



Health Equity Audit of Maternity Care and Birth Outcomes in Bristol 2003-2005

1.0 Introduction

1.1 Maternity Services

Maternity services in England address all aspects of the care and support of pregnant women, their partners, families and babies. This begins in the antenatal period and continues through delivery and into the postnatal phase. This care is provided by both community and hospital health services.

The National Service Framework for Children, Young People and Maternity Services, published in 2004, recognised that for the majority of women, pregnancy and childbirth are normal life events. The recent Modernising Maternity Care (2006)¹ document has advised of targets based on professional consensus or existing best practice for the delivery of maternity care, with the aim of promoting normality and reducing inequalities.

Maternity care is central to ensuring not only the safety and well-being of the mother and baby in the short term, but also in the longer term. Evidence suggests that factors such as birth weight and breastfeeding can have long term health consequences for the baby and the mother. Low birth weight has been associated with an increased risk of heart disease in later life for that baby² and women who breastfeed have lower rates of breast³ and ovarian cancers.⁴ This suggests that performance in maternity care can affect longer term health inequalities.

Additionally women have the right to be supported and encouraged to have as normal a pregnancy and birth as possible (NSF [2004] Children, Young People and Maternity Services) and for this to be planned according to parental choice. There are evidence based 'interventions' that can impact the health of the

¹ Modernising Maternity Care (2006); A commissioning toolkit for England. DH/NCT/RCOG. 2nd Edition

² Owen CG, Whincup PH & Odoki K et al (2002) Infant feeding and blood cholesterol: a study in adolescents and a systematic review. *Paediatrics* 110 (3) 597-608

³ Beral V, Bull D, Doll R, Peto R, Reeves G (2002). Breast Cancer and Breastfeeding collaborative reanalysis of individual data from 47 epidemiological studies in 30 countries including 50302 women with breast cancer and 96973 women without the disease. *Lancet* 360; 9328: 187-95

⁴ Heinig MJ & Dewey KG (1997) Health effects of breastfeeding for mothers; a critical review. *Nutrition Research Reviews*. 10 (1) 35-6

mother and birth outcome of the baby. The implementation of these interventions is central to the achievement of Standard 11 of the NSF: 'women have easy access to supportive, high quality maternity services, designed around their individual needs and those of their babies'.

1.2 Health Inequalities

Whilst year on year improvements in the health of the population in England have been noted⁵, there is a general acknowledgement that health inequalities, as measured by infant mortality⁶ and life expectancy, are worsening for those from the most socio-economic disadvantaged households.

The NSF for Children, Young People and Maternity Services specifically seeks