed.

Data quality

- There is a discrepancy in the amount of information available in the routinely collected maternity datasets, both within and between countries. This means that currently not all NMPA measures can be derived for all sites.
- Where electronic maternity data are available, we have demonstrated that local collection of high quality data is achievable but that at present data quality is highly variable between sites, especially in England. This is despite the requirement from 1st November 2014 for English maternity systems to be fully compliant with the Maternity Services Data Set standard, and requires urgent attention. Data quality and completeness also varies between Welsh boards, whilst Scotland has high levels of consistency.
- Some key data items such as gestational age, birth weight and mode of birth are highly complete across maternity services. However, the completeness of other key data items including labour onset, augmentation, fetal presentation, and anaesthesia/analgesia in labour is highly variable between services and needs to improve. This means that some important measures are not currently possible for the NMPA to report.
- Electronic data collection is currently focused on booking and the period of labour and birth. The lack of information recorded during pregnancy and after the birth impedes the interpretation of labour events and the evaluation of care during pregnancy and the postnatal period.

Recommendations

Recommendations for individual clinicians

- Clinicians involved in maternity care should, in multidisciplinary teams, familiarise themselves with the findings for their own service and how these compare to national averages in order to determine the focus of quality improvement activity required.
- Clinicians should make every possible effort for all babies to have skin to skin contact with their mothers within one hour of birth, where the condition of mother and baby allows. For babies who are to be admitted to a neonatal unit, all efforts should be made to offer skin to skin contact prior to transfer of the baby where the baby's clinical condition allows.
- All clinicians involved in maternity and neonatal care should take ownership of the completeness and accuracy of the electronic recording of the care they provide. This includes influencing local purchasing decisions to ensure that software systems are appropriate for use and compliant with data standards.
- Clinicians should record maternal smoking status, both at booking and at the end of pregnancy.

Recommendations for services

- Services should examine their own findings and data quality and compare these to internal audits where available, both to evaluate their data quality and to consider how they compare with national rates, and to determine action plans for quality improvement.
- Results for individual measures should not be interpreted in isolation. Rather, services should examine all measures together, attempting to understand possible relationships between them, and use this analysis to improve services as a whole, not just to one particular target. Measures in this report should also be considered together with perinatal mortality results from MBRRACE and measures of neonatal care from the National Neonatal Audit Programme (NNAP).
- Where the rate for a service differs substantially from the overall rates, the service should identify reasons for this. This includes rates that appear to be 'positive' outliers as this may be due to under-diagnosis or data quality issues. Where true positive outliers are identified, services should consider ways of sharing best practice with their peers and with the NMPA so that these can be shared with other services.
- Services should ensure that local information about the rates of care processes and outcomes in labour is made available to women using their services.
- Audit departments should facilitate dissemination of these findings among all relevant staff and services and commissioners should share and discuss the findings as part of their Maternity Voices Partnerships (formerly Maternity Services Liaison Committees).
- Further work is needed to understand the potential for increased use of midwife-led settings. This includes gaining a better understanding of the proportion of women considered suitable to use these settings and the criteria applied by different services through local review by providers and commissioners, inclusion of relevant questions in national surveys of women, and further research.

- Maternity services, commissioners, GPs and local authorities should work together to support women to achieve and maintain a healthy weight before, during and after pregnancy.
- Services should engage with national initiatives aimed at identifying babies that are small for gestational age (the Saving Babies' Lives care bundle in England and the Scottish Patient Safety Collaborative) in order to enable appropriate care for mothers carrying small for gestational age babies.
- Services should conduct an internal audit of their elective deliveries prior to 39 weeks without recorded clinical indication. This should aim to identify whether improvements in clinical practice or documentation, or both, are required to ensure that elective delivery before 39 weeks only occurs with appropriately documented clinical indication.
- Several key NMPA data items are not currently routinely captured by all services, including blood loss, labour onset, fetal presentation, and the use of anaesthesia and analgesia in labour. Maternity services should aim to enter complete data for all key data items and ensure that standard coding definitions are followed to improve consistency.
- Services should ensure they have systems in place for data entry and hold regular training and data quality assurance exercises.
- When procuring maternity IT systems, maternity services should take into account the need for ongoing support from system suppliers for operational use and meeting national data submission requirements.

Recommendations for commissioners

- Commissioners should facilitate the dissemination of these results to GPs and local authorities.
- When planning services, commissioners together with policymakers and providers should take into account local demographics, including the increasing age and BMI of women giving birth.
- Commissioners, in collaboration with public health departments and services, should examine the rates of women who stop smoking during pregnancy and consider initiatives to increase this.
- Commissioners, together with clinicians, services and policymakers should strongly prioritise the provision of resources to support breastfeeding, both in maternity units and in the community, to reduce the variation in the proportion of babies receiving breast milk at their first feed and at discharge from the maternity unit.
- Commissioners should support services to collect information on planned and actual place of birth, distinguishing between obstetric units, alongside midwifery units, freestanding midwifery units and home, and to collect information on transfers in utero, and during labour and the postnatal period.
- Commissioners should hold providers to account on data quality performance.
- Allocation of sufficient staff and financial resource is required to ensure high quality electronic maternity data. Funding for maternity services should include provision for sufficient staff time to enter data and check quality, and to maintain adequate hardware and software.

Recommendations for system suppliers

- Software providers of maternity information systems should continue to develop solutions to allow users to review data quality. They should design systems that support users to enter accurate and complete data which are easily retrieved for care provision and reporting.
- System configurations currently support at best the entry of electronic information at booking and at birth, leading to a paucity of information about changes during pregnancy and postnatal care. This has significant implications for measurement of outcomes and care of interest to women, clinicians, commissioners and policymakers. System suppliers should therefore develop and implement solutions to support the collection of information during and after pregnancy, such as electronic hand held records.

Recommendations for national organisations, professional bodies and policymakers

- Professional bodies and policymakers should establish tools for investigating and reducing unwarranted variation.
- National bodies should develop initiatives to assist clinicians to effectively predict, prevent and recognise severe obstetric haemorrhage.
- National bodies should look to develop self-reported outcome and experience measures for women using maternity services to complement the set of NMPA measures.
- National organisations responsible for collating and managing maternity datasets should review current specifications and consider whether these are fit for purpose or need revising in light of evolving national priorities, including more information on antenatal and postnatal care for women and on outcomes for babies.
- National organisations responsible for collating and managing maternity datasets should continue efforts to report data quality concerns back to services which repeatedly submit poor quality data and provide support to help them improve their data collection systems. Both information professionals and clinical teams should be informed and encouraged to work together to find solutions to local challenges.

Conclusion

This first set of NMPA measures show that, while the information held on maternity information systems is variable in quality, it can be used to make meaningful observations about maternity care within and between countries in Britain. This 'balanced scorecard' of measures allows women, clinicians, commissioners and policymakers to evaluate care given locally and nationally in order to facilitate improvement. This report therefore provides a starting point for reflection as well as measurement of care. We would urge individual sites to take these results and examine their own rates and their accuracy in recording the care and outcomes for women and babies using their services.

Abbreviations and glossary

Amniotic fluid – fluid surrounding the baby

Apgar score – a five component score that is used to summarise the health of a newborn baby, typically at 1, 5 and 10 minutes of age

AMU – 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

ATAIN – Avoiding Term Admissions Into Neonatal units, a national project

BMI – Body Mass Index, defined as the individuals' weight in kilograms divided by their height in metres squared

Case mix – the demographic characteristics and state of health of the people using a particular health service

Cephalic (cephalic presentation) – where the fetus is positioned with its head down

CQC – Care Quality Commission, responsible for inspecting healthcare services

Elective caesarean section – planned caesarean section before labour onset

Emergency caesarean section – unplanned caesarean section (prior to, or during labour)

Episiotomy – a cut through the vaginal muscle and skin to facilitate birth of the baby

FMU – 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

Fundal height – a measurement of the distance from the symphysis pubis in the pelvis to the fundus of the uterus; used to indicate growth of the baby in pregnancy

HES – Hospital Episode Statistics, a dataset containing information about individuals admitted to NHS hospitals in England

HQIP – Healthcare Quality Improvement Partnership

Instrumental birth – birth with the assistance of either a ventouse cup or forceps

Intrapartum – during labour and birth

In utero transfer – the transfer of a pregnant mother from one unit to another, in order to ensure the right level of care for her baby or babies after birth

Index of Multiple Deprivation (IMD) – a within-country measure of socioeconomic status

Local Maternity System (LMS) – England only: collaboration between maternity service providers, commissioners and users to implement the national maternity review recommendations. This is the maternity element of the local Sustainability and Transformation Plan (STP; joint proposals by NHS organisations and local councils in 44 areas covering all of England to make sustainable improvements to health and care built around the needs of the local population)

LNU – local neonatal unit. LNUs provide all categories of neonatal care for their own catchment population, but they transfer babies who require complex or longer-term intensive care to a NICU. LNUs may receive transfers from other neonatal services in the network

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

Miscarriage – the spontaneous loss of a pregnancy before 24 weeks of gestation

MSDS – Maternity Services Data Set, managed by NHS Digital. This gathers data about pregnancy and birth from maternity healthcare providers in England

NHSE – NHS England

NHS board/health board – in Scotland and Wales, NHS services are provided by 14 NHS boards and 7 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)

NICE – National Institute for Health and Care Excellence

NICU – neonatal intensive care unit. NICUs provide the whole range of medical neonatal care for their local population, along with additional care for babies and their families referred from the neonatal network. NICUs may be co-located with neonatal surgery services and other specialised services

NMPA – National Maternity and Perinatal Audit

NNAP – National Neonatal Audit Programme

NWIS – NHS Wales Informatics Service

Obstetric haemorrhage – heavy bleeding from the genital tract before, during, or after birth

OU – 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 women at low risk of complications, while obstetricians have primary responsibility for women 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

PEDW – Patient Episode Database for Wales, a dataset which records all inpatient and day case activity in NHS hospitals in Wales, managed by the NHS Wales Informatics Service (NWIS)

Perinatal – related to events around the time of birth; may be used in general or in relation to pregnant women and new mothers, as in perinatal mental health, or to unborn and newborn babies, as in perinatal mortality and in the National Maternity and Perinatal Audit

Placental abruption – a pregnancy complication in which the placenta partially or completely separates from the wall of the uterus, usually necessitating immediate caesarean delivery

Placenta praevia – a pregnancy complication in which the placenta implants low in the uterus, necessitating delivery by caesarean section. This can lead to severe bleeding

Plurality – the number of babies a woman is expecting in this pregnancy

Postnatal – after the birth

Pre-eclampsia – a pregnancy complication which is characterised by high blood pressure, protein in the urine and oedema (fluid retention) and can lead to poor outcomes for both mothers and babies

Preterm birth – birth of a baby before 37^{+0} weeks gestation

RCM – Royal College of Midwives

RCOG – Royal College of Obstetricians and Gynaecologists

RCPCH – Royal College of Paediatrics and Child Health

SBR – Scottish Birth Record, a dataset recording all births in Scotland, managed by the Information Services Division

SCBU – special care baby unit. SCBUs provide special care for their own local population and may also provide some high dependency services. In addition, SCBUs provide a stabilisation facility for babies who need to be transferred to a NICU or LNU for intensive or high dependency care, and they also receive transfers from other units for continuing special care

SMR-01 – Scottish Morbidity Record 1. A dataset containing information about general/acute inpatient and day case admissions in Scotland, managed by the Information Services Division in Scotland

SMR-02 – Scottish Morbidity Record 2. A dataset containing information about maternity inpatient and day case admissions in Scotland, managed by the Information Services Division in Scotland

Stillbirth – the birth of a baby without signs of life at or after 24 weeks of gestation

Third and fourth degree tear – a tear from childbirth that extends into the anal sphincter (third degree tear) or mucosa (fourth degree tear)

Ventouse – an instrument to assist vaginal birth using a vacuum cup applied to the baby's head

VBAC – vaginal birth after a previous caesarean birth

Introduction

The National Maternity and Perinatal Audit

The National Maternity and Perinatal Audit (NMPA) is a national audit of NHS maternity services across England, Scotland and Wales.[i] It was commissioned in July 2016 by the Healthcare Quality Improvement Partnership (HQIP)[ii] as one of the National Clinical Audit and Patient Outcomes Programmes on behalf of NHS England, the Welsh Government and the Health Department of the Scottish Government.

The NMPA is led by the Royal College of Obstetricians and Gynaecologists (RCOG) in partnership with the Royal College of Midwives (RCM), the Royal College of Paediatrics and Child Health (RCPCH) and the London School of Hygiene and Tropical Medicine (LSHTM).

The overarching aim of the NMPA is to produce high-quality information about NHS maternity and neonatal services which can be used by providers, commissioners and users of the services to benchmark against national standards and recommendations where these exist, and to identify good practice and areas for improvement in the care of women and babies. The NMPA consists of three separate but related elements:

- an organisational survey of maternity and neonatal care in England, Scotland and Wales providing an up-to-date overview of care provision, and services and options available to women
- a continuous clinical audit of a number of key measures to identify unexpected variation between service providers or regions
- a programme of periodic 'sprint' audits on specific topics

Some NMPA themes overlap with those of other national programmes, such as the National Neonatal Audit Programme, MBRRACE-UK (Mothers and Babies: Reducing Risk through Audits and Confidential Enquiries across the UK) and the National Pregnancy in Diabetes Audit. Where this is the case, discussion takes place to avoid duplication and to explore collaboration to enhance the value of each programme.

Why was the NMPA commissioned?

Following transfer of the responsibility for the National Clinical Audit and Patient Outcomes Programme (NCAPOP) from the Department of Health to NHS England (NHSE) on the 1st April 2013, NHSE confirmed its commitment to continue the expansion of the NCAPOP programme to support the requirements of the NHS Outcomes Framework. Maternity and perinatal care was identified as an area

i Northern Ireland are not currently participating in the audit.

ii HQIP is led by a consortium of the Academy of Medical Royal Colleges, the Royal College of Nursing and National Voices. Its aim is to promote quality improvement, and in particular to increase the impact that clinical audit has on healthcare quality in England and Wales. HQIP holds the contract to manage and develop the National Clinical Audit and Patient Outcomes Programme, comprising more than 30 clinical audits that cover care provided to people with a wide range of medical, surgical and mental health conditions. The programme is funded by NHS England, the Welsh Government and, with some individual audits, also funded by the Health Department of the Scottish Government, DHSSPS Northern Ireland and the Channel Islands (www.hqip.org.uk).

for which there was no national audit covering the whole pathway for all women and babies, and thus became a priority area.

Maternity and perinatal care represents a complex pathway experienced by almost 750,000 women and babies each year in England, Scotland and Wales. The majority of women giving birth in the UK receive a safe and effective service. However, the stillbirth rate is higher in the UK than in many other European countries.[1] There is also evidence of substantial variation in maternity care and outcomes among hospitals, as well as between women from different socio-economic and ethnic backgrounds.[2] To address these issues, we need to have robust information that allows clinicians, NHS managers, policy makers and women themselves to examine the extent to which current practice meets the national guidelines and standards, and to compare maternity services and their maternal and neonatal outcomes.

The overall aims of the continuous clinical audit

The overarching aim of the NMPA continuous clinical audit is to produce a framework for monitoring care and outcomes in NHS maternity services in Britain. The main objectives are:

- to develop a comprehensive set of clinically meaningful and technically robust audit measures that cover the maternity and perinatal pathway and can be used for performance assessment and quality improvement
- to describe variation between providers for key measures, highlighting good practice and areas for improvement
- to develop an interactive web-based system providing timely feedback to maternity providers, commissioners and women. This will allow the comparison of their services as well as maternal and neonatal outcomes against national and regional figures to inform local quality improvement initiatives
- to monitor changes over time

The NMPA measures a range of outcomes and provides these data to maternity services to support quality improvement. The NMPA does not limit its set of audit measures to only those that have 'auditable standards'. Very few standards exist in maternity care which can be measured via a national audit. In the current absence of clear standards defining 'acceptable ranges' for rates of common interventions such as caesarean section and induction, maternity services will benefit from being able to consider their patterns of care using a wider set of performance measures. Maternity care is complex, therefore focusing on a small number of measures would inappropriately ignore some strong associations between the range of maternity care events and outcomes.

We hope that a wider set of measures will allow maternity services to compare their antenatal, intrapartum and postnatal care patterns, and prompt services to reflect on variation, acting if appropriate, even in the absence of national standards. Further analyses aiming to identify determinants of variation in maternity services will also provide explicit guidance for quality improvement initiatives. This may contribute to the future development of appropriate standards and 'acceptable ranges'.

The purpose of the continuous audit is to:

- stimulate thought among healthcare professionals, managers, commissioners and policy-makers
- lead people to ask challenging questions and discuss and reflect locally, regionally and nationally
- enable maternity services and commissioners to identify priority areas for improving outcomes and productivity

The first step is for local services to understand their own results in context so they can focus on reducing variation, further improving safety and ensuring their services meet the needs of women and their families. This would be a lasting response to the challenges currently faced by maternity services, as highlighted by our recent organisational survey report[3] amid the ongoing reconfiguration of NHS maternity care.

What does this report cover?

Following the publication of the organisational report in August 2017, this report presents a series of 16 measures of maternity and perinatal care in English, Welsh and Scottish hospitals based on births in NHS services between 1st April 2015 and 31st March 2016. Measures were selected for inclusion in the report on the basis of explicit evaluation criteria (p.26). In addition to the clinical measures, the report also provides contextual information describing the characteristics of women and babies cared for by NHS maternity services during this time period.

The trusts and boards included in the NMPA provide intrapartum maternity care on one or more sites, and this report presents aggregated results by site. Results are reported at other organisational levels (trust/board, region/Local Maternity System and country) on the NMPA website http://www.maternityaudit.org.uk/pages/continuousaudit. The website allows services to benchmark themselves against other services or national averages. Further site-specific information is available on the website's organisational survey reporting pages, which may help users to identify possible organisational factors influencing variation between units: http://www.maternityaudit.org.uk/Audit/Charting/Organisational.

Methods

The analysis in this report is based on births in NHS maternity services in England, Scotland and Wales between 1st April 2015 and 31st March 2016. Data from 149 of 155 trusts and boards that provide on-site intrapartum care have been included.

The NMPA approach to data collection

The NMPA differs from many other NCAPOP audits in that it brings together available data sources (i.e. those that are already collected either for clinical or hospital administrative purposes) rather than collecting primary data to create a bespoke audit dataset. By using existing datasets and linking these together, we aim to minimise – if not eliminate – the burden on clinical staff of data collection for the sole purpose of the NMPA.

A recent systematic review found that broader adoption of routine data linkage of databases could yield substantial gains for perinatal health research and surveillance.[4] The NMPA aims to be at the forefront of developing and benefitting from methodological and technological developments related to the linkage of perinatal databases.

The secondary use of linked, routinely collected datasets has many other advantages for national audits, including near universal coverage which minimises selection bias. The financial and time costs of accessing these data are also relatively low compared to conducting primary data collection. Additionally, hospital administrative datasets are able to capture multiple procedures and diagnoses at an individual record level, and so provide a rich description of patient case mix.

However, routine datasets also present challenges for national audits compared with primary data collection, including a lack of detailed time-point data, a lack of user experience measures, and varying data completeness and coding practices between services.

Nonetheless, given that nearly 750,000 births take place in Britain each year and are eligible for inclusion in the NMPA, an approach that ensures that the large quantities of maternity and perinatal data already being captured electronically by the majority of NHS maternity units are used for national audit is highly advantageous. Such an approach adheres to the principle of 'collect once, use many times' advocated by national data collection strategies. We hope that by using these datasets for national audit and feeding back results to trusts and boards, the NMPA will help to drive up the quality of the data contained within them year on year.

Data sources used by the NMPA

We used a different approach to obtaining data in each home nation, reflecting the different status and maturity of centralised national maternity datasets.

Scotland

Scotland's national maternity data collection system has been established the longest of the three countries. The Scottish Morbidity Record 02 (SMR02), submitted by maternity units to the Information

Services Division Scotland since 1975, collects information on clinical and demographic characteristics and outcomes for all women admitted as inpatients or day cases to Scottish maternity units.[5] The register is subjected to regular quality assurance checks and since the late 1970s has been more than 99% complete. The extract used for this report comprised SMR02 records linked with the Scottish Birth Record[6] and Scottish Morbidity Record 01 (SMR01).[7]

Wales

In Wales, a new Maternity Indicators data set (MIds) was established in 2016 with the aim of providing data to populate a set of maternity indicators which were derived to monitor and develop the maternity services in Wales.[8] The MIds captures a selected subset of data items from the maternity IT systems in Welsh health boards. The dataset is managed by NHS Wales Informatics Service (NWIS) which provided an extract of antenatal and delivery data from the first year of MIds data to the NMPA for the purposes of this report. These data were then linked at record level with Admitted Patient Care (APC) records from the Patient Episode Database for Wales (PEDW).[9]

England

In England, a new Maternity Services Data Set (MSDS), managed by NHS Digital, has been developed to provide a data source that can inform how the quality of maternity services can be improved in the English NHS. There has been a national requirement for English NHS trusts to contribute to the MSDS for women booking their antenatal care from April 2015. However, only around half of the women who gave birth between 1st April 2015 and 31st March 2016 are included in the MSDS as they booked before April 2015. Furthermore, whilst MSDS submission rates have been steadily improving in recent months, the dataset is not yet sufficiently complete to be used as a data source for a national audit. NHS Digital are undertaking a number of activities to improve the completeness of the MSDS and publish monthly data quality results and experimental statistics.[10] The English data used in this report have therefore been obtained using an interim approach, with a view to switching to the MSDS as the primary source of data once this dataset becomes sufficiently populated.

The vast majority of trusts in England with a maternity service use an electronic maternity information system (MIS) to capture detailed demographic and clinical information related to each pregnancy and birth under their care. These databases typically cover antenatal booking through to birth and immediate postnatal care, with the data entered by midwives and support staff in the antenatal clinic or labour ward. Although there are 20 different systems in use, each of which collects slightly different information in sometimes different formats, there is sufficient similarity between systems to allow a single dataset to be developed from which comparative measures can be derived.

In December 2016, the NMPA sent all eligible trusts in England a set of instructions and a data extract specification giving the preferred codes to be used for each data item required by the NMPA for eligible births that took place within their service.[11] The specification was based on national code definitions and drew on the MSDS specification as much as possible. If it was not possible for a trust to provide a coded extract, we accepted raw data extracts and re-coded these internally to match the preferred specification. MIS birth records were then linked to Hospital Episode Statistics (HES) inpatient records to allow longitudinal follow-up of mothers and babies (see online Technical Appendix).

Selection of audit measures for the NMPA

The suitability of a measure for inclusion in a national clinical audit depends on a number of explicit criteria: validity, fairness, sufficient statistical power and adequate technical specification. In addition to these criteria, it is also important for a set of audit measures to be *balanced*. In other words, the audit should cover various dimensions of care to give a complete overall picture of the service.

Measures were selected for inclusion in the NMPA continuous clinical audit through an iterative process:

1. A long-list of audit measures was prepared by the NMPA project team between July and November 2016, based on:
   - a pre-tender NMPA development and prioritisation project carried out by the National Perinatal Epidemiology Unit in 2014[12]
   - a review of relevant national standards and guidelines
   - consultation with the NMPA partner Colleges
   - a scoping exercise of currently available record-level datasets related to maternity to determine which measures would be possible to derive
2. The long-list was used as a basis for consultation with the NMPA Clinical Reference Group and Women and Families Involvement Group to determine the validity and usefulness of each measure. This process took place between November 2016 and May 2017 and resulted in a short-list of measures that were deemed clinically relevant and of use to our audience of women and families, clinicians, policymakers, commissioners and stakeholder groups
3. Each short-listed measure was evaluated further by the NMPA project team, taking into account the data the NMPA has been able to collect and access in its first year. The team considered the suitability of a measure in terms of:
   - feasibility and data quality
     i. how well can the population of interest be defined with the available data items?
     ii. how well can the important case mix difference be captured by the available data?
     iii. how well can the procedures or outcomes that define the measure be captured?
   - statistical power
     i. what is the average number of patients within each unit with the procedure or outcome of interest?
     ii. what is the average number of relevant events within each unit?
     iii. what is the chance that a true outlier will be detected (in a unit of average size)?

Sixteen measures met these criteria and are presented in this report. The NMPA has also developed a list of audit measures that are currently aspirational because the necessary data items are not collected in routine datasets. Discussion is taking place with the national organisations responsible for managing maternity datasets to determine whether some of these measures may be collectable on a national basis in future years. In future years it is also possible that some of the measures developed as part of the NMPA sprint audits will become part of the set of continuous audit measures.

Outlier indicators

For the first NMPA report, three measures have been selected as indicators for outlier reporting this year because they met the above evaluation criteria, and furthermore, represent an adverse outcome for women or babies with potential serious or long-term effects. These indicators are:

- proportion of vaginal births with a severe (3rd or 4th degree) perineal tear
- proportion of women with an obstetric haemorrhage of 1500ml or more
- proportion of singleton, term, liveborn babies with a 5-minute Apgar score of less than 7

Case ascertainment

Data on Welsh and Scottish births were provided centrally and case ascertainment was performed by the relevant national organisations. In England, we compared the number of births reported by each trust against the numbers recorded for that trust in:

1 Hospital Episode Statistics 2015/16 financial year data

2 Office for National Statistics 2015 data (latest available at time of publication)

Neither of these data sources is a perfect 'gold standard' against which to measure case ascertainment. We investigated discrepancies where trusts supplied less than 90% of the expected number of births according to either source. Based on these investigations, we excluded three trusts that supplied data for less than 70% of births within the time period. Six trusts supplied data for between 70% and 90% of the expected number of births within the time period; these trusts are included in our analysis.

Table 1: Estimated case ascertainment

Country	Reported to the NMPA		Total registerable births (from official national statistics) (%)
	Women who gave birth in 2015/16	Babies born in 2015/16	
England	602,199	611,959	667,351 (92%)*
Scotland	53,344	54,119	54,485 (99%)
Wales	30,270	30,660	33,437 (92%)*
Overall	**685,813**	**696,738**	**755,273 (92%)**

* Office for National Statistics data on registerable births in the 2015/16 financial year were not available at the time of publication. These figures instead relate to the 2015 calendar year and the case ascertainment rates should therefore be treated as an estimate.

Analysis

Construction of audit measures

The statistics in this report are given as the proportion of events occurring within a group of women or babies. The reference group of women or babies (the denominator) changes between audit measures. 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, the measure of the 'proportion of women with a third or fourth degree tear' is restricted to women who gave birth vaginally.

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. We plan to analyse a set of key measures for preterm and multiple births and to publish this separately.

Case mix adjustment

When presenting figures for individual health service providers, it is often appropriate for audit measures to take into account how similar the patient groups are at each service, and how they differ between services. Clinical and demographic characteristics of women can affect both the demands placed on the maternity service and the outcomes of care. In turn, some women and babies with more complex needs and at higher risk are referred to specialist services. Accounting for risk factors which are outside the control of care providers is essential before fair and meaningful comparisons across services can be performed.

In this report, we control for differences in the case mix between services by adjusting results for case mix using logistic regression models. This model adjusts for risk factors which are beyond the control of the maternity services such as age, ethnicity, level of socio-economic deprivation, and clinical risk factors that may contribute to variation in performance between organisations. Further details, including which case mix factors were used in each model, are given in an online Technical Appendix.

