National Maternity and Perinatal Audit

NHS Maternity Care for Women with a Body Mass Index of 30 kg/m^2 or Above

Births between 1 April 2015 and 31 March 2017
in England, Wales and Scotland

LONDON SCHOOL of HYGIENE &TROPICAL MEDICINE
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The National Maternity and Perinatal Audit (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).

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The NMPA Project Team and Board

Abbreviations and glossary

The definition of abbreviations and terms that are commonly used to describe the technical methods of the NMPA can be found in the NMPA Clinical Report 2019.[1]

AGA	Appropriate for gestational age. A neonate with birthweight between the 10th and 90th centile for gestational age, as defined by UK 1990 population centiles.
AMU	Alongside midwifery-led unit.
BMI	Body mass index, an estimate of body fat based on height and weight. Measured in kilograms of weight, divided by squared height in metres (kg/m^2).
Cephalic position	The baby is lying in the uterus with the head down towards the birth canal; this is the most common position of the baby for vaginal birth.
EDD	Estimated due date of the birth of the baby, the date at which the gestational age of the baby is estimated to be 40 weeks.
Encephalopathy	A heterogeneous, clinically defined syndrome characterised by disturbed brain function in the earliest days of life in a baby born at or beyond 35 weeks of gestation, manifested by a reduced level of consciousness or seizures, often accompanied by difficulty with initiating and maintaining breathing, and by depression of tone and reflexes.
FMU	Freestanding midwifery-led unit.
Great Britain	The island consisting of England, Scotland and Wales.
Hyperinsulinaemia	High blood levels of insulin, the hormone that regulates high levels of blood glucose.
Hypoglycaemia	Low level of blood sugar.
IMD	Index of multiple deprivation, a measure of socio-economic deprivation.
LGA	Large for gestational age. A baby with estimated fetal weight or actual birthweight greater than the 90th centile for gestational age, as defined by UK 1990 population centiles.
Multip/multiparous	A woman who has given birth to at least one baby before the current pregnancy.
NICE	National Institute for Health and Care Excellence.
NNRD	National Neonatal Research Database.
Nullip/nulliparous	A woman who has not previously given birth to a baby.
OASI	Obstetric anal sphincter injury, another name for a severe perineal tear at the time of birth which involves injury to the anal sphincter muscles.
Obstetric haemorrhage	Heavy blood loss during pregnancy, usually defined by blood loss of more than 500 ml.
OU	Obstetric unit.
Parity	The number of babies that a woman has given birth to before the current pregnancy.
SGA	Small for gestational age. A baby with estimated fetal weight or actual birthweight lower than the 10th centile for gestational age, as defined by UK 1990 population centiles.
Shoulder dystocia	A vaginal cephalic birth that requires additional obstetric manoeuvres to complete the birth of a baby, after gentle traction has failed to release the baby's shoulders.
Thromboprophylaxis	Methods employed to reduce the risk of a woman experiencing a thromboembolism (usually a deep vein thrombosis or pulmonary embolism) during pregnancy.
VBAC	Vaginal birth after caesarean section. For the NMPA measure, this is defined only in secundiparous women for whom the first birth was by caesarean section.

VTE	Venous thromboembolism, comprising deep vein thrombosis and/or pulmonary embolism. These are blood clots that form and block blood vessels. Pulmonary embolism is a leading cause of maternal death in the UK.
WHO	World Health Organization.

Executive summary

Introduction

This report focuses on the maternal and neonatal outcomes of pregnant women with body mass index (BMI) of 30 kg/m^2 or above who gave birth between 1 April 2015 and 31 March 2017, compared with those of women with BMI in the range 18.5–24.9 kg/m^2.

Methods

This study uses existing NMPA linked datasets to explore the characteristics and outcomes of women and babies according to category of maternal BMI at booking with the maternity service provider. Women are grouped by BMI according to established World Health Organization (WHO) categories.

The association between maternal BMI and each maternal or neonatal measure is represented using line graphs, stratified by maternal parity (nulliparous, multiparous with previous vaginal births only, multiparous with a previous caesarean birth). We also explored the feasibility of stratifying the outcomes according to the woman's risk status at the time of labour and birth (as defined by the National Institute of Health and Care Excellence (NICE) *Intrapartum Care for Healthy Women and Babies* guideline). Finally, we described the type of maternity units in which the women gave birth, by maternal BMI.

A lay advisory group was involved at all stages of this sprint audit, including discussing the choice of outcomes, interpreting the results, and reviewing the draft report and recommendations.

Key findings

For the period 1 April 2015 to 31 March 2017, we estimate that 21.8% of women giving birth had a BMI of 30 kg/m^2 or above; however, 16.9% of women did not have a BMI (or height and weight) recorded.

The likelihood of a woman experiencing an intrapartum intervention or adverse maternal outcome, or her baby experiencing very serious complications following birth, increases as BMI increases. We do not know whether this is because women with higher BMI are more likely to develop complications requiring intervention or because of differences in the clinicians' threshold to intervene. However, those women with a BMI of 30 kg/m^2 or above who have previously had at least one vaginal birth (and no caesarean births) are almost as likely to have another unassisted vaginal birth as multiparous women with a BMI in the range 18.5–24.9 kg/m^2 who have also not previously had a caesarean birth.

Babies born to women with a BMI of 30 kg/m^2 or above are less likely to receive skin-to-skin contact within 1 hour of birth or breast milk for their first feed than babies born to women with a lower BMI.

The proportion of women giving birth in a freestanding midwifery unit, or at home, decreases as BMI increases, although 1.7% of women with a BMI of 35.0–39.9 kg/m^2 and 1.1% of women with a BMI of 40 kg/m^2 or above did give birth in one of these settings.

The lay advisory group requested that we also measure access to birth in water, monitoring of fetal growth by ultrasound, access to perinatal mental health services and prevention of venous

thromboembolism in women with a BMI of 30 kg/m^2 or above. We currently do not have sufficient information in the NMPA dataset to assess these.

Presentation of maternal or neonatal outcomes by maternal BMI, parity and risk status (as assessed at admission for birth) is both feasible and likely to be useful to support informed decision making. It is limited by uncertainty with less common outcomes (particularly those indicating poor condition of the baby at birth), more so when these are estimated in smaller groups of women.

Recommendations

R1 Audit local rates of missing data on BMI (or height and weight) before the end of the 2021/22 reporting year, and commence local initiatives to improve electronic recording of this where it is low.

(Audience: Maternity service providers)

R2 Commence by the end of June 2023 the production of, or include in updates to existing documents, detailed guidance on the antenatal and intrapartum care offered to women who are suspected to have a large-for-gestational-age baby, including whether the guidance should differ for women with a BMI of 30 kg/m^2 or above.

(Audience: National organisations responsible for publishing guidance on maternity care)

R3 Support research and investigation into why women with a BMI of 30 kg/m^2 or above have a higher risk of stillbirth, in order to inform clinical care which aims to reduce this risk.

(Audience: National Institute for Health Research, Health and Care Research Wales and NHS Research Scotland in consultation with the Royal College of Obstetricians and Gynaecologists and policy makers, service planners/commissioners, service managers and healthcare professionals working for maternity services)

R4 Ensure that women with a BMI of 30 kg/m^2 or above are given preconception and antenatal information tailored to their individual circumstances (including their BMI and whether this is their first birth or they have previously had a caesarean birth). To support women in their decision making, this should include information from this report on their risk of the following:

- birth interventions
- major postpartum blood loss
- postnatal readmission to hospital
- very serious complications for their baby following birth.

(Audience: Healthcare professionals working in maternity services, general practitioners)

R5 Identify common causes for readmission to the maternity unit following birth specifically for women with a BMI of 40 kg/m^2 or above, and commence local quality improvement initiatives to reduce the risk of readmission.

(Audience: Maternity service providers)

R6 Support all women and babies to experience skin-to-skin contact with one another within 1 hour of birth should they choose to and regardless of the woman's BMI, unless it is unsafe to do so because either the woman or baby requires immediate medical attention.

(Audience: Healthcare professionals working in maternity services)

R7 Offer all women breastfeeding information and support during pregnancy and again shortly after the birth. Women with a BMI of 30 kg/m^2 or above may require support to be tailored to their specific needs and to be provided by a healthcare professional who is trained to adapt breastfeeding techniques for women with a higher BMI.

(Audience: Healthcare professionals working in maternity services)

R8 Incorporate information on antenatal assessment of fetal growth status (suspected SGA or LGA) and on venous thromboembolism risk scores and prophylaxis in future trust/board and national maternity dataset specifications.

(Audience: Maternity service providers, the Data and Intelligence Division of Public Health Scotland, the National Welsh Informatics Service)

R9 Assess the quality of data on labour or birth in water, and where completeness is low, commence initiatives to improve it.

(Audience: Maternity service providers)

Key findings, recommendations, report evidence and related national guidance

	Key finding (KF) **Recommendation (R)** *(Audience)*	**Report findings underlying this recommendation**	**Page**	**Related national guidance**
KF1	21.8% of pregnant women had a BMI of 30 kg/m^2 or above; this is associated with a higher rate of adverse outcomes for both these women and their babies.		4–5	RCOG (2019) *Care of Women with Obesity in Pregnancy*[2]
KF2	Overall, 16.9% of women did not have a BMI documented in their maternity records, and this was more common in records from England and Wales than in Scotland, with completeness varying between hospital trusts/boards.		4	NICE (2008) *Antenatal Care for Uncomplicated Pregnancies*[3]
R1	**Audit local rates of missing data on BMI (or height and weight) before the end of the 2021/22 reporting year, and commence local initiatives to improve electronic recording of this where it is low.** *(Maternity service providers)*	KF2	4	NICE (2008) *Antenatal Care for Uncomplicated Pregnancies*[3]
KF3	The chance of having a large-for-gestational-age baby increases as BMI increases.		6, 8	RCOG (2019) *Care of Women with Obesity in Pregnancy*[2]
R2	**Commence by the end of June 2023 the production of, or include in updates to existing documents, detailed guidance on the antenatal and intrapartum care offered to women who are suspected to have a large-for-gestational-age baby, including whether the guidance should differ for women with a BMI of 30 kg/m^2 or above.** *(National organisations responsible for publishing guidance on maternity care)*	KF3	6, 8–9	NICE (2019) *Intrapartum Care for Women with Existing Medical Conditions or Obstetric Complications and Their Babies*,[4] RCOG (2019) *Care of Women with Obesity in Pregnancy*[2]
KF4	The risk of having a stillborn baby increases as BMI increases, so that women with a BMI of 40 kg/m^2 or above have twice the risk (6/1000) of women with a BMI between 18.5 and 24.9 kg/m^2 (3/1000).		6, 8	RCOG (2019) *Care of Women with Obesity in Pregnancy*[2]

	Key finding (KF) **Recommendation (R)** *(Audience)*	**Report findings underlying this recommendation**	**Page**	**Related national guidance**
R3	**Support research and investigation into why women with a BMI of 30 kg/m^2 or above have a higher risk of stillbirth, in order to inform clinical care which aims to reduce this risk.** *(National Institute for Health Research, Health and Care Research Wales and NHS Research Scotland in consultation with the Royal College of Obstetricians and Gynaecologists and policy makers, service planners/commissioners, service managers and healthcare professionals working for maternity services)*	KF4	6, 8–9	
KF5	The likelihood of a woman experiencing a caesarean birth, heavy postpartum blood loss or postnatal readmission or the baby having an adverse outcome (low Apgar score, admission to a neonatal unit, neonatal encephalopathy, receiving mechanical ventilation) increases as BMI increases.		14–18	RCOG (2019) *Care of Women with Obesity in Pregnancy*[2]
KF6	Women with a BMI of 30 kg/m^2 or above who have previously had at least one vaginal birth (and no caesarean births) are almost as likely to have another unassisted vaginal birth as multiparous women with a BMI in the range 18.5–24.9 kg/m^2 who have also not previously had a caesarean birth.		16	RCOG (2019) *Care of Women with Obesity in Pregnancy*[2]
KF7	For secundiparous women with a previous caesarean birth, the rate of undergoing an elective caesarean birth increases, and the rate of having a vaginal birth in women who attempt it decreases, with increasing BMI. We do not know whether this is because women with higher BMI are more likely to develop a complication or because clinicians have a lower threshold to intervene.		14–15	RCOG (2019) *Care of Women with Obesity in Pregnancy*[2]
R4	**Ensure that women with a BMI of 30 kg/m^2 or above are given preconception and antenatal information tailored to their individual circumstances (including their BMI and whether this is their first birth or they have previously had a caesarean birth). To support women in their decision making, this should include information from this report on their risk of the following:** • **birth interventions** • **major postpartum blood loss** • **postnatal readmission to hospital** • **very serious complications for their baby following birth.** *(Healthcare professionals working in maternity services, general practitioners)*	KF5, KF6, KF7	14–18	RCOG (2019) *Care of Women with Obesity in Pregnancy*[2]

	Key finding (KF) **Recommendation (R)** *(Audience)*	**Report findings underlying this recommendation**	**Page**	**Related national guidance**
R5	**Identify common causes for readmission to the maternity unit following birth specifically for women with a BMI of 40 kg/m^2 or above, and commence local quality improvement initiatives to reduce the risk of readmission.** *(Maternity service providers)*	KF5	17, 21–22	NICE (2006) *Postnatal Care up to 8 Weeks after Birth*[5]
KF8	Babies born to women with a BMI of 30 kg/m^2 or above are less likely to receive skin-to-skin contact within 1 hour of birth or breast milk for their first feed than babies born to women with a lower BMI.		17–18	Unicef UK (2017) *Guide to the Unicef UK Baby Friendly Initiative Standards*[6]
R6	**Support all women and babies to experience skin-to-skin contact with one another within 1 hour of birth should they choose to and regardless of the woman's BMI, unless it is unsafe to do so because either the woman or baby requires immediate medical attention.** *(Healthcare professionals working in maternity services)*	KF8	17–19, 22	Unicef UK (2017) *Guide to the Unicef UK Baby Friendly Initiative Standards*[6]
R7	**Offer all women breastfeeding information and support during pregnancy and again shortly after the birth. Women with a BMI of 30 kg/m^2 or above may require support to be tailored to their specific needs and to be provided by a healthcare professional who is trained to adapt breastfeeding techniques for women with a higher BMI.** *(Healthcare professionals working in maternity services)*	KF8	17–19, 21–22	Unicef UK (2017) *Guide to the Unicef UK Baby Friendly Initiative Standards*[6]
KF9	In addition to the measures already presented, the lay advisory group requested that we measure access to birth in water, monitoring of fetal growth by ultrasound, access to perinatal mental health services and prevention of venous thromboembolism in women with a BMI of 30 kg/m^2 or above. We currently do not have sufficient information in the NMPA datasets to assess these.		12–13	RCOG (2013) *The Investigation and Management of the Small-for-Gestational-Age Fetus*,[7] RCOG (2015) *Reducing the Risk of Venous Thromboembolism during Pregnancy and the Puerperium*[8]
R8	**Incorporate information on antenatal assessment of fetal growth status (suspected SGA or LGA) and on venous thromboembolism risk scores and prophylaxis in future trust/board and national maternity dataset specifications.** *(Maternity service providers, the Data and Intelligence Division of Public Health Scotland, the National Welsh Informatics Service)*	KF9	12–13	RCOG (2013) *The Investigation and Management of the Small-for-Gestational-Age Fetus*,[7] RCOG (2015) *Reducing the Risk of Venous Thromboembolism during Pregnancy and the Puerperium*[8]
R9	**Assess the quality of data on labour or birth in water, and where completeness is low, commence initiatives to improve it.** *(Maternity service providers)*	KF9	12–13	

	Key finding (KF) **Recommendation (R)** *(Audience)*	**Report findings underlying this recommendation**	**Page**	**Related national guidance**
KF10	The proportion of women giving birth in a freestanding midwifery unit, or at home, decreases as BMI increases, although 1.7% of women with a BMI of 35.0–39.9 kg/m^2 and 1.1% of women with a BMI of 40 kg/m^2 or above did give birth in one of these settings, compared with 4.3% of women with a BMI in the range 18.5–24.9 kg/m^2.		24–25	NICE (2014) *Intrapartum Care for Healthy Women and Babies*[9]
KF11	The quality and availability of data distinguishing between births in an obstetric unit and those in its alongside midwifery unit is a limitation when assessing place of birth for women with a BMI of 30 kg/m^2 or above.		24–25	NICE (2014) *Intrapartum Care for Healthy Women and Babies*[9]
KF12	Presentation of maternal or neonatal outcomes by maternal BMI, parity and risk status (as assessed at admission for birth) is both feasible and likely to be useful to support informed decision making. It is limited by uncertainty with less common outcomes, such as poor condition of the baby at birth, particularly when these are estimated in smaller groups of women.		26–27	N/A

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, commissioned 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 NMPA aims to produce high-quality information that can be used by providers, commissioners and users of maternity services to benchmark against national standards and recommendations where these exist, and to identify good practice and areas for improvement.