Presentation of data using funnel plots

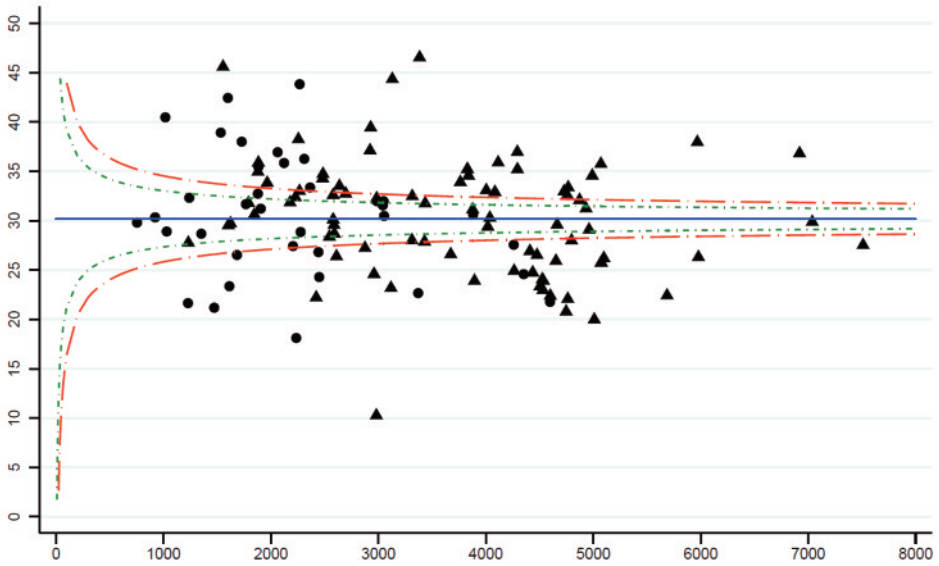
A funnel plot is a graphical method for comparing the performance of organisations.[13] The main advantage of this technique is that it takes the size of each organisation into account. This is important because the amount by which a hospital's indicator value may vary from the national mean is influenced by random fluctuations that are related to the number of births at its maternity unit (figure 1). The control limits within funnel plots highlight how much of the variation between providers exceeds that expected to occur due to chance alone.

In other audit publications, this approach has been used to label providers outside the funnel limits as outliers with 'good' or 'poor' levels of performance. We do not use funnel plots in this way, with the exception of the three NMPA indicators that have been identified for 'outlier reporting' this year. For all other audit measures, it is not our intention to label sites with values beyond the outer control limits as 'outliers'. Instead we use funnel plots only to show where there are substantial systematic (non-random) differences between sites.

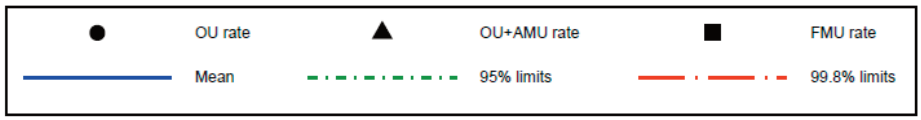
Several of the funnel plots presented in this report show evidence of a phenomenon known as overdispersion.[14] Overdispersion occurs when a greater level of variability among providers is demonstrated than can be explained by chance and the existence of a few outlying units. Important explanations for overdispersion are differences in data quality, the limitations of the risk adjustment methods and 'clinical uncertainty.' This means variation in practice as a result of the absence of clear evidence-based clinical standards and different clinician preferences.

We have attempted to limit the impact of differences in case mix and in data collection and coding practices between sites. However it is likely that some of the systematic variation between hospitals reflects clinical uncertainty. Consequently, for many audit measures we concluded that it would be premature to make speculative conclusions about whether differences in the patterns of maternity care reflect differences in care quality. We hope to be able to be more conclusive as the audit develops.

The **vertical axis** measures the frequency of the outcome, expressed as a percentage. The points higher up are sites with a higher rate of the outcome



The **horizontal axis** represents the denominator, i.e. the relevant population, for example number of births at term. The points further to the right are sites with more births



The **blue horizontal** centre line shows the national mean: in the example above, this is 31 events per 100 deliveries.

The **green lines** constitute the inner funnel limits. These limits define the range of percentages that are within two standard deviations of the national average. One would expect only one in 20 sites to have a percentage that is outside these limits if the observed variation was due to chance alone.

The **red lines** constitute the outer funnel limits. These limits define the range of percentages that are within three standard deviations of the national average. One would expect only one in 500 sites to have a percentage that is outside these limits if the observed variation was due to chance alone.

Figure 1: Interpretation of funnel plots

Levels of reporting

Current configuration of services has resulted in many NHS trusts and boards providing maternity services at more than one site (figure 2).

This report presents aggregated results by site. Hospitals with both an obstetric unit (OU) and an alongside midwifery unit (AMU) are therefore treated as one site. Site is the lowest level of granularity we are currently able to report for the clinical measures, because for most sites with a co-located OU and AMU it is not possible to be absolutely certain whether a woman gave birth in the OU or AMU due to inconsistencies in the way place of birth is recorded and lack of information on transfers in labour. Furthermore, site is a meaningful reporting level for clinicians and maternity service users because reporting aggregated results by trust or board has the effect of masking differences between sites. Results by trust/board, region/Local Maternity System and country are available on the NMPA website and will allow services to benchmark themselves against other services or national averages.

Suppression of small numbers

We are not able to present results where individual women or babies could theoretically become identifiable. Statistical power to detect true differences between sites is also influenced by the number of births occurring at that site. These issues affect the level at which some results can be reported, and particularly affect freestanding midwifery units (FMUs), the majority of which have fewer than 500 births annually. For each measure, any site reporting fewer than 5 births that are eligible to be in the denominator are not reported at site level.

	TOTAL	ENGLAND	SCOTLAND	WALES
TRUST/BOARD	155	134 trusts	14 boards	7 boards
SITE	281 61 OU only 124 OU+AMU 96 FMU only	51 OU only 106 OU+AMU 63 FMU only	10 OU only 6 OU+AMU 19 FMU only	0 OU only 12 OU+AMU 14 FMU only
MATERNITY UNIT	405 185 OUs 124 AMUs 96 FMUs	157 OUs 106 AMUs 63 FMUs	16 OUs 6 AMUs 19 FMUs	12 OUs 12 AMUs 14 FMUs

OU = obstetric unit
AMU = alongside midwifery unit
FMU = freestanding midwifery unit

Figure 2: Organisation of maternity care in Britain at the start of 2017

Data quality

Key findings

There is a discrepancy in the amount of information available in the routinely collected maternity datasets, both within and between countries. This means that currently not all NMPA measures can be derived for all sites.

Where electronic maternity data are available, we have demonstrated that local collection of high quality data is achievable but that at present data quality is highly variable between sites, especially in England. This is despite the requirement from 1st November 2014 for English maternity systems to be fully compliant with the Maternity Services Data Set standard, and requires urgent attention. Data quality and completeness also varies between Welsh boards, whilst Scotland has high levels of consistency.

Some key data items such as gestational age, birth weight and mode of birth are highly complete across maternity services. However, the completeness of other key data items including labour onset, augmentation, fetal presentation, and anaesthesia/analgesia in labour is highly variable between services and needs to improve. This means that some important measures are not currently possible for the NMPA to report.

Electronic data collection is currently focused on booking and the period of labour and birth. The lack of information recorded during pregnancy and after the birth impedes the interpretation of labour events and the evaluation of care during pregnancy and the postnatal period.

How does the NMPA assess data quality?

As described in the methods section, the NMPA uses a different approach to obtaining data in each nation, reflecting the status and maturity of centralised national maternity datasets.

In Scotland and Wales, data was submitted centrally for all health boards. In England, 128 of 134 eligible trusts provided a MIS extract for births between 1st April 2015 and 31st March 2016. The data extracts were then individually processed and cleaned to create the NMPA dataset. This process involved the removal of duplicates and records that did not appear to relate to an eligible birth, as well as checks for internal consistency.

Following the removal of duplicates and the exclusion of three trusts/boards that provided data for less than 70% of births within the time period,[iii] the quality of the coding of each essential data item required by the NMPA was carefully assessed for each site.

The analysis in this report is restricted to a) sites that passed the NMPA site level data quality checks and b) birth records within those sites that contained the required data to construct the measure. The number of sites for which results were available therefore varied from measure to measure, depending on the specific data requirements. We conducted data quality assessments at site rather than

iii The following trusts which provided data were excluded due to low case ascertainment against Hospital Episode Statistics (percentage of births submitted given in brackets): Derby Hospitals NHS Foundation Trust (26%), Buckinghamshire Healthcare NHS Trust (46%), Oxford University Hospitals NHS Trust (56%).

trust/board level because, for organisations with more than one site, publishing results at trust/board level based on aggregated trust/board data quality scores could have led to the inclusion of some sites with known data quality problems.

We assessed data quality at site level in three ways:

- Data completeness: for all key data items required by the NMPA, we excluded records if the proportion of records missing this information exceeded 30%.
- Plausible distribution: for many key variables, we defined acceptable ranges for non-missing values. Rates of each measure were tabulated by type of site (i.e. sites with or without an OU) and inspected by a clinical team. We excluded strongly outlying sites that had a rate that was either too low or too high to be plausible i.e. where no clinical reason for this level of variation could be envisaged. For example, sites with an obstetric unit failed the gestational age check if the proportion of babies born at term (37^{+0} to 42^{+6} weeks) was less than 70%.
- Internal consistency checks: for some variables, it was also possible to perform internal consistency checks within the database. For example, it would be implausible for a woman who is coded as having her labour start as 'not applicable – delivered prior to labour onset via caesarean section' to also be coded as having given birth vaginally. We checked that these types of implausible records were rare within the dataset.

Assessment criteria were developed based on previous work.[2] A list of all of the individual data quality checks performed is given in an online Technical Appendix.

These techniques each serve a different purpose and, together, improve the likelihood of detecting poor quality data. For example, data quality assessment based on the proportion of missing data alone would not be sufficient, as it could lead to the inclusion of records from hospitals with seemingly complete data but with an observed distribution of data outside the expected range of values. By combining these techniques we can be confident that the published figures are based on data that have met at least a minimum standard of completeness and consistency.

Country level differences

Due to the different data sources used by the NMPA for each country, the number of possible data quality checks varied accordingly. In England, there were 21 different data completeness checks performed for each site. The number of completeness checks was lower in Wales and Scotland, at 18 and 17, respectively. Figure 3 presents site level data completeness for the 15 'core' variables available in each of the three countries, with a higher score representing higher data completeness.

As shown in figure 3, data quality was highly variable between sites. There did not appear to be any relationship between data completeness and size of site. The highest level of variation was seen in England. Ensuring local electronic systems collect high quality data is a shared responsibility between maternity services and their contracted software suppliers. The variation observed in data completeness is likely to be a reflection of a combination of differences in software design, user interfaces and local adaptation of systems, as well as support and training provision for staff, and the extent to which dedicated staff time is available for data entry and quality checking.

The long history of centralised quality monitoring of maternity data in Scotland demonstrates that it is possible to achieve a high level of consistency between services (figure 3). Nonetheless, it was not possible for any Scottish board to pass more than 17 of the NMPA data completeness checks, as certain variables such as labour augmentation and skin to skin contact are not captured by the SMR02.

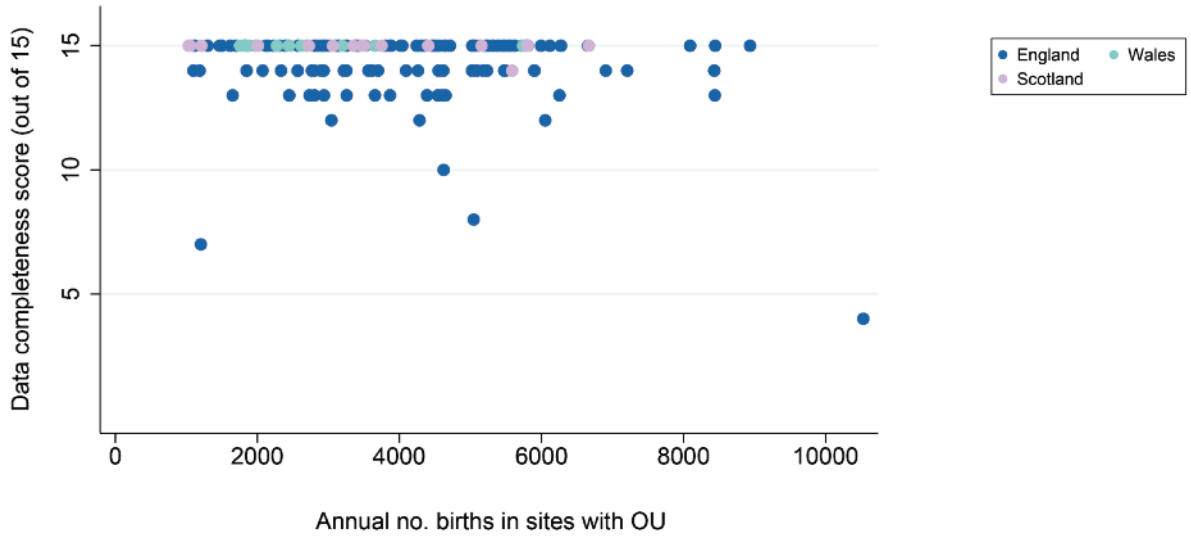


Figure 3: Variation in results of NMPA data quality assessments at sites with an obstetric unit

Results of data quality assessments

Table 2: Results of data quality assessment at site level

Data item	% sites with an OU passing data quality check			
	England (n = 151)	Scotland (n=15)	Wales (n=11)	GB total (n=177)
Date of birth	100	100	100	100
Previous caesarean section	100	100	100	100
Index of Multiple Deprivation (IMD) quintile	100	100	91	99
Number of infants	98	100	100	98
Birth weight	97	100	100	98
Parity	97	100	100	98
Maternal age	96	100	100	97
Gestational age	97	100	100	97
Mode of birth	97	100	100	97
Perineal tears	98	100	55	96
Episiotomy	93	100	82	93
Fetal presentation	93	93	100	93
Apgar score at 5 minutes	90	100	98	92
Mode of labour onset	88	100	100	89
Birth status (livebirth/stillbirth)	88	100	96	89
Maternal ethnicity	94	60	18	86
BMI at booking	78	100	73	80
Smoking at booking	76	100	100	79
Blood loss	80	N/A	100	75
First feed	76	73	N/A	71
Smoking at delivery	75	N/A	100	70
Feed upon discharge	68	100	N/A	67
Skin to skin contact	72	N/A	N/A	61
Anaesthetic in labour/birth	59	100	N/A	59
Augmentation	60	N/A	81	57
Birth in water	41	N/A	N/A	35

Individual site level data quality results are available on our website www.maternityaudit.org.uk.

At present, the majority of maternity care involves dual record keeping on paper notes and electronic systems. Therefore, the fact that something is not recorded in the electronic notes does not mean it is not recorded at all, but that this information is not transferred to the electronic record.

How does poor data quality affect our ability to derive nationally important measures? An illustrative example

Birth without intervention

In selecting measures for inclusion in the NMPA, there was a strong desire to recognise the importance not only of measuring rates of medical interventions and of adverse outcomes, but also of measuring the proportion of births that occur without interventions such as labour induction or augmentation, caesarean section, or the use of instruments, episiotomy, epidural or other anaesthetics.

Inclusion of such a measure in the NMPA could, in conjunction with other NMPA measures, assist trusts/boards in ensuring that they are finding an appropriate balance between intervening 'too much, too soon' and 'too little, too late'.[15]

However, since such a measure would need to be composite in nature (relying on multiple data items), it presents some additional challenges. This is because in order to construct the measure, all of the individual data items must meet a sufficient data quality standard, thereby increasing the number of checks to be passed. Missing or poor quality data, even for only one individual component, can therefore reduce the number of services for which this measure can be derived (table 3).

Table 3: Quality of data items required to construct a 'birth without intervention' measure

Data item required*	% of sites with an obstetric unit (OU) passing data quality checks for this item		
	% English sites (n = 151)	% Scottish sites (n = 15)	% Welsh sites (n = 11)
Mode of birth	97	100	100
Onset of labour	88	100	100
Augmentation	60	0**	81
Episiotomy	93	100	82
Anaesthetic during labour and birth	59	100	0**
% of sites with an OU passing data quality checks for all items	40	0	0

* All measures also need to pass basic checks for plurality, gestational age, and fetal presentation since measures are restricted to singleton, term, cephalic births.
** No sites passed these checks as these items are not included in national data collections.

At present, publishing this indicator as part of the NMPA would require one of the following:

- only being able to publish results for the 40% of sites that provide sufficient quality data for all data items required;
- having to lower the threshold for data quality standards, i.e. accepting poor quality data for some data items in order to provide results for the majority of providers; or
- having to reduce the number of different data items included in the definition of 'birth without intervention' (e.g. exclude augmentation as this is not available in Scotland and poorly completed in England and Wales).

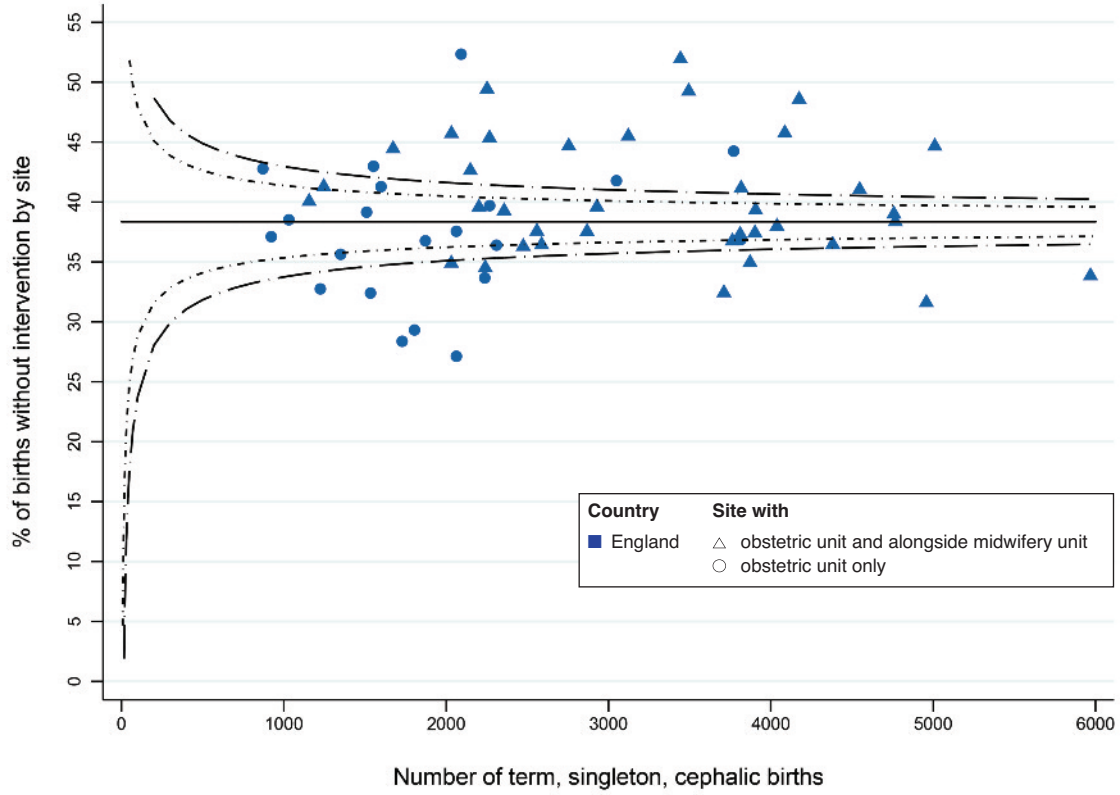


Figure 4: Proportion of births without intervention at sites with an obstetric unit, where data quality was sufficient

Clearly, none of these options is ideal. We have therefore decided not to include this measure in this first report. It is our hope that the current inability to derive this important measure on a national basis will stimulate the collection of better quality data in all three countries.

Currently, the NMPA is therefore only able to present rates of 'spontaneous vaginal birth' (page 54).

As a final point on the subject of composite measures, although it may be aspirational at present, in future we aim to develop a composite indicator that focuses on a positive outcome for both the mother and the baby, not only the absence of intervention. Such a development would contribute to a 'balanced scorecard' approach to providing varied yet complementary insights into the overall system of care.

Recommendations

For clinicians

- All clinicians involved in maternity and neonatal care should take ownership of the completeness and accuracy of the electronic recording of the care they provide. This includes influencing local purchasing decisions to ensure that software systems are appropriate for use and compliant with data standards.

For services

- Services should examine their own data quality results and compare these to internal audits where available, to evaluate their data quality and consider how this compares nationally.
- Several key NMPA data items are not currently routinely captured by all services, including blood loss, labour onset, fetal presentation, and the use of anaesthesia and analgesia in labour. Maternity services should aim to enter complete data for all key data items and ensure that standard coding definitions are followed to improve consistency.
- Services should ensure they have systems in place for data entry and hold regular training and data quality assurance exercises.
- When procuring maternity IT systems, maternity services should take into account the need for ongoing support from system suppliers for operational use and meeting national data submission requirements.

For system suppliers

- Software providers of maternity information systems should continue to develop solutions to allow users to review data quality. They should design systems that support users to enter accurate and complete data which are easily retrieved for care provision and reporting.
- System configurations currently support at best the entry of electronic information at booking and at birth, leading to a paucity of information about changes during pregnancy and postnatal care. This has significant implications for measurement of outcomes and care of interest to women, clinicians, commissioners and policymakers. System suppliers should therefore develop and implement solutions to support the collection of information during and after pregnancy, such as electronic hand held records.

For commissioners

- Commissioners should hold providers to account on data quality performance.
- Allocation of sufficient staff and financial resource is required to ensure high quality electronic maternity data. Funding for maternity services should include provision for sufficient staff time to enter data and check quality, and to maintain adequate hardware and software.

For national bodies and policymakers

- National organisations responsible for collating and managing maternity datasets should review current specifications and consider whether these are fit for purpose or need revising in light of evolving national priorities, including more information on antenatal and postnatal care for women and on outcomes for babies.
- National organisations responsible for collating and managing maternity datasets should continue efforts to report data quality concerns back to services which repeatedly submit poor quality data and provide support to help them improve their data collection systems. Both information professionals and clinical teams should be informed and encouraged to work together to find solutions to local challenges.

Findings

Key findings

Fewer than half of pregnant women (47.3%) have a body mass index within the normal range (BMI between 18.5 and 25) and 21.3% have a booking BMI of 30 or over. The high level of maternal obesity has implications for maternity and neonatal service provision.

Overall, 52.5% of women giving birth are aged 30 or over and in England and Scotland, at around 2.7%, the proportion of women having their first baby aged 40 or over is higher than the proportion having their first baby before age 18. Increasing maternal age has implications for clinical outcomes and maternity service provision.

Increasing access to midwife-led birth settings is a national priority and although the majority of obstetric units are co-located with an alongside midwifery unit in England, only around 13% of women give birth in a midwife-led setting.

Allowing for data quality issues, there is extremely wide variation in the proportion of women who quit smoking during pregnancy, which is not related to the number of births in a site or trust.

Among women giving birth vaginally to a singleton, term baby, 3.5% sustain a third or fourth degree perineal tear, which can give rise to long term continence problems. The proportion of women affected varies from 0.6% to 6.5% between maternity services, even after adjustment for case mix.

2.7% of women giving birth to a singleton, term baby in England and Wales have a haemorrhage of 1500ml or more. The proportion of this varies between maternity services, from 1.1% to 5.6%, even after case mix adjustment. Obstetric haemorrhage is associated with risk of maternal illness and death.

1.2% of babies born at term in Britain have an Apgar score of less than 7 at five minutes of age, which is associated with short and long term morbidity. This proportion varies between maternity services, from 0.3% to 3.5%, despite adjustment for case mix.

Over half of all babies born small for gestational age (below the 10th centile) at term are born after their due date. This would suggest that these babies are currently not identified by local or national guidelines in use. Better identification of these babies has the potential to reduce stillbirth and severe neonatal complications.

28.7% of women having an elective delivery at 37 or 38 weeks gestation currently have no documented clinical indication; this rate is higher in Wales and Scotland than in England. Delivery in the early term period increases the risk of illness for the baby.

Although some services achieve high rates, there is extremely wide variation in the proportion of babies receiving skin to skin contact within the first hour after birth, which has been shown to improve the rates of women starting and continuing to breastfeed, and in the proportion of babies receiving breast milk for their first feed.

Characteristics of women and their babies

The NMPA provides a unique opportunity to describe the diversity of the women who gave birth during the audit period. This chapter outlines demographic and other general characteristics of these women and their babies. Where applicable, these characteristics were used in the case mix adjustment for the NMPA indicators and measures.

In total, clinical data were available for 685,813 women who gave birth and 696,738 babies born in the period from 1st April 2015 to 31st March 2016 (table 4).

Table 4: Number of records in the NMPA clinical dataset (all gestations, all outcomes)

	Women who gave birth	Babies born
England	602,199	611,959
Scotland	53,344	54,119
Wales	30,270	30,660
Overall (Britain)	**685,813**	**696,738***

* of which 667,668 were singletons

Many demographic data items had a high level of completeness for the majority of trusts and boards, but this varied considerably between data items and between countries, as well as between individual maternity services. Data quality results are available on the NMPA website www.maternityaudit.org.uk.

Maternal age

The median age of all women at the time of birth was 30 (interquartile range 26 to 34). The median age of women having their first baby was 28 and varied across regions, with the highest median ages in the Southern regions of England. The proportion of first births to women aged 40 or over was 2.7% in England and Scotland and 1.7% in Wales (figure 5).

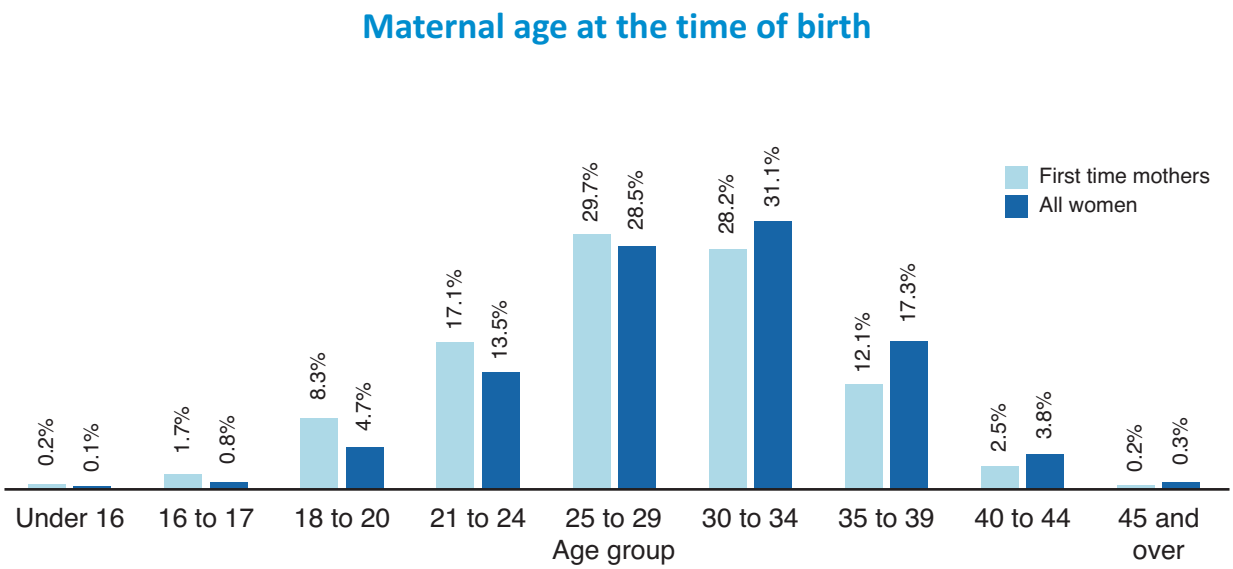


Figure 5: Maternal age

Ethnic background

England had a higher proportion of women from black and minority ethnic backgrounds than Scotland and Wales (table 5), and this proportion also showed a high level of local and regional variation (figure 6).