Patient and public involvement

A lay advisory group composed of lay members who have a lived experience of pregnancy with a BMI of 30 kg/m^2 or above was convened for this audit. The group members were consulted on the language of the audit, the measures or outcomes of pregnancy and birth most important to them, their interpretation of the results, and the development and reporting of key findings and recommendations. Their opinions have been included in this report using quotations. In some cases, the women preferred to not be identified – either throughout the report or in specific cases; these quotations have been identified as 'anonymous'.

Terminology

Early in the process of conducting this audit we consulted with the lay advisory group regarding their preferred terminology when referring to pregnant women with a body mass index (BMI) of 30 kg/m^2 or above. The group acknowledged a wide range of words in common and professional use that refer to individuals who meet these criteria, including 'fat', 'obese', 'overweight', 'high BMI', 'larger' and 'bigger'. The group also noted that the World Obesity Federation recommends the term 'individuals *with obesity*' in preference to '*obese* individuals' as recognition that obesity is a disease.[10] Furthermore, the lay group were aware that there is no single term that suits everyone. However, there was unanimous agreement that we should refer to women who are grouped according to their BMI by using the group BMI thresholds, for example 'pregnant women with a BMI of 30 kg/m^2 or above', in preference to the other established terms in common medical use.

> "*Personally, I prefer […] BMI of 30+ or 35+. Because that is particularly specific, it is unequivocal, it is clear to everybody what you are talking about.*" (Amber)

> "*I would personally prefer that we look at it in terms of over, whatever the number is, rather than the labels, because the labels of overweight, obese, morbidly obese, have different meanings in the real world.*" (Hollie)

Potential implications of BMI of 30 kg/m^2 or above in pregnancy

Approximately 21.3% of pregnant women giving birth in Great Britain between April 2015 and March 2016 had a BMI of 30 kg/m^2 or above.[11]

Women with BMI of 30 kg/m^2 or above have at least a two-fold higher risk of complications antenatally (e.g. gestational diabetes), intrapartum (e.g. caesarean section) and postnatally (e.g. maternal venous thromboembolism) than women with a BMI in the healthy range (18.5–24.9 kg/m^2).[2] Nevertheless, approximately one-third of these women have a pregnancy and birth without complication[12] and, of otherwise-healthy multiparous women with a BMI of 30 kg/m^2 or above but no antenatal complications, approximately 80% have a birth without intervention or adverse maternal outcome.[13]

The majority (98%) of women with a BMI over 35 kg/m^2 give birth to their babies in obstetric units,[14] but the percentage for women with a BMI between 30 and 35 kg/m^2 has not been reported. Giving birth in obstetric-led units is associated with a higher rate of interventions and greater cost but with similar composite maternal or perinatal outcomes when compared with giving birth in midwifery-led units for 'low risk' women with a BMI in the range 18.5–24.9 kg/m^2 at the onset of labour.[15]

Maternal parity has been identified as one of the most significant predictors of birth outcome for women with BMI of 30 kg/m^2 or above.[12,13] Analysis of NMPA datasets has also identified that, in terms of risk for birth interventions or adverse outcomes, multiparous women who have previously had a caesarean birth represent a parity group distinct from multiparous women who have never had a caesarean birth.[16]

Some women with a BMI of 30 kg/m^2 or above will have no other risk factors (no hypertension, diabetes or previous complications) for an adverse birth outcome. For these women, births without complication or intervention are more likely and they may therefore be suited to giving birth in midwifery-led birthing centres, particularly if they have previously given birth vaginally.[2,13]

Providing the rates of outcomes and auditable measures presented by BMI category is expected to inform both national initiatives supporting greater choice, and quality improvements in care for women, according to maternal parity and BMI. This is especially required in the group of women with a BMI of 35 kg/m^2 or above who are generally considered at higher risk for most pregnancy and birth outcomes.

Aims and objectives

The aim of this audit was to determine the rate of intrapartum interventions and maternal and neonatal outcomes for women with a BMI of 30 kg/m^2 or above in pregnancy, giving birth in England, Wales or Scotland, and to compare these with rates for women with a BMI in the range 18.5–24.9 kg/m^2.

The objectives were to:

- determine the characteristics of women with a BMI of 30 kg/m^2 or above, compared with women with lower BMI
- report NMPA outcome measures for women and their babies, according to maternal BMI and parity
- determine where women with a BMI of 30 kg/m^2 or above give birth, compared with women with lower BMI
- explore the feasibility of reporting NMPA outcome measures for women and their babies, according to BMI category, parity and maternal risk status at birth.

Data sources

The NMPA uses data routinely collected in the course of maternity and neonatal care and links these datasets together to produce a central maternity and neonatal dataset. A different approach to obtaining data is used in each participating country, reflecting the status and maturity of centralised national maternity datasets. The data sources have previously been described in the NMPA Clinical Report 2019.[1]

Assessment of data quality

The NMPA uses existing approaches to assess data quality and to determine which trusts/boards can be included in the report. These approaches are set out in the NMPA Clinical Report 2019 and NMPA Measures Technical Specification.[1,17] The analysis in this report is restricted to (i) trusts/boards that passed the NMPA trust/board level data quality checks and (ii) birth records within those trusts or boards that contained the required data to construct the measure. The number of trusts and boards for which results were available therefore varied from measure to measure, depending on the specific data requirements. The included trusts and boards in this report are the same as those in the same years from the earlier clinical reports.[1,11]

Construction and reporting of audit measures

The maternal and neonatal measures included in this audit have previously been reported for all women in the NMPA Clinical Report 2019,[1] which can be referred to for a description of the methods employed. For this audit, the results of the same measures for all women in Great Britain have been stratified by the categories of BMI as defined by the World Health Organization (WHO).[18]

For the reasons outlined above, we have presented birth outcome measures according to whether the woman is nulliparous, multiparous with at least one previous birth by caesarean, or multiparous without previous caesarean births. This strategy was also suggested by the lay advisory group, who agreed that this type of stratification was important to them:

> "*In your dataset, do you have the number of the birth, whether it is first, second or third? There is potentially reduced risk if you've had uncomplicated pregnancy previously, the first birth is arguably, statistically at least, more risky, because you don't know what happened* [no previous birth to compare to]" (Hollie)

> "*I think with the amount of births you have, the more confident you become* [to question care]. *This needs to be reflected on the graphs because it needs to be 'this woman has a BMI of 33, she had her first birth and then she had X amount of intervention'. Does the graph look the same if another woman of BMI 33 had a subsequent birth?*" (Rachel-Sara)

To explore the feasibility and usefulness of presenting maternal outcomes by risk status on admission to hospital for birth (according to criteria specified in the NICE guideline *Intrapartum Care for Healthy Women and Babies*),[9] we have included a small selection of outcome measures that explore this. The methods for determining risk status have recently been described in a paper by Jardine et al.;[16] however, for this analysis, high risk status was not allocated to women whose only risk factor was a BMI of 35 kg/m^2 or above.

Characteristics of women and their babies by category of BMI

Key findings and recommendations

KF1 21.8% of pregnant women had a BMI of 30 kg/m^2 or above; this is associated with a higher rate of adverse outcomes for both these women and their babies.

KF2 Overall, 16.9% of women did not have a BMI documented in their maternity records, and this was more common in records from England and Wales than in Scotland, with completeness varying between hospital trusts/boards.

KF3 The chance of having a large-for-gestational-age baby increases as BMI increases.

KF4 The risk of having a stillborn baby increases as BMI increases, so that women with a BMI of 40 kg/m^2 or above have twice the risk (6/1000) of women with a BMI between 18.5 and 24.9 kg/m^2 (3/1000).

R1 Audit local rates of missing data on BMI (or height and weight) before the end of the 2021/22 reporting year, and commence local initiatives to improve electronic recording of this where it is low.

(Audience: Maternity service providers)

R2 Commence by the end of June 2023 the production of, or include in updates to existing documents, detailed guidance on the antenatal and intrapartum care offered to women who are suspected to have a large-for-gestational-age baby, including whether the guidance should differ for women with a BMI of 30 kg/m^2 or above.

(Audience: National organisations responsible for publishing guidance on maternity care)

R3 Support research and investigation into why women with a BMI of 30 kg/m^2 or above have a higher risk of stillbirth, in order to inform clinical care which aims to reduce this risk.

(Audience: National Institute for Health Research, Health and Care Research Wales and NHS Research Scotland in consultation with the Royal College of Obstetricians and Gynaecologists and policy makers, service planners/commissioners, service managers and healthcare professionals working for maternity services)

The NMPA holds records for 1 401 828 women and 1 423 389 babies (of whom 1 380 977 were singletons) from the period 1 April 2015 to 31 March 2017 in England, Scotland and Wales. Of these, 253 880 women giving birth to 257 995 babies were recorded as having a BMI of 30 kg/m^2 or above, and 236 419 women had missing values for BMI or the information required to calculate it.

Findings

Distribution of BMI among pregnant women

The proportion of pregnant women with BMI in each of the WHO-defined categories is presented for each country of Great Britain in Table 1. Overall, 21.8% of women had a BMI of 30 kg/m^2 or above.

There was a high proportion of women in England (18.2%, *n* = 225 133) and Wales (13.5%, *n* = 8204) with missing data on BMI; this was less common in Scotland (2.9% missing, *n* = 3082). Evaluation of women with missing data on BMI found that their outcomes were similar to the overall rate among all women, suggesting that the BMIs recorded were likely to be representative of the whole population (i.e. randomly rather than systematically missing). We have therefore excluded women with missing BMI from the audit results.

Table 1 Distribution of BMI by WHO-defined categories in women giving birth in Great Britain between 1 April 2015 and 31 March 2017 for whom BMI data was recorded

BMI (kg/m^2)	England		Scotland		Wales		Great Britain	
	n	%	*n*	%	*n*	%	*n*	%
Total number	1 009 200		103 691		52 518		1 165 409	
<18.5	29 288	2.9%	2 866	2.8%	1 257	2.4%	33 411	2.9%
18.5–24.9	477 139	47.3%	47 762	46.1%	22 522	42.9%	547 423	47.0%
25.0–29.9	286 743	28.4%	28 983	28.0%	14 969	28.5%	330 695	28.4%
30.0–34.9	132 606	13.1%	14 443	13.9%	7 752	14.8%	154 801	13.3%
35.0–39.9	54 933	5.4%	6 340	6.1%	3 687	7.0%	64 960	5.6%
≥40	28 491	2.8%	3 297	3.2%	2 331	4.4%	34 119	2.9%

The proportion of women with a BMI of 30 kg/m^2 or above giving birth in each area of England and Wales between 1 April 2015 and 31 March 2017 is presented in Figure 1.

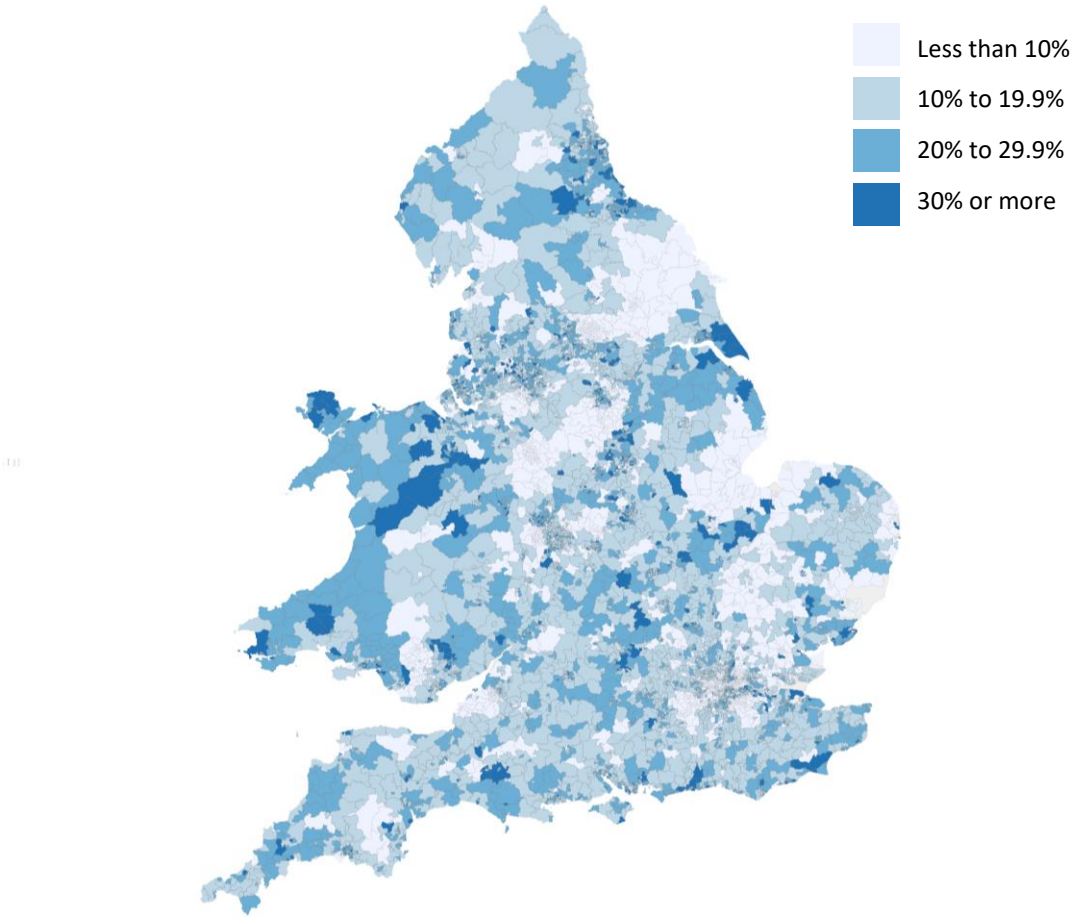


Figure 1 Proportion of women with a BMI of 30 kg/m^2 or above at booking in the NMPA dataset, by geographic area (middle layer super output area) in England and Wales (women's postcode or geographic area was not available in the Scottish dataset)

Characteristics of women, presented by BMI category

The NMPA provides a unique opportunity to describe the diversity of the women who gave birth during the audit period, including how their characteristics differ by category of BMI. This section outlines demographic and other general characteristics of these women and their babies (Table 2).