Table 5: Ethnic background

	England	Scotland	Wales	Overall (Britain)
White	77.3%	92.7%	91.3%	78.7%
Asian	12.4%	4.2%	4.0%	11.6%
Black	4.9%	1.5%	1.4%	4.6%
Mixed	1.9%	0.5%	2.1%	1.8%
Other	3.5%	1.1%	1.3%	3.3%

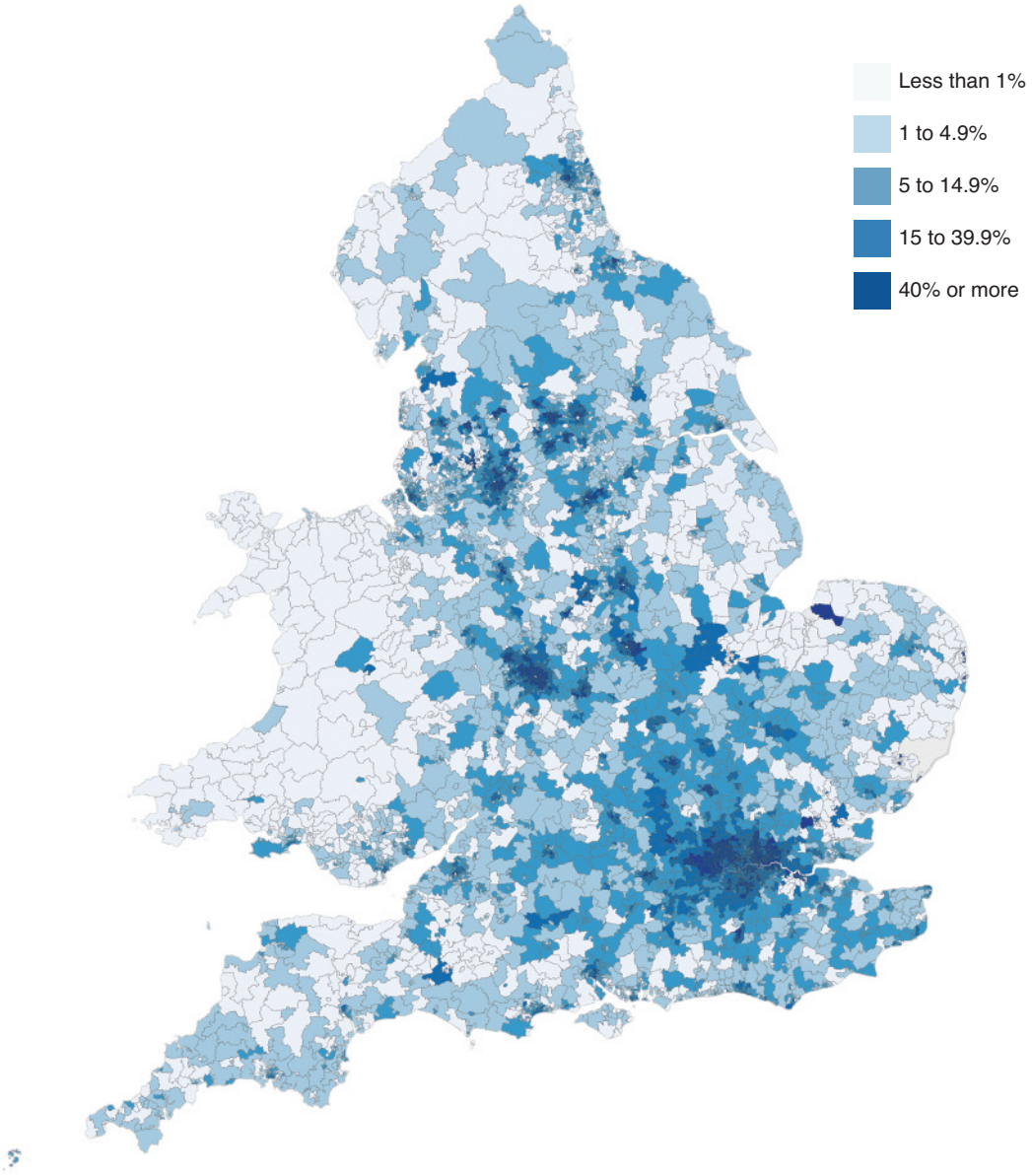


Figure 6: Proportion of women from black and minority ethnic backgrounds in the NMPA dataset, by middle layer super output area (women's postcode or geographic area was not available in the Scottish dataset)

Deprivation

The indices of multiple deprivation (IMD) are constructed separately and slightly differently in each of the three countries, so can only be used for comparisons within, not between countries. The indices are based on postcode, so do not reflect the socio-economic status of individuals. More than a quarter of women who gave birth in each of the three countries lived in an area which fell into the most deprived category (table 6).

Table 6: Index of multiple deprivation

	England	Scotland	Wales	Overall (Britain)
1 (least deprived)	16.9%	17.2%	15.4%	16.8%
2	14.1%	18.2%	16.0%	14.5%
3	18.9%	17.9%	19.6%	18.9%
4	22.8%	21.4%	22.3%	22.6%
5 (most deprived)	27.4%	25.3%	26.7%	27.2%

Parity

The proportion of first time mothers (parity 0) was 40.1% overall (39.7% in England, 43.0% in Scotland and 42.1% in Wales; table 7). All women who had 2 or more previous babies were reported as one group in the Welsh data.

Table 7: Parity

Number of previous births at 24 weeks of gestation or over	England	Scotland	Wales	Overall (Britain)
0	39.7%	43.0%	42.1%	40.1%
1	35.9%	35.8%	35.3%	35.9%
2 to 4 (2 or more in Wales)	22.6%	20.1%	22.7%	22.4%
5 or more (not available for Wales)	1.8%	1.1%	0.0%	1.6%

Pre-existing medical conditions, obstetric history and current pregnancy-related problems

Information from the electronic maternity records about women's pre-existing medical conditions, obstetric history and current pregnancy-related problems was derived from the maternity record and, where available, supplemented with other information (HES, SMR01 or PEDW).

Pre-existing diabetes was recorded for 0.6% of women in the dataset, which is comparable with the results of the National Pregnancy in Diabetes Audit 2015 (where registerable births to women with pre-existing diabetes reported by 86% of obstetric units represented 0.4% of ONS-registered births).[16,17]

Similar data collections for comparison are not available for the other conditions, but comparable rates were found in the literature.[18–21] Although previous caesarean sections were not always well recorded in the MIS, a look-back approach using HES data was used to increase completeness and the rate of 23.5% is plausible given the overall caesarean section rate.[22]

Table 8: Pre-existing medical conditions, obstetric history and current pregnancy-related problems

Characteristic	Prevalence in the NMPA dataset
Pre-existing medical conditions (among all women)	
Pre-existing diabetes	0.6%
Pre-existing hypertension	0.5%
Obstetric history (among women who have had a baby before)	
Previous caesarean section	23.5%
Current pregnancy problems (among all women)	
Gestational diabetes	4.3%
Pre-eclampsia	1.8%
Placenta praevia and abruption	0.9%
Abnormal amniotic fluid volume	1.2%

Body mass index

Women's median body mass index (BMI) at booking was at the upper limit of normal (table 9). The proportion of women who were obese (BMI of 30 or over) and morbidly obese (BMI of 40 or over) differed between the three countries (figures 7 and 8).

Table 9: Body mass index at booking

	Median	Interquartile range
England	24.9	22.0 to 29.0
Scotland	25.1	22.2 to 29.4
Wales	25.6	22.5 to 30.1
Overall	25.0	22.0 to 29.0

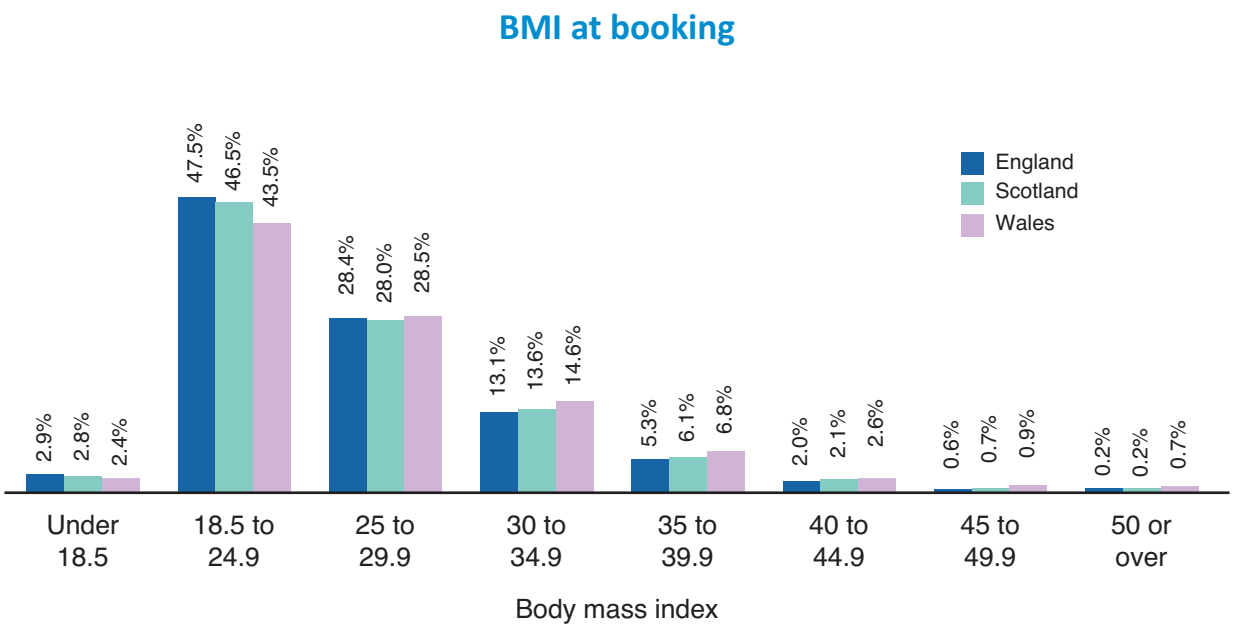


Figure 7: Body mass index at booking

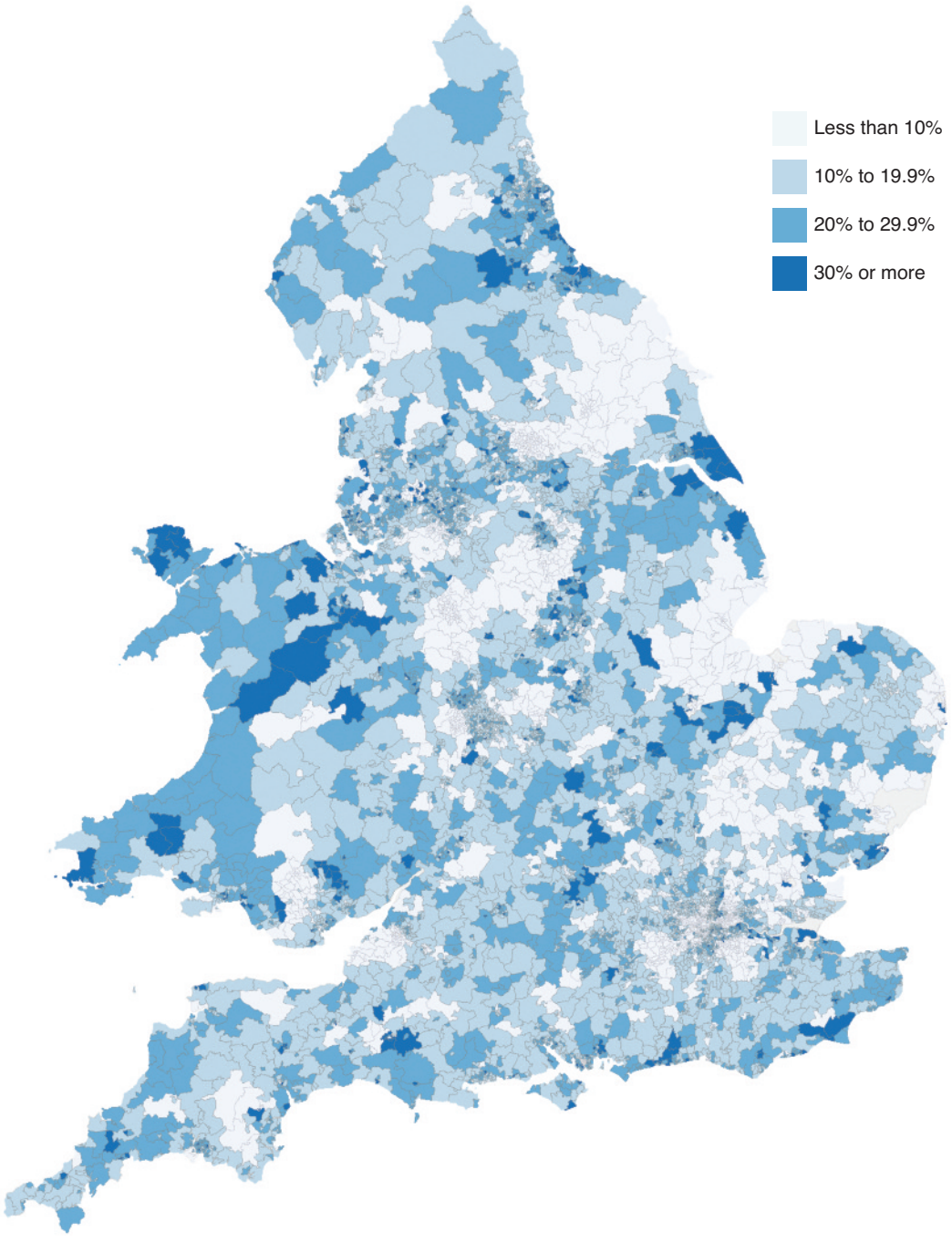


Figure 8: Proportion of women with a BMI of 30 or over at booking in the NMPA dataset, by middle layer super output area (women's postcode or geographic area was not available in the Scottish dataset)

Smoking

Of women whose smoking status at booking was recorded, 14.1% were smoking at the time of booking in England, 15.9% in Scotland and 18.3% in Wales. In line with the local and regional variation in smoking rates among the general population, there was a high level of variation between sites (figure 9).

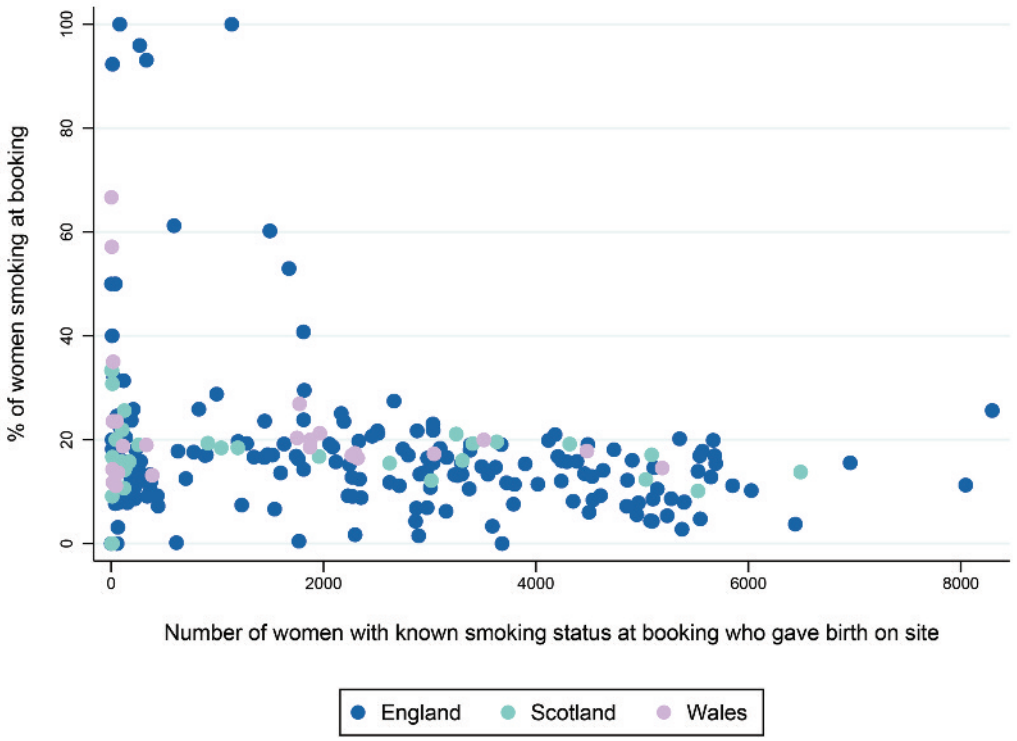


Figure 9: Site level proportions of women recorded as smoking at booking

Gestational age at birth

The pattern of gestational age at birth (particularly among those sites providing this information in days rather than weeks of gestation) reflected the timing of elective caesarean sections and of induction of labour for the prevention of prolonged pregnancy (figure 10). 93.7% of singleton babies and 42.2% of twins and higher order multiples were born at 37 weeks gestation or later. The proportion of preterm births among singletons was similar in all three countries at around 6%. Figure 11 shows the neonatal unit designation on the sites where preterm babies were born.

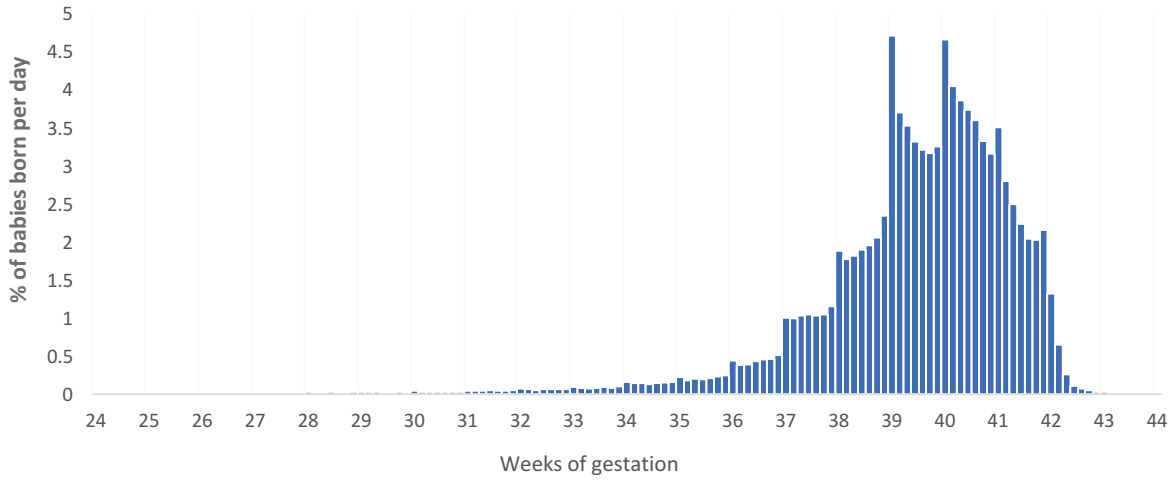


Figure 10: Gestational age at birth (of those records where gestation was provided in days, from 24 to 44 weeks (n=379,926); this only includes English records from a subsection of trusts, as gestation is provided in weeks in the Scottish and Welsh data)

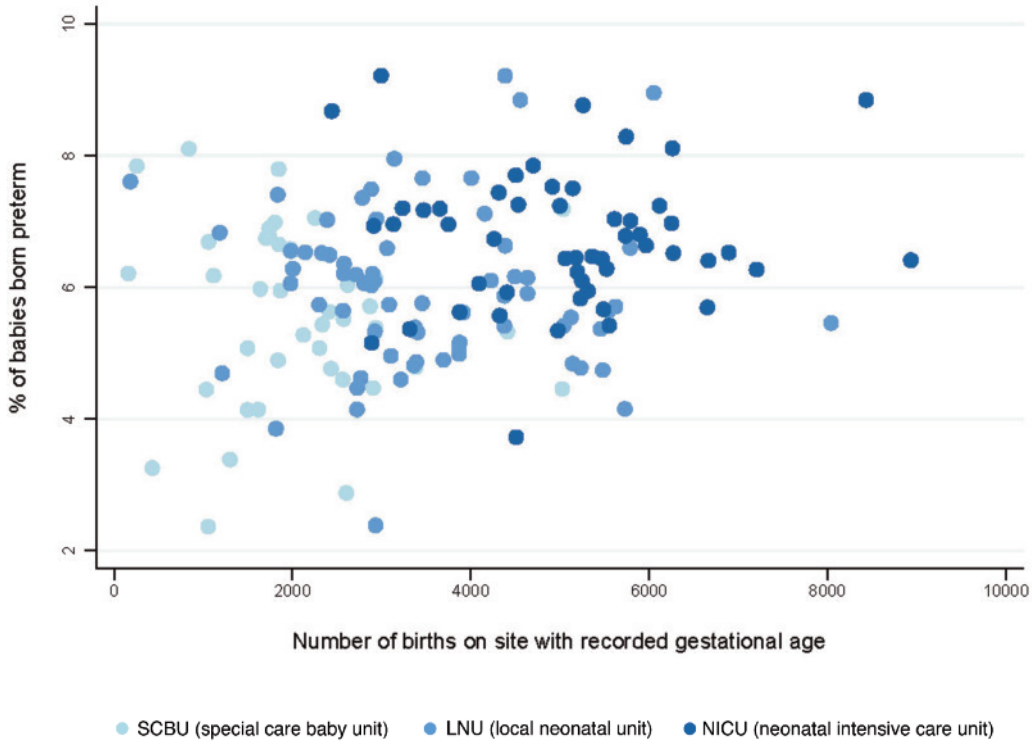


Figure 11: Site level proportions of singleton babies born preterm, by neonatal unit designation on site

Birth weight

Median birth weight was 3380g (interquartile range 3020 to 3720g) and similar in all three countries. 5.8% of singletons and 57.0% of multiples weighed less than 2500g (tables 10, 11).

Table 10: Birth weight

	Singletons	Multiples
Less than 2500g	38,006 (5.8%)	11,171 (57.0%)
2500–4000g	539,871 (82.9%)	8391 (42.8%)
More than 4000g	73,421 (11.3%)	51 (0.3%)

Table 11: Birth weight centiles[23]

	Singletons	Multiples
2nd centile or below	8464 (1.4%)	1099 (5.9%)
3rd to 10th centile	39,361 (6.3%)	2901 (15.5%)
11th to 25th centile	90,497 (14.6%)	4476 (23.9%)
26th to 75th centile	332,299 (53.5%)	8724 (46.5%)
76th to 90th centile	90,628 (14.6%)	1104 (5.9%)
91th to 98th centile	44,765 (7.2%)	348 (1.9%)
Above 98th centile	14,592 (2.4%)	94 (0.5%)

Discussion

The NMPA data reflect national and international trends of increasing maternal age and BMI[24–27] and show local and regional variation. Overall, 52.5% of women giving birth were aged 30 or over and in England and Scotland, at 2.7% the proportion of women having their first baby at the age of 40 or over was higher than the proportion having their first baby before age 18. The chance of pregnancy complications and stillbirth increases with rising maternal age.[28]

Fewer than half of pregnant women had a normal BMI at booking. While a low BMI is associated with an increased chance of babies being born preterm or small for their gestational age, only 2.9% of women had a booking BMI below 18.5. By contrast, 21.3% of women had a BMI of 30 or over, which is associated with an increased chance of numerous complications, including gestational diabetes, pre-eclampsia, caesarean section, congenital anomalies and stillbirth.[29]

The increased levels of monitoring and intervention recommended in older and obese women have implications for maternity service provision. Gestational age patterns reflect the timing of elective caesarean sections and inductions, which have lowered the average gestational age at birth over time.[31]

Place of birth

The Birthplace[32] study showed that women at low risk of complications who plan birth in a midwife-led setting (at home or in a midwifery unit) have the same or better outcomes than those who plan to give birth in an obstetric unit.

The National Institute of Health and Care Excellence (NICE) and the maternity reviews in England and Scotland agree with the recommendation that pregnant women with low risk of complications should be encouraged to plan birth at home or in a midwifery unit. To enable this, NICE recommends that all women have access to all four choices of birth setting (obstetric unit, alongside midwifery unit, freestanding midwifery unit and home). In our organisational report, we found that 22% of trusts and boards across England, Scotland and Wales meet this ambition, and 77% offer homebirth, at least one type of midwifery unit (alongside or freestanding) and an obstetric unit.

Table 12 shows the sites where the women in the NMPA dataset gave birth, based on the maternity unit type(s) associated with the site code of the place of birth recorded. Information on homebirth in Scotland and Wales was not available in the dataset; homebirths in these countries will have been included in one or more of the other site categories.

The English Maternity Services Data Set contains a field to record midwifery unit type when birth took place in an alongside or freestanding midwifery unit, which was mirrored by the NMPA data request. However, the contents of this field were often inconsistent with those of the field for actual place of delivery, a field which has been in existence for longer but which does not discern between different midwifery unit types. In order to estimate the proportions of women giving birth in different unit types we therefore drew on a combination of the actual place of delivery field and the unit types known to be present on the site where the woman was recorded to have given birth (table 13).

Table 12: Place of birth by site in Britain

Type of site	England	Scotland	Wales	Overall (Britain)
Site with a freestanding midwifery unit	8861 (1.5%)	1014 (1.9%)	757 (2.5%)	10,632 (1.6%)
Site with an obstetric unit and an alongside midwifery unit	434,166 (72.1%)	25,515 (47.8%)	29,423 (97.2%)	489,104 (71.3%)
Site with an obstetric unit only	140,563 (23.3%)	26,815 (50.3%)	0	167,378 (24.4%)
At home (planned and unplanned)*	8546 (1.4%)	0*	0*	8546 (1.3%)*
Site of birth unknown or non-NHS	10,063 (1.7%)	0	90 (0.3%)	10,153 (1.5%)

* No information on homebirth in Scotland and Wales in the dataset; homebirths in these countries will have been included in one or more of the other site categories.

Table 13: Place of birth by unit/birth setting in England

Type of unit/birth setting	England	% out of total	% out of those where place of birth could be determined
Freestanding midwifery unit	8283	1.4%	1.6%
Alongside midwifery unit	54,088	9.0%	10.2%
Obstetric unit	459,155	76.2%	86.6%
Planned homebirth	7662	1.3%	1.4%
Other (incl. in transit, unplanned homebirth)	1815	0.3%	0.3%
Unable to determine exact place of birth	72,114	12.0%	

Our findings confirm those of a recent study which found that while the minority of women give birth in midwifery units, this number is increasing.[33] Most women give birth in obstetric units which are co-located with alongside midwifery units, suggesting that women who are considered to be at low risk of developing complications and therefore deemed suitable to give birth in midwife-led settings do have this option. On the other hand, the number of women who fall into this category is declining due to rising obesity and gestational diabetes,[34] and increasing maternal age. Further work is required to explore reasons behind the variation in the use of midwife-led settings, including an understanding of the proportion of women considered suitable to use these settings and the criteria applied by different services.

It should be noted that more women start labour in midwife-led settings than give birth there due to transfers during labour. We are not able to examine intended place of birth at the onset of labour or transfers in this report due to poor data quality and completeness. However, the Birthplace study[32] reported a 36% transfer rate from freestanding midwifery units and a 40% transfer rate from alongside midwifery units for women having their first baby, with a rate of around 10% for women having subsequent babies in these settings. From this, the proportion of women beginning their labour in midwifery units can be estimated as being in the region of 18%.

Measures of care before, during and after birth

In this section, we discuss what happens to women and their babies before, during and after the process of giving birth. We describe how women give birth, and rates of immediate complications. We discuss the baby's condition after birth, measures to promote bonding and breastfeeding, and unplanned maternal readmission to hospital.

Most NMPA measures are restricted to women giving birth to singleton babies at term. We received information about gestational age in weeks instead of days from some services and have therefore pragmatically defined term as between 37^{+0} and 42^{+6} weeks of gestation. However, all women are included in our measure about smoking cessation whilst babies born from 34 weeks onwards and twins and triplets are included in our measures about breast milk and skin to skin contact.

When considering the results presented in this chapter, it is important to bear in mind that the comparisons are centred around national averages, not established standards. For many of these measures, the 'ideal' rate is unknown. It is always possible to further improve services as we strive to deliver the best possible care to women and their babies.

Smoking at booking and birth

Smoking rates across the UK are falling, but 15.3% of women in the UK smoked cigarettes in 2015.[30] Smoking poses risks both during pregnancy and childhood: women who smoke are more likely to experience a miscarriage, ectopic pregnancy, and stillbirth. Their babies are also more likely to be born small or premature, to die in infancy and to have long term health and behaviour problems.[35] Pregnancy poses a unique opportunity for public health interventions to stop smoking, with regular health contacts, a desire for change, and strong benefits evident from that change. This measure looks at the 'quit rate' of women who are smoking at booking, to see how many of them are smoking at the time of birth.

Practices differ in how smoking status is recorded. NICE and the Scottish Patient Safety Collaborative recommend the use of a carbon monoxide monitor[36,37] but this is not universally used, particularly at the time of birth. In Scotland, smoking status is recorded at booking and during pregnancy, but not at birth. Recent efforts have focused on identifying women who are smoking at booking, rather than recording whether they are smoking at birth.[37]

Figure 12 suggests that some units do not reliably record smoking status at booking and at the time of birth; some, with an apparent smoking cessation rate of 0%, may be simply recording the same values at booking and at birth.

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 14: Proportion of women who stop smoking during pregnancy

Country	England	Wales	England and Wales
Number of women included in analysis	432,818	29,500	462,318
Smoking at birth (among all women)	11.5%	14.8%	11.7%
Smoking at booking but not at birth (among women who smoked at booking)	19.5%	22.9%	19.9%

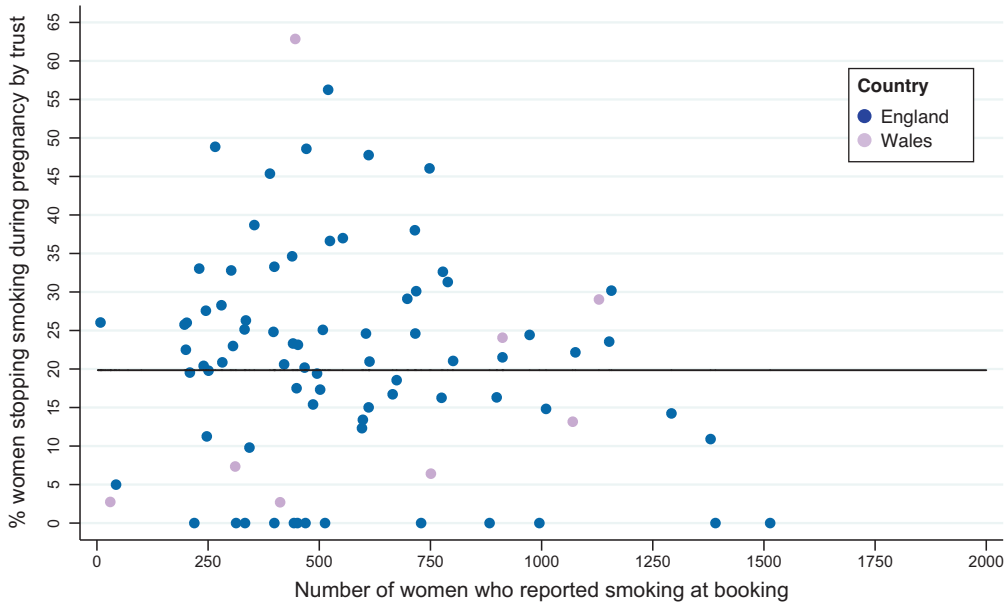


Figure 12: Trust level proportions (including births in FMUs and at home) of women who were smoking at booking but not at birth

Induction of labour

Induction of labour is increasingly common in Britain and around the world, a trend which is likely to continue as the number of women entering pregnancy with pre-existing medical conditions and at an older age increases, and the indications for induction increase.[28,38–40]

The purpose of induction of labour is most commonly to prevent a risk; for example, of stillbirth or illness for the baby, or of further deterioration from an illness caused or exacerbated by pregnancy (such as pre-eclampsia) for the mother. NICE recommends an induction threshold for all women, depending on their risk profile; they recommend induction for women at low risk of complications between 41 and 42 weeks of gestation.[41] Induction can also be used to plan the timing of birth, if for example the baby will need specialist care after birth.

In many of these situations, the alternative is to deliver the baby by caesarean section, so the rate of induction of labour should be considered in the context of the elective caesarean rate.

After case mix adjustment, there is still substantial variation in the funnel plot. This could either be a result of data quality or of practice variation. For example, if diabetes is not well coded and a site has a population with a high prevalence of diabetes, their rate will not be lowered as much by adjustment as it could be. However, even among sites with high data quality, there is still substantial variation, suggesting differences in practice.

What is measured:

The proportion of women with a singleton baby in the cephalic position between 37^{+0} and 42^{+6} weeks of gestation, whose birth commenced with an induction of labour.

Table 15: Proportion of women with a singleton, cephalic pregnancy at term receiving induction of labour

Country	England	Scotland	Wales	Total (Britain)
Number of women included in analysis	397,969	42,238	21,257	461,464
Overall proportion of women receiving induction of labour	28.8%	33.7%	32.4%	29.4%
Proportion of primiparous women	34.5%	39.7%	35.2%	35.0%
Proportion of multiparous women	25.1%	29.2%	30.9%	25.7%

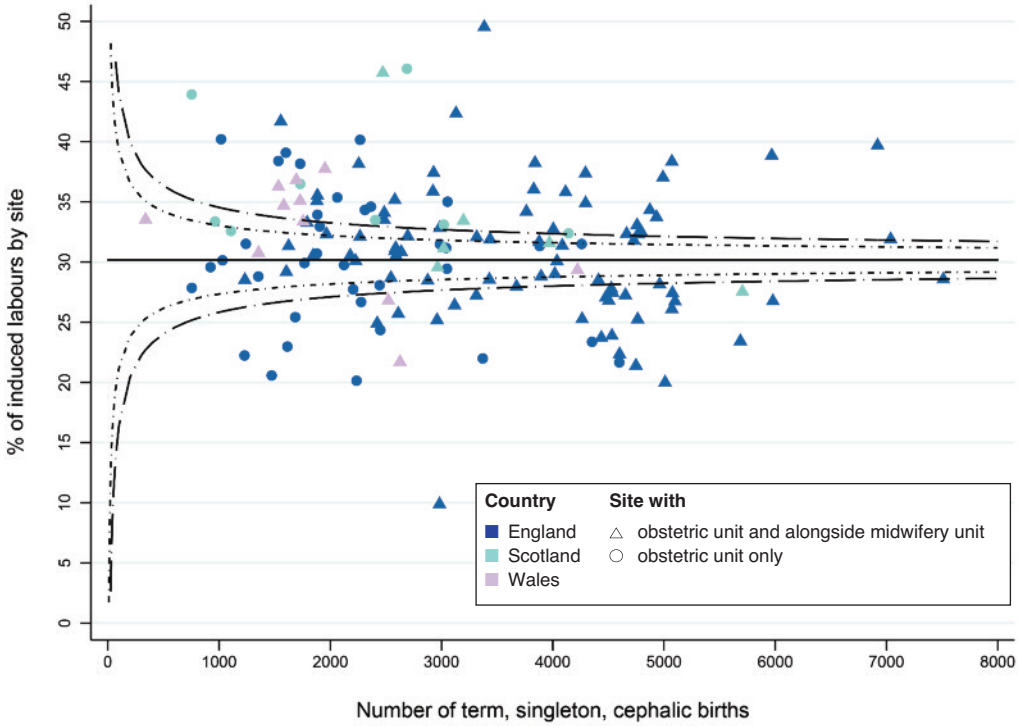


Figure 13: Site level proportions of women with a singleton, cephalic pregnancy at term receiving induction of labour, at sites with an obstetric unit

Elective deliveries performed at 37^{+0} to 38^{+6} weeks gestation without a documented clinical indication

Although the definition of 'term' birth is at or beyond 37 weeks gestation, babies born in the early term period before 39 weeks have a higher burden of morbidity and mortality both at birth and throughout their lives. The ATAIN (Avoiding Term Admissions into Neonatal care)[42] project showed that these babies are more likely to be admitted to neonatal care. Thus planning birth before 39 weeks without clinical indication has a negative impact on the baby as well as an impact on local resources, and can result in preventable separation of babies from their mothers.

In this measure, we are particularly reliant on the quality of local recording of clinical indication. If no clinical indication has been recorded, we have assumed there was none. Maternity services should therefore record the indication, where one is present.

The variation observed here is substantial, with some of this likely due to poor coding of indication. However, there is still a substantial difference between the sites with the lowest rates and the national average, suggesting considerable scope for improvement.

What is measured:

Of women who give birth either by elective caesarean section or induced labour to a singleton baby between 37^{+0} and 38^{+6} weeks of gestation, the proportion for whom there was no recognised clinical indication for this.

Table 16: Proportion of elective deliveries of singleton babies between 37^{+0} and 38^{+6} weeks gestation without a documented clinical indication

Country	England	Scotland	Wales	Total (Britain)
Number of women included in analysis	46,319	5484	2407	54,210
Overall proportion	26.0%	47.0%	32.8%	29.0%

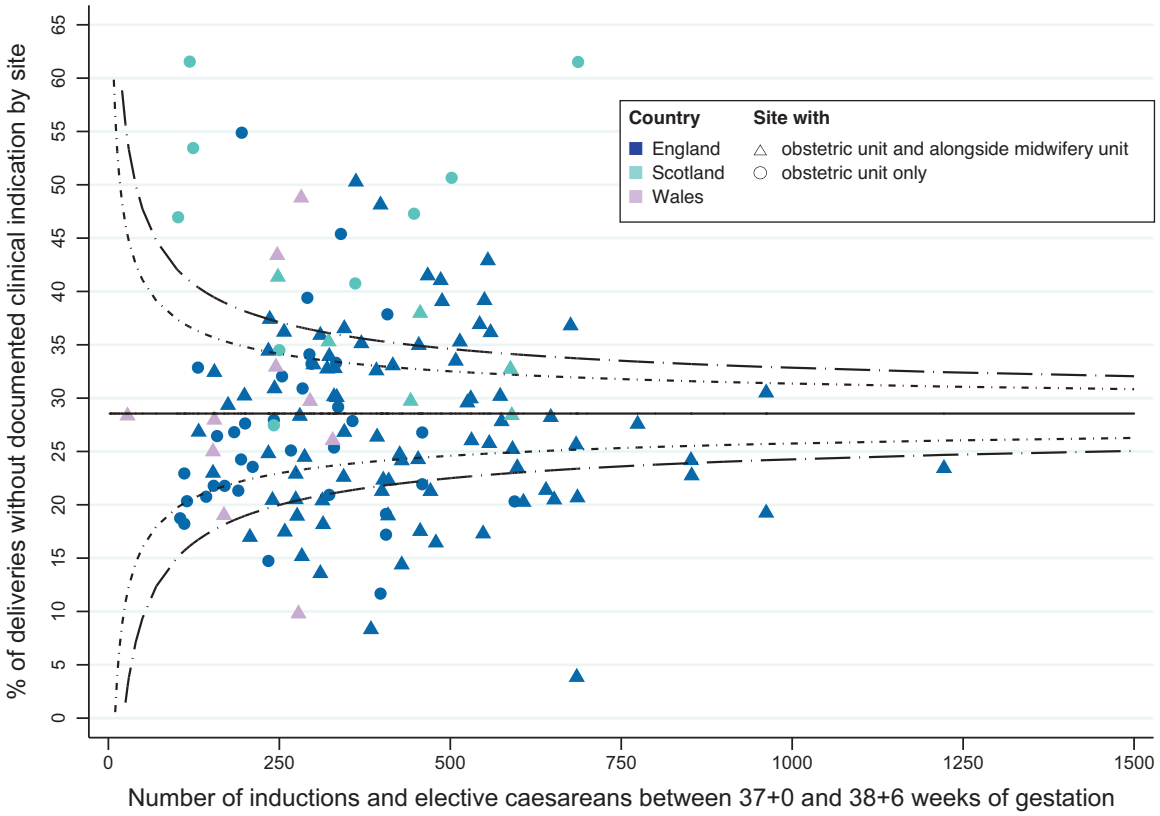


Figure 14: Site level proportions of elective deliveries of singleton babies between 37^{+0} and 38^{+6} weeks gestation without a documented clinical indication, at sites with an obstetric unit

Babies born small

Babies who are small for their gestational age are at increased risk of adverse outcomes during pregnancy and birth.[43,44] The most common reason for stillbirth at term is growth restriction due to placental failure. In recent years, there has been an increase in initiatives to improve detection of babies who are small at term, in order to enable elective induction or caesarean section. The 'Saving Babies' Lives' care bundle in England,[45] which mandates serial fundal height measurement for women at low risk of having a small baby and serial scans for women at higher risk, is currently undergoing evaluation; a similar programme exists in Scotland.[46]

A baby born small after 40 weeks of gestation can be considered to represent a failure of antenatal detection (a 'false negative'). It is likely that, as none of the tests of fetal growth are specific, there will also be a high rate of 'false positives': that is, babies identified as possibly small before birth who are actually of normal weight. It is recommended that individual services consider this measure in the context of their induction and caesarean section rates.

There is less variation in this measure. This is partly due to the high quality and completeness of birth weight in the dataset, but also reflects that this finding is mirrored throughout Britain, with no site delivering more than 70% of such babies prior to their due date.

What is measured:

Of babies born small for gestational age (defined as less than the 10th birth weight centile using UK 1990 charts[23]) between 37^{+0} and 42^{+6}, the proportion that are born after their estimated due date.

Table 17: Proportion of term babies born small for gestational age at term

Country	England	Scotland	Wales	Total (Britain)
Number of babies included in analysis	457,781	48,514	23,462	529,757
Proportion of term babies who are born with weight <10th centile	7.3%	4.7%	5.4%	6.9%
Proportion of term babies born with weight <2nd centile	1.1%	0.7%	0.9%	1.1%
Proportion of all babies at term who are <10th centile, who are not born by 40^{+0} weeks	55.3%	53.8%	60.8%	55.3%

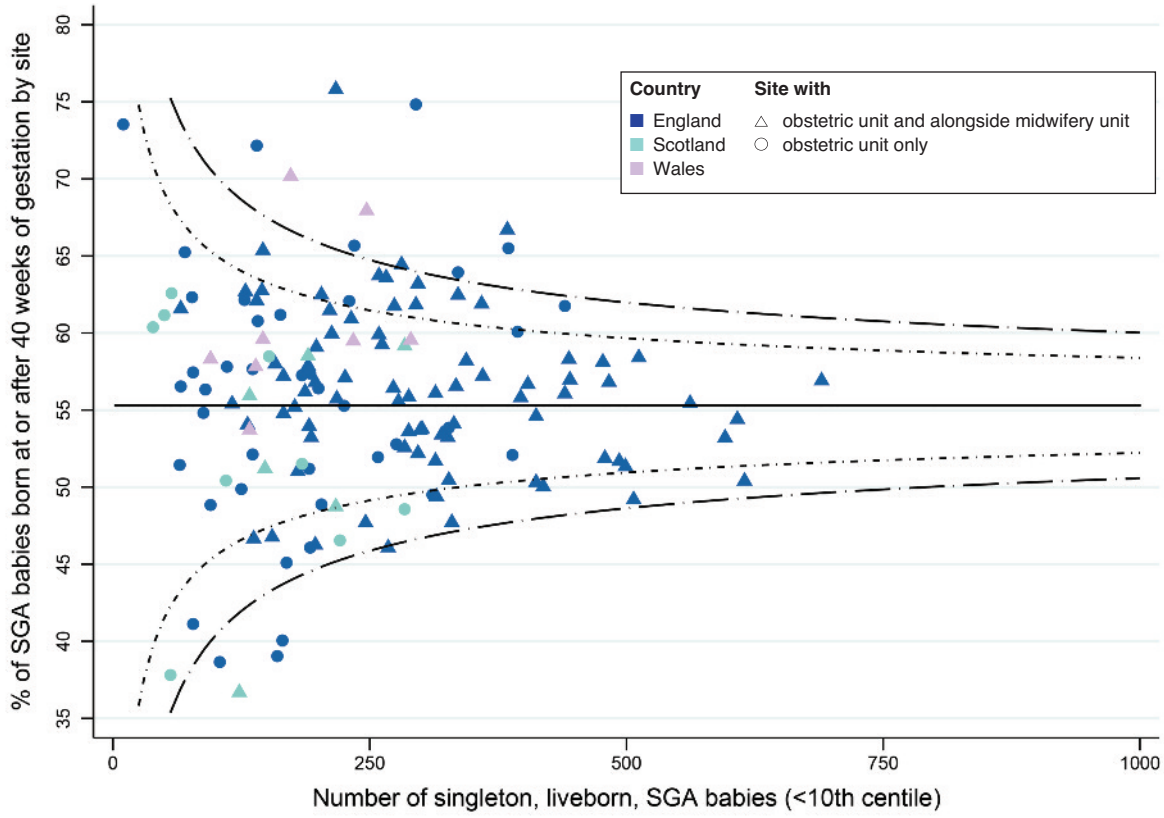


Figure 15: Site level proportions of babies born at term with weight below the 10th centile, who are not born by their estimated due date, at sites with an obstetric unit

Modes of birth

Spontaneous vaginal birth is associated with better outcomes for both mother and baby than instrumental or caesarean birth.[15,47] Over the past century, rates of birth by caesarean section have risen across the world as rates of spontaneous vaginal birth have fallen. These higher rates are due partly to an expanding list of indications, shifting demographics and reduced overall parity. However, they are also due to changes in health systems and clinician preference.[48,49]

There is no doubt that the package of care offered by modern maternity practice is highly effective in reducing maternal and infant mortality, both of which have fallen across the world due to medical intervention as well as improvements in public health. However, it is coupled with a rising burden of interventions which in themselves can cause harm.[50] The balance of how much to intervene – between 'too much, too soon' and 'too little, too late'[15] – is one of the central questions of maternity care. Many decisions, particularly those made during labour, do not have exact thresholds.

Elective caesarean delivery is offered for a range of reasons, including illness of the mother or baby, a baby in a non-cephalic position, previous caesarean section, maternal injury and maternal psychological need. Often, the alternative would be to offer an induction of labour, so these rates should be considered together. In this report, as previously, there is less variation in the rate of elective caesarean sections than emergency caesarean sections or inductions. While this may be partly explained by capacity, with a limited number of elective theatre lists, it is also likely to reflect different practices in individual units.

Emergency delivery during labour occurs either by caesarean section or with the assistance of an instrument. Indications for delivery include prolonged labour, concern about the wellbeing of the baby, and maternal illness.

Where expedited birth is considered necessary in the first stage of labour, caesarean section is the only option available. When birth is necessary but not imminent in the second stage of labour, there are two options for the clinician: either to perform a caesarean section, which can be challenging due to the baby's position, or to perform an instrumental delivery.

A successful instrumental birth avoids a caesarean section, minimising surgical trauma and impact on future pregnancies. However, instrumental birth is associated with an increased risk of maternal pelvic floor injuries and birth trauma compared to spontaneous vaginal births. Across the world, the rate of instrumental birth has fallen, particularly the use of forceps, as the rate of caesarean delivery has increased. In the UK, while the rate of instrumental birth has remained constant at 9-12%, the relative proportion of those deliveries that are by forceps has fallen.

The rate of emergency caesarean sections should therefore be considered together with the rates for spontaneous and instrumental birth. Breakdowns of these measures by parity grouping can be seen on the accompanying website www.maternityaudit.org.uk.

When considering rates of caesarean birth, it is important to bear in mind that many women with complicated pregnancies in Wales will receive their pregnancy and intrapartum care in England, if this is the nearest centre appropriate to their needs. This may partially account for the lower rate of caesarean births, and correspondingly higher rate of spontaneous vaginal births in Wales.

The interrelatedness of these measures partly accounts for the substantial variation seen. Mode of delivery is well coded, and it is evident from the funnel plots that practice differs, even after adjustment for case mix.

What is measured:

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

1 Spontaneous vaginal: vaginal and without the use of instruments

2 Instrumental: vaginal with the assistance of instruments

3 Caesarean (both elective and emergency)

Table 18: Proportion of women giving birth to a singleton, cephalic baby at term, by mode of birth

Country		England	Scotland	Wales	Total (Britain)
Number of mothers included in analysis		385,763	42,234	21,542	449,539
Overall rate	Spontaneous	65.7%	65.8%	70.6%	66.0%
	Caesarean	20.7%	19.7%	15.7%	20.3%
	Elective	8.3%	8.2%	6.2%	8.2%
	Emergency	12.4%	11.5%	9.6%	12.2%
	Instrumental	13.5%	14.6%	13.7%	13.6%
	Forceps	7.6%	11.0%	10.2%	8.1%
	Ventouse	5.9%	3.5%	3.5%	5.6%
Rate in primiparous women	Spontaneous	53.7%	53.8%	59.9%	54.0%
	Caesarean	21.1%	20.3%	16.4%	20.8%
	Instrumental	25.3%	25.9%	23.7%	25.3%
Rate in multiparous women	Spontaneous	74.1%	74.6%	78.6%	74.3%
	Caesarean	20.5%	19.3%	15.3%	20.1%
	Instrumental	5.5%	6.1%	6.1%	5.6%

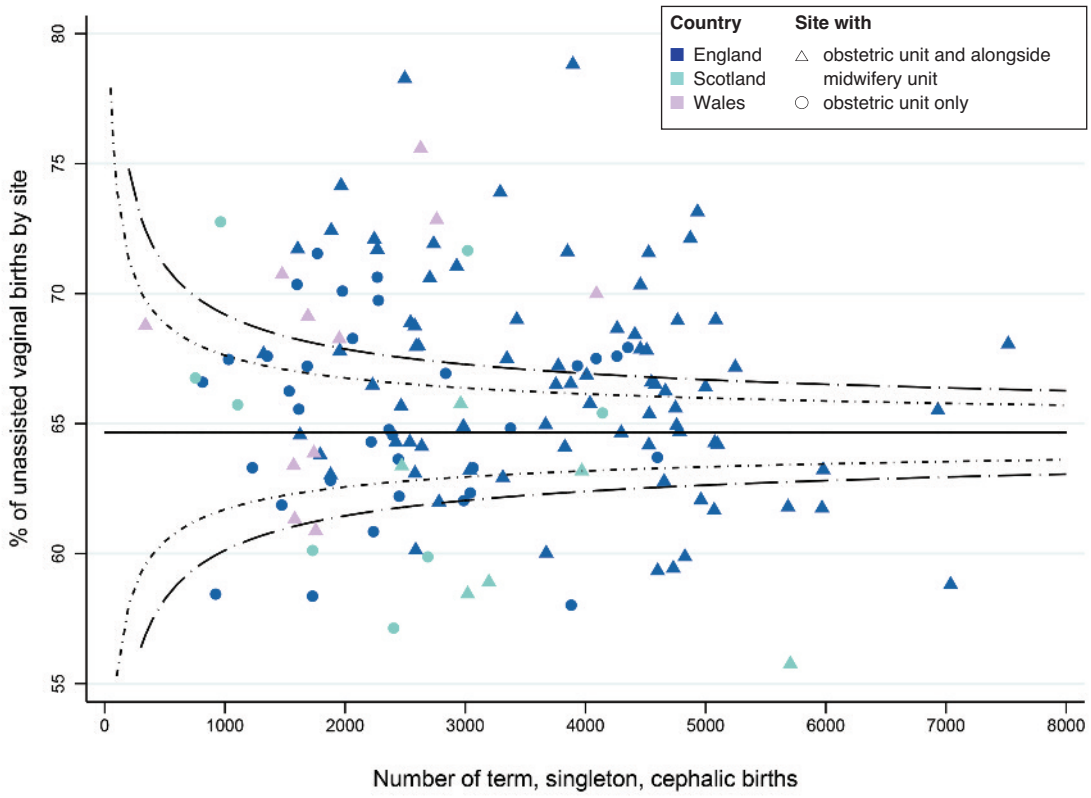


Figure 16: Site level proportions of women giving birth to a singleton, cephalic baby at term who have a spontaneous vaginal birth, at sites with an obstetric unit

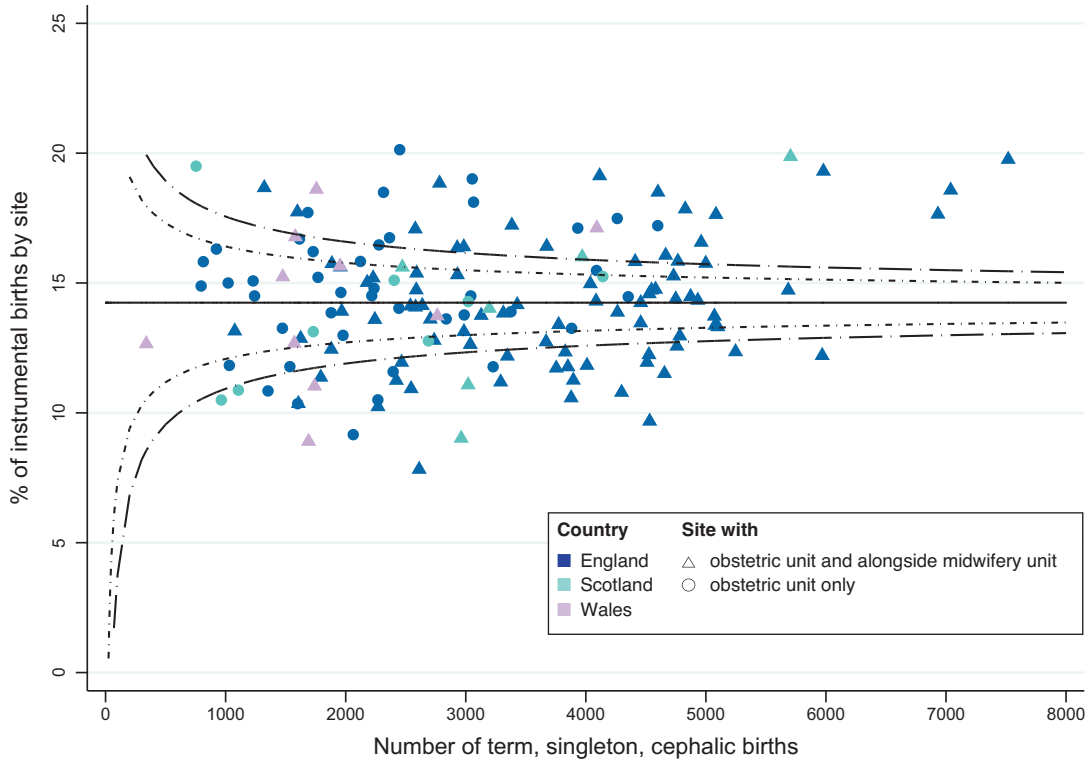


Figure 17: Site level proportions of women giving birth to a singleton, cephalic baby at term who have an instrumental vaginal birth, at sites with an obstetric unit

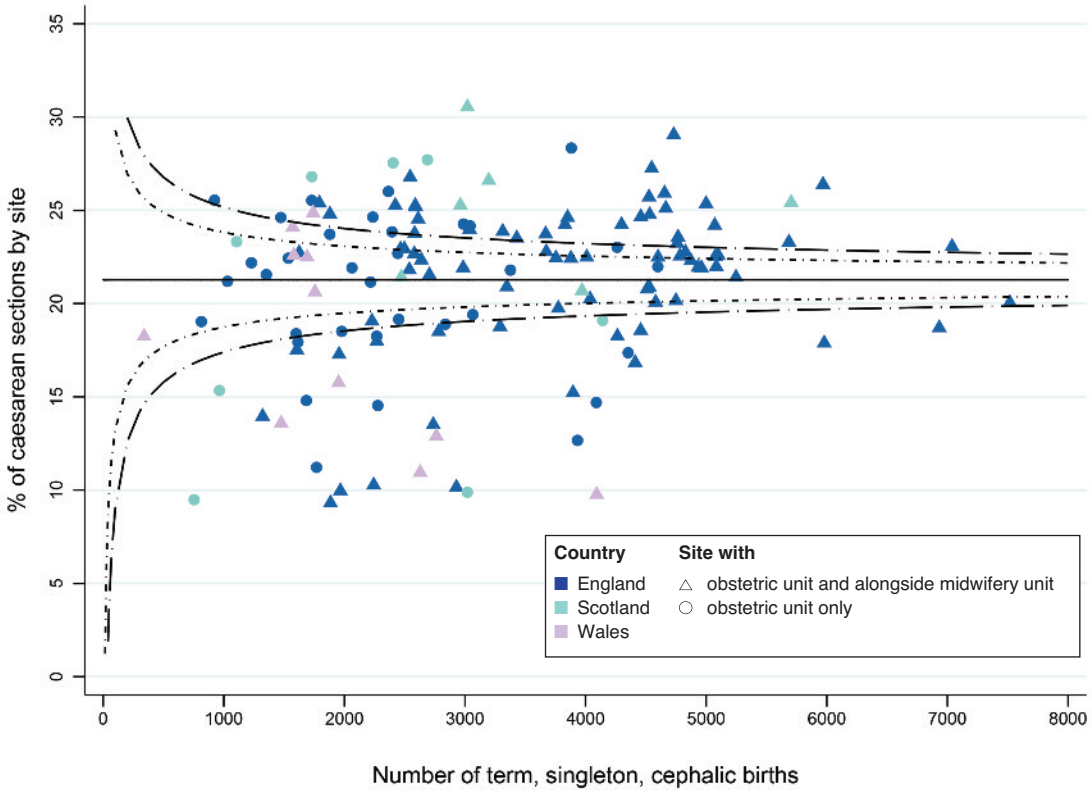


Figure 18: Site level proportions of women giving birth to a singleton, cephalic baby at term who have a caesarean birth, at sites with an obstetric unit

Vaginal birth after caesarean section

If a woman has previously given birth by caesarean section, she enters her next pregnancy with a scar on her uterus from the previous surgery. This has implications throughout pregnancy, including increased risk of miscarriage, scar ectopic pregnancy and preterm birth. There is also a risk of scar rupture, which is highest during labour.