- A BMI of under 18.5 kg/m^2 was more common in younger women, and women with a BMI of over 40 kg/m^2 were less likely to be under 20 years old. For all other BMI categories, the distribution of maternal age was similar.
- Women with a BMI under 18.5 kg/m^2 and those with a BMI between 30 and 34.9 kg/m^2 were more likely to be of South Asian ethnicity than women with a BMI between 18.5 and 24.9 kg/m^2. Women with BMI of 35 kg/m^2 or above were more likely to be of white or Black ethnicity than women with a BMI between 18.5 and 24.9 kg/m^2.
- Women living in the most deprived areas (fifth quintile of the deprivation index) were more likely to be underweight (BMI under 18.5 kg/m^2) or, have a BMI of 30 kg/m^2 or above.
- There were positive relationships with BMI category for multiparity, diabetes, hypertension and history of a previous caesarean birth (each was more common as BMI increased).

Characteristics of babies, presented by BMI category of the mother

This section reports on characteristics of babies at birth – multiplicity, birth outcome, gestational age at birth and appropriateness of birthweight for gestational age (Table 3).

- There was no clear association between BMI and multiple birth.
- There was an increasing rate of stillbirth with increasing BMI, with women with a BMI of 40 kg/m^2 or above having twice the rate (6/1000 births) of those with BMI between 18.5 and 24.9 kg/m^2 (3/1000 births).
- Increasing BMI was also associated with higher rates of preterm birth between 32^{+0} and 36^{+6} weeks of gestation, but women with a BMI under 18.5 kg/m^2 had the highest rate of all.
- There was an increasing rate of having a large-for-gestational age (LGA) baby with increasing BMI, and a decreasing rate of having a small for gestational age (SGA) baby; to some extent, this may be related to women with a BMI of 30 kg/m^2 or above being more likely to have diabetes (Table 2), which is also associated with having an LGA baby.

Table 2 Characteristics of women who gave birth in England, Scotland and Wales between 1 April 2015 and 31 March 2017, who were included in the NMPA data, presented by BMI category

Characteristic		BMI <18.5		BMI 18.5–24.9		BMI 25–29.9		BMI 30–34.9		BMI 35–39.9		BMI ≥40	
		n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
	Total number	33 411		547 423		330 695		154 801		64 960		34 119	
Age	<15	8	0.02%	98	0.02%	27	0.01%	6	0.0%	#[a]	0.0%	0	0.0%
	15–19	3 165	9.5%	20 441	3.7%	8 327	2.5%	3 566	2.3%	1 301	2.0%	492	1.4%
	20–24	8 448	25.3%	80 180	14.6%	45 152	13.7%	23 712	15.3%	10 793	16.6%	5 464	16.0%
	25–29	9 759	29.2%	149 336	27.3%	91 465	27.7%	44 269	28.6%	19 457	30.0%	10 775	31.6%
	30–34	7 683	23.0%	174 708	31.9%	104 189	31.5%	45 634	29.5%	18 437	28.4%	9 702	28.4%
	35–39	3 280	9.8%	94 254	17.2%	61 166	18.5%	27 454	17.7%	10 784	16.6%	5 528	16.2%
	40–44	491	1.5%	18 260	3.3%	13 988	4.2%	6 885	4.4%	2 761	4.3%	1 408	4.1%
	≥45	29	0.1%	1 281	0.2%	1 026	0.3%	551	0.4%	211	0.3%	112	0.3%
	Missing age	548	1.6%	8 865	1.6%	5 355	1.6%	2 724	1.8%	1 210[a]	1.9%	638	1.9%
Ethnic origin	White	22 193	66.4%	389 460	71.1%	226 208	68.4%	107 905	69.7%	48 272	74.3%	26 529	77.8%
	South Asian	4 676	14.0%	50 588	9.2%	36 518	11.0%	14 842	9.6%	4 361	6.7%	1 502	4.4%
	Black	813	2.4%	14 119	2.6%	16 335	4.9%	9 944	6.4%	3 903	6.0%	1 981	5.8%
	Mixed	577	1.7%	8 634	1.6%	5 393	1.6%	2 599	1.7%	1 045	1.6%	586	1.7%
	Other	1 514	4.5%	21 279	3.9%	11 128	3.4%	4 439	2.9%	1 358	2.1%	499	1.5%
	Missing ethnicity	3 638	10.9%	63 343	11.6%	35 113	10.6%	15 072	9.7%	6 021	9.3%	3 022	8.9%
Index of multiple deprivation (IMD)[b]	1 = least deprived	3 702	11.1%	85 435	15.6%	42 738	12.9%	15 777	10.2%	5 631	8.7%	2 464	7.2%
	2	4 368	13.1%	91 168	16.7%	49 348	14.9%	20 100	13.0%	7 922	12.2%	3 690	10.8%
	3	5 359	16.0%	97 513	17.8%	56 544	17.1%	25 386	16.4%	10 535	16.2%	5 329	15.6%
	4	7 047	21.1%	107 361	19.6%	68 590	20.7%	33 740	21.8%	14 129	21.8%	7 475	21.9%
	5 = most deprived	9 857	29.5%	116 282	21.2%	82 105	24.8%	44 765	28.9%	20 112	31.0%	11 375	33.3%
	Missing IMD	3 078	9.2%	49 664	9.1%	31 370	9.5%	15 033	9.7%	6 631	10.2%	3 786	11.1%
Parity	Nulliparous	16 615	49.7%	251 059	45.9%	128 696	38.9%	53 421	34.5%	21 007	32.3%	10 428	30.6%
	Multiparous	16 569	49.6%	292 844	53.5%	199 992	60.5%	100 430	64.9%	43 594	67.1%	23 498	68.9%
	Missing parity	227	0.7%	3 520	0.6%	2 007	0.6%	950	0.6%	359	0.6%	193	0.6%
Comorbidities	Hypertension	46	0.1%	1 295	0.2%	1 669	0.5%	1 487	1.0%	932	1.4%	755	2.2%
	Pre-existing diabetes	698	2.1%	16 038	2.9%	18 761	5.7%	15 342	9.9%	8 597	13.2%	6 007	17.6%
Obstetric history	Previous caesarean section	2 789	8.3%	61 191	11.2%	51 270	15.5%	28 946	18.7%	13 659	21.0%	8 480	24.9%

[a] Numbers less than 5 have been suppressed and the number of records with missing data approximated to prevent calculation of the suppressed values.

[b] The IMD is derived from the recorded standardised socio-economic quintile of the individual's local area based on postcode (LSOA) in England and on postcode in Scotland. The IMD for Wales is only available from the area of the GP cluster and so is included in the missing data here. As the areas used are of different granularity, these are not comparable between the three countries.

Table 3 Characteristics of babies born in England, Scotland and Wales between 1 April 2015 and 31 March 2017 who were included in the NMPA, presented by the mother's BMI category

Characteristic		BMI <18.5		BMI 18.5–24.9		BMI 25.0–29.9		BMI 30.0–34.9		BMI 35.0–39.9		BMI ≥40	
		n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
	Total number	33 797		555 141		335 885		157 310		66 029		34 656	
Multiplicity	Singleton	33 045	97.8%	539 985	97.3%	325 624	96.9%	152 392	96.9%	63 908	96.8%	33 581	96.9%
	Twins	737	2.2%	14 884	2.7%	10 065	3.0%	4 823	3.1%	2 076	3.1%	1 042	3.0%
	Higher order	15	0.04%	272	0.05%	196	0.06%	95	0.06%	45	0.07%	33	0.1%
Fetus outcome	Live birth	33 258	98.4%	545 425	98.2%	329 856	98.2%	154 395	98.1%	64 764	98.1%	33 973	98.0%
	Stillbirth	115	0.3%	1 722	0.3%	1 266	0.4%	660	0.4%	317	0.5%	198	0.6%
	Other[a]	34	0.1%	747	0.1%	451	0.1%	207	0.1%	91	0.1%	49	0.1%
	Missing outcome	390	1.2%	7 247	1.3%	4 312	1.3%	2 048	1.3%	857	1.3%	436	1.3%
Gestational age at birth (weeks)	23–27^{+6}	144	0.4%	1 916	0.3%	1 319	0.4%	664	0.4%	332	0.5%	195	0.6%
	28–31^{+6}	361	1.1%	4 135	0.7%	2 618	0.8%	1 363	0.9%	581	0.9%	300	0.9%
	32–36^{+6}	2 861	8.5%	34 187	6.2%	21 186	6.3%	10 452	6.6%	4 724	7.2%	2 615	7.5%
	37–41^{+6}	29 572	87.5%	495 515	89.3%	297 815	88.7%	138 618	88.1%	57 869	87.6%	30 307	87.5%
	≥42	471	1.4%	13 224	2.4%	9 040	2.7%	4 298	2.7%	1 748	2.6%	870	2.5%
	Missing GA	388	1.1%	6 164	1.1%	3 907	1.2%	1 915	1.2%	775	1.2%	369	1.1%
Birthweight centile	SGA	5 259	15.6%	47 940	8.6%	23 384	7.0%	9 818	6.2%	3 787	5.7%	1 759	5.1%
	AGA	26 841	79.4%	460 416	82.9%	271 527	80.8%	123 717	78.6%	50 290	76.2%	25 262	72.9%
	LGA	1 697	5.0%	46 785	8.4%	40 974	12.2%	23 775	15.1%	11 952	18.1%	7 635	22.0%

[a] Includes late miscarriages (including of second twin), and terminations of pregnancy.

Abbreviations: GA = gestational age, SGA = small for gestational age, AGA = appropriate for gestational age, LGA = large for gestational age

Discussion

Of all women giving birth during the audit period, 21.8% had a BMI of 30 kg/m^2 or above when booking for maternity care with the trust/board at which they later gave birth. This rate was highest (26.2%) in Wales. We acknowledge that the BMI for some women may have been overestimated, particularly if it is calculated using weight measured after the first trimester of pregnancy. Since this is only likely to affect a small proportion of women who do not attend for antenatal care until late in pregnancy, the impact on the findings in this report is likely to be minimal. We have previously recommended that maternity services, primary care and public health services should work together, with involvement of local service users, to ensure that there is appropriate provision to support weight management prior to, during and after pregnancy.[1]

Approximately one in six women who gave birth in Great Britain between 1 April 2015 and 31 March 2017 did not have a BMI recorded in their notes. This was more common in England and Wales than in Scotland. Since many national recommendations apply to groups of women according to their BMI, measurement and recording of BMI is informative in the provision of high-quality and safe maternity care. In this report, we have not adjusted outcomes according to maternal characteristics, and instead presented results stratified by BMI, parity and previous caesarean birth. Given that women with a BMI of 30 kg/m^2 or above are more likely to be from the most deprived areas, with different distributions of ethnicity and higher prevalence of comorbidities, these characteristics may contribute to some of the differences seen. An NMPA report on variation in outcomes by the index of multiple deprivation (IMD) or ethnicity will be published later in 2021.

With increasing BMI, women are increasingly more likely to have an LGA or stillborn baby. We know that the majority of fetal deaths occur antenatally (not intrapartum), and that a BMI of 30 kg/m^2 or above increases the risk of antenatal fetal death.[19] Further research is required to investigate why the babies of women with higher BMI are more likely to be stillborn, and to evaluate initiatives intended to recognise babies at risk and to intervene to prevent stillbirth. Having an LGA baby is associated with a higher chance of having a caesarean birth, severe perineal trauma, postpartum haemorrhage, shoulder dystocia and neonatal hypoglycaemia, and is more common among women with pre-existing or gestational diabetes, which is also associated with having a BMI of 30 kg/m^2 or above.[20,21] Induction of labour at term for non-diabetic mothers with suspected big babies has been shown to reduce the rate of shoulder dystocia and neonatal fractures (but not brachial plexus injury) without increasing the risk of assisted vaginal birth or caesarean section.[22] However, it is not known whether induction of labour has the same effect in women with a BMI of 30 kg/m^2 or above, who are most at risk of having an LGA baby and shoulder dystocia.[23] National guidelines are currently not available to guide the care offered to women with a baby suspected to be LGA; however, all women should be given the information that they require about the benefits and risks of all their options, in order to make an informed decision.[24] Further research is required to determine the optimum gestation of induction, to improve the accuracy of antenatal diagnosis, and to determine whether induction of labour is also beneficial in women with a BMI of 30 kg/m^2 or above.

Measures of care before, during and after birth

Key findings and recommendations

KF5 The likelihood of a woman experiencing a caesarean birth, heavy postpartum blood loss or postnatal readmission or the baby having an adverse outcome (low Apgar score, admission to a neonatal unit, neonatal encephalopathy, receiving mechanical ventilation) increases as BMI increases.

KF6 Women with a BMI of 30 kg/m^2 or above who have previously had at least one vaginal birth (and no caesarean births) are almost as likely to have another unassisted vaginal birth as multiparous women with a BMI in the range 18.5–24.9 kg/m^2 who have also not previously had a caesarean birth.

KF7 For secundiparous women with a previous caesarean birth, the rate of undergoing an elective caesarean birth increases, and the rate of having a vaginal birth in women who attempt it decreases, with increasing BMI. We do not know whether this is because women with higher BMI are more likely to develop a complication or because clinicians have a lower threshold to intervene.

KF8 Babies born to women with a BMI of 30 kg/m^2 or above are less likely to receive skin-to-skin contact within 1 hour of birth or breast milk for their first feed than babies born to women with a lower BMI.

KF9 In addition to the measures already presented, the lay advisory group requested that we measure access to birth in water, monitoring of fetal growth by ultrasound, access to perinatal mental health services and prevention of venous thromboembolism in women with a BMI of 30 kg/m^2 or above. We currently do not have sufficient information in the NMPA datasets to assess these.

R4 Ensure that women with a BMI of 30 kg/m^2 or above are given preconception and antenatal information tailored to their individual circumstances (including their BMI and whether this is their first birth or they have previously had a caesarean birth). To support women in their decision making, this should include information from this report on their risk of the following:

- **birth interventions**
- **major postpartum blood loss**
- **postnatal readmission to hospital**
- **very serious complications for their baby following birth.**

(Audience: Healthcare professionals working in maternity services, general practitioners)

R5 Identify common causes for readmission to the maternity unit following birth specifically for women with a BMI of 40 kg/m^2 or above, and commence local quality improvement initiatives to reduce the risk of readmission.