Current UK guidance[51] recommends that a woman is offered a choice between a planned repeat elective caesarean section and a planned vaginal birth after caesarean section (VBAC), provided she does not have an absolute indication for a caesarean section. VBAC offers the benefits associated with vaginal birth as well as a reduction in risk for future pregnancies.

The funnel shows substantial variation in VBAC rates across Britain. This may reflect maternal preference, as well as clinical decision making.

What is measured:

Of women having their second baby following a caesarean section for their first baby[iv], the proportion who give birth to their second baby vaginally between 37^{+0} and 42^{+6} weeks of gestation.

iv This subgroup has been selected for the measure because of the limitations of historical records, and because this is the most common population of women considering VBAC. The rate quoted here is therefore smaller than would be expected by clinicians, as it does not include those women who previously had a vaginal birth.

Table 19: Proportion of women who had their first baby by caesarean section and who give birth to their second baby vaginally at term

Country	England	Scotland	Wales	Total (Britain)
Number of mothers eligible for VBAC and included in analysis	28,108	2543	1789	32,440
Rate of attempted VBAC (among those eligible)	45.3%	37.4%	62.0%	45.5%
Rate of successful VBAC (among those attempted)	59.9%	56.2%	73.8%	60.4%
Overall VBAC rate (among those eligible)	28.1%	21.7%	42.1%	28.4%

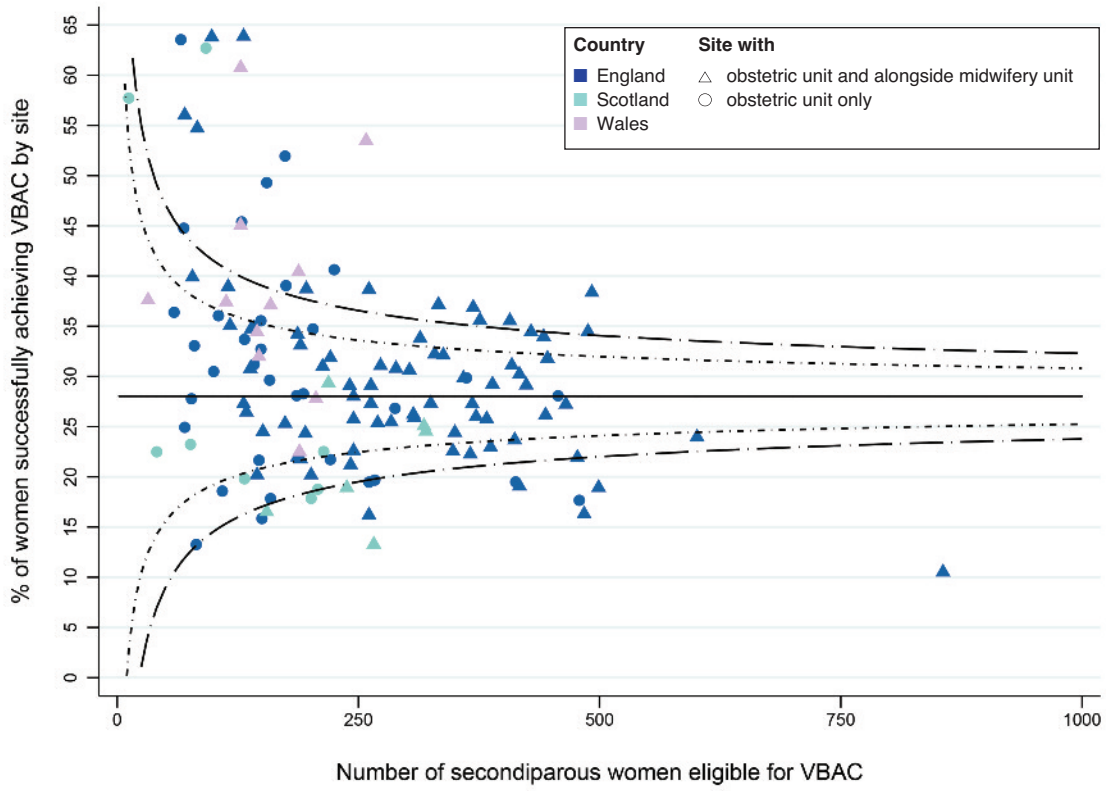


Figure 19: Site level proportions of women who had their first baby by caesarean section and who give birth to their second baby vaginally at term, at sites with an obstetric unit

Episiotomy

An episiotomy is a cut through the vaginal muscle and skin to facilitate birth of the baby. In the UK, episiotomies are typically performed medio-laterally, with the intention to reduce the likelihood of the tear extending into the anal sphincter.

Current guidelines[52] do not support the routine use of episiotomy during spontaneous vaginal birth; however, its use is indicated if there is concern about the baby's condition, or if the clinician thinks it is required, for example to avoid a third or fourth degree tear.

Observational studies[53,54] have shown reduced obstetric anal sphincter injury rates among women having an episiotomy, with the evidence particularly strong for instrumental births. However, association is not the same as causation, and there is currently no evidence to support the routine use of episiotomy.

The rate of episiotomy should be considered together with the rate of instrumental birth and the rate of 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 had an episiotomy.

Table 20: Proportion of women who have a vaginal birth of a singleton, cephalic baby at term and who have an episiotomy

Country		England	Scotland	Wales	Total (Britain)
Number of mothers included in analysis		313,392	33,404	16,769	365,565
Overall rate	Overall	21.7%	25.4%	21.1%	22.0%
	Spontaneous	8.5%	10.5%	9.1%	8.7%
	Instrumental	85.5%	91.4%	86.3%	86.1%

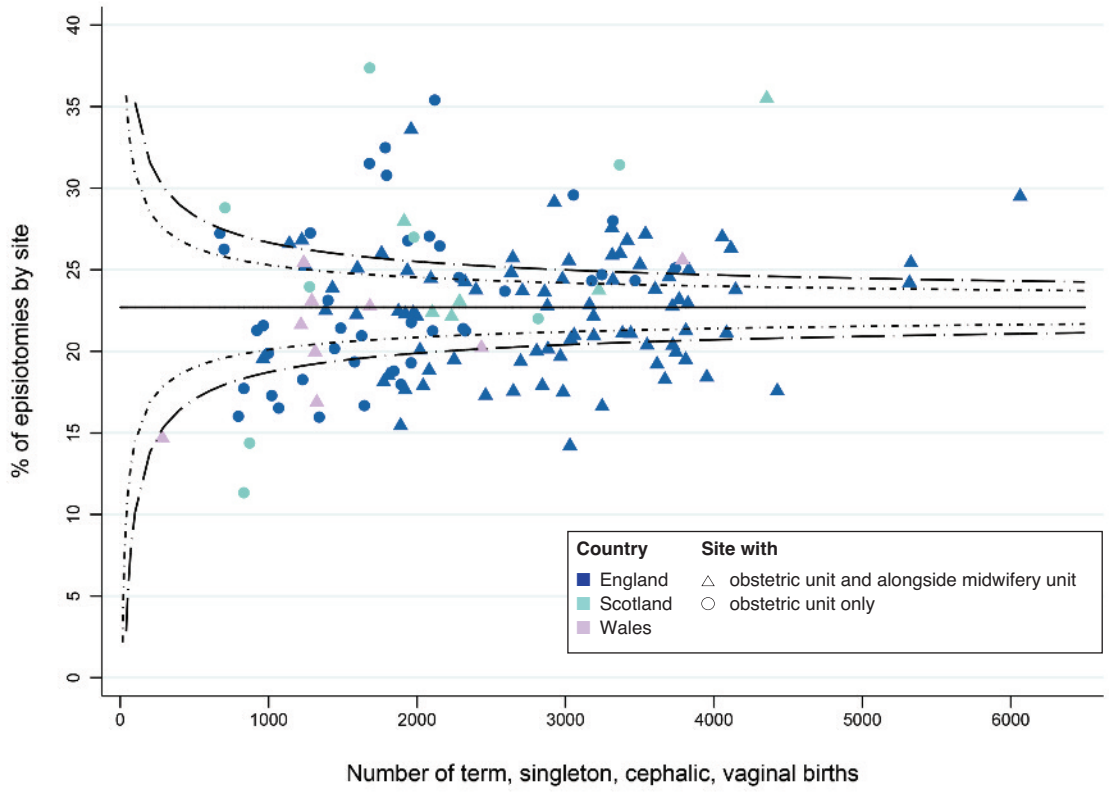


Figure 20: Site level proportions of women who have a vaginal birth of a singleton, cephalic baby at term and who have an episiotomy, at sites with an obstetric unit

Third and fourth degree tears

Vaginal birth may be accompanied by tearing of the vaginal skin and muscle; 85% of women giving birth for the first time will sustain a tear. Obstetric anal sphincter injury (OASI) is a major complication of vaginal birth, occurring in 2.9% of all vaginal births in England.[2,54] An OASI is defined as a tear occurring during birth that extends into the anal sphincter and/or anal mucosa. These tears are also known as 'third degree' (extending into the anal sphincter) and 'fourth degree' (anal mucosa) tears. The rate of reported OASI has increased in recent years, tripling from 1.8% to 5.9% in primiparous women giving birth at term to a baby in the cephalic position between 2000 and 2012.[54] This increased rate is most likely due to increased awareness and detection following a concerted effort to educate clinicians.

In the UK, all OASI are repaired as soon as possible after birth in order to reduce the risk of long term incontinence. Even with timely repair, the risk of complications is high: 20-40% of women will have symptoms of incontinence or urgency at 12 months after giving birth.[55–57] A care bundle aimed at reducing rates of OASI is currently being piloted.[58]

As the rate of OASI varies by mode of birth, this indicator should be considered in the context of the rates of unassisted and assisted vaginal birth. However, even after adjustment for this and case mix, the rate of OASI varies substantially between sites. This may be partially due to better detection and recording of these tears, but may also reflect differences in true rates between sites.

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 sustained a third or fourth degree tear.

Table 21: Proportion of women who have a vaginal birth of a singleton, cephalic baby at term and who sustain a third or fourth degree perineal tear

Country		England	Scotland	Wales	Total (Britain)
Number of mothers included in analysis		241,204	33,901	8492	383,597
Proportion overall sustaining third or fourth degree tear		3.6%	3.4%	3.3%	3.5%
Primiparous women	Spontaneous	5.4%	4.9%	4.5%	5.3%
	Instrumental	7.8%	7.0%	8.5%	7.7%
Multiparous women	Spontaneous	1.6%	1.5%	1.4%	1.6%
	Instrumental	4.8%	4.1%	5.4%	4.7%

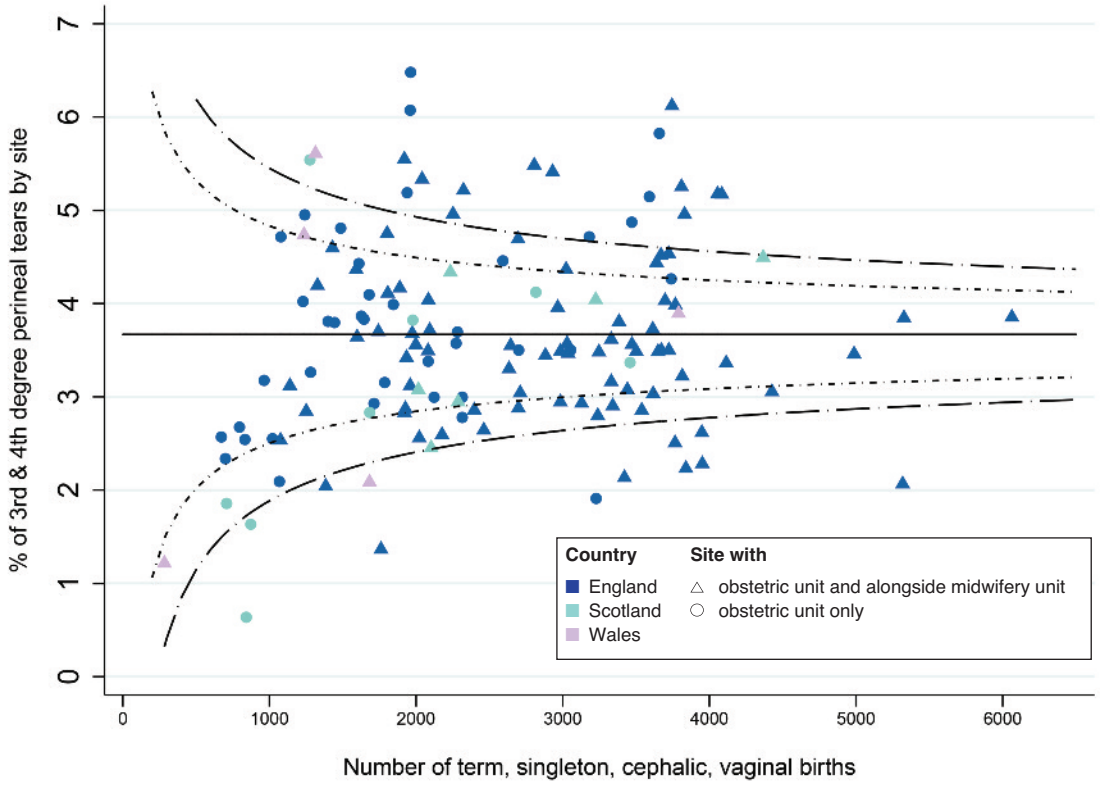


Figure 21: Site level proportions of women who have a vaginal birth of a singleton, cephalic baby at term and who sustain a third or fourth degree perineal tear, at sites with an obstetric unit

Obstetric haemorrhage of 1500ml or more

Obstetric haemorrhage is a major source of morbidity and one of the most common direct causes of maternal mortality. Between 2012 and 2014, 13 women per 100,000 died from obstetric haemorrhage.[59] Many more will receive blood transfusions, experience prolonged stays in hospital and be unwell after birth. The most common cause of any postpartum haemorrhage (PPH) is failure of the uterus to contract down after birth; this is more likely in women who are obese, have a multiple birth or large baby, have a prolonged labour or caesarean section, or who have had a haemorrhage before. A threshold of 1500ml of blood loss is used to define 'massive' obstetric haemorrhage.[60]

There has previously been little information available about PPH rates on a national level, although a systematic review has suggested that there may be regional variation in its prevalence.[61] This is reflected in our findings, where there is substantial variation in the proportion of women recorded as having a PPH of 1500ml or more.

Visual estimation often underestimates blood loss[62] and in significant haemorrhage blood collection drapes[63] or weighing of swabs[64] should be used for a more accurate estimate. An apparently low rate of PPH can, therefore, be due to poor practice in estimation.

Estimated blood loss is not recorded as a continuous variable in SMR02; instead there is an indicator for whether the woman lost more than 500ml of blood at birth.[5] This does not meet the definition here, so Scotland is excluded from this indicator.

What is measured:

Of women who give birth to a singleton baby in the cephalic position between 37^{+0} and 42^{+6} weeks of gestation, the proportion who sustained an obstetric haemorrhage of 1500ml or more.

Table 22: Proportion of women who have a singleton, cephalic baby at term and who have an obstetric haemorrhage of 1500ml or more

Country	England	Wales	England and Wales
Number of mothers included in analysis	318,921	21,692	340,613
Overall proportion of women having a haemorrhage ≥1500ml	2.7%	2.1%	2.6%
Proportion among women having a vaginal birth	2.1%	1.6%	2.1%
Proportion among women having a caesarean birth	4.1%	4.9%	4.1%

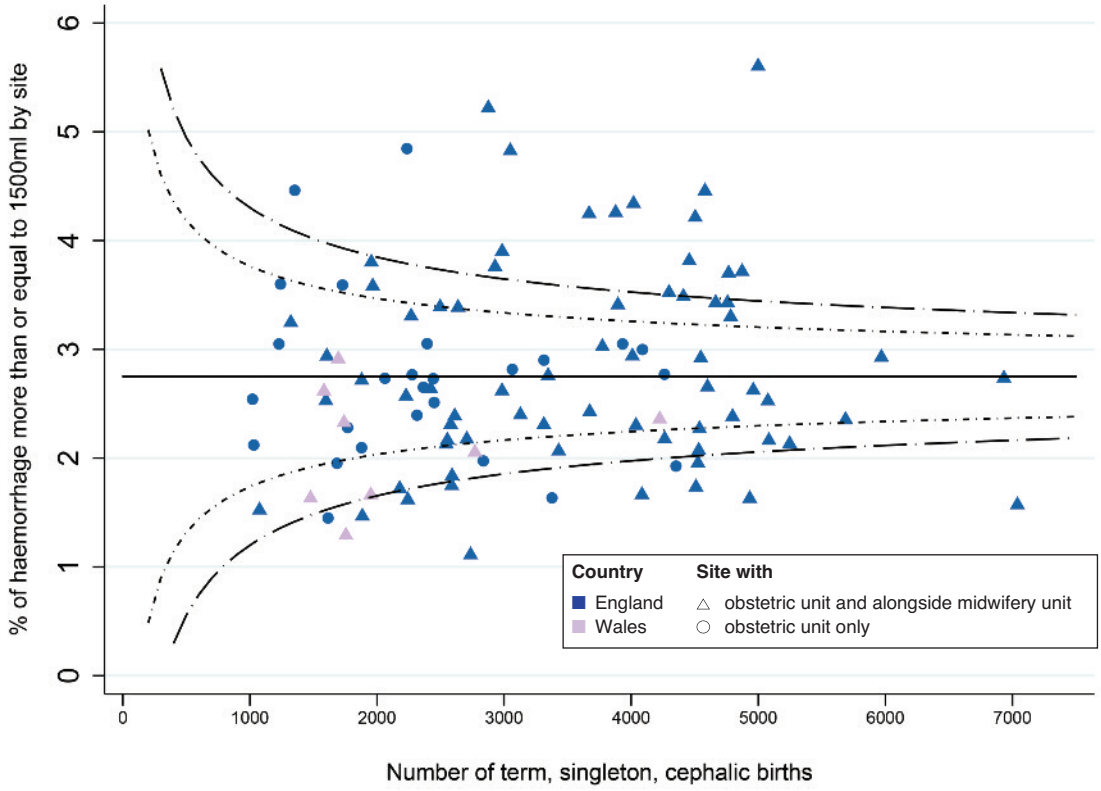


Figure 22: Site level proportions of women who have a singleton, cephalic baby at term and who have an obstetric haemorrhage of 1500ml or more, at sites with an obstetric unit

Five minute Apgar score

The Apgar score is a five component score used to summarise the condition of a newborn baby, typically at 1, 5 and 10 minutes of age.[65] A 5 minute Apgar score of less than 7 has been associated with an increased risk of cerebral palsy, epilepsy, developmental delay and infant mortality. There are some concerns that Apgar scores may not be always correctly assessed and recorded.[66–68] However, it is almost universally recorded, unlike other forms of evaluation of the baby's condition, such as measurement of cord pH, which is usually only measured where there is clinical concern.[69]

Table 23: Apgar scoring system

Score	0	1	2
Skin colour	Blue or pale all over	Blue extremities, body pink	Pink all over
Pulse rate	Absent	<100 beats per minute	>100 beats per minute
Reflex irritability	No response to stimulation	Grimace on suction or stimulation	Cry on stimulation
Activity	None	Some flexion	Flexion of arms and legs, resisting extension
Respiratory effort	None	Weak, gasping	Strong cry

The Apgar score of a newborn is not always a direct consequence of the care given to the mother during pregnancy and birth; babies with congenital abnormalities, for example, are more likely to have a lower score, but information on congenital abnormalities is incomplete in our dataset.

Despite these caveats, the proportion of babies with a low five minute Apgar score is relatively homogeneous within Britain suggesting that there is a level of agreement in its measurement.

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 five minutes of age.

Table 24: Proportion of singleton babies born at term who are assigned an Apgar score of <7 at five minutes of age

Country	England	Scotland	Wales	Total (Britain)
Number of babies included in analysis	413,853	48,029	23,291	480,480
Proportion of babies with Apgar score <7 at 5 minutes	1.2%	1.3%	1.2%	1.2%

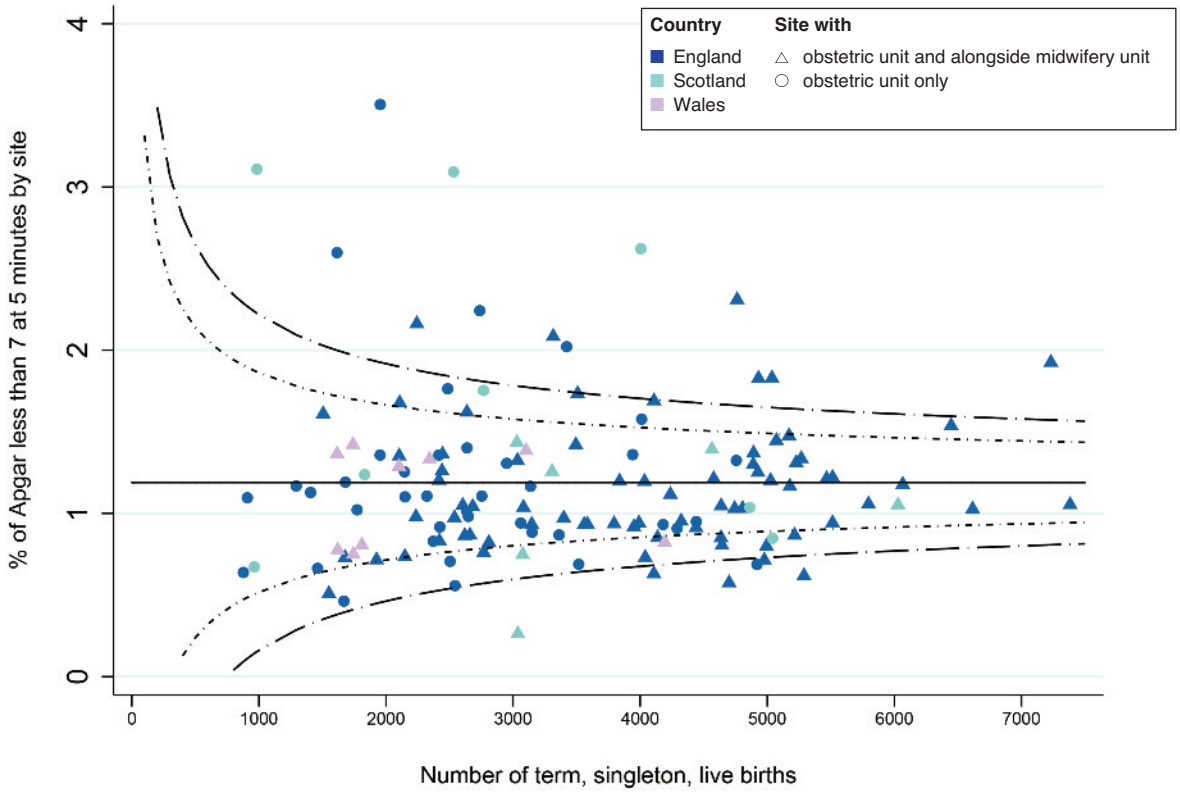


Figure 23: Site level proportions of singleton babies born at term who are assigned an Apgar score of <7 at five minutes of age, at sites with an obstetric unit

Skin to skin contact within one hour of birth

Early skin to skin contact has been shown to improve breastfeeding initiation and continuation rates for healthy newborns from 35 weeks of gestation.[70] There is also evidence to suggest a positive impact on the stability of the cardio-respiratory system in babies who received skin to skin contact. Supporting early skin to skin contact is one of UNICEF-UK's Baby Friendly standards.[71]

This information is only available for babies born in England because it is not recorded in the Scottish or Welsh datasets.

There is substantial variation in these rates; while some of this may be due to coding, it is likely to also reflect differences in practice between sites.

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 one hour of birth.

Table 25: Proportion of babies born between 34 weeks and 42 weeks who receive skin to skin contact within one hour of birth

Country	England
Number of babies included in analysis	341,150
Proportion of babies receiving skin to skin contact within one hour of birth	79.8%
Proportion among babies born between 34^{+0} and 36^{+6} weeks gestation	55.0%
Proportion among babies born between 37^{+0} and 42^{+6} weeks gestation	81.3%

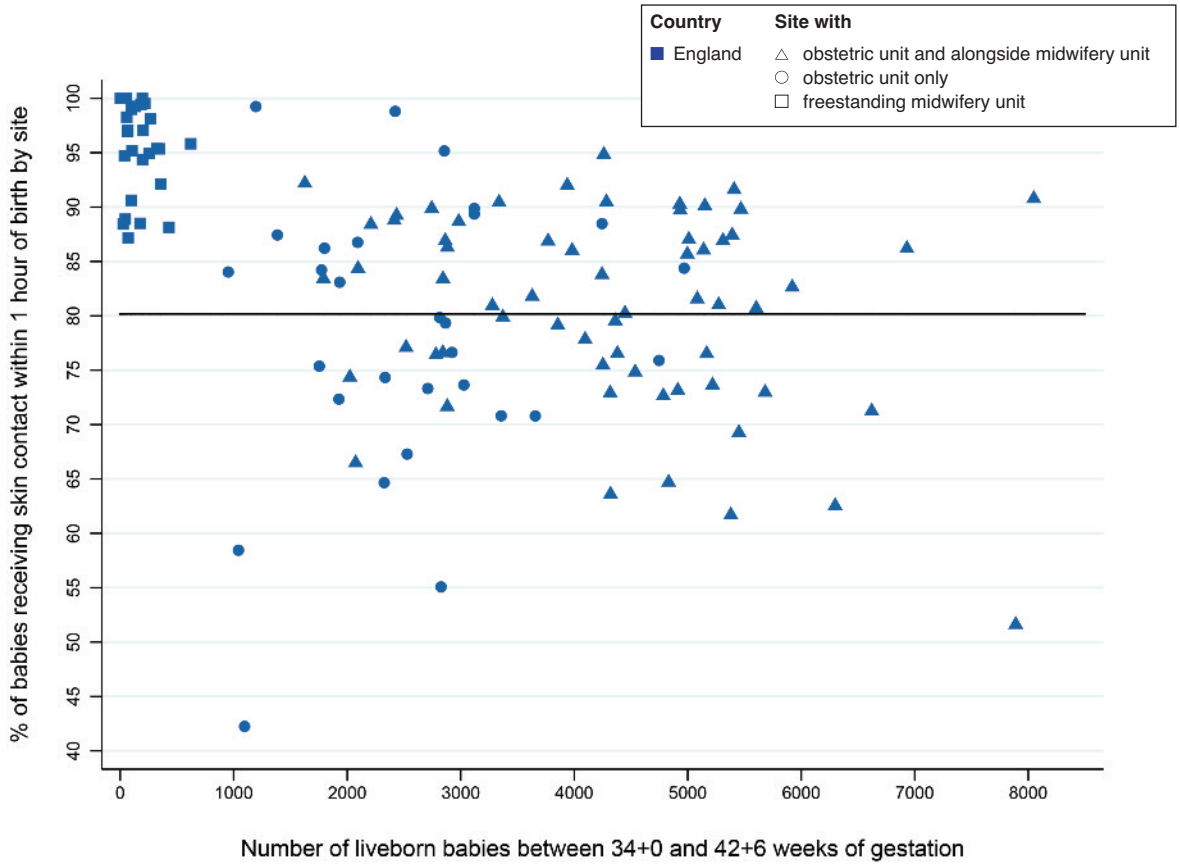


Figure 24: Site level proportions of babies born between 34 weeks and 42 weeks who receive skin to skin contact within one hour of birth. Note these data are presented for sites with an obstetric unit and for freestanding midwifery units

Breast milk at first feed, and at discharge

Breastfeeding is associated with significant benefits for mothers and babies. For the baby, there is protection against childhood infections, diabetes and rates of obesity, along with an increase in measured intelligence.[72,73] For the mother, breastfeeding offers protection against breast cancer and weight gain, along with probable protection against ovarian cancer and type two diabetes.[71] The UNICEF-UK Baby Friendly Initiative champions a range of interventions to support breastfeeding and 59% of maternity services are fully accredited, with a further 32% working towards accreditation.[71]

Data on this measure are not available for Wales.

There is very large variation between sites in recorded breastfeeding rates, with rates from 45% to greater than 90% at both first feed and discharge.

What is measured:

Of liveborn babies born between 34^{+0} and 42^{+6} weeks of gestation, the proportion who received any breast milk for their first feed, and at discharge from the maternity unit.

Table 26: Proportion of babies born between 34 weeks and 42 weeks who receive breast milk (a) at their first feed and (b) at discharge

Country		England	Scotland	England and Scotland
Number of babies included in analysis		366,094	28,403	394,497
Overall proportion receiving breast milk at first feed		74.1%	67.2%	73.6%
Overall proportion receiving breast milk at discharge		69.9%	56.8%	68.1%
Proportion of babies born between 34^{+0} and 36^{+6} weeks gestation receiving breast milk	At first feed	61.5%	58.0%	61.3%
	At discharge	57.9%	48.7%	56.5%
Proportion of babies born between 37^{+0} and 42^{+6} weeks gestation receiving breast milk	At first feed	74.7%	67.7%	74.2%
	At discharge	70.5%	57.3%	68.7%

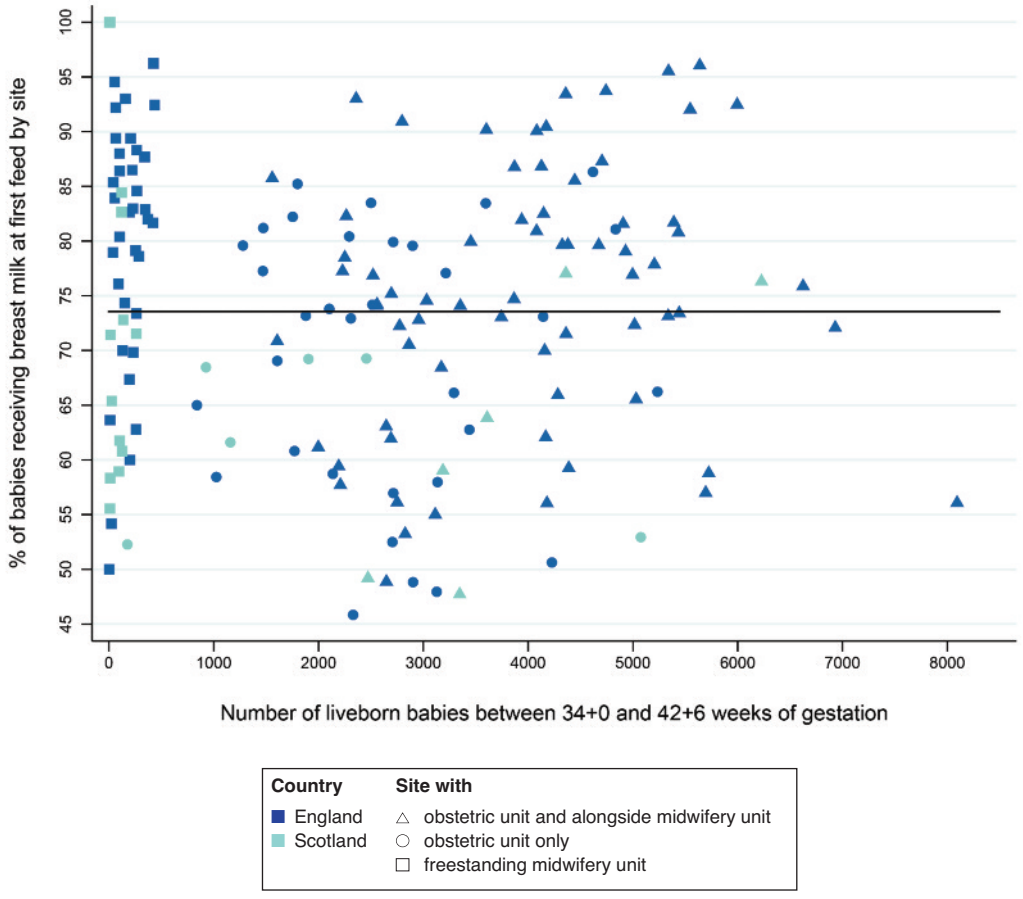


Figure 25: Site level proportions of babies born between 34 weeks and 42 weeks who receive breast milk at their first feed. Note these data are presented for sites with an obstetric unit and for freestanding midwifery units

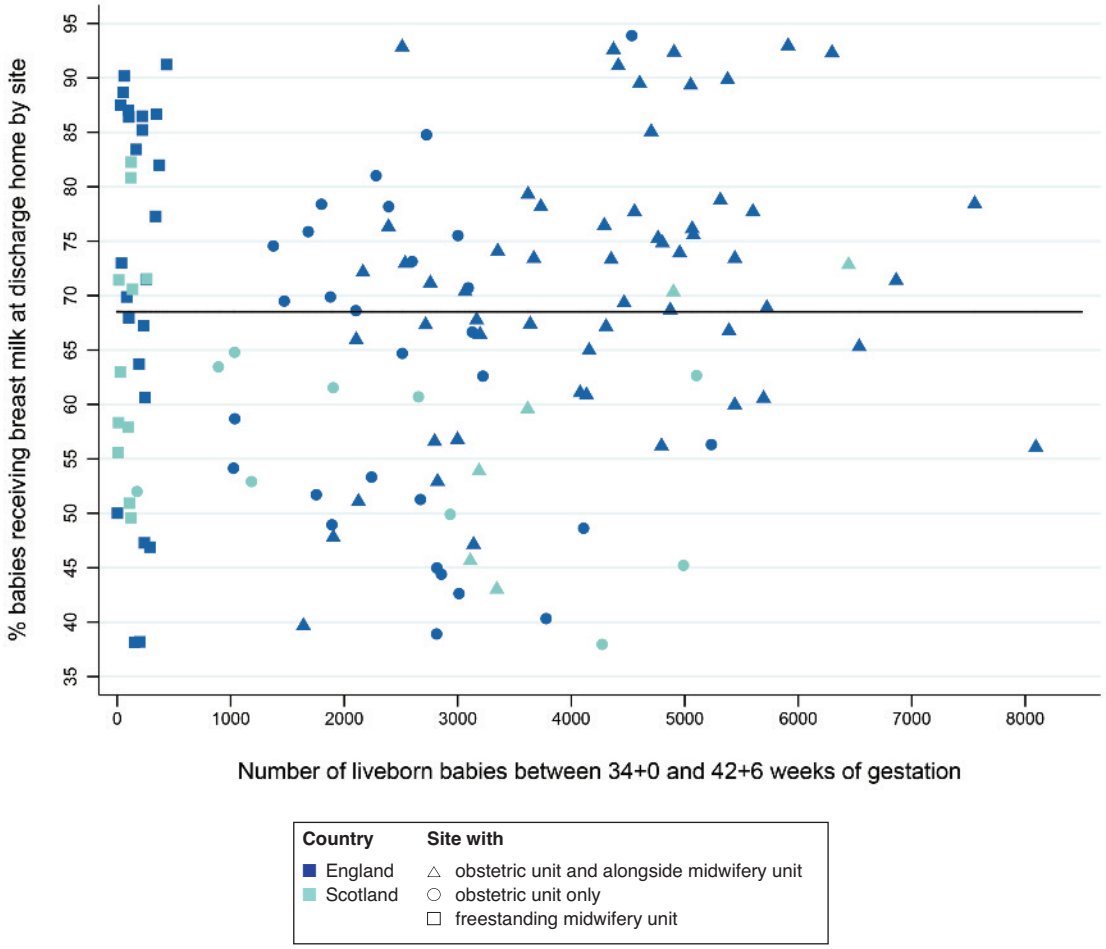


Figure 26: Site level proportions of live babies born between 34 weeks and 42 weeks who are receiving breast milk at discharge from the maternity unit. Note these data are presented for sites with an obstetric unit and for freestanding midwifery units

Unplanned maternal readmission

In the UK, there is no recommended minimum length of stay in hospital after birth for healthy mothers and babies, and the average length of stay is one of the lowest in the world.[74] There is some concern that pressure on beds and rapid discharges are associated with increased readmission rates.

Emergency readmission to hospital within 6 weeks of birth represents a deviation from the normal course of postnatal care, separating new families and having potential emotional and social consequences, in addition to physical morbidity. The most common causes of maternal readmission are infection, wound breakdown, pain, anaemia and venous thromboembolism; rarely, readmission is due to surgical complication.

Data on this measure are not available for Wales.

What is measured:

Of women giving birth, those who have an unplanned, overnight readmission to hospital within 42 days of giving birth, excluding those accompanying an unwell baby.

Table 27: Proportion of women who have an unplanned, overnight readmission to hospital within 42 days of giving birth

Country		England	Scotland	Total (England and Scotland)
Number of mothers included in analysis		456,359	48,400	504,759
Overall rate	Overall	2.4%	2.9%	2.5%
	Among women who had a vaginal birth	2.1%	2.5%	2.1%
	Among women who had a caesarean birth	3.6%	3.8%	3.6%

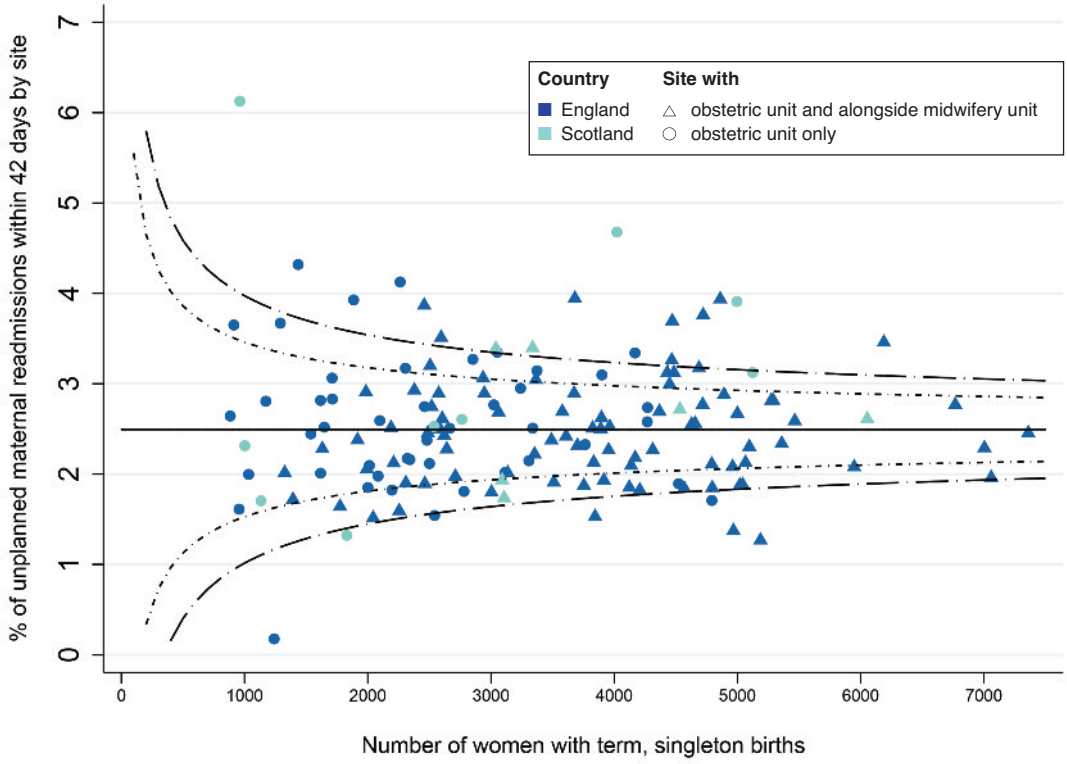


Figure 27: Site level proportions of women who have an unplanned, overnight readmission to hospital within 42 days of giving birth, at sites with an obstetric unit

Discussion

This first set of NMPA measures shows that, while the information held on maternity information systems is variable in quality, it can be used to make meaningful observations about maternity care within and between countries in Britain.

This 'balanced scorecard' of measures allows women, clinicians, commissioners and policymakers to evaluate care given locally and nationally in order to facilitate improvement. Our findings show the population of women cared for by maternity services across Britain; for the first time, we are able to describe and adjust for characteristics such as body mass index at booking, improving the fairness of comparisons between services. The measures demonstrate current practice and variation in a range of areas where there is no 'ideal' rate, for example in caesarean section. This enables maternity services to benchmark themselves against national averages and is particularly important for the three 'outlier' indicators of third and fourth degree tears, low Apgar score at five minutes and obstetric haemorrhage, where a high rate represents an excess of poor outcomes for mothers and their babies.

However, it is challenging to draw conclusions from variation alone. Variation is a feature of health specialities and systems.[75] Studies across the world have shown variation between hospitals in rates of key measures, such as caesarean section.[76,77] Not all variation is unwarranted: while some variation is due to poor knowledge and processes, some is due to patient-centred care.[78] It is not always obvious to pinpoint what is inappropriate; the 'ideal' rate for caesarean section may lie with the units with the lowest rate, those with the highest rate or those in the middle.

This report therefore provides a starting point for reflection as well as measurement of care. We would urge individual maternity services to take these results and examine their own rates and their accuracy in recording these important outcomes. Where a concern is recognised, services should proceed to identify, implement and share methods for improvement. Where a service truly achieved a positive rate, this good practice should be celebrated and shared for others to learn from. The NMPA programme will seek to disseminate case studies as it develops further.

Recommendations

Recommendations for individual clinicians

- Clinicians involved in maternity care should, in multidisciplinary teams, familiarise themselves with the findings for their own service and how these compare to national averages in order to determine the focus of quality improvement activity required.
- Clinicians should make every possible effort for all babies to have skin to skin contact with their mothers within one hour of birth, where the condition of mother and baby allows. For babies who are to be admitted to a neonatal unit, all efforts should be made to offer skin to skin contact prior to transfer of the baby where the baby's clinical condition allows.
- Clinicians should record maternal smoking status, both at booking and at the end of pregnancy.

Recommendations for services

- Services should examine their own findings and data quality and compare these to internal audits where available, both to evaluate their data quality and to consider how they compare with national rates, and to determine action plans for quality improvement.
- Results for individual measures should not be interpreted in isolation. Rather, services should examine all measures together, attempting to understand possible relationships between them, and use this analysis to improve services as a whole, not just to one particular target. Measures in this report should also be considered together with perinatal mortality results from MBRRACE and measures of neonatal care from the National Neonatal Audit Programme (NNAP).
- Where the rate for a service differs substantially from the overall rates, the service should identify reasons for this. This includes rates that appear to be 'positive' outliers as this may be due to under-diagnosis or data quality issues. Where true positive outliers are identified, services should consider ways of sharing best practice with their peers and with the NMPA so that these can be shared with other services.
- Services should ensure that local information about the rates of measures of care and outcomes in labour is made available to women using their services.

- Audit departments should facilitate dissemination of these findings among all relevant staff and services and commissioners should share and discuss the findings as part of their Maternity Voices Partnerships (formerly Maternity Services Liaison Committees).
- Further work is needed to understand the potential for increased use of midwife-led settings. This includes gaining a better understanding of the proportion of women considered suitable to use these settings and the criteria applied by different services through local review by providers and commissioners, inclusion of relevant questions in national surveys of women, and further research.
- Maternity services, commissioners, GPs and local authorities should work together to support women to achieve and maintain a healthy weight before, during and after pregnancy.
- Services should engage with national initiatives aimed at identifying babies that are small for gestational age (the Saving Babies' Lives care bundle in England and the Scottish Patient Safety Collaborative) in order to enable appropriate care for mothers carrying small for gestational age babies.
- Services should conduct an internal audit of their elective deliveries prior to 39 weeks without recorded clinical indication. This should aim to identify whether improvements in clinical practice or documentation, or both, are required to ensure that elective delivery before 39 weeks only occurs with appropriately documented clinical indication.

Recommendations for commissioners

- Commissioners should facilitate the dissemination of these results to GPs and local authorities.
- When planning services, commissioners together with policymakers and providers should take into account local demographics, including the increasing age and BMI of women giving birth.
- Commissioners, in collaboration with public health departments and services, should examine the rates of women who stop smoking during pregnancy and consider initiatives to increase this.
- Commissioners, together with clinicians, services and policymakers should strongly prioritise the provision of resources to support breastfeeding, both in maternity units and in the community to reduce the variation in the proportion of babies receiving breast milk at their first feed and at discharge from the maternity unit.
- Commissioners should support services to collect information on planned and actual place of birth, distinguishing between obstetric units, alongside midwifery units, freestanding midwifery units and home, and to collect information on transfers in utero, and during labour and the postnatal period.

Recommendations for national bodies and policymakers

- Professional bodies and policymakers should establish tools for investigating and reducing unwarranted variation.
- National bodies should develop initiatives to assist clinicians to effectively predict, prevent and recognise severe obstetric haemorrhage.
- National bodies should look to develop self-reported outcome and experience measures for women using maternity services to complement the set of NMPA measures.

Stakeholder perspectives

A family's perspective

When I was expecting my first baby I assumed that maternity care was pretty standard up and down the country. After all, women have been giving birth for as long as there have been women, surely we should have this all figured out by now? But as I went through that pregnancy and the two that followed, and talked to friends all over the country as they became parents, it became clear just how wrong my assumption had been. The services that were standard in my little corner of London could be unrecognisable in Colchester and completely different again in Glasgow. They might even be different at the other London hospital a few miles up the road.

This is why I was pleased to hear about the NMPA and why I feel so privileged to be part of the Women and Families Involvement Group working on it. It is vital that we identify where things are going wrong, both in individual trusts and nationally. The impressive scale of the data set makes the NMPA a very powerful tool for doing that. But it also lets us identify what is working well, so we can spread the innovations and successes of individual organisations to the whole UK.

Crucially, we have the opportunity to share what we are learning with those it will matter to most, the expectant parents whose pregnancy is not a routine event or a statistic, but a life changing, unique process, one that can seem daunting and confusing.

Each time I began planning for a baby, I turned to the internet to try and understand my options; which hospital was best? Where would I be safest? Where could I access the services that mattered to me? With each pregnancy the questions were different. I started out as a low risk woman in her twenties, but by the time my third child was born, earlier this year, I was heading rapidly towards 40 and ticking the high risk box several times. Yet with each set of searches I found the same things: an overwhelming amount of mostly contradictory information on some subjects, and almost nothing on others. I am fortunate to live in an area where I had choices about my maternity care, but without good information how could I be confident in making those choices?

By communicating the findings of the NMPA to those using maternity services we can give them the clear, unbiased information that is often so lacking. We can enable parents to have meaningful discussions with their doctors and midwives, about what actually matters in their individual case, and ensure they can make genuinely informed decisions about their maternity care.

Kirsty Sharrock, NMPA Women and Families Involvement Group member

A midwifery perspective

As a Head of Midwifery I found the report incredibly useful; by participating in the National Maternity and Perinatal Audit we are reaping the benefits of the time midwives in particular spend recording women's and babies' care. It reinforces the importance of correct measurement and the value of accurate data collection, and I will make it my priority to work closely with clinical staff and the IT department to ensure all our data are consistently of the highest quality.

One of the most powerful messages from the report was that while an increasing number of women give birth in midwifery units, more women could potentially do so, and I endorse the recommendation that maternity services should look into this locally and develop strategies to overcome barriers and increase the use of midwife-led settings. More women giving birth in the place most suitable for them, be it a midwifery unit, home or an obstetric unit, will mean a better use of resources and potentially better outcomes and experiences.

The report reinforces the trends of increasing maternal BMI and age, which impact on the maternity services. While these are adjusted for in the results, there may be other aspects of women's health or circumstances which could account for some of the wide variation in the use of induction, instrumental and caesarean birth, and episiotomy. However, we need to ensure variation due to differences in clinical practice is minimised. As midwives and obstetricians we also need to focus on prevention of adverse outcomes like major obstetric haemorrhage, third and fourth degree tears, low Apgar scores and readmissions.

The variation in the proportion of babies who have skin to skin contact and breast milk is unacceptably high; we need to urgently investigate the reasons for this and share good practice. Staffing levels may be a contributing factor and I support the recommendation for commissioners, services and policymakers to strongly prioritise adequate resourcing to support breastfeeding. Smoking cessation support should also remain a priority.

The National Maternity and Perinatal Audit provides a great opportunity for us all to learn from each other. It is vital that all members of the maternity team are involved in using the NMPA data to identify opportunities for improvement and I urge midwives to take a leading role in this.

Manjit Roseghini, Head of Midwifery and Women's Health Service, Whittington Health NHS Trust

An obstetric perspective

This first NMPA report continues to highlight the variation in key maternal and neonatal outcomes that have been previously noted by the RCOG clinical indicator reports.[2,79]

From an obstetric perspective the challenge to clinicians is firstly to digest the findings to their own clinical teams and disseminate through recognised local forums. Thereafter the degree of variation from the national mean needs to be addressed via multidisciplinary mechanisms such as multiprofessional training in obstetric emergencies and fetal heart rate monitoring. Other variations in practice in areas such as induction or VBAC rates will require longer term planning with key clinical collaborators such as midwifery colleagues and involvement of mothers themselves.

Together with the previously published organisational audit this first report of the NMPA is greatly welcomed by the obstetric profession. It is anticipated that it will function as a catalyst to reduce the variation in clinical practice and improve clinical outcomes for our mothers and their babies.

Alan Cameron, Consultant Obstetrician and Subspecialist in Maternal-Fetal Medicine, NHS Greater Glasgow & Clyde

A neonatal perspective

The publication of the NMPA first continuous audit report is warmly welcomed. It is a fantastic achievement to have collected such a comprehensive data set across so many systems in many different trusts in different regions of the UK. The National Neonatal Audit Programme (NNAP) has been in place for a number of years now providing an informative set of audits with regard to the quality of care on neonatal units. NNAP has increased the focus on quality of care in neonatology, and improved data recording over time resulting in more meaningful and useful outcomes and measures. The reports which the NMPA produces will add to this and give a wider obstetric and maternity context to some of the outcomes.

Neonatal outcomes are important to both maternity and neonatal professionals, and many of the measures included in the NMPA are of relevance to the newborn. Evidence that a large proportion of mothers has a high BMI clearly affects maternal morbidity but is also of relevance to the number of babies who may have related complications such as neonatal hypoglycaemia. The finding that although there is a low rate of Apgar scores <7, there is significant variation in this rate could reflect the way that Apgar scores are measured and recorded or may represent true differences in care which have an impact on outcomes. Data like these raise questions which can only be answered with improved data collection and improved outcome measures, something which I hope will develop over time.

Another important outcome of relevance to the newborn is the number of elective caesarean sections performed before 39 weeks of gestation without a documented clinical indication. Early term caesarean sections impact on neonatal morbidity, increasing the number of infants needing admission to neonatal units. This highlights the importance of good documentation and improved data capture, with the aim of demonstrating improvements in the quality of care and outcomes. Variation in the initiation of breast feeding is already well recognised, although it is not always clear how it can be improved. There will be lessons to be learnt from the NMPA which may help to improve breastfeeding rates generally.

In order to ensure complete data collection, the NMPA requires all participating maternity services to have the correct resources, including good IT systems, and the right number of appropriately trained staff. It is hoped that this report will emphasise the importance of this.

Many important neonatal outcomes are affected by maternity care, and it would thus be good to see more of these included in maternity datasets and the NMPA. I look forward to the neonatal sprint audit which will focus more on neonatal issues. The obstetric and organisational data contained in the NMPA give very useful information on issues which impact on neonatal services and have potential to provide a starting point for joint working to ensure that maternity services are designed to deliver the best outcomes for mothers and babies.

Stephen Wardle, Consultant Neonatologist Nottingham University Hospitals, on behalf of the British Association of Perinatal Medicine

A commissioning perspective

Commissioners have a responsibility to assess the needs of their local community, plan and purchase services in accordance to these and then monitor and regularly review them. For maternity services this equates to commissioners having a maternity health needs assessment, a service specification and contract with one or more providers for their defined population.

Often commissioners will also have a longer-term focused maternity strategy, one that reflects the transformational agenda of the national 'Better Births' publication. Recently there has been recognition of the need for commissioners and providers, as well as other key stakeholders to work together across a wider geographical footprint. In England this is demonstrated by the recent formation of the Local Maternity Systems (LMS), often on the footprint of a Sustainable Transformation Plan area (STP).

The NMPA clinical audit is an excellent resource for commissioners in their role of assuring the clinical quality of the services they commission, whether at a local level, or to support conversations within the LMS. Current methods, such as maternity dashboards, support conversations between commissioners and providers (clinicians and managers) but have many caveats as to the robustness of the data and often have substantial limitations in terms of being able to benchmark with similar units elsewhere.

Effective commissioning is delivered by having access to robust and intelligent data and by having excellent relationships with local providers and partners in order to review and understand areas needing to be prioritised for service improvement.

The NMPA clinical audit provides a credible source of intelligence to inform these local discussions. This resource, alongside the local maternity health needs assessment to understand case mix, and an effective method of including the voices of local women and families, will focus where improvement is needed and where a local deeper dive is required.

The NMPA clinical audit, alongside the organisational audit already published and the forthcoming sprint audits are a critical resource for all stakeholders involved in planning and providing maternity services to utilise together.