(Audience: Maternity service providers)

Key findings and recommendations *(continued)*

R6 **Support all women and babies to experience skin-to-skin contact with one another within 1 hour of birth should they choose to and regardless of the woman's BMI, unless it is unsafe to do so because either the woman or baby requires immediate medical attention.**

(Audience: Healthcare professionals working in maternity services)

R7 **Offer all women breastfeeding information and support during pregnancy and again shortly after the birth. Women with a BMI of 30 kg/m^2 or above may require support to be tailored to their specific needs and to be provided by a healthcare professional who is trained to adapt breastfeeding techniques for women with a higher BMI.**

(Audience: Healthcare professionals working in maternity services)

R8 **Incorporate information on antenatal assessment of fetal growth status (suspected SGA or LGA) and on venous thromboembolism risk scores and prophylaxis in future trust/board and national maternity dataset specifications.**

(Audience: Maternity service providers, the Data and Intelligence Division of Public Health Scotland, the National Welsh Informatics Service)

R9 **Assess the quality of data on labour or birth in water, and where completeness is low, commence initiatives to improve it.**

(Audience: Maternity service providers)

This chapter discusses measures of care for:

- timing of birth
- modes of birth
- maternal outcomes
- neonatal outcomes.

The definitions of the measures included remain unchanged from previous reports but have been repeated for convenience of reference in the *Findings* section below. During meetings with the lay advisory group, we discussed the measures that we routinely report, but we also consulted the group about what else they would like to know. In particular, the group asked whether we could measure:

1 Birth in water

> "*Women of greater BMI are routinely denied access to pools and water, despite there being very poor evidence for why. It would be lovely to cover that if possible.*" (Amber)

> "*In my experience, often the reason given for the denial is that women will not be able to remove the woman from the pool in an emergency without risk to their own health, but actually, having a BMI cut-off for that makes no sense whatsoever, because, as a pretty short woman with a high BMI, my actual weight is much lower than somebody with a standard BMI who is 6-foot tall.*" (Mari)

2 Measures relating to surveillance of fetal growth

> "*I'd be particularly interested in the reported scan estimate of weight versus the actual birthweight. That might be something that you can pull out because, obviously, we are often getting encouraged to be induced because you know, 'This baby is going to be huge!'.* […] *Both times I was told I was going to have a big baby, both times they were below average and this is not unusual and I wonder if it's much less unusual when you are bigger because they look at you and they say 'well, it's going to be massive'.*" (Amber)

3 Measures of mental health

> "*From my experience with my first, I would be really interested to see if there is an increase in mental health issues* […] *either antenatally or postpartum for women with higher BMIs, because you spend a lot of time being told very negative things, you spend a lot of time being made to worry excessively about risks, that people who are of normal range BMI don't have.*" (Hollie)

4 Administration of thromboprophylaxis

> "*Do you have data on DVTs* [deep vein thromboses]*? We are reportedly more at risk of it, so I know of people who have been recommended to have Clexane or those kind of things* [low-molecular-weight heparin]*. Interested to know whether that's working or not.*" (Amber)

Recommendations to target the availability and quality of all these data items will improve our ability to audit maternity care for women in the future. We have not been able to include these measures in this report for the following reasons:

1. Birth in water is very poorly recorded in the NMPA dataset.[11]
2. We do not have data on fetal ultrasound findings. Given that national guidance recommends that all women with a BMI of 35 kg/m^2 or above be offered serial fetal growth surveillance by ultrasound in pregnancy, to reduce the risk of undetected SGA and stillbirth,[2,7,25] data on this would allow us to measure an important aspect of maternity care.
3. While we do currently hold data on mental health diagnoses for women in Scotland (and have requested data from England), at the time of carrying out this audit we were also conducting a sprint audit evaluating the feasibility of using this Scottish data to assess the quality of perinatal mental health care. That sprint audit concluded that this might well be feasible in the future, and we hope that this might also be possible for women with a BMI of 30 kg/m^2 or above.[26]
4. Venous thromboembolism (VTE) risk assessment scores are often recorded electronically, but data are not currently available to the NMPA on this or on administration of thromboprophylaxis. Nevertheless, VTE is one of the most common causes of direct maternal death in the UK and women with a BMI of 30 kg/m^2 or above are at higher risk,[27] so we agree that this is an important aspect of care to measure.

Findings

The findings are presented graphically in this chapter, with the aggregated numbers and percentages included for reference in Appendices 1–3, presented according to whether the birth occurred in England, Scotland or Wales. The measures reported in this chapter are restricted to the population of women who have complete information on BMI, parity and number of previous caesarean births (if any). There were 1 151 515 women giving birth to 1 168 664 babies (of whom 1 133 651 were singletons) in the dataset who met this criterion.

Timing of birth

In this section, we report on maternal interventions that determine the timing of birth. The measures are as follows:

- **Induction of labour:** Of women who give birth to a liveborn baby between 37^{+0} to 42^{+6} weeks of gestation, the proportion with an induced labour (Figure 2a).
- **Small for gestational age (SGA) born after the estimated due date:** Of babies born SGA* between 37^{+0} and 42^{+6} weeks of gestation, the proportion who are born on or after their estimated due date (EDD) (Figure 2b).

Both measures are reported using line graphs with 95% confidence intervals for each point estimate.

* Defined as less than the 10th birthweight centile using UK 1990 charts.

(a) Induction of labour:

(b) Small for gestational age born after the estimated due date:

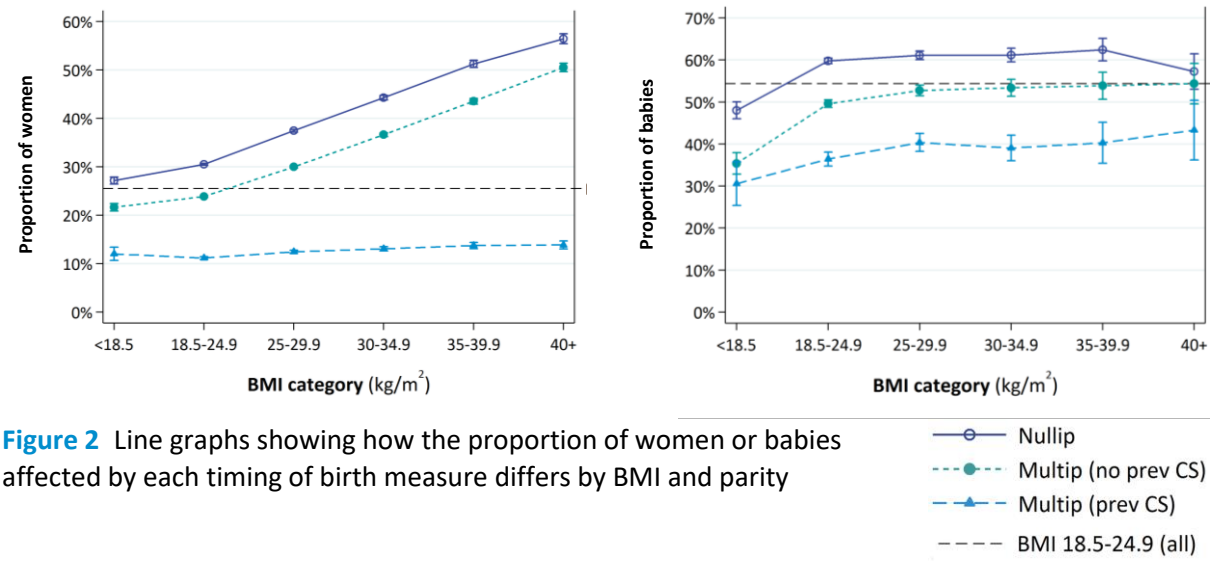


Figure 2 Line graphs showing how the proportion of women or babies affected by each timing of birth measure differs by BMI and parity

Mode of birth

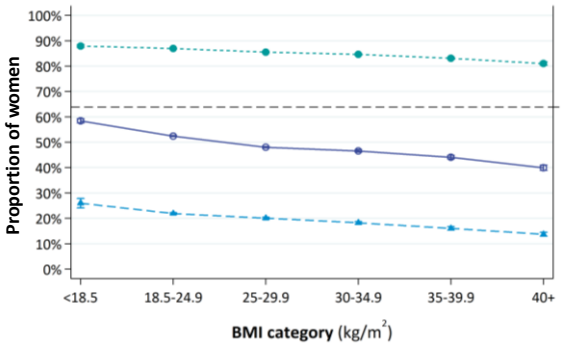
In this section, we report on the type of birth that women have, presented by category of BMI and parity. The measures are as follows:

- **Unassisted vaginal birth:** Of women who give birth to a singleton baby between 37^{+0} and 42^{+6} weeks of gestation, the proportion who have a vaginal birth without the use of instruments (Figure 3a).
- **Assisted vaginal birth:** Of women who give birth to a singleton baby between 37^{+0} and 42^{+6} weeks of gestation, the proportion who have a vaginal birth with the assistance of instruments (Figure 3b).
- **Birth without intervention:** Of women who give birth to a singleton baby between 37^{+0} and 42^{+6} weeks of gestation, the proportion who give birth without intervention* (Figures 3c and 3d).
- **Elective caesarean birth:** Of women who give birth to a singleton baby between 37^{+0} and 42^{+6} weeks of gestation, the proportion who have a planned caesarean birth (Figure 3e).
- **Emergency caesarean birth:** Of women who give birth to a singleton baby between 37^{+0} and 42^{+6} weeks of gestation, the proportion who have an emergency caesarean birth (Figure 3f).
- **Vaginal birth after caesarean (VBAC):** Of women having their second baby after having had a caesarean section for their first baby, the proportion who attempt and the proportion who actually have a vaginal birth for their second baby (Figure 4).

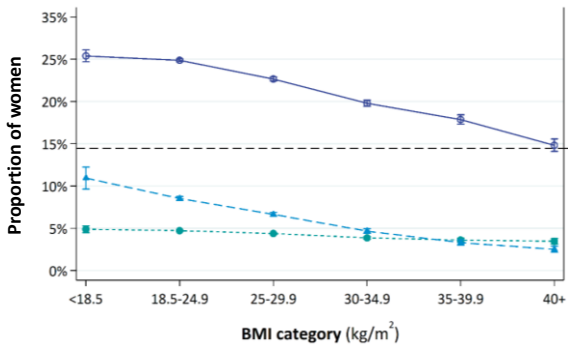
The majority of measures are reported using line graphs with 95% confidence intervals for each point estimate. VBAC has been presented differently, since this is only relevant to multiparous women who have previously experienced a caesarean birth.

* Two variations of birth without intervention are reported: definition 1 reports birth with spontaneous onset and progression and spontaneous birth, without epidural and without episiotomy; definition 2 omits the criterion for spontaneous progression.

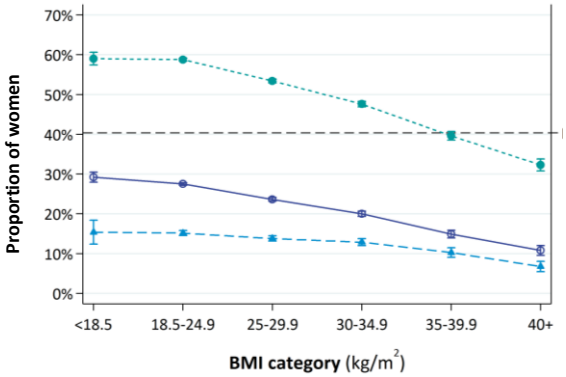
(a) Unassisted vaginal birth:



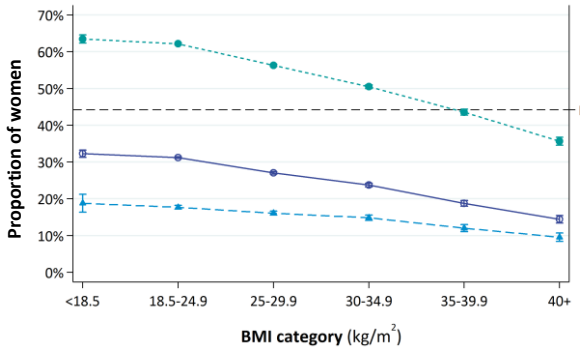
(B) Assisted vaginal birth:



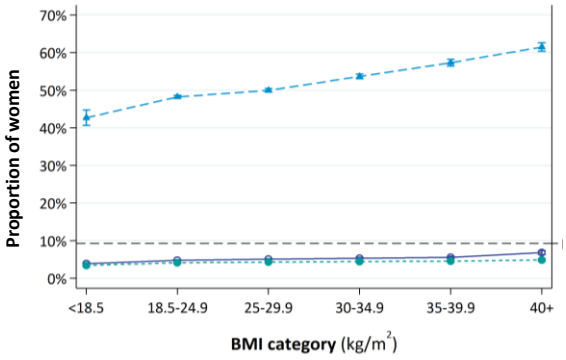
(c) Birth without intervention (definition 1):



(d) Birth without intervention (definition 2):



(e) Elective caesarean birth:



(f) Emergency caesarean birth:

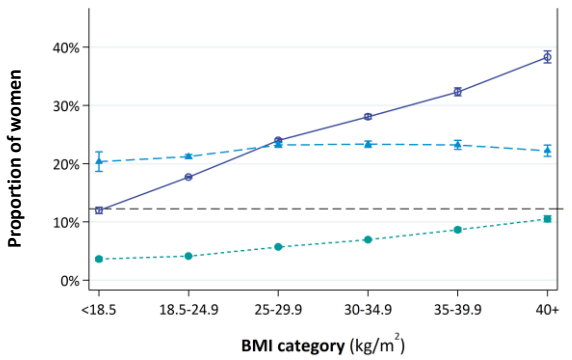
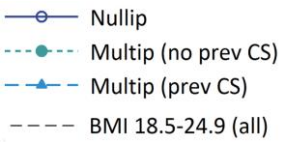


Figure 3 Line graphs showing how the proportion of women having each mode of birth differs by BMI and parity



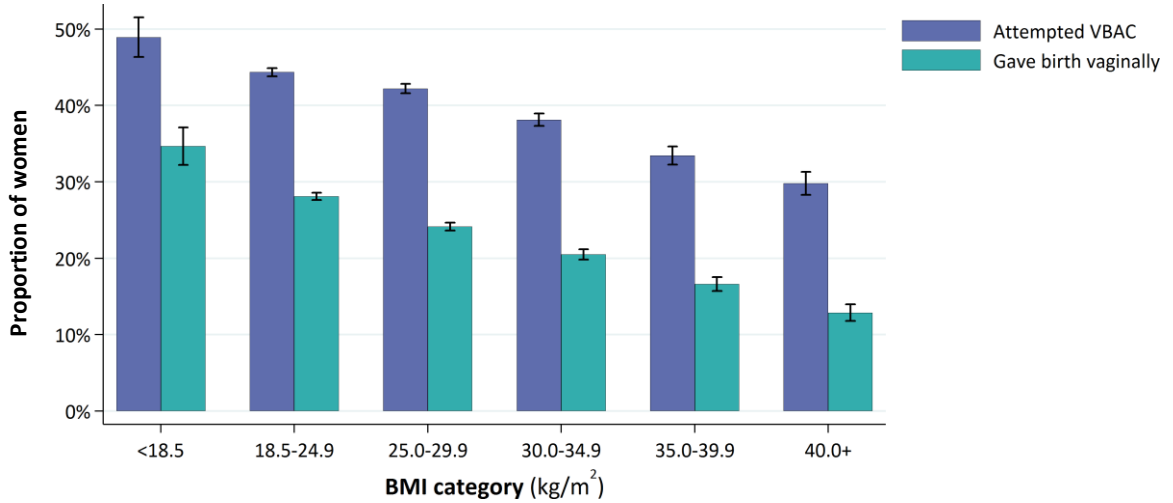


Figure 4 Bar chart showing how the proportion of women attempting and actually having a vaginal birth after caesarean (VBAC) differs by BMI

Maternal outcomes

In this section, we report on maternal outcomes. The measures are as follows:

- **Episiotomy:** 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 (Figure 5a).
- **Obstetric anal sphincter injury (OASI):** Of women who give birth vaginally to a singleton baby between 37^{+0} and 42^{+6} weeks of gestation, the proportion who sustain a third- or fourth-degree tear (Figure 5b).
- **Obstetric haemorrhage:**[*] Of women who give birth to a singleton baby between 37^{+0} and 42^{+6} weeks of gestation, the proportion who have an obstetric haemorrhage of 1500 ml or more (Figure 5c).
- **Unplanned maternal readmission:** Of women who give birth to a singleton baby between 37^{+0} and 42^{+6} weeks of gestation, the proportion who have an unplanned, overnight readmission to hospital within 42 days of giving birth, excluding those accompanying an unwell baby (Figure 5d).