Jane Mischenko, Lead Commissioner for Children & Maternity Services, NHS Leeds South & East CCG

Appendix 1
Contributors

NMPA Clinical Reference Group (CRG)

(Role on CRG between brackets)

Mrs Victoria Stakelum, Women's Network Member, Royal College of Obstetricians and Gynaecologists (RCOG) (Chair)

Prof Jacqueline Dunkley-Bent, Acting Head of Midwifery, NHS England (Funding body representative)

Dr Corinne Love, Senior Medical Officer, Scottish Government (Funding body representative)

Dr Claire Francis, Maternity Network Wales Clinical Lead, NHS Wales (Funding body representative)

Mr Edward Morris, Vice President Clinical Quality, RCOG/Chair NMPA Project Board (Collaborating organisation)

Prof Anne Greenough, Vice President Science and Research, Royal College of Paediatrics and Child Health (Collaborating organisation)

Prof Alan Cameron, Senior Clinical Advisor, Lindsay Stewart Centre for Audit and Clinical Informatics, RCOG (Collaborating organisation)

Ms Mandy Forrester, Head of Quality and Standards, Royal College of Midwives (Collaborating organisation)

Prof Jan van der Meulen, Clinical Epidemiologist, London School of Hygiene and Tropical Medicine/Chair NMPA Project Team (Collaborating organisation)

Ms Katharine Robbins, Information Analysis Lead Manager (Maternity, Child Health and Community), NHS Digital (National data partner)

Dr Nicola Steedman, Clinical Lead, Maternal and Sexual Health, Information Services Division of NHS National Services Scotland (National data partner)

Ms Kathryn Greaves, Safer Pregnancy Wales Project Lead, Public Health Wales (Stakeholder)

Ms Beverley Beech, Chair, Association for Improvements in the Maternity Services (AIMS) (Stakeholder)

Dr Steve Wardle, Representative for the North of England, British Association of Perinatal Medicine (BAPM) (Stakeholder)

Ms Janet Scott, Research and Prevention Lead, Sands (Stakeholder)

Ms Zoe Chivers, Head of Services, Bliss (Stakeholder)

Prof Jenny Kurinczuk, Director, National Perinatal Epidemiology Unit/Lead, MBRRACE-UK (Stakeholder)

Dr Rupert Gauntlett, Executive Committee Member, Obstetric Anaesthetists Association/Consultant Obstetric Anaesthesia and Intensive Care Medicine, Royal Victoria Infirmary, Newcastle upon Tyne (Stakeholder)

Dr Louise Page, British Maternal and Fetal Medicine Society (Stakeholder)

Dr Jane Mischenko, Lead Commissioner for Children & Maternity Services, NHS Leeds South & East CCG (Stakeholder)

Ms Elizabeth Duff, Senior Policy Adviser, National Childbirth Trust (Stakeholder)

Ms Manjit Roseghini, Head of Midwifery and Women's Health Service, Whittington Health NHS Trust (Stakeholder)

Dr Sam Oddie, Clinical Lead, National Neonatal Audit Programme (Stakeholder)

Prof Gordon Smith, Head of Department, Department of Obstetrics and Gynaecology, University of Cambridge School of Clinical Medicine/Chair, RCOG Stillbirth CSG (Independent clinical academic)

Prof Jane Sandall, Professor of Social Science and Women's Health, King's College London (Independent clinical academic)

Prof Zarko Alfirevic, Co-Principal Investigator, Each Baby Counts/Chair, RCOG Academic Board (Independent clinical academic)

NMPA Project Board

Mr Edward Morris (Chair), Vice President Clinical Quality, RCOG

Prof Alan Cameron, Senior Clinical Advisor, Lindsay Stewart Centre, RCOG

Ms Anita Dougall, Director Clinical Quality, RCOG

Dr Alison Elderfield, Head of Lindsay Stewart Centre for Audit and Clinical Informatics, RCOG

Prof Steve Thornton, Chair, Lindsay Stewart Committee for Audit and Clinical Informatics, RCOG

Ms Sophia Olatunde, Project Manager, Healthcare Quality Improvement Partnership, HQIP

Ms Tina Strack, Associate Director for the Clinical Outcome Review Programmes, HQIP

Ms Victoria Stakelum, Chair, NMPA Clinical Reference Group

Prof Jan van der Meulen, Senior Methodologist, NMPA Project Team

Dr Tina Harris, Senior Clinical Lead (Midwifery), NMPA Project Team

Dr Jane Hawdon, Senior Clinical Lead (Neonatology), NMPA Project Team

Dr Dharmintra Pasupathy, Senior Clinical Lead (Obstetrics), NMPA Project Team

Ms Hannah Knight, NMPA Audit Lead, NMPA Project Team

Ms Mandy Forrester, Head of Quality and Standards, RCM

Prof Anne Greenough, Vice President for Science and Research, RCPCH

NMPA Women and Families Involvement Group

NMPA Project Team

Prof Jan van der Meulen, NMPA Senior Methodologist (Chair)

Dr Tina Harris, NMPA Senior Clinical Lead (Midwifery)

Dr Jane Hawdon, NMPA Senior Clinical Lead (Neonatology)

Dr Dharmintra Pasupathy, NMPA Senior Clinical Lead (Obstetrics)

Dr David Cromwell, NMPA Senior Methodological Advisor

Dr Ipek Gurol-Urganci, NMPA Senior Methodological Advisor

Ms Hannah Knight, NMPA Audit Lead

Dr Jen Jardine, NMPA Clinical Fellow (Obstetrics)

Ms Andrea Blotkamp, NMPA Clinical Fellow (Midwifery)

Dr Fran Carroll, NMPA Research Fellow
Dr Lindsey Macdougall, NMPA Data Manager
Ms Natalie Moitt, NMPA Statistician
Miss Becky Dumbrill, Lindsay Stewart Centre Administrator

Healthcare Quality Improvement Partnership Maternal, Perinatal and Infant Independent Advisory Group

Mr Derek Tuffnell (Chair)
Mr Richard Arnold
Ms Alison Baum
Ms Carole Bell
Prof Debra Bick
Mr Tim Draycott
Prof Neil Marlow
Dr Steve Robson
Prof Keith Willet
Ms Tina Strack
Ms Sophia Olatunde

Appendix 2
Site-level results

Key

- No data available for this site
- Within expected range for a site of this size (within 99.8% control limits)
- Lower than expected for a site of this size (below 99.8% control limits)
- Higher than expected for a site of this size (above 99.8% control limits)

VBAC	% of secondiparous women eligible for VBAC who achieve a vaginal birth
Spontaneous vaginal	% of term, singleton, cephalic births that are spontaneous vaginal
Instrumental	% of term, singleton, cephalic births that are instrumental
Caesarean	% of term, singleton, cephalic births that are caesarean sections
Episiotomy	% of term, singleton, cephalic, vaginal births with an episiotomy
Induction	% of term, singleton, cephalic births commencing with induction of labour
Early elective	% of elective deliveries between 37^{+0} and 38^{+6} weeks without a documented clinical indication
SGA 40 weeks	% of SGA babies (<10^{th} centile) born at or after 40 weeks of gestation
Haemorrhage	% of term, singleton, cephalic births with an obstetric haemorrhage more than or equal to 1500ml
Low Apgar	% of liveborn, singleton, term babies with an Apgar score of less than 7 at 5 minutes
3^{rd}/4^{th} degree tears	% of term, singleton, cephalic, vaginal births with a 3^{rd} or 4^{th} degree perineal tear

Footnote

The following trusts did not submit data to the NMPA for 2015/16:

Croydon Health Services NHS Trust
Dartford and Gravesham NHS Trust
James Paget University Hospitals NHS Foundation Trust
Peterborough and Stamford Hospitals NHS Foundation Trust
Southport and Ormskirk Hospital NHS Trust
The Queen Elizabeth Hospital King's Lynn NHS Foundation Trust

The following trust/hospitals submitted data to the NMPA for 2015/16 but were excluded from the analysis in this report due to low case ascertainment (<70% of births that took place during the period were submitted). The percentage of births that were submitted is given in brackets.

Buckinghamshire Healthcare NHS Trust	(46%)
Derby Hospitals NHS Foundation Trust	(26%)
Oxford University Hospitals NHS Trust	(56%)
Princess of Wales Hospital, Cardiff	(<1%)

Trust name	Site name	Site type	VBAC	Spontaneous vaginal	Instrumental	Caesarean	Episiotomy	Induction	Early elective	SGA 40 weeks	Haemorrhage	Low Apgar	3rd/4th degree tears
	All sites mean		28.0	64.7	14.2	21.3	22.7	30.2	28.6	55.3	2.8	1.2	3.7
			%	%	%	%	%	%	%	%	%	%	%
England													
Airedale NHS Foundation Trust	Airedale Maternity Unit	OU + AMU	35.1	71.7	10.4	17.5	26.8	29.2	32.4	56.2	2.9	1.7	4.2
Ashford and St Peter's NHS Foundation Trust	St Peter's Hospital	OU + AMU	30.8	62.0	18.8	18.5	23.8	28.5	33.1	63.6	5.2	1.4	2.9
Barking, Havering and Redbridge NHS Trust	Queen's Hospital	OU + AMU	24.0	58.8	18.6	23.1	24.2	31.9	23.5	56.9	1.6	1.1	2.1
Barnsley Hospital NHS Foundation trust	Barnsley District General Hospital	OU + AMU	34.7	63.1	14.1	23.8		30.9	30.2	53.2		1.2	4.0
Barts Health NHS Trust	Newham General Hospital	OU + AMU							33.5	50.3			
Barts Health NHS Trust	The Royal London Hospital	OU + AMU			16.4		24.4	25.2	32.8	58.3	2.6		2.9
Barts Health NHS Trust	Whipps Cross Hospital	OU + AMU			13.8		21.0	26.4	30.2	55.6	2.4		2.9
Basildon and Thurrock University Hospitals NHS Foundation Trust	Basildon Hospital	OU + AMU		78.8	11.3	15.2	17.5	28.8	26.8	75.8	3.4	1.2	3.5
Bedford Hospital NHS Trust	Bedford Hospital Cygnet Wing	OU + AMU	24.3	68.0	15.4	25.2	33.6	30.5	22.9	65.4	1.8	1.0	3.1
Birmingham Women's NHS Foundation Trust	Birmingham Women's Hospital	OU + AMU	37.2	63.2	19.3	17.9		26.8	3.8			1.0	3.5
Blackpool Teaching Hospitals NHS Foundation Trust	Blackpool Maternity Unit	OU + AMU	25.3	64.3	14.1	21.8	17.9	34.1	19.0	46.3	2.2	1.6	5.3
Bolton NHS Foundation Trust	Princess Anne Maternity Unit	OU + AMU	35.5	69.0	17.6	22.0	27.0	38.4	20.3	57.0	2.2	1.3	5.2
Bradford Teaching Hospitals NHS Foundation Trust	Bradford Women's and Newborn Unit	OU + AMU	32.2	68.7	13.9	18.2	25.3	25.3	41.0	72.9	2.2	1.0	3.5
Brighton and Sussex University Hospitals NHS Trust	Princess Royal Hospital	OU only	44.8	67.2	17.7	14.8	21.4	25.4	32.0	72.2	2.0	1.3	4.8
Brighton and Sussex University Hospitals NHS Trust	Royal Sussex County Hospital	OU only	49.3	69.7	16.5	14.5	21.8	26.7	45.4	65.7	2.8	1.0	6.5
Burton Hospitals NHS Foundation Trust	Queen's Hospital Burton	OU only											
Calderdale and Huddersfield NHS Foundation Trust	Calderdale Royal Hospital	OU + AMU	63.9	71.1	16.4	10.1	24.8	37.4	24.7	53.2	3.8	1.0	4.7
Cambridge University Hospitals NHS Foundation Trust	Rosie Maternity Hospital	OU + AMU	27.3	67.8	11.9	20.8		27.1	30.2	56.6	1.7	1.3	3.7
Central Manchester NHS Foundation Trust	Saint Mary's Hospital	OU + AMU	34.5	68.1	19.8	20.0	29.5	28.6	19.2				3.9

Trust name	Site name	Site type	VBAC		Spontaneous vaginal		Instrumental		Caesarean		Episiotomy		Induction		Early elective		SGA 40 weeks		Haemorrhage		Low Apgar		3rd/4th degree tears	
		All sites mean	28.0		64.7		14.2		21.3		22.7		30.2		28.6		55.3		2.8		1.2		3.7	
			%		%		%		%		%		%		%		%		%		%		%	
England																								
Chelsea and Westminster Hospital NHS Foundation Trust	Chelsea and Westminster Hospital	OU + AMU	19.1		59.4		15.3		29.0		22.1		32.5		29.6		59.9		2.4		0.7		2.8	
Chelsea and Westminster Hospital NHS Foundation Trust	West Middlesex Hospital	OU + AMU	31.1		70.3		14.2		24.7		24.4		26.8		24.3		63.2		4.2		1.0		3.6	
Chesterfield Royal Hospital NHS Foundation Trust	Chesterfield Birth Centre	OU + AMU	39.9		72.1		13.6		10.3		18.8						51.0		1.6		0.8		3.5	
City Hospitals Sunderland NHS Foundation Trust	Sunderland Royal Hospital	OU only													27.9		57.3				2.2			
Colchester Hospital University NHS Foundation Trust	Colchester Hospital	OU + AMU	25.4		63.2		12.6		24.0		19.5		9.9		26.8		55.7		4.8		0.9		5.0	
Countess of Chester Hospital NHS Foundation Trust	Countess of Chester Hospital	OU + AMU	25.8		64.1		14.1		22.3		22.2		30.8		18.2		57.9		3.4		0.8		3.6	
County Durham and Darlington NHS Foundation Trust	Darlington Memorial Hospital	OU only	33.1		65.6		16.7		17.9		23.1		23.0		27.6		57.4		1.4		1.0		3.8	
County Durham and Darlington NHS Foundation Trust	The University Hospital of North Durham	OU only	33.7		62.2		20.1		19.2		27.1		24.4		30.9		49.9		2.5		1.4		3.4	
Doncaster and Bassetlaw Hospitals NHS Foundation Trust	Bassetlaw District General	OU only					14.9				16.0		27.9		20.3		51.4				1.1		2.7	
Doncaster and Bassetlaw Hospitals NHS Foundation Trust	Doncaster Royal Infirmary	OU only					14.6				19.3		33.9		17.2		46.1				0.9		6.1	
Dorset County Hospital NHS Foundation Trust	Dorset County Hospital Maternity Unit	OU only													24.2		54.8				0.5			
East and North Hertfordshire NHS Trust	Diamond Jubilee Maternity Unit, Lister Hospital	OU + AMU	38.4		73.1		14.3		21.9		22.9		33.7		35.3		61.5		1.6		1.4		2.2	
East Cheshire NHS Trust	Macclesfield Birth Centre	OU + AMU	26.4		64.6		12.9		22.7		25.2		31.3		29.3		55.4				0.7		2.8	
East Kent Hospitals University Foundation Trust	Queen Elizabeth the Queen Mother Hospital	OU + AMU	22.0		68.9		10.9		26.8		17.6		28.7		34.4		62.5		2.1		0.9		5.5	
East Kent Hospitals University Foundation Trust	William Harvey Hospital	OU + AMU	31.0		69.0		14.2		23.5		23.7		28.5		35.9		56.4		2.1		0.9		3.0	
East Lancashire Hospitals NHS Trust	Lancashire Women and Newborn Centre	OU + AMU	29.8		59.9		17.9		22.8		24.6		31.8		24.2		51.7				1.8		4.0	
East Sussex Healthcare NHS Trust	Conquest Obstetric led Maternity Unit	OU only	51.9		64.8		16.7		26.0		32.5		34.6				65.5		2.7		1.4		3.2	
Epsom and St Helier NHS Trust	Epsom Hospital	OU + AMU	38.9		67.7		18.7		13.9		26.6		28.5		23.0		61.6		3.2		1.6		3.1	
Epsom and St Helier NHS Trust	St Helier Hospital	OU + AMU	38.7		67.8		15.6		17.3		22.3		30.6		24.8		62.7		3.8		0.7		4.4	

Trust name	Site name	Site type	VBAC	Spontaneous vaginal	Instrumental	Caesarean	Episiotomy	Induction	Early elective	SGA 40 weeks	Haemorrhage	Low Apgar	3rd/4th degree tears
		All sites mean	28.0	64.7	14.2	21.3	22.7	30.2	28.6	55.3	2.8	1.2	3.7
			%	%	%	%	%	%	%	%	%	%	%
England													
Frimley Health NHS Foundation Trust	Frimley Park Hospital	OU + AMU	25.8	72.1	14.5	22.3	19.5	34.3	36.2	56.1	3.7	1.2	5.3
Frimley Health NHS Foundation Trust	Wexham Park Hospital	OU + AMU											
Gateshead Hospitals NHS Trust	Gateshead Hospitals Queen Elizabeth Maternity Unit	OU only	18.6	66.3	11.8	22.4	18.3	38.4	27.9	62.3		2.6	4.0
George Eliot Hospital NHS Trust	George Eliot Hospital	OU + AMU	20.2	63.8	11.4	25.4	22.5	33.3	36.2	62.1		0.5	2.0
Gloucestershire Hospitals NHS Foundation Trust	The Gloucester Women's Centre, Gloucester Royal Hospital	OU + AMU	29.1	62.1	16.6	21.9	25.0	28.1	30.0	61.8	2.6	1.2	5.0
Great Western Hospital NHS Foundation Trust	Great Western Hospital	OU + AMU	22.6	64.1	12.3	24.2	22.8	36.0	41.5	52.6		0.9	
Guy's and St Thomas' NHS Foundation Trust	St Thomas' Hospital	OU + AMU	23.0	61.7	13.7	24.2	23.6	26.1	39.2	58.1		0.9	3.5
Hampshire Hospitals NHS Foundation Trust	Basingstoke and North Hampshire Hospital	OU only	28.3	63.6	14.0	22.7	26.8	28.1	54.9	57.7	2.7	0.6	5.2
Hampshire Hospitals NHS Foundation Trust	Royal Hampshire County Hospital	OU only	21.7	60.8	14.8	24.6	31.5	20.1	26.4	57.8	4.8	1.1	4.1
Harrogate and District NHS Foundation Trust	Harrogate District Hospital Maternity Unit	OU only			14.5		19.9	31.5	21.8	65.2	3.6	1.2	5.0
Heart of England NHS Foundation Trust	Good Hope Hospital	OU only	19.7	62.0	13.8	24.3	30.8	31.5	19.1	48.9		0.9	3.6
Heart of England NHS Foundation Trust	Princess of Wales Women's Unit, Heartlands Hospital	OU + AMU	27.3	64.2	13.3	22.6	29.1	26.7	27.6	50.4		1.2	2.6
Hinchingbrooke Health Care NHS Trust	The Park Maternity Centre, Hinchingbrooke Hospital	OU + AMU			17.7		25.1	41.7	28.3	54.1	2.5	1.4	3.6
Homerton University Hospital NHS Foundation Trust	Homerton Maternity Unit	OU + AMU	26.2	67.2	12.4	21.4	18.4	20.0	39.1	58.4	2.1	0.9	2.3
Hull and East Yorkshire Hospitals NHS Trust	Women and Children's Hospital	OU only	40.6	67.9	14.5	17.4	25.1	23.4	37.9	61.8	1.9	0.7	4.3
Imperial College Healthcare NHS Trust	Queen Charlotte's and Chelsea Hospital	OU + AMU											
Imperial College Healthcare NHS Trust	St Mary's Hospital	OU + AMU											
Ipswich Hospital NHS Trust	Ipswich Hospital NHS Trust	OU + AMU		62.9	13.8	23.9		27.2		56.8	2.3	2.1	3.3

			VBAC	Spontaneous vaginal	Instrumental	Caesarean	Episiotomy	Induction	Early elective	SGA 40 weeks	Haemorrhage	Low Apgar	3rd/4th degree tears
		All sites mean	28.0	64.7	14.2	21.3	22.7	30.2	28.6	55.3	2.8	1.2	3.7
Trust name	Site name	Site type	%	%	%	%	%	%	%	%	%	%	%
England													
Isle of Wight NHS Trust	Maternity Unit St Mary's Hospital	OU only	27.8	67.5	11.8	21.2	17.7	30.1	18.2		2.1		2.5
Kettering NHS Foundation Trust	Rockingham Wing, Kettering General Hospital	OU only	19.5	62.3	14.5	24.2	21.4	31.2	26.8	55.3		1.2	3.0
King's College Hospital NHS Foundation Trust	King's College Hospital	OU only	29.9	67.6	17.5	23.0	24.3	31.5	33.2	60.1	2.8	0.9	4.7
King's College Hospital NHS Foundation Trust	Princess Royal University Hospital	OU + AMU											
Kingston Hospital NHS Foundation Trust	Kingston Maternity Unit	OU + AMU	21.9	64.3	13.4	22.5	21.3	27.4	21.3	54.1	2.5	1.3	3.2
Lancashire Teaching Hospitals NHS Foundation Trust	Royal Preston Hospital	OU + AMU			15.3		17.9	35.9	17.3	53.7		1.2	5.4
Leeds Teaching Hospitals NHS Trust	Leeds General Infirmary	OU only	39.0	67.5	15.5	14.7	24.7			51.9	3.0	0.9	5.8
Leeds Teaching Hospitals NHS Trust	St James University Hospital	OU only	45.4	67.2	17.1	12.7	28.0			49.5	3.0	0.9	5.1
Lewisham and Greenwich NHS Trust	Queen Elizabeth Hospital	OU + AMU											
Lewisham and Greenwich NHS Trust	University Hospital Lewisham	OU + AMU											
Liverpool Women's NHS Foundation Trust	Liverpool Women's Hospital	OU + AMU	10.5	65.5	17.6	18.7	25.4	39.7	23.4	63.7	2.7	1.9	3.8
London North West NHS Trust	Northwick Park Hospital	OU + AMU	27.2	71.6	12.2	25.7	27.6	27.8	33.9	66.7	2.0	0.9	2.9
Luton and Dunstable University Hospital NHS Foundation Trust	Luton and Dunstable University Hospital	OU + AMU	31.8	66.3	16.1	25.1	26.8	32.3	25.8	61.9	3.4	1.0	3.6
Maidstone and Tunbridge Wells NHS Trust	Tunbridge Wells Hospital at Pembury	OU only	28.1	63.7	17.2	22.0	24.3	21.7	33.3	63.9		1.3	4.9
Medway NHS Foundation Trust	Medway Maritime Hospital	OU + AMU											
Mid Cheshire Hospitals NHS Foundation Trust	Leighton Hospital	OU + AMU		78.3		22.9	24.9	33.5	15.2	58.0	3.4	1.0	3.4
Mid Yorkshire NHS Trust	Bronte Birth Centre	OU only								53.9	2.9	0.9	
Mid Yorkshire NHS Trust	Pinderfields Hospital	OU + AMU	27.3	63.0	12.4	24.8	23.9	35.1	17.5	47.7	2.7	0.7	4.6
Milton Keynes University Hospital NHS Foundation Trust	Milton Keynes Maternity Unit	OU only	26.8	64.8	13.9	21.8	23.7	22.0	34.1	62.1	1.6	0.7	4.5

Trust name	Site name	Site type	VBAC	Spontaneous vaginal	Instrumental	Caesarean	Episiotomy	Induction	Early elective	SGA 40 weeks	Haemorrhage	Low Apgar	3rd/4th degree tears
	All sites mean		28.0	64.7	14.2	21.3	22.7	30.2	28.6	55.3	2.8	1.2	3.7
			%	%	%	%	%	%	%	%	%	%	%
England													
Newcastle upon Tyne Hospitals NHS Trust	Royal Victoria Infirmary	OU + AMU	16.3	61.8	12.2	26.4	17.6	38.9	30.5	50.0	2.9	1.2	3.1
Norfolk and Norwich University Hospitals NHS Foundation Trust	Norfolk and Norwich University Hospital	OU + AMU	22.3	64.9	12.6	23.2	20.4	33.1	20.7	55.8	3.4	1.4	4.5
North Bristol NHS Trust	Southmead Hospital Maternity Unit	OU + AMU	29.2	66.4	15.8	25.4	19.9	37.0	28.2	54.6	5.6	0.6	6.1
North Cumbria University Hospitals NHS Trust	Cumberland Infirmary	OU only											
North Cumbria University Hospitals NHS Trust	West Cumberland Hospital	OU only											
North Middlesex University Hospital NHS Trust	North Middlesex Maternity Unit	OU + AMU	28.0	65.4	9.7	24.8	21.1	23.9	35.1	56.8	2.1	0.8	3.1
North Tees and Hartlepool NHS Foundation Trust	University Hospital of North Tees	OU + AMU			15.0		24.5	30.5	30.1	60.9	1.7	1.0	3.7
Northampton General Hospital NHS Trust	Northampton Maternity Unit	OU + AMU	26.2	66.5	11.7	22.4	20.1	29.0	24.1	46.1	4.3	0.6	3.4
Northern Devon Healthcare NHS Trust	North Devon Hospital	OU only	30.5	63.3	15.1	22.2	21.6	22.2	18.7	73.5	3.0	1.2	3.2
Northern Lincolnshire and Goole NHS Trust	Department of Family Services Maternity Unit	OU only	35.6	70.6	10.5	18.2	18.0	40.2	25.4				3.9
Northern Lincolnshire and Goole NHS Trust	Scunthorpe General Hospital	OU only	36.0	70.4	10.4	18.4	16.0	39.1	14.7				
Northumbria Healthcare NHS Foundation Trust	Northumbria Specialist Emergency Care Hospital	OU + AMU	54.7	72.4	15.7	9.3		35.5	30.9	46.7	1.5	1.0	3.7
Nottingham University Hospitals NHS Trust	Nottingham City Hospital	OU + AMU	25.9	66.5	14.8	20.1	22.8	37.4	48.1	56.1	4.5		3.5
Nottingham University Hospitals NHS Trust	Queen's Medical Centre	OU + AMU	21.2	65.0	12.7	23.7	20.0	31.9	22.3	52.2	4.2		5.5
Pennine Acute NHS Trust	North Manchester General Hospital	OU + AMU	31.1	66.5	10.6	22.4	14.2	31.7	22.3	57.2	4.3	0.9	3.6
Pennine Acute NHS Trust	The Royal Oldham Hospital	OU + AMU	25.5	64.6	10.8	24.2	16.6	34.9	21.4	49.2	3.5	0.9	3.5
Plymouth Hospitals NHS Trust	Plymouth Hospital	OU only			19.0		29.6	29.4	21.9	52.8		1.4	3.5
Poole Hospital NHS Foundation Trust	St Mary's Maternity Unit, Poole	OU + AMU	35.6	66.9	11.8	22.5	20.7	32.7	32.6	53.6	2.9	1.7	3.5
Portsmouth Hospitals NHS Trust	Queen Alexandra Hospital	OU + AMU	38.7	67.9	13.5	18.6	23.2	23.7	42.9	62.5	3.8	1.5	4.0

			VBAC	Spontaneous vaginal	Instrumental	Caesarean	Episiotomy	Induction	Early elective	SGA 40 weeks	Haemorrhage	Low Apgar	3rd/4th degree tears
		All sites mean	28.0	64.7	14.2	21.3	22.7	30.2	28.6	55.3	2.8	1.2	3.7
Trust name	Site name	Site type	%	%	%	%	%	%	%	%	%	%	%
England													
Princess Alexandra Hospital NHS Trust	Princess Alexandra Maternity Unit	OU + AMU											
Royal Berkshire NHS Foundation Trust	Royal Berkshire Hospital Maternity Unit	OU + AMU	34.0	69.0	15.8	23.6	23.8	25.2	50.3	64.4	3.7	1.3	3.5
Royal Cornwall Hospitals NHS Trust	Royal Cornwall Hospital	OU only	15.8	66.9	13.6	18.9	21.3			61.2	2.0	1.3	
Royal Free London NHS Foundation Trust	Barnet Hospital	OU + AMU	24.4	62.8	11.5	25.9	26.0	27.3		53.4		1.0	2.1
Royal Free London NHS Foundation Trust	The Royal Free Hospital	OU + AMU	20.2	64.3	11.2	25.3	26.0	24.9	37.4		2.6	1.4	1.4
Royal Surrey County Hospital NHS Foundation Trust	Royal Surrey County Hospital	OU + AMU	29.1	68.8	17.1	22.7	22.3	35.2	32.8		2.3		3.7
Royal United Hospitals NHS Foundation Trust	Princess Anne Wing, Royal United Hospital	OU only	17.7	63.3	18.1	19.4	24.5	35.0	39.4	74.8	2.8	2.0	3.7
Royal Wolverhampton NHS Trust	New Cross Hospital	OU + AMU	30.6	71.6	11.8	24.6	19.7	38.2	35.0	50.5			4.0
Salisbury NHS Foundation Trust	Salisbury Maternity Unit	OU only	29.6	70.1	13.0	18.5	21.0	33.0	21.3	60.8		1.4	3.9
Sandwell and West Birmingham NHS Trust*	City Hospital Maternity Unit	OU + AMU	32.1	65.6	14.4	20.2	20.9	21.4	14.4	54.4		1.8	2.5
Sheffield Teaching Hospitals NHS Foundation Trust	Jessop Wing	OU + AMU							36.9	53.2		1.5	
Sherwood Forest Hospitals NHS Foundation Trust	Sherwood Birthing Unit	OU only			15.8		21.3	29.8	29.2	45.1		1.1	3.0
Shrewsbury and Telford Hospital NHS Trust	The Princess Royal, Telford	OU + AMU	56.0	71.9	12.8	13.5	17.3				1.1		2.6
South Tees Hospitals NHS Trust	James Cook University Hospital	OU + AMU			17.2		21.1	49.5	16.4	60.0		1.1	3.8
South Tyneside NHS Foundation Trust	South Tyneside District Hospital	OU only			15.0		17.3	40.2	32.9		2.5		2.6
South Warwickshire NHS Foundation Trust	South Warwickshire Maternity Unit	OU only	34.7	64.3	14.5	21.2		27.7	21.8	52.1		0.8	2.9
Southend University NHS Foundation Trust	Southend University Hospital	OU + AMU	21.8	68.0	7.8	24.5	20.1	25.7	17.0	59.1	2.4	1.3	2.6
St George's University Hospitals NHS Foundation Trust	St George's Hospital	OU + AMU	33.8	68.4	15.8	16.8	19.2	28.5	33.1	58.2	3.5	1.2	3.0

* At the time of publication the trust's review into the accuracy of this data was still ongoing.

			VBAC	Spontaneous vaginal	Instrumental	Caesarean	Episiotomy	Induction	Early elective	SGA 40 weeks	Haemorrhage	Low Apgar	3rd/4th degree tears
		All sites mean	28.0	64.7	14.2	21.3	22.7	30.2	28.6	55.3	2.8	1.2	3.7
Trust name	Site name	Site type	%	%	%	%	%	%	%	%	%	%	%
England													
St Helens and Knowsley Teaching Hospitals NHS Trust	Whiston Maternity Unit	OU only			11.8					51.2		1.0	1.9
Stockport NHS Foundation Trust	Stepping Hill Hospital	OU + AMU	29.1	64.9	13.1	21.9	24.3	32.8	13.6	57.1	3.9	1.0	5.2
Surrey and Sussex NHS Trust	East Surrey Hospital	OU + AMU	36.9	65.8	15.0	20.2	22.8	30.1	26.0	47.7	2.3	0.9	
Tameside Hospital NHS Foundation Trust	Tameside Hospital	OU only	31.2	68.3	9.2	21.9	16.7	35.4	20.9	39.0	2.7	1.1	3.8
Taunton and Somerset NHS Foundation Trust	Musgrove Park Hospital	OU + AMU	24.5	66.5	15.2	19.1	18.5	30.1	20.5	62.7	2.6	2.2	4.1
The Dudley Group NHS Foundation Trust	Russells Hall Maternity Unit	OU + AMU							25.2	51.7			
The Hillingdon Hospitals NHS Foundation Trust	Duchess of Kent Maternity Unit	OU + AMU	23.7	60.0	16.4	22.8	25.7	28.0	26.4	55.8	2.4	0.9	3.5
The Rotherham NHS Foundation Trust	The Rotherham Maternity Unit	OU only								57.4		0.7	
The Royal Devon and Exeter NHS Foundation Trust	Centre for Women's Health, RD & E Wonford	OU + AMU	27.3	67.5	12.2	20.9	17.5	32.1	17.5	55.2	2.8	1.7	
Torbay and South Devon NHS Foundation Trust	Torbay Hospital	OU only	32.7	62.8	13.9	23.7	20.2	30.7	23.6	62.1	2.1	3.5	3.8
United Lincolnshire Hospitals NHS Trust	Lincoln County Hospital	OU only											
United Lincolnshire Hospitals NHS Trust	Pilgrim Hospital, Boston	OU only											
University College London Hospitals NHS Foundation Trust	Elizabeth Garrett Anderson Wing, UCLH	OU + AMU	18.9	61.8	14.7	23.3	23.8	23.4	27.8	55.4	2.4	1.1	
University Hospital South Manchester NHS Foundation Trust	Wythenshawe Hospital	OU + AMU	22.6	60.1	14.7	25.3	22.3	31.2	19.0	54.0	1.7	0.9	2.8
University Hospital Southampton NHS Foundation Trust	Princess Anne Hospital	OU + AMU	34.4	59.3	18.5	22.5	27.2	22.3	36.5	56.7	2.7	2.3	2.9
University Hospitals Bristol NHS Foundation Trust	St Michael's Hospital	OU + AMU	16.2	64.2	14.6	20.9	20.4				2.3		4.4
University Hospitals Coventry and Warwickshire NHS Trust	University Hospital Coventry	OU + AMU			19.1		26.3	35.8	36.8	53.8		1.2	3.4
University Hospitals of Leicester NHS Trust	Leicester General Hospital	OU + AMU	30.8	67.2	13.4	19.7	25.6	34.2	21.3	51.9	3.0	0.7	4.4
University Hospitals of Leicester NHS Trust	Leicester Royal Infirmary	OU + AMU	26.0	64.7	13.0	22.6	18.3	32.3	25.6	51.3	3.3	0.8	4.5

Trust name	Site name	Site type	VBAC	Spontaneous vaginal	Instrumental	Caesarean	Episiotomy	Induction	Early elective	SGA 40 weeks	Haemorrhage	Low Apgar	3rd/4th degree tears
		All sites mean	28.0	64.7	14.2	21.3	22.7	30.2	28.6	55.3	2.8	1.2	3.7
			%	%	%	%	%	%	%	%	%	%	%
England													
University Hospitals of Morecambe Bay NHS Foundation Trust	Furness General Hospital	OU only	24.9	58.4	16.3	25.5	26.3	29.6	22.9	41.1			2.3
University Hospitals of Morecambe Bay NHS Foundation Trust	Royal Lancaster Infirmary	OU only	17.8	58.4	16.2	25.5	27.3	38.2	25.1	38.7	3.6	1.4	3.3
University Hospitals of North Midlands NHS Trust	Royal Stoke Hospital	OU + AMU			14.3		21.1	31.4	22.7	49.4	1.7		5.2
Walsall Healthcare NHS Trust	Walsall Manor Maternity Unit	OU only	19.5	58.0	13.3	28.3	35.4	31.3	20.3	52.1		1.6	3.5
Warrington and Halton Hospitals NHS Foundation Trust	Warrington Maternity Unit	OU + AMU	33.1	65.7	11.9	22.9		38.1	22.6	46.8		1.3	2.9
West Hertfordshire Hospitals NHS Trust	Watford General Hospital	OU + AMU	30.2	66.6	14.7	27.2	25.9	27.5	20.4	61.8	2.9	0.6	3.2
West Suffolk Hospital NHS Foundation Trust	West Suffolk Hospital	OU + AMU	34.8	71.7	10.2	18.0	15.4	32.1	20.4	54.8	3.3		4.2
Western Sussex Hospitals NHS Foundation Trust	St Richard's Hospital	OU + AMU	63.8	74.2	13.9	10.0	18.1	32.3	24.5		3.6		4.8
Western Sussex Hospitals NHS Foundation Trust	Worthing Hospital	OU only	63.5	71.5	15.2	11.2	19.4	29.9	26.8		2.3		4.4
Whittington Health NHS Trust	Whittington Hospital	OU + AMU											
Wirral University Teaching Hospitals NHS Trust	Wirral Women and Childrens Hospital	OU + AMU	34.2	70.6	13.6	21.5	22.5	32.2	8.3	57.2	2.2	0.8	2.6
Worcestershire Acute Hospitals NHS Trust	Alexandra Hospital	OU only	36.4	66.6	15.8	19.0	27.2			56.5		0.6	2.6
Worcestershire Acute Hospitals NHS Trust	Worcestershire Royal Hospital	OU + AMU	31.9	73.9	11.2	18.8	19.4	42.4	20.5	59.2		0.9	2.9
Wrightington, Wigan and Leigh NHS Foundation Trust	Wigan Maternity Unit	OU only	28.1	64.6	11.6	23.8	18.8	34.3	11.7	40.1	3.1	1.8	4.0
Wye Valley NHS Trust	Hereford County Hospital	OU only	21.7	61.9	13.3	24.6	21.3	20.6	20.8	56.3		0.7	4.7
Yeovil District Hospital NHS Foundation Trust	Yeovil Maternity Unit	OU only	13.3	67.6	10.8	21.5	16.5	28.8		48.8	4.5	1.1	2.1
York Teaching Hospital NHS Foundation Trust	Scarborough Hospital	OU + AMU			13.2		19.5				1.5		2.5
York Teaching Hospital NHS Foundation Trust	York Hospital	OU only			18.5		26.5			56.4	2.4	0.9	2.8

Trust name	Site name	Site type	VBAC	Spontaneous vaginal	Instrumental	Caesarean	Episiotomy	Induction	Early elective	SGA 40 weeks	Haemorrhage	Low Apgar	3rd/4th degree tears
		All sites mean	28.0	64.7	14.2	21.3	22.7	30.2	28.6	55.3	2.8	1.2	3.7
			%	%	%	%	%	%	%	%	%	%	%
Scotland													
NHS Ayrshire and Arran	Ayrshire Maternity Unit	OU + AMU	13.3	58.4	11.1	30.5	22.4	31.1	35.3	55.9		0.7	2.5
NHS Borders	Borders General Hospital Maternity Unit	OU only	57.7	66.8	19.5	9.5	28.8	43.9	53.4	60.4		0.7	1.9
NHS Dumfries and Galloway	Cresswell Maternity Wing	OU only	23.2	65.7	10.9	23.3	14.4	32.6	61.5	62.6			1.6
NHS Fife	Victoria Hospital	OU + AMU	18.9	65.8	9.0	25.3	22.1	29.6	41.4	58.5		1.4	4.3
NHS Forth Valley	Forth Valley Royal Hospital	OU only	22.5	59.9	12.8	27.7	27.0	46.1	40.8	58.5		1.8	3.8
NHS Grampian	Aberdeen Maternity Hospital	OU + AMU	29.3	63.2	16.0	20.7	23.8	31.6	38.0	48.7		1.4	4.0
NHS Grampian	Dr Gray's Hospital	OU only	22.5	72.8	10.5	15.3	11.3	33.4	47.0	61.2		3.1	0.6
NHS Greater Glasgow and Clyde	Princess Royal Maternity	OU only							61.5	48.6		1.0	
NHS Greater Glasgow and Clyde	Queen Elizabeth University Hospital Maternity Unit	OU only	17.9	65.4	15.2	19.1	31.4	32.4	50.7	46.5		0.8	3.4
NHS Greater Glasgow and Clyde	Royal Alexandra Hospital	OU + AMU	16.5	63.4	15.6	21.4	28.0	45.7	32.7	36.7		0.3	3.1
NHS Highland	Raigmore Hospital	OU only	19.8	60.1	13.1	26.8	24.0	36.5	27.5	37.8		1.2	5.5
NHS Lanarkshire	Wishaw General Hospital	OU only	62.7	71.7	14.3	9.9	22.0	33.1	47.3	51.5		2.6	4.1
NHS Lothian	Simpson Centre for Reproductive Health, Edinburgh Royal Infirmary	OU + AMU	25.1	55.8	19.9	25.4	35.5	27.5	28.4	59.2		1.1	4.5
NHS Lothian	St John's Hospital, Livingston	OU only	18.8	57.1	15.1	27.5	37.4	33.5	34.5	50.4		3.1	2.8
NHS Tayside	Ninewells Hospital	OU + AMU	24.5	58.9	14.0	26.6	23.1	33.4	29.7	51.2		1.3	2.9
NHS Western Isles	Western Isles Hospital Maternity Unit	OU only											

Trust name	Site name	Site type	VBAC	Spontaneous vaginal	Instrumental	Caesarean	Episiotomy	Induction	Early elective	SGA 40 weeks	Haemorrhage	Low Apgar	3rd/4th degree tears
	All sites mean		28.0	64.7	14.2	21.3	22.7	30.2	28.6	55.3	2.8	1.2	3.7
			%	%	%	%	%	%	%	%	%	%	%
Wales													
Abertawe Bro Morgannwg University Health Board	Singleton Hospital	OU + AMU	37.1	60.9	18.6	20.6		33.4	32.9	70.2	1.3	1.3	
Aneurin Bevan Health Board	Nevill Hall Hospital	OU + AMU	45.0	70.7	15.2	13.6	23.1	30.8	28.0	58.3	1.6	0.7	
Aneurin Bevan Health Board	Royal Gwent Hospital	OU + AMU	53.5	72.8	13.7	12.9	20.2	26.8	29.7	59.5	2.1	1.4	
Betsi Cadwaladr University Health Board	Wrexham Maelor	OU + AMU											
Betsi Cadwaladr University Health Board	Ysbyty Glan Clwyd	OU + AMU	27.8	61.3	16.8	22.6	21.6	34.7	19.0		2.6	1.4	
Betsi Cadwaladr University Health Board	Ysbyty Gwynedd	OU + AMU	40.4	69.1	8.9	22.5	16.9	36.8	25.0		2.9	1.4	
Cardiff and Vale University Health Board	University Hospital of Wales	OU + AMU	60.8	70.0	17.1	9.8	25.6	29.3	9.8	59.6	2.4	0.8	3.9
Cwm Taf University Health Board	Prince Charles Hospital	OU + AMU	32.0	63.4	12.7	24.1	25.4	36.3	43.4	53.7		0.8	4.7
Cwm Taf University Health Board	Royal Glamorgan Hospital	OU + AMU	22.5	63.9	11.0	24.9	20.0	35.1	48.8	59.6	2.3	0.8	5.6
Hywel Dda Health Board	Glangwili Hospital	OU + AMU	34.4	68.3	15.6	15.8	22.8	37.8	26.0	57.8	1.7	1.3	2.1
Hywel Dda Health Board	Gwenllian Maternity Unit, Bronglais Hospital	OU + AMU	37.6	68.8	12.7	18.2	14.7	33.5	28.4				1.2

References

1. Cousens S, Blencowe H, Stanton C, Chou D, Ahmed S, Steinhardt L, et al. National, regional, and worldwide estimates of stillbirth rates in 2009 with trends since 1995: a systematic analysis. The Lancet. 2011 Apr 16;377(9774):1319–30.
2. Carroll F, Knight HE, Gurol-Urganci I, van der Meulen JH. Patterns of maternity care in English NHS Trusts 2013/14. [Available from: http://indicators.rcog.org.uk]
3. NMPA Team. National Maternity and Perinatal Audit: organisational report 2017. RCOG London; 2017 Aug [Available from: http://www.maternityaudit.org.uk]
4. Delnord M, Szamotulska K, Hindori-Mohangoo AD, Blondel B, Macfarlane AJ, Dattani N, et al. Linking databases on perinatal health: a review of the literature and current practices in Europe. Eur J Public Health. 2016 Jun;26(3):422–30
5. Information Services Division Scotland. Summary of Codes – SMR02 [Available from: http://www.ndc.scot.nhs.uk/Data-Dictionary/SMR-Crib-Sheets/SMR02_CRIB_2015_April.pdf]
6. Information Services Division Scotland. Scottish Birth Record [Available from: http://www.ndc.scot.nhs.uk/Data-Dictionary/SMR-Datasets/Scottish-Birth-Record/]
7. Information Services Division Scotland. SMR01 – General acute inpatient/daycase record. [Available from: http://www.ndc.scot.nhs.uk/Data-Dictionary/SMR-Datasets//SMR01-General-Acute-Inpatient-and-Day-Case/]
8. NHS Wales Informatics Service. Maternity Indicators Data Set [Available from: http://www.nwisinformationstandards.wales.nhs.uk/sitesplus/documents/299/20160629-DSCN%202016%2002-Maternity%20Indicators%20Data%20Set-Final%20v1.1.pdf]
9. NHS Wales Informatics Service. Information and Statistics – PEDW Data Online. [Available from: http://www.wales.nhs.uk/docopen/155869]
10. NHS Digital. Maternity Services Monthly Statistics. [Available from: http://digital.nhs.uk/media/32373/Maternity-Services-Monthly-Statistics-England-April-2017-Experimental-statistics-Executive-Summary/default/msms-apr17-exp-rep]
11. National Maternity and Perinatal Audit: data specification [Available from: http://www.maternityaudit.org.uk/pages/resources]
12. Kurinczuk J, Knight M, Draper E. National Maternity and Perinatal Audit Development Project. 2014.
13. Spiegelhalter DJ. Funnel plots for comparing institutional performance. Stat Med. 2005 Apr 30;24(8):1185–202.
14. Spiegelhalter DJ. Handling over-dispersion of performance indicators. BMJ Quality & Safety. BMJ Publishing Group Ltd; 2005 Oct 1;14(5):347–51.
15. Miller S, Abalos E, Chamillard M, Ciapponi A, Colaci D, Comandé D, et al. Beyond too little, too late and too much, too soon: a pathway towards evidence-based, respectful maternity care worldwide. Lancet. 2016 Oct 29;388(10056):2176–92.
16. National Diabetes Audit Team. National Pregnancy in Diabetes Audit Report 2015. 2016 Oct.
17. Healthcare Quality Improvement Project. National Pregnancy in Diabetes Audit: Data Quality Statement [Available from: https://digital.nhs.uk/media/29744/National-Pregnancy-in-Diabetes-Audit-2015-Report-Data-Quality-Statement-/]
18. Chu SY, Callaghan WM, Kim SY, Schmid CH, Lau J, England LJ, et al. Maternal obesity and risk of gestational diabetes mellitus. Diabetes Care 2007 Aug;30(8):2070–6
19. Wotherspoon AC, Young IS, Patterson CC, McCance DR, Holmes VA, Diabetes and Pre-eclampsia Intervention Trial (DAPIT) Study Group. Effect of pregnancy planning on maternal and neonatal outcomes in women with Type 1 diabetes. Diabet. Med. 2017 Sep;34(9):1303–8.
20. Hutcheon JA, Lisonkova S, Joseph KS. Epidemiology of pre-eclampsia and the other hypertensive disorders of pregnancy. Best Pract Res Clin Obstet Gynaecol. 2011 Aug;25(4):391–403.
21. Fitzpatrick KE, Sellers S, Spark P, Kurinczuk JJ, Brocklehurst P, Knight M. Incidence and Risk Factors for Placenta Accreta/Increta/Percreta in the UK: A National Case-Control Study. PLoS ONE. 2012;7(12):e52893.
22. Knight HE, Gurol-Urganci I, van der Meulen JH, Mahmood TA, Richmond DH, Dougall A, et al. Vaginal birth after caesarean section: a cohort study investigating factors associated with its uptake and success. BJOG. 2014 Jan;121(2):183–92.

23. Cole TJ, Williams AF, Wright CM. Revised birth centiles for weight, length and head circumference in the UK-WHO growth charts. Annals of Human Biology. 2010 Jun 9;38(1):7–11.
24. Heslehurst N, Rankin J, Wilkinson JR, Summerbell CD. A nationally representative study of maternal obesity in England, UK: trends in incidence and demographic inequalities in 619 323 births, 1989–2007. Int J Obes Relat Metab Disord 2009 Dec 22;34(3):420–8.
25. Office for National Statistics. Births by parents' characteristics in England and Wales 2015 [Available from: https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/livebirths/bulletins/birthsbyparentscharacteristicsinenglandandwales/2015]
26. World Health Organisation. Mean Body Mass Index trends, ages 18+, 1975-2014 (age standardized estimate) [Available from: http://gamapserver.who.int/gho/interactive_charts/ncd/risk_factors/bmi/atlas.html]
27. Centre for Maternal and Child Enquiries. Maternal obesity in the UK: findings from a national project. 2010. [Available from: http://www.hqip.org.uk/assets/NCAPOP-Library/CMACE-Reports/10.-December-2010-Maternal-Obesity-in-the-UK-Findings-from-a-national-project-2008-2010.pdf]
28. Dhanjal MK, Kenyon A. Scientific Impact Paper No. 34: Induction of labour at term in older mothers. Royal College of Obstetricians and Gynaecologists; 2013.
29. Denison FC, Norwood P, Bhattacharya S, Duffy A, Mahmood T, Morris C, et al. Association between maternal body mass index during pregnancy, short-term morbidity, and increased health service costs: a population-based study. BJOG. 2014 Jan 1;121(1):72–82.
30. NHS Digital. Statistics on Women's Smoking Status at Time of Delivery: England April 2015 to March 2016. [Available from: https://digital.nhs.uk/media/28902/Statistics-on-Women-s-Smoking-Status-at-Time-of-Delivery-England-Quarter-4-2015-16-Report/Any/stat-wome-smok-time-deli-eng-q4-15-16-rep]
31. Nassar N, Schiff M, Roberts CL. Trends in the Distribution of Gestational Age and Contribution of Planned Births in New South Wales, Australia. PLoS ONE. 2013;8(2):e56238.
32. Birthplace in England Collaborative Group. Perinatal and maternal outcomes by planned place of birth for healthy women with low risk pregnancies: the Birthplace in England national prospective cohort study. BMJ. 2011;343:d7400
33. Walsh D (Personal Correspondence). Place of birth in England. Implementating the National Maternity Review in Rural Areas. Feb 2017.
34. Sandall J (Personal Correspondence). Risk profile and place of delivery for women in England.
35. RCOG. Information for you: Smoking in Pregnancy. 2015 [Available from: https://www.rcog.org.uk/globalassets/documents/patients/patient-information-leaflets/pregnancy/pi-smoking-and-pregnancy-2.pdf]
36. NHS Scotland. Scottish Patient Safety Programme: Maternity Care [Available from: http://www.scottishpatientsafetyprogramme.scot.nhs.uk/programmes/mcqic/Maternity-Care]
37. National Institute for Health and Care Excellence. Smoking: stopping in pregnancy and after childbirth. NICE; 2010 Jun [Available from: https://www.nice.org.uk/guidance/ph26]
38. Walker KF, Bugg GJ, Macpherson M, McCormick C, Grace N, Wildsmith C, et al. Randomized Trial of Labor Induction in Women 35 Years of Age or Older. N Engl J Med. 2016 Mar 3;374(9):813–22.
39. Gülmezoglu AM, Crowther CA, Middleton P, Heatley E. Induction of labour for improving birth outcomes for women at or beyond term. The Cochrane database of systematic reviews. 2012;6:CD004945. doi:10.1002/14651858.CD004945.pub3.
40. Walker KF, Bugg G, Macpherson M, McCormick C, Wildsmith C, Smith G, et al. Induction of labour versus expectant management for nulliparous women over 35 years of age: a multi-centre prospective, randomised controlled trial. BMC Pregnancy Childbirth. BioMed Central; 2012 Dec 11;12(1):145.
41. National Institute for Care Excellence. Antenatal care for uncomplicated pregnancies (Clinical Guideline 62). NICE. 2008 [Available from: https://www.nice.org.uk/guidance/cg62]
42. Battersby C, Michaelides S, Upton M, Rennie JM. Term admissions to neonatal units in England: a role for transitional care? A retrospective cohort study. BMJ Open. 2017 May 1;7(5):e016050.
43. Odibo AO, Francis A, Cahill AG, Macones GA, Crane JP, Gardosi J. Association between pregnancy complications and small-for–gestational-age birth weight defined by customized fetal growth standard versus a population-based standard. The Journal of Maternal-Fetal & Neonatal Medicine. 2011 Feb 4;24(3):411–7.
44. Veglia M, Cavallaro A, Papageorghiou A, Black R, Impey L. Small for Gestational Age Babies After 37 Weeks: An Impact Study of a Risk Stratification Protocol. Ultrasound Obstet Gynecol. 2017 Jun 10.
45. O'Connor D. Saving babies' lives. A care bundle for reducing stillbirth. NHS England; 2016.
46. Maternity and Children's Quality Improvement Collaborative. Scottish Patient Safety Programme – Maternity Care Programme. [Available from: http://www.scottishpatientsafetyprogramme.scot.nhs.uk/]

47. National Institute for Health and Care Excellence. Caesarean section (Clinical Guideline 132). NICE 2011. [Available from: https://www.nice.org.uk/guidance/cg132]
48. World Health Organization. WHO statement on caesarean section rates. 2014. [Available from: http://www.who.int/reproductivehealth/publications/maternal_perinatal_health/cs-statement/en/]
49. Betrán AP, Merialdi M, Lauer JA, Bing Shun W, Thomas J, Van Look P, et al. Rates of caesarean section: analysis of global, regional and national estimates. Paediatric and Perinatal Epidemiology. 2007 Mar 1;21(2):98–113.
50. Johanson R, Newburn M, Macfarlane A. Has the medicalisation of childbirth gone too far? BMJ 2002 Apr 13;324(7342):892–5.
51. Gupta JK, Smith G, Chodankar RR. RCOG Green-top Guideline No 45: Birth after Previous Caesarean Birth. 2015. [Available from: https://www.rcog.org.uk/en/guidelines-research-services/guidelines/gtg45/]
52. National Institute for Health and Care Excellence. Intrapartum care for healthy women and babies. 2017. [Available from: https://www.nice.org.uk/guidance/cg190]
53. Edozien LC, Gurol-Urganci I, Cromwell DA, Adams EJ, Richmond DH, Mahmood TA, et al. Impact of third- and fourth-degree perineal tears at first birth on subsequent pregnancy outcomes: a cohort study. BJOG. 2014 Dec 1;121(13):1695–703.
54. Gurol-Urganci I, Cromwell DA, Edozien LC, Mahmood TA, Adams EJ, Richmond DH, et al. Third- and fourth-degree perineal tears among primiparous women in England between 2000 and 2012: time trends and risk factors. BJOG. 2013 Nov 1;120(12):1516–25.
55. Fernando RJ, Williams AA, Adams EJ. RCOG Green-top Guideline No 29: The management of third and fourth degree perineal tears. 2015. [Available from: https://www.rcog.org.uk/globalassets/documents/guidelines/gtg-29.pdf]
56. Sultan AH, Kamm MA, Hudson CN, Thomas JM, Bartram CI. Anal-Sphincter Disruption during Vaginal Delivery. New Eng J Med; 2010 Jan 15;329(26):1905–11.
57. Fernando RJ, Williams AA, Adams EJ. RCOG Green-top Guideline No 29: The management of third and fourth degree perineal tears. 2015. [Available from: https://www.rcog.org.uk/globalassets/documents/guidelines/gtg-29.pdf]
58. Royal College of Obstetricians and Gynaecologists. The OASI Care Bundle [Available from: https://www.rcog.org.uk/OASICareBundle]
59. Knight M, Nair M, Tuffnell D, Kenyon S, Shakespeare J, Brocklehurst P, Kurinczuk J (Eds). Saving Lives, Improving Mothers' Care: Surveillance of maternal deaths in the UK 2012–14 and lessons learned to inform maternity care from the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2009–14. 2016
60 Mavrides E, Allard S, Chandraharan E, Collins P, Green L, Hunt BJ, Risis S, Thomson AJ on behalf of the Royal College of Obstetricians and Gynaecologists. Prevention and Management of Postpartum Haemorrhage. BJOG 2016;124:e106-e149.
61. 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.
62. Glover P. Blood loss at delivery: how accurate is your estimation? Australian Midwifery. 2003 Jun;16(2):21–4.
63. Patel A, Goudar SS, Geller SE, Kodkany BS, Edlavitch SA, Wagh K, et al. Drape estimation vs. visual assessment for estimating postpartum hemorrhage. International Journal of Gynecology & Obstetrics. 2006 Jun 1;93(3):220–4.
64. Schorn MN. Measurement of blood loss: review of the literature. J Midwifery Womens Health. 2010 Jan;55(1):20–7.
65. Papile LA. The Apgar score in the 21st century. N Engl J Med. 2001 Feb 15;344(7):519–20.
66. Sun Y, Vestergaard M, Pedersen CB, Christensen J, Olsen J. Apgar Scores and Long-Term Risk of Epilepsy. Epidemiology. 2006 May 1;17(3):296–301.
67. Odd DE, Rasmussen F, Gunnell D, Lewis G, Whitelaw A. A cohort study of low Apgar scores and cognitive outcomes. Archives of Disease in Childhood - Fetal and Neonatal Edition. 2008 Mar 1;93(2):F115–20.
68. Moster D, Lie RT, Irgens LM, Bjerkedal T, Markestad T. The association of Apgar score with subsequent death and cerebral palsy: A population-based study in term infants. The Journal of Pediatrics. 2001 Jun;138(6):798–803.
69. Delgado Nunes V, Gholitabar M, Sims JM, Bewley S, Guideline Development Group. Intrapartum care of healthy women and their babies: summary of updated NICE guidance. BMJ. 2014. p. g6886.
70. Moore ER, Bergman N, Anderson GC, Medley N. Early skin to skin contact for mothers and their healthy newborn infants. Cochrane Database Syst Rev. 2016 Nov 25;11(5):CD003519.

71. UNICEF-UK. Guide to the Baby Friendly Initiative standards. 2012. [Available from: https://www.unicef.org.uk/babyfriendly/accreditation/]
72. Victora CG, Bahl R, Barros AJD, França GVA, Horton S, Krasevec J, et al. Breastfeeding in the 21st century: epidemiology, mechanisms, and lifelong effect. Lancet. 2016 Jan 30;387(10017):475–90.
73. Ajetunmobi OM, Whyte B, Chalmers J, Tappin DM, Wolfson L, Fleming M, et al. Breastfeeding is associated with reduced childhood hospitalization: evidence from a Scottish Birth Cohort (1997–2009). The Journal of Pediatrics. 2015 Mar;166(3):620–4.
74. Campbell OMR, Cegolon L, Macleod D, Benova L. Length of Stay After Childbirth in 92 Countries and Associated Factors in 30 Low- and Middle-Income Countries: Compilation of Reported Data and a Cross-sectional Analysis from Nationally Representative Surveys. PLoS Med. 2016 Mar;13(3):e1001972.
75. Appleby J, Raleigh V, Frosini F, Bevan G, Gao H. Variations in health care: the good, the bad and the inexplicable. The King's Fund. 2011
76. Kozhimannil KB, Law MR, Virnig BA. Cesarean delivery rates vary tenfold among US hospitals; reducing variation may address quality and cost issues. Health Aff 2013 Mar;32(3):527–35.
77. Bragg F, Cromwell DA, Edozien LC, Gurol-Urganci I, Mahmood TA, Templeton A, et al. Variation in rates of caesarean section among English NHS trusts after accounting for maternal and clinical risk: cross sectional study. BMJ.2010 Oct 6;341:c5065–5.
78. Mulley AG. Improving productivity in the NHS. BMJ. 2010 Jul 27;341:c3965–5.
79. Knight HE, Cromwell D, van der Meulen J, Gurol-Urganci I, Richmond D, Mahmood T, et al. Patterns of Maternity Care in English NHS Hospitals 2011/12.

National Maternity and Perinatal Audit
Lindsay Stewart Centre for Audit and Clinical Informatics
Royal College of Obstetricians and Gynaecologists
27 Sussex Place, Regent's Park, London NW1 4RG

Email: nmpa@rcog.org.uk
Website: www.maternityaudit.org.uk
Twitter: @nmpa_audit

NMPA
National Maternity & Perinatal Audit