All measures are reported using line graphs with 95% confidence intervals for each point estimate.

Neonatal outcomes

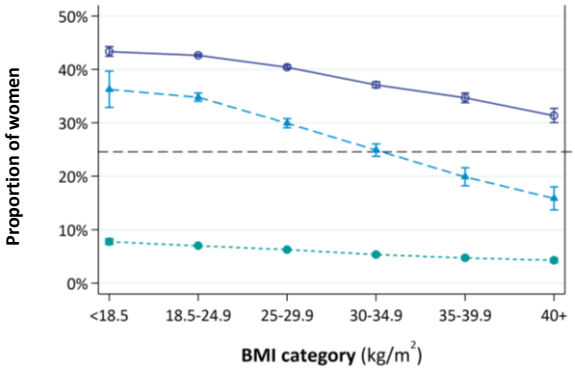
In this section, we report on measures relating to all liveborn babies. The latter four measures can only be presented for babies born in England or Scotland (excluding NHS Lothian), for whom linkage with the National Neonatal Research Database (NNRD) was possible.[28]

The measures are:

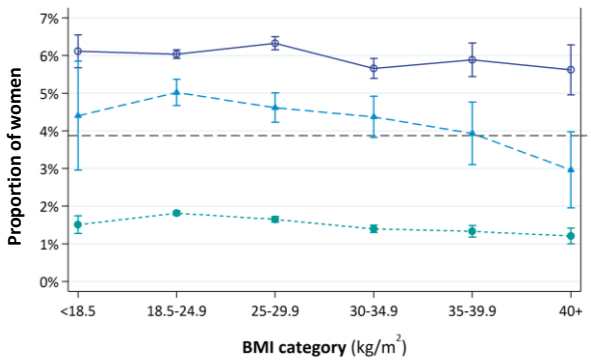
- **5 minute Apgar score less than 7:** Of liveborn, singleton babies born at or after 37^{+0} weeks of gestation, the proportion who are assigned an Apgar score of less than 7 at 5 minutes of age (Figure 6a).

[*] In the Scottish data sources, information on postpartum haemorrhage is only available using a threshold of 500 ml, so this measure does not include Scotland.

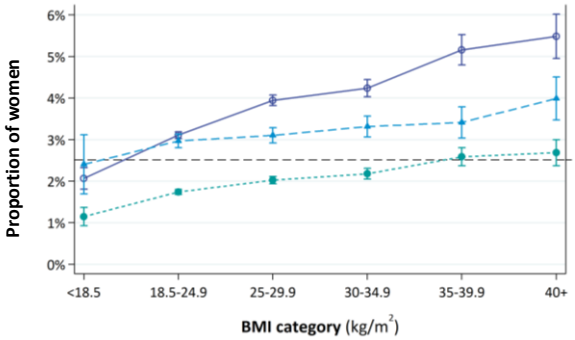
(a) Episiotomy:



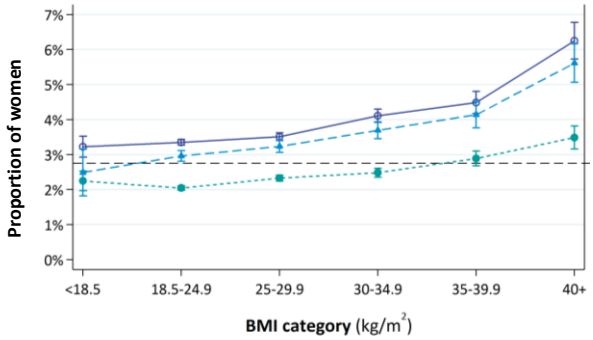
(b) Obstetric anal sphincter injury (OASI):



(c) Obstetric haemorrhage:



(d) Maternal readmission:



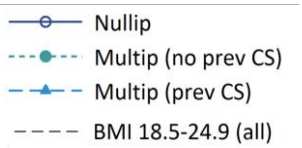
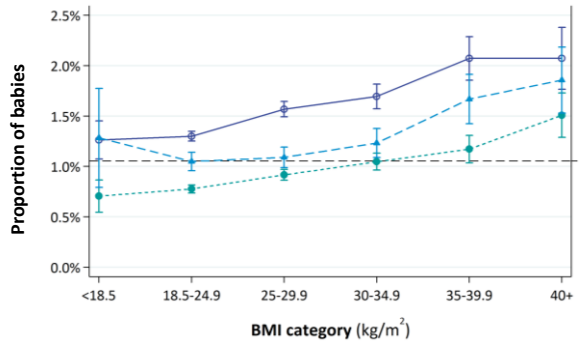


Figure 5 Line graphs showing how the proportion of women affected by each outcome differs by BMI and parity

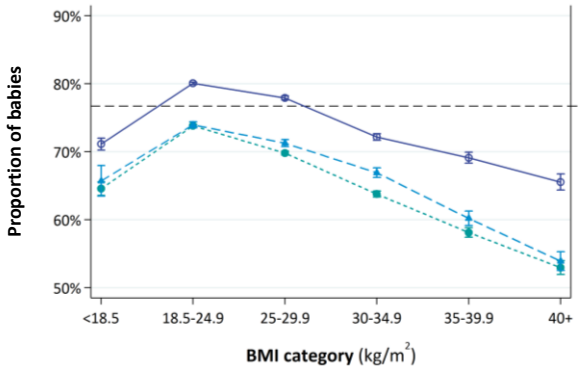
- **Breastfeeding:** Of liveborn babies born at or after 34^{+0} weeks of gestation, the proportion who receive any breast milk for their first feed (Figure 6b). We also assessed the proportion receiving breast milk at the time of hospital discharge, but this has not been presented graphically since the association with BMI was the same as for first feed. Data on breastfeeding are not available for babies born in Wales.
- **Skin-to-skin contact within 1 hour of birth:** Of liveborn babies born between 34^{+0} and 42^{+6} weeks of gestation, the proportion who receive skin-to-skin contact within 1 hour of birth (Figure 6c).
- **Admission to a neonatal unit (late preterm births):** Of liveborn babies born between 34^{+0} and 36^{+6} weeks of gestation, the proportion who are admitted to the neonatal unit (Figure 6d).
- **Admission to the neonatal unit (term births):** Of liveborn babies born between 37^{+0} and 42^{+6} weeks of gestation, the proportion who are admitted to the neonatal unit (Figure 6e).
- **Babies with encephalopathy:** The proportion of singleton babies born between 35^{+0} and 42^{+6} weeks of gestation with encephalopathy in the first 72 hours of life, defined as showing two or more of the following neurological signs in the same day: abnormal tone; reduced consciousness (lethargic or comatose); convulsions (seizures) (Figure 6f).
- **Babies receiving mechanical ventilation:** Of liveborn, singleton babies born between 37^{+0} and 42^{+6} weeks of gestation, the proportion who receive mechanical ventilation in the first 72 hours of life (Figure 6g).

All measures are reported using line graphs with 95% confidence intervals for each point estimate.

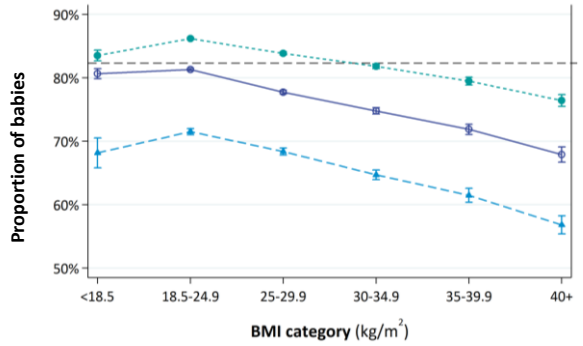
(a) 5 minute Apgar score less than 7:



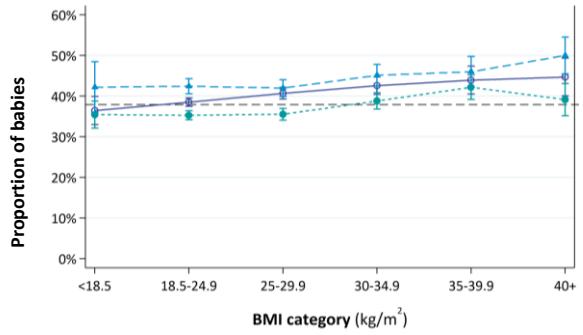
(b) Breastfeeding at first feed:



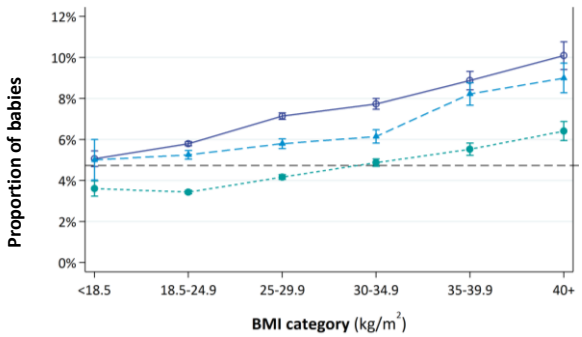
(c) Skin-to-skin contact within 1 hour of birth



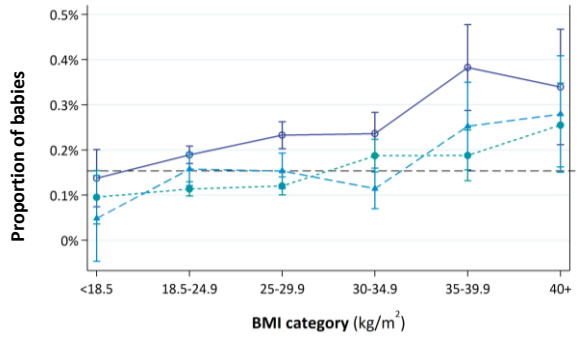
(d) Admission to the neonatal unit (late preterm births):



(e) Admission to the neonatal unit (term births):



(f) Babies with encephalopathy:



(g) Babies receiving mechanical ventilation:

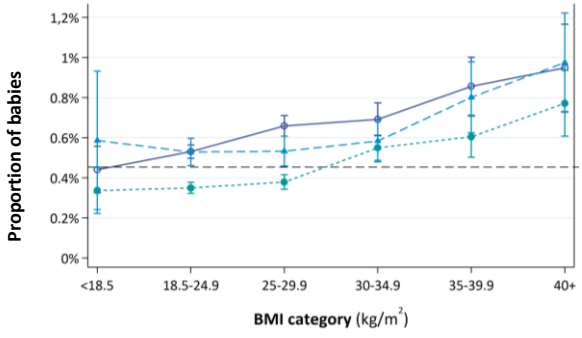
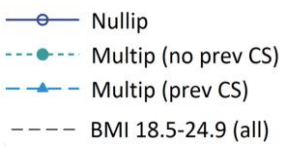


Figure 6 Line graphs showing how the proportion of babies affected by each outcome differs by their mother's BMI and parity



Summary of findings

With increasing maternal BMI, the following are found:

- The likelihood of a woman experiencing an intrapartum intervention, postpartum haemorrhage or postnatal readmission to hospital increases.
- The rate of induced labour or emergency caesarean birth increases for women who have not previously had a caesarean birth, although to a lesser extent in multiparous women.
- Women are less likely to have unassisted or assisted vaginal births, or births without an intervention; however, for multiparous women who have not previously had a caesarean birth, the rate of unassisted vaginal birth is still high (above 80% of women).
- The rate of elective caesarean birth increases, but mostly for women who have previously had a caesarean birth.
- Secundiparous women who had a caesarean for the first birth are less likely to attempt a vaginal birth after caesarean and, when they do attempt it, they are less likely to actually have a vaginal birth.
- Women are less likely to receive an episiotomy or experience a severe perineal tear (this is more evident in the crude numbers, or when graphs are not separated by parity).
- Neonates are more likely to be born in poor condition (low Apgar scores), to require admission to a neonatal unit or mechanical ventilation, or to be diagnosed with neonatal encephalopathy. They are also less likely to receive skin-to-skin contact with the mother, or breast milk at first feed (or before hospital discharge).

Interpretation by the lay advisory group

The lay advisory group have had the opportunity to review the results for each maternal and neonatal measure, presented by category of BMI. Their observations and interpretations of the trends have been very interesting, and common interpretations are described here.

As an overall comment, Mari requested caution in the interpretation of rates which change by BMI category for several of the process measures, referencing in particular a national trend of increasing interventions, some of which may not be supported by evidence or national guidelines.

> *"One of the difficulties for us looking at this, and for you too, and I think it's a much wider problem, is that we don't know which inductions are necessary, and which are unnecessary. There's a tendency in obstetric circles to* [assume that] *all emergency caesareans must have been necessary, all inductions must have been necessary, and not acknowledge that actually the previous care can be that conveyor belt of interventions that ends up in that, whether that's repeated scans, or whether that's going through an induction process, leading to a caesarean."* (Mari)

The group wished us to consider whether higher rates of interventions and adverse outcomes among women with a BMI of 30 kg/m^2 or above are always clinically indicated, or whether clinicians sometimes have a lower threshold to offer intervention to women with a high BMI. Variation in clinical practice is often demonstrated through funnel plots presented in other NMPA reports, but these are outside the scope of this audit report.

Timing and mode of birth

With regard to a lower rate of birth without intervention for women with a BMI of 30 kg/m^2 or above, compared with women with a BMI between 18.5 and 24.9 kg/m^2, the group wondered whether this is somewhat mediated by their joint experience that women with a high BMI are recommended to have early epidurals in labour.

> *"We do know that larger women are encouraged to have them earlier, it's definitely often said 'look, because bigger women are more of a problem siting an epidural, if you're even verging on the balance of "maybe I will", "maybe I won't", you should do it sooner because it might take longer, it might not work first time, they're difficult to site.' You often have to have an appointment with the anaesthetist to have a prod at your spine and to see whether they're going to get the needle in easy enough."* (Amber)

Several members of the group were reassured to see that approximately one in five women with a BMI of 30 kg/m^2 or above have a birth without intervention, and that this rate is as high as one in two women for those who have previously had a vaginal birth (for women with a BMI between 30 and 35 kg/m^2). They hoped that this finding may be used to support clinicians to offer birth in alongside midwifery units (AMUs) to more women with a BMI of 30 kg/m^2 or above:

> *"It may help you with an argument to enter into an alongside unit, surely. Because, you're over the corridor or up in the lift, maybe when your trust is looking at it and 'well actually, that number is a bit too low for us to be comfortable with you being 10 miles away, by ambulance, but actually maybe, downstairs is fine'."* (Hollie)

Mari was worried about how clinicians might interpret the rates of vaginal birth for women with a BMI of 30 kg/m^2 or above attempting VBAC. In her own birth experience, she had had a traumatic caesarean birth for her first baby, followed by a vaginal birth for her second birth:

> *"The thing that scares me is that that information could be presented by obstetricians to women to say 'look, you're really unlikely to succeed so why even bother trying'."* (Mari)

Maternal outcomes

The group were reassured to see that women with a BMI of 30 kg/m^2 or above were less likely to receive an episiotomy, or to experience a severe perineal tear (overall):

> *"Vaginal tears and repairs. We are less likely to need repair […]. They never tell us that!"* (Amber)

However, they were surprised to find that the rate of unplanned maternal readmission increases with BMI category. We discussed possible indications for readmission, including wound infection, mastitis or high blood pressure. Mari asked whether this was a measure of quality care:

> *"For me it raises the question: is the readmission because we needed more care, so you know, poor wound healing two weeks down the line, or is it because we shouldn't have been discharged?"* (Mari)

We have not looked at data on the indication for readmission, but maternity services will have access to the reason for readmission for their women and could easily identify local causes and target improvement initiatives aimed at reducing the rate.

Neonatal outcomes

The group disagreed as to whether the increase in the rate of babies with a low Apgar score at 5 minutes of age with increasing BMI was important in practice:

> *"For me, as someone with a BMI that would have been in the 35+ category, for example, going up to 1.6%* [from 1.1%]*, it doesn't concern me."* (Mari)

> *"For me there is still a trend, so although it's tiny, if it's significant, there's still an upward trend for people with a high BMI. It's still an increase."* (Nicola)

The finding that babies are less likely to receive breast milk for their first feed as their mothers' BMIs increase was not a surprise to the lay advisory group. They attribute this to low levels of support, individualised to the women's needs:

> *"So for my experience, I was really keen to breastfeed, really really wanted to breastfeed with my first, but I don't think I would have come under that 'received breast milk at the beginning' because it was so difficult because I did not get the support to do it with big breasts, I was in a hospital bed, I had two drips in my arm, even positioning with two drips in my arm at the time, and my husband had to go home. Even just being able to try for a continual amount of time was difficult. We eventually got there at home and were able to find a position that worked for us, and that's how we did it for 12 months sat on the sofa. But I wouldn't have been in that first graph at all, so I'm not sure that intent would be obvious, or how that would impact in terms of the care that we're giving."* (Nicola)

Amber was also worried about how these data may be used by women with a BMI of 30 kg/m^2 or above:

> *"This is leading massively into a self-fulfilling prophecy. So, we are told as bigger women that we are less likely to succeed at breastfeeding and therefore we are less likely to even bother trying in the first place because if there's no point, why bother."* (Amber)

The group members found it very difficult to explain why babies born to women with a BMI of 30 kg/m^2 or above were less likely to receive skin-to-skin contact within 1 hour of birth:

> *"So I've seen hospitals where babies are still put skin-to-skin with a mum who's had a general anaesthetic and the midwife is there, holding the baby, in place for skin-to-skin and that baby stays skin-to-skin in recovery and everything else. And I've also seen hospitals where actually if you've had an epidural and a caesarean then you're not allowed to hold your baby until you get into recovery, which, if it's really complicated, could be an hour, but I don't think it usually is. But I don't think that any of those numbers would really explain the 10% difference, there's not 10% of women with a BMI over 40 having general anaesthetic, I don't think."* (Mari)

> *"I'm kind of wondering, is it because our babies are more likely to go to neonatal units, or is it a lack of support around* [skin-to-skin]*?"* (Mari)

Discussion

We do not know the extent to which an increase in the rate of obstetric interventions is associated with biological factors or with clinicians having a progressively lower threshold to offer intervention to women with higher BMI. Nor do we know the extent to which adverse neonatal outcomes in babies born to women with a BMI of 30 kg/m^2 or above are related to biological factors or to delays in or avoidance of interventions that could be used to prevent these outcomes. A biological increase in risk is likely to be a major factor, given that women with higher BMI are more likely to have prepregnancy comorbidities such as hypertension and diabetes and babies born to women with a BMI of 30 kg/m^2 or above are more likely to be stillborn or LGA.

While SGA babies born to women with a BMI less than 18.5 kg/m^2 or to women who have previously had a caesarean birth are more likely to be born before their EDD than babies born to other women (elective repeat caesarean births are usually offered before the EDD), for the remaining women the proportion of SGA babies born after the EDD does not change significantly with BMI, despite women with a BMI of 30 kg/m^2 or above being less likely to have an SGA baby and more likely to be offered induction of labour, and also nationally recommended to have serial fetal growth assessment by ultrasound during pregnancy (women with a BMI of 35 kg/m^2 or above only).[2,7]

At least 80% of multiparous women who have previously only had vaginal births have another unassisted vaginal birth in their subsequent pregnancy; this is only slightly more likely (up to 90%) for women with a BMI under 30 kg/m^2, and overall higher than the proportion for all women with a BMI in the range 18.5–24.9 kg/m^2. This supports the recommendation in the RCOG Green-top Guideline *Care of Women with Obesity in Pregnancy* that multiparous women with a BMI of 30 kg/m^2 or above who are otherwise low risk can be offered a choice of birth in midwifery-led units.[2]

While the rate of attempting VBAC and of having a vaginal birth when attempting VBAC reduces with increasing BMI, approximately 50% of women with a BMI of 30 kg/m^2 or above do have a vaginal birth when attempting VBAC and so this option should be supported for women who choose it.

The reason for the increasing rate of adverse neonatal outcomes is unknown but may be related to the higher rates of maternal comorbidities and of maternal hyperinsulinaemia (which causes neonatal hypoglycaemia), difficulties in maintaining quality intrapartum fetal monitoring for women with a high BMI,[2,29] or events such as shoulder dystocia.

As BMI increases, babies are less likely to receive skin-to-skin contact and breast milk for their first feed. The increased risk of being admitted to a neonatal unit does not significantly account for this, particularly since some babies can safely receive both prior to a neonatal admission. Skin-to-skin contact has been shown to increase breastfeeding initiation and continuation rates for healthy newborn babies,[30] and its support is one of the Unicef UK Baby Friendly standards.[6] Women with a BMI of 30 kg/m^2 or above are known to have lower rates of breastfeeding intention, and may be affected by embarrassment and stigma as a barrier to taking up breastfeeding.[31] These women therefore require tailored breastfeeding support, provided to them by maternity care professionals who have been trained in its provision.

Where do women with a BMI of 30 kg/m^2 or above give birth?

Key findings

KF10 The proportion of women giving birth in a freestanding midwifery unit, or at home, decreases as BMI increases, although 1.7% of women with a BMI of 35.0–39.9 kg/m^2 and 1.1% of women with a BMI of 40 kg/m^2 or above did give birth in one of these settings, compared with 4.3% of women with a BMI in the range 18.5–24.9 kg/m^2.

KF11 The quality and availability of data distinguishing between births in an obstetric unit and those in its alongside midwifery unit is a limitation when assessing place of birth for women with a BMI of 30 kg/m^2 or above.

The NICE guideline *Intrapartum Care for Healthy Women and Babies* (2014) recommends that women with a BMI above 35 kg/m^2 plan to deliver in obstetric units and that women with a BMI between 30 and 35 kg/m^2 be individually assessed.[9] The same NICE guideline states that women with comorbidities such as diabetes should be offered care according to the relevant guideline for the comorbidity. More recently, RCOG guidance has been published, updating this recommendation to state that multiparous women with a BMI of 30 kg/m^2 or above who are otherwise low risk can be offered a choice of setting including in midwifery-led units.[2]

The National Maternity Review *Better Births* (2016) outlined a vision for maternity services in England 'where every woman has access to information to enable her to make decisions about her care; and where she and her baby can access support that is centred around their individual needs'.[32] The review recommends that maternity services support personalisation, safety and choice for women, based on evidence-based information about risks and outcomes. Nationally, maternity units are already providing more choice for women, with a quadrupling of 'alongside' midwifery units over the last decade.[33]

In this chapter, we report on the types of maternity unit in which women give birth, according to their BMI.

Findings

The measures reported in this chapter are restricted to the population of women who have complete information on BMI. There were 1 165 718 women giving birth to 1 423 804 babies (of whom 1 147 307 were singletons) in the dataset who met this criterion.

What is measured: The proportion of women who give birth in each setting:

- obstetric unit (OU)
- alongside midwifery-led unit (AMU)
- freestanding midwifery-led unit (FMU)
- at home
- other (e.g. in transit).

As BMI increases, women are less likely to give birth in FMUs or at home, although 1.7% of women with a BMI of 35.0–39.9 kg/m^2 and 1.1% of women with a BMI of 40 kg/m^2 or above did plan to give birth in one of these settings and did so. The proportion of women giving birth in a standalone OU therefore increases as BMI increases. The proportion of women who give birth in an AMU, as opposed to its co-located OU, is not known (Table 4).

Table 4 Type of maternity unit in which women gave birth (regardless of fetal outcome)

Type of site	BMI <18		BMI 18–24.9		BMI 25–29.9		BMI 30–34.9		BMI 35–39.9		BMI ≥40	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Number of women included in analysis	29432		483120		292283		135876		56620		29676	
Standalone obstetric unit (OU)	3619	12.3%	59411	12.3%	35981	12.3%	18160	13.4%	8288	14.6%	4620	15.6%
Obstetric unit (OU) with alongside midwifery unit (AMU)	24447	83.1%	399612	82.7%	244232	83.6%	113070	83.2%	47124	83.2%	24628	83.0%
Freestanding midwifery unit (FMU)	583	2.0%	11301	2.3%	5659	1.9%	2139	1.6%	394	0.7%	81	0.3%
Home (planned)[a]	575	2.0%	9811	2.0%	4864	1.7%	1822	1.3%	585	1.0%	235	0.8%
Other (e.g. in transit, unplanned homebirth, non-maternity ward such as A&E)	208	0.7%	2985	0.6%	1547	0.5%	685	0.5%	229	0.4%	112	0.4%

[a] Homebirth is not recorded in SMR-02 (Scottish Morbidity Record 2) and is therefore not available for births in Scotland; this may have caused a small under-ascertainment of the percentage of births which occur at home.

Discussion

Guidance in place at the time of these births recommended that women with a BMI of 35 kg/m^2 or above give birth in OUs,[9] but further guidance has since been published which acknowledges that multiparous women who are at low risk of birth interventions or complications, other than having a high BMI, should be supported in choices to give birth in midwifery-led settings.[2]

The ability of the NMPA to distinguish between births in an AMU and an OU is key to assessing the application of national policy, with regard to an offer of choice on place of birth.[32] We have previously acknowledged inconsistencies in the data distinguishing between births in AMUs and OUs, information on which is currently only available for births in England.[11] When place of birth was presented by BMI category, information inconsistencies for English births became more apparent and the resultant rates of birth in an OU or AMU were not compatible with rates reported in published contemporary studies based in the UK.[15,34] We have also previously reported on the need to distinguish between the type of maternity unit in which the labour started and the type of unit in which the birth occurred. This was also noted to be important by members of the lay advisory group:

> "[I think it's important to measure] *where labour started. Not the intended place of birth, but where the labour started. I mean whether the person was planning a home birth, started at home, midwife came out to them at home and then transferred in.*" (Mari)

While recommendations to maternity service providers and national organisations responsible for collecting maternity data on the need for specific data on place of birth, unit type and unit type at the start of labour are important to the conduct of future audits for outcomes according to maternal BMI, we have previously made this recommendation and therefore have not repeated it in this report, which is based on the same data.[11]

Feasibility of reporting maternal and neonatal outcomes according to maternal risk status

Key finding

KF12 Presentation of maternal or neonatal outcomes by maternal BMI, parity and risk status (as assessed at admission for birth) is both feasible and likely to be useful to support informed decision making. It is limited by uncertainty with less common outcomes, such as poor condition of the baby at birth, particularly when these are estimated in smaller groups of women.

It is recognised that women with a BMI of 30 kg/m^2 or above are not equal in terms of their risk of receiving interventions or experiencing adverse outcomes. Women vary in terms of their BMI category and parity, but also by their past obstetric history, antenatal complications and medical comorbidities, as well as in their values and choices. To reflect this heterogeneity, we have explored the feasibility of reporting maternal and neonatal outcomes according to maternal parity and risk status at the time of admission for birth, where risk is classified according to the NICE *Intrapartum Care* guideline criteria,[9] using methods described previously by our team.[16] This approach was felt to be really important by the lay advisory group:

> *"For me who didn't have high blood pressure, didn't have gestational diabetes, in fact, didn't have anything else going on, I want to know the* [risks] *for me, not the* [risks] *for a group that I happen to be in, which includes a whole load of people who don't have the same circumstances."* (Amber)

Each measure is presented for five groups of women, by category of BMI:

- nulliparous women without additional risk factors (low risk)
- nulliparous women with additional risk factors (high risk)
- multiparous women without risk factors (low risk), previously only experienced vaginal births
- multiparous women with risk factors (high risk), previously only experienced vaginal births
- multiparous women who have previously experienced at least one caesarean birth (high risk).

It is important to note that multiparous women with a previous caesarean birth are not further categorised into low or high risk, because a previous caesarean birth itself is a significant risk factor.

At present, this feasibility work has only been done for England, since this is the dataset in which the methods were first developed. We believe that this approach is likely to be feasible for Scotland, but we have not yet developed the methods or tested the validity in this dataset. We do not have sufficiently detailed information on past medical or obstetric history for women giving birth in Wales and therefore this method is not currently feasible for this country.

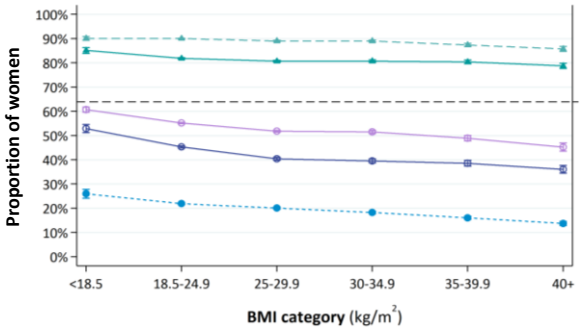
To demonstrate the feasibility of this risk stratification strategy, we have presented a limited number of maternal and neonatal outcomes: unassisted vaginal birth, emergency caesarean birth and low Apgar score at birth. The measure definitions are unchanged from those presented earlier in this report.

Findings

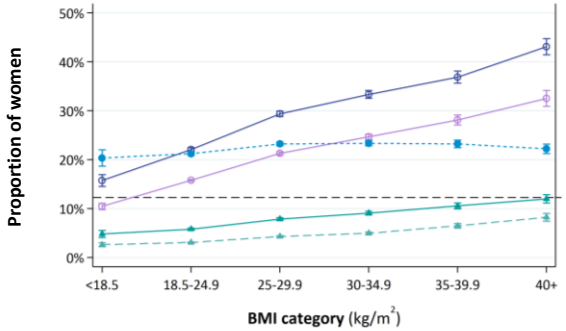
The measures reported in this chapter are restricted to the population of women who gave birth in England and have complete information on BMI, parity, number of previous caesarean births (if any) and risk status. There were 896 591 women giving birth to singleton babies in the dataset who met these criteria.

The line graphs for each of the three exemplar measures are presented in Figure 7, with 95% confidence intervals for each estimate.

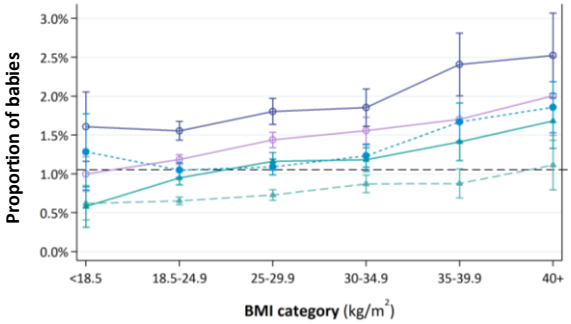
(a) Unassisted vaginal birth:



(b) Emergency caesarean birth:



(c) 5 minute Apgar score less than 7:



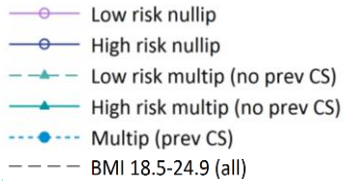


Figure 7 Line graphs showing how the proportion of women or babies affected by each outcome differs by BMI, parity and maternal risk status in England

Discussion

We have demonstrated that presentation of maternal or neonatal outcomes by maternal BMI, parity and risk status (as assessed at birth) is feasible for births in England and is expected to be useful. We also anticipate that the method will be feasible in Scotland, but not Wales.

This approach has the potential to offer more individualisation of care for women, who can be counselled on the possibility of being affected by a given measure according to their previous obstetric history and presence or absence of other risk factors. The approach is limited by a small number of women experiencing the outcome in some categories; in such cases (e.g. for low Apgar score affecting babies born to women with a BMI of 40 kg/m^2 or above), the wide confidence intervals reflect uncertainty in the estimate.

We plan to explore this work in more detail in the future, including confirmation that these methods can be applied for births in Scotland and application of the risk stratifications to other measures.

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Appendix 1

Results for England

Measure	BMI:	<18.5 kg/m²			18.5–24.9 kg/m²			25–29.9 kg/m²			30–34.9 kg/m²			35–39.9 kg/m²			≥40 kg/m²		
	Parity:	Nullip	Multip	Prev CS	Nullip	Multip	Prev CS	Nullip	Multip	Prev CS	Nullip	Multip	Prev CS	Nullip	Multip	Prev CS	Nullip	Multip	Prev CS
Induction of labour	%	26.9	21.4	12.1	30.1	23.4	11.1	36.9	29.5	12.6	44.0	36.2	13.4	50.8	43.4	14.0	56.1	50.3	14.3
	n	3373	2112	231	56755	40326	4942	34860	32878	4722	16751	19113	2796	7482	9415	1350	3998	5384	844
	Total	12549	9883	1916	188507	172601	44492	94399	111500	37426	38108	52741	20831	14735	21682	9615	7121	10700	5907
Small for gestational age	%	47.7	35.5	30.5	59.6	49.1	36.9	61.0	52.8	40.8	60.6	52.8	40.1	62.3	52.2	40.6	55.8	53.7	45.2
	n	1033	425	83	11355	5244	1091	4887	2853	752	1852	1145	363	678	432	144	251	194	75
	Total	2166	1198	272	19046	10670	2958	8017	5407	1845	3057	2168	906	1089	827	355	450	361	166
Unassisted vaginal birth	%	58.3	88.2	26.0	52.5	87.3	22.3	48.2	85.9	20.7	46.8	85.4	18.9	44.4	83.8	16.9	40.4	81.7	14.4
	n	7424	8837	504	100512	152956	10073	46252	97109	7876	18172	45674	3996	6649	18395	1647	2941	8868	861
	Total	12725	10021	1939	191617	175135	45222	95992	113054	37981	38793	53495	21159	14989	21956	9771	7275	10852	5993
Assisted vaginal birth	%	25.4	4.9	11.4	25.1	4.6	8.8	22.9	4.3	6.8	20.0	3.8	5.0	18.2	3.6	3.4	15.4	3.5	2.6
	n	3218	489	220	47944	8039	3981	21941	4905	2595	7746	2045	1048	2718	785	335	1116	379	155
	Total	12694	10010	1938	191236	175037	45182	95790	112977	37952	38739	53454	21141	14970	21945	9762	7270	10846	5991
Birth without intervention (definition 1)	%	29.2	59.0	15.4	27.5	58.8	15.2	23.7	53.4	13.8	20.0	47.6	12.9	14.9	39.6	10.3	10.8	32.3	6.8
	n	1415	2163	86	19197	38294	1934	8238	22460	1429	2754	9224	714	770	3105	260	259	1222	101
	Total	4842	3665	559	69714	65138	12750	34808	42035	10352	13751	19374	5540	5163	7838	2530	2396	3783	1492
Birth without intervention (definition 2)	%	32.9	64.4	19.8	31.9	63.4	18.9	27.8	57.5	17.2	24.3	51.8	16.2	19.1	44.3	13.3	15.0	36.5	10.7
	n	2471	3750	168	34736	65870	3471	14809	37840	2516	5092	15754	1241	1528	5543	469	555	2216	224
	Total	7511	5820	848	109051	103886	18373	53195	65786	14614	20933	30437	7664	7984	12506	3518	3698	6066	2101
Caesarean birth (any)	%	16.0	6.8	62.6	22.2	8.0	68.8	28.7	9.7	72.4	33.0	10.7	76.1	37.3	12.6	79.7	44.1	14.7	83.0
	n	2036	681	1214	42542	13982	31101	27480	10911	27459	12773	5717	16090	5588	2757	7776	3209	1589	4974
	Total	12694	10010	1938	191236	175037	45182	95790	112977	37952	38739	53454	21141	14970	21945	9762	7270	10846	5991
Elective caesarean birth	%	4.0	3.4	42.3	4.8	4.0	47.0	5.0	4.1	48.3	5.2	4.0	51.8	5.5	4.1	55.2	6.4	4.4	59.8
	n	509	337	819	9188	7024	21249	4784	4611	18312	2011	2134	10941	820	906	5387	464	481	3584
	Total	12694	10010	1938	191236	175037	45182	95790	112977	37952	38739	53454	21141	14970	21945	9762	7270	10846	5991
Emergency caesarean birth	%	12.0	3.4	20.4	17.4	4.0	21.8	23.7	5.6	24.1	27.8	6.7	24.4	31.9	8.4	24.5	37.8	10.2	23.2
	n	1527	344	395	33354	6958	9852	22696	6300	9147	10762	3583	5149	4768	1851	2389	2745	1108	1390
	Total	12694	10010	1938	191236	175037	45182	95790	112977	37952	38739	53454	21141	14970	21945	9762	7270	10846	5991

Measure	BMI:	<18.5 kg/m^2			18.5–24.9 kg/m^2			25–29.9 kg/m^2			30–34.9 kg/m^2			35–39.9 kg/m^2			≥40 kg/m^2		
	Parity:	Nullip	Multip	Prev CS	Nullip	Multip	Prev CS	Nullip	Multip	Prev CS	Nullip	Multip	Prev CS	Nullip	Multip	Prev CS	Nullip	Multip	Prev CS
VBAC – attempts VBAC*	%			49.2			45.0			43.2			39.5			34.8			30.9
	n	N/A		605	N/A		12 874	N/A		9 586	N/A		4 454	N/A		1 784	N/A		911
	Total			1 230			28 627			22 212			11 282			5 120			2 945
VBAC – gives birth vaginally*	%			35.4			28.7			24.9			21.3			17.4			13.5
	n	N/A		443	N/A		8 447	N/A		5 677	N/A		2 476	N/A		917	N/A		409
	Total			1 252			29 384			22 786			11 602			5 256			3 028
Episiotomy	%	43.0	7.5	37.5	42.4	6.6	34.7	40.1	6.0	29.9	36.8	5.1	25.1	34.5	4.6	19.6	31.4	4.0	15.6
	n	4 396	652	258	60 303	9 966	4 639	26 240	5 732	2 944	9 105	2 287	1 186	3 087	824	360	1 213	350	147
	Total	10 222	8 719	688	142 225	150 723	13 361	65 368	95 543	9 860	24 752	44 604	4 716	8 946	17 991	1 839	3 867	8 676	943
Obstetric anal sphincter injury	%	6.2	1.6	4.6	6.0	1.8	4.9	6.4	1.6	4.6	5.6	1.3	4.3	5.7	1.3	3.6	5.4	1.2	3.0
	n	639	141	32	8 639	2 810	666	4 186	1 586	460	1 402	603	208	512	250	69	211	103	30
	Total	10 293	9 009	701	143 094	155 038	13 519	65 798	98 419	10 081	24 976	46 115	4 864	9 054	18 538	1 912	3 900	8 900	987
Obstetric haemorrhage >1500 ml	%	2.1	1.2	2.3	3.1	1.7	2.9	3.9	2.0	3.1	4.2	2.2	3.3	5.1	2.6	3.5	5.5	2.7	4.0
	n	229	101	39	5 241	2 687	1 172	3 323	2 010	1 013	1 435	1 018	602	673	495	291	350	252	203
	Total	11 142	8 751	1 695	169 258	154 371	39 867	84 493	98 858	33 071	33 970	46 487	18 237	13 210	19 146	8 425	6 380	9 457	5 112
Obstetric haemorrhage >500 ml	%	29.1	15.1	39.2	37.7	17.9	47.5	43.3	19.8	51.8	46.1	21.1	55.0	50.2	22.5	56.2	53.7	24.9	61.8
	n	3 243	1 318	665	63 882	27 660	18 924	36 590	19 527	17 136	15 673	9 827	10 039	6 631	4 307	4 737	3 426	2 352	3 158
	Total	11 142	8 751	1 695	169 258	154 371	39 867	84 493	98 858	33 071	33 970	46 487	18 237	13 210	19 146	8 425	6 380	9 457	5 112
Unplanned maternal readmission	%	3.1	2.2	2.4	3.3	2.0	2.9	3.5	2.3	3.3	4.0	2.4	3.8	4.4	2.8	4.1	6.0	3.5	5.5
	n	368	213	44	5 868	3 345	1 255	3 076	2 465	1 181	1 415	1 236	761	612	589	383	409	358	315
	Total	11 868	9 468	1 841	176 613	164 711	43 037	88 104	106 799	36 233	35 811	50 553	20 130	13 905	20 877	9 328	6 790	10 321	5 721
Apgar score <7 (5 mins)	%	1.2	0.6	1.2	1.3	0.8	1.1	1.5	0.9	1.1	1.7	1.0	1.3	2.0	1.1	1.7	2.2	1.5	1.8
	n	141	58	21	2 246	1 212	437	1 354	927	383	598	488	247	274	226	153	148	143	99
	Total	11 546	8 968	1 741	175 199	159 096	41 140	87 365	102 085	34 235	35 220	48 083	19 161	13 675	19 813	8 829	6 606	9 748	5 366
Skin-to-skin contact within 1 hour of birth	%	80.6	83.5	68.2	81.3	86.2	71.5	77.7	83.9	68.4	74.8	81.8	64.7	71.9	79.5	61.5	67.9	76.4	56.8
	n	7 778	6 384	1 032	118 682	113 492	24 481	57 580	70 755	19 412	22 497	32 522	10 202	8 380	13 259	4 559	3 866	6 331	2 611
	Total	9 645	7 643	1 514	145 942	131 666	34 226	74 062	84 366	28 390	30 078	39 746	15 765	11 658	16 679	7 416	5 693	8 284	4 596
Breastfeeding at first feed	%	71.7	65.3	66.4	80.5	74.3	74.2	78.3	70.3	71.5	72.6	64.4	67.2	69.5	58.7	60.8	66.0	53.6	54.4
	n	7 040	5 263	1 041	118 600	103 154	25 585	58 246	62 241	20 518	21 812	26 994	10 700	8 152	10 163	4 578	3 719	4 611	2 502
	Total	9 813	8 062	1 567	147 368	138 878	34 498	74 376	88 483	28 686	30 024	41 904	15 930	11 728	17 303	7 528	5 638	8 601	4 601
Breastfeeding at discharge	%	69.4	64.3	64.7	77.7	72.1	72.7	74.0	68.4	69.8	66.4	61.8	64.6	61.8	55.3	58.2	56.6	48.4	50.3
	n	6 876	5 112	1 050	116 588	97 625	26 169	55 327	59 585	21 008	19 891	25 381	10 808	7 209	9 411	4 581	3 192	4 113	2 383
	Total	9 910	7 952	1 624	150 070	135 424	36 011	74 788	87 146	30 083	29 965	41 057	16 718	11 673	17 023	7 871	5 637	8 506	4 739

* Both VBAC measures use the denominator of secundiparous women who had a caesarean section for their first birth. The denominator varies slightly because of data quality issues in defining VBAC 'attempts'.

Appendix 2

Results for Scotland

Measure*	BMI:	<18.5 kg/m²			18.5–24.9 kg/m²			25–29.9 kg/m²			30–34.9 kg/m²			35–39.9 kg/m²			≥40 kg/m²		
	Parity:	Nullip	Multip	Prev CS	Nullip	Multip	Prev CS	Nullip	Multip	Prev CS	Nullip	Multip	Prev CS	Nullip	Multip	Prev CS	Nullip	Multip	Prev CS
Induction of labour	%	30.5	25.0	7.4	34.6	28.4	6.0	42.0	34.6	5.8	47.2	40.4	4.8	55.6	45.0	5.1	59.5	53.2	4.5
	n	380	274	14	6 920	5 463	268	4 582	4 112	212	2 346	2 381	108	1 164	1 134	57	616	648	32
	Total	1 244	1 097	188	20 016	19 246	4 443	10 922	11 890	3 650	4 967	5 890	2 227	2 095	2 521	1 120	1 035	1 217	716
Small for gestational age	%	51.9	31.3	25.0	58.1	50.7	24.9	59.9	52.7	37.5	60.2	56.4	25.6	61.2	66.2	#	61.2	48.3	#
	n	80	35	5	797	408	45	348	193	36	151	88	11	60	45	#	30	14	#
	Total	154	112	20	1 372	805	181	581	366	96	251	156	43	98	68	17	49	29	9
Unassisted vaginal birth	%	56.7	85.1	19.7	49.7	82.6	15.5	44.3	81.0	11.5	41.8	77.3	10.0	40.1	76.7	7.4	33.1	73.7	5.3
	n	706	934	37	9 960	15 924	690	4 841	9 648	421	2 079	4 557	223	840	1 934	83	343	899	38
	Total	1 245	1 097	188	20 039	19 267	4 449	10 934	11 907	3 655	4 975	5 897	2 230	2 096	2 522	1 122	1 035	1 219	717
Assisted vaginal birth	%	27.3	5.3	6.9	24.4	6.1	6.0	21.6	5.0	4.3	18.8	4.4	2.6	15.7	4.1	1.7	12.3	3.8	1.3
	n	339	58	13	4 886	1 184	266	2 364	592	158	937	260	58	329	103	19	127	46	9
	Total	1 244	1 097	188	20 032	19 262	4 448	10 931	11 903	3 654	4 975	5 893	2 230	2 096	2 522	1 122	1 034	1 219	717
Birth without intervention (definition 2)	%	27.7	58.0	14.1	27.1	54.8	11.4	22.4	49.0	9.7	20.6	43.4	8.7	16.8	39.6	6.3	11.8	31.4	5.0
	n	320	600	21	4 832	9 912	374	2 107	5 374	245	860	2 318	128	293	897	44	93	339	22
	Total	1 154	1 034	149	17 861	18 073	3 267	9 414	10 975	2 520	4 175	5 344	1 469	1 741	2 265	702	789	1 078	438
Caesarean birth (any)	%	16.0	9.6	73.4	25.9	11.2	78.5	34.1	14.0	84.2	39.4	18.3	87.4	44.2	19.2	90.9	54.5	22.5	93.4
	n	199	105	138	5 186	2 154	3 492	3 726	1 663	3 075	1 959	1 076	1 949	927	485	1 020	564	274	670
	Total	1 244	1 097	188	20 032	19 262	4 448	10 931	11 903	3 654	4 975	5 893	2 230	2 096	2 522	1 122	1 034	1 219	717
Elective caesarean birth	%	3.5	4.5	50.5	5.0	5.4	61.3	6.2	6.6	67.7	7.2	8.7	71.9	6.9	8.3	76.5	10.6	8.9	77.7
	n	44	49	95	1 007	1 045	2 726	674	783	2 473	358	515	1 603	145	210	858	110	108	557
	Total	1 244	1 097	188	20 032	19 262	4 448	10 931	11 903	3 654	4 975	5 893	2 230	2 096	2 522	1 122	1 034	1 219	717
Emergency caesarean birth	%	12.5	5.1	22.9	20.9	5.8	17.2	27.9	7.4	16.5	32.2	9.5	15.5	37.3	10.9	14.4	43.9	13.6	15.8
	n	155	56	43	4 179	1 109	766	3 052	880	602	1 601	561	346	782	275	162	454	166	113
	Total	1 244	1 097	188	20 032	19 262	4 448	10 931	11 903	3 654	4 975	5 893	2 230	2 096	2 522	1 122	1 034	1 219	717

Measure*	BMI:	<18.5 kg/m^2			18.5–24.9 kg/m^2			25–29.9 kg/m^2			30–34.9 kg/m^2			35–39.9 kg/m^2			≥40 kg/m^2		
	Parity:	Nullip	Multip	Prev CS	Nullip	Multip	Prev CS	Nullip	Multip	Prev CS	Nullip	Multip	Prev CS	Nullip	Multip	Prev CS	Nullip	Multip	Prev CS
VBAC – attempts	**%**			43.7			36.1			29.8			24.1			18.8			17.8
VBAC	***n***	N/A		55	N/A		1 044	N/A		678	N/A		318	N/A		122	N/A		72
	Total			126			2 894			2 273			1 322			648			405
VBAC – gives birth	**%**			23.0			19.5			13.5			10.7			6.5			4.7
vaginally	***n***	N/A		29	N/A		565	N/A		308	N/A		141	N/A		42	N/A		19
	Total			126			2 898			2 278			1 323			650			406
Episiotomy	**%**	48.6	10.6	32.0	46.4	10.7	39.1	43.9	9.1	33.0	40.3	7.4	25.8	36.1	6.8	19.6	32.5	6.3	14.9
	n	503	103	16	6 817	1 806	373	3 125	914	189	1 200	353	72	415	137	20	151	59	7
	Total	1 035	969	50	14 689	16 841	953	7 115	10 063	572	2 981	4 742	279	1 150	2 000	102	464	930	47
Obstetric anal	**%**	4.6	0.9	#	5.7	1.8	5.8	5.5	1.8	3.8	5.5	1.9	4.6	5.0	0.8	6.9	4.9	1.1	#
sphincter injury	***n***	48	9	#	846	306	55	393	189	22	165	92	13	58	16	7	23	10	#
	Total	1 044	992	50	14 819	17 070	955	7 196	10 223	577	3 012	4 808	281	1 164	2 034	102	469	942	47
Obstetric	**%**	28.4	17.3	37.2	38.6	20.5	49.1	44.6	23.5	53.7	47.4	26.2	56.2	50.0	28.4	58.6	57.2	29.2	70.0
haemorrhage	***n***	354	190	70	7 738	3 945	2 183	4 873	2 793	1 961	2 359	1 546	1 253	1 047	717	657	592	356	502
>500 ml	**Total**	1 245	1 097	188	20 039	19 267	4 449	10 934	11 907	3 655	4 975	5 897	2 230	2 096	2 522	1 122	1 035	1 219	717
Unplanned	**%**	4.1	2.1	3.2	3.4	2.0	3.2	3.3	2.4	3.1	4.8	2.6	3.3	5.0	3.3	4.5	7.3	3.5	7.0
maternal	***n***	51	23	6	678	383	144	363	281	114	240	156	74	105	84	50	75	42	50
readmission	**Total**	1 242	1 097	188	19 995	19 235	4 444	10 914	11 884	3 654	4 966	5 891	2 230	2 093	2 519	1 121	1 034	1 216	716
Apgar score <7	**%**	1.5	0.9	#	1.5	0.9	1.0	1.8	1.1	1.0	1.9	1.4	0.8	2.7	1.6	1.4	1.3	1.9	1.8
(5 mins)	***n***	19	10	#	288	174	42	191	128	36	94	82	18	55	40	15	13	23	13
	Total	1 235	1 079	188	19 781	18 992	4 409	10 788	11 744	3 621	4 897	5 806	2 203	2 065	2 494	1 101	1 014	1 196	711
Breastfeeding at	**%**	62.1	56.2	57.6	74.6	68.5	71.4	72.9	63.2	67.7	66.7	55.9	63.5	64.8	50.8	52.1	61.0	45.1	48.4
first feed	***n***	416	382	80	8 424	8 254	1 972	4 338	4 527	1 390	1 792	1 907	772	689	744	299	316	320	191
	Total	670	680	139	11 292	12 050	2 761	5 951	7 162	2 053	2 687	3 412	1 215	1 063	1 465	574	518	709	395
Breastfeeding at	**%**	51.4	48.6	53.7	64.2	59.9	61.7	60.5	55.0	58.5	53.3	46.7	52.0	47.7	41.6	45.4	43.2	34.0	39.7
discharge	***n***	670	572	116	13 295	11 989	2 913	6 861	6 789	2 245	2 773	2 858	1 221	1 033	1 103	533	462	439	297
	Total	1 304	1 176	216	20 721	20 026	4 725	11 347	12 351	3 839	5 199	6 115	2 348	2 166	2 652	1 175	1 070	1 293	749

* The following measures cannot be reported for Scotland: Obstetric haemorrhage >1500 ml; Birth without intervention (definition 1); Skin-to-skin contact within 1 hour of birth.

Numbers less than 5 are suppressed.

Appendix 3

Results for Wales

Measure*	BMI:	<18.5 kg/m²			18.5–24.9 kg/m²			25–29.9 kg/m²			30–34.9 kg/m²			35–39.9 kg/m²			≥40 kg/m²		
	Parity:	Nullip	Multip	Prev CS	Nullip	Multip	Prev CS	Nullip	Multip	Prev CS	Nullip	Multip	Prev CS	Nullip	Multip	Prev CS	Nullip	Multip	Prev CS
Induction of labour	%	26.0	19.6	20.7	30.3	24.2	22.9	37.8	30.5	22.4	43.6	36.4	23.0	49.4	42.9	25.8	55.0	49.1	23.9
	n	125	77	19	2 352	1 725	492	1 736	1 552	402	978	980	254	484	562	147	338	406	99
	Total	480	392	92	7 757	7 142	2 144	4 587	5 085	1 798	2 241	2 695	1 103	980	1 311	570	615	827	414
Small for gestational age	%	50.0	44.7	#	68.3	59.9	42.9	67.3	52.4	34.6	75.9	61.8	31.0	67.7	68.6	60.0	73.3	72.7	#
	n	25	17	#	427	230	51	202	100	27	107	55	13	42	24	12	22	16	#
	Total	50	38	9	625	384	119	300	191	78	141	89	42	62	35	20	30	22	12
Unassisted vaginal birth	%	66.0	89.3	38.3	58.8	88.4	27.4	53.6	87.8	23.2	53.0	85.8	22.5	48.3	84.3	19.3	45.4	82.3	18.9
	n	320	352	36	4 622	6 358	615	2 495	4 503	445	1 209	2 342	267	484	1 115	119	289	687	83
	Total	485	394	94	7 866	7 194	2 242	4 659	5 130	1 914	2 280	2 729	1 187	1 002	1 322	616	636	835	438
Assisted vaginal birth	%	21.9	3.8	10.6	21.4	4.2	8.0	20.2	3.9	7.4	18.3	3.7	3.5	18.2	3.1	4.4	12.9	2.6	3.7
	n	106	15	10	1 684	300	179	938	200	142	417	102	42	182	41	27	82	22	16
	Total	484	393	94	7 862	7 194	2 239	4 653	5 127	1 913	2 277	2 729	1 187	1 001	1 322	615	636	833	438
Birth without intervention (definition 2)	%	40.6	65.9	0.0	37.3	65.8	11.1	32.1	58.4	14.3	25.8	50.1	6.1	20.6	41.2	#	12.9	30.1	#
	n	28	27	0	368	603	29	178	427	34	78	195	9	27	80	#	11	40	#
	Total	69	41	9	987	916	261	554	731	237	302	389	148	131	194	80	85	133	66
Caesarean birth (any)	%	12.0	6.6	51.1	19.8	7.5	64.5	26.2	8.3	69.3	28.6	10.4	74.0	33.5	12.6	76.3	41.7	14.9	77.4
	n	58	26	48	1 556	536	1 445	1 220	424	1 326	651	285	878	335	166	469	265	124	339
	Total	484	393	94	7 862	7 194	2 239	4 653	5 127	1 913	2 277	2 729	1 187	1 001	1 322	615	636	833	438
Elective caesarean birth	%	2.3	2.5	36.2	3.9	3.5	46.9	4.6	3.7	50.6	4.4	4.0	53.7	4.2	4.3	56.6	5.8	4.9	57.8
	n	11	10	34	309	253	1 050	214	189	968	100	110	637	42	57	348	37	41	253
	Total	484	393	94	7 862	7 194	2 239	4 653	5 127	1 913	2 277	2 729	1 187	1 001	1 322	615	636	833	438
Emergency caesarean birth	%	9.7	4.1	14.9	15.9	3.9	17.6	21.6	4.6	18.7	24.2	6.4	20.3	29.3	8.2	19.7	35.8	10.0	19.6
	n	47	16	14	1 247	283	395	1 006	235	358	551	175	241	293	109	121	228	83	86
	Total	484	393	94	7 862	7 194	2 239	4 653	5 127	1 913	2 277	2 729	1 187	1 001	1 322	615	636	833	438

Measure*	BMI:	<18.5 kg/m^2			18.5–24.9 kg/m^2			25–29.9 kg/m^2			30–34.9 kg/m^2			35–39.9 kg/m^2			≥40 kg/m^2		
	Parity:	Nullip	Multip	Prev CS	Nullip	Multip	Prev CS	Nullip	Multip	Prev CS	Nullip	Multip	Prev CS	Nullip	Multip	Prev CS	Nullip	Multip	Prev CS
VBAC – attempts	**%**			55.6			48.7			47.9			42.9			39.8			35.4
VBAC	***n***	N/A		30	N/A		688	N/A		569	N/A		304	N/A		143	N/A		95
	Total			54			1 413			1 187			708			359			268
VBAC – gives	**%**			44.6			32.3			29.1			24.4			22.3			17.7
birth vaginally	***n***	N/A		25	N/A		481	N/A		371	N/A		189	N/A		89	N/A		51
	Total			56			1 487			1 277			775			399			288
Episiotomy	**%**	38.6	7.0	21.4	39.4	6.1	30.9	38.7	6.1	28.3	36.2	5.6	20.3	34.7	3.4	24.0	30.0	4.4	19.3
	n	160	25	9	2 492	403	243	1 310	279	166	574	133	62	221	38	37	109	29	17
	Total	414	357	42	6 330	6 597	787	3 385	4 606	586	1 586	2 364	306	637	1 120	154	363	662	88
Obstetric anal	**%**	8.1	1.8	0.0	7.1	2.0	6.2	7.8	2.1	7.2	7.1	2.3	6.3	12.2	2.3	7.2	10.2	2.4	#
sphincter injury	***n***	25	5	0	357	105	30	210	80	28	88	43	13	61	20	7	26	12	#
	Total	307	278	21	5 035	5 384	481	2 699	3 776	388	1 245	1 885	205	502	888	97	256	497	46
Obstetric	**%**	2.3	#	#	3.4	1.8	3.5	4.2	1.9	3.8	4.4	2.0	3.6	6.1	2.6	2.9	5.5	2.9	4.2
haemorrhage	***n***	11	#	#	263	126	76	191	95	71	98	53	41	59	34	17	34	24	18
>1500 ml	**Total**	474	382	91	7 657	7 039	2 158	4 540	5 016	1 854	2 211	2 657	1 148	975	1 298	594	623	814	424
Obstetric	**%**	23.4	14.1	40.7	31.8	15.8	42.8	37.6	16.6	46.4	39.6	19.9	47.6	47.6	21.0	52.9	49.0	25.6	57.8
haemorrhage	***n***	111	54	37	2 436	1 109	924	1 705	832	860	875	530	547	464	273	314	305	208	245
>500 ml	**Total**	474	382	91	7 657	7 039	2 158	4 540	5 016	1 854	2 211	2 657	1 148	975	1 298	594	623	814	424
Unplanned	**%**	4.7	2.9	#	4.3	2.8	3.5	4.9	3.0	2.8	5.7	3.1	2.5	4.7	3.3	4.0	7.8	4.0	4.3
maternal	***n***	13	7	#	200	123	50	134	91	34	77	49	19	27	26	16	27	20	12
readmission	**Total**	274	238	58	4 642	4 329	1 441	2 747	3 063	1 216	1 352	1 590	755	573	793	396	348	505	278
Apgar score <7	**%**	1.5	1.4	#	1.3	0.7	1.0	1.5	0.7	0.8	1.2	0.9	1.1	1.8	0.8	1.3	1.6	1.4	2.1
(5 mins)	***n***	8	6	#	115	59	23	74	40	15	29	25	13	19	12	8	11	12	9
	Total	526	434	96	8 667	7 906	2 282	5 062	5 608	1 946	2 422	2 918	1 198	1 054	1 414	616	677	856	437

* The following measures cannot be reported for Wales: Birth without intervention (definition 1); Skin-to-skin contact within 1 hour of birth; Breastfeeding.

Numbers less than 5 are suppressed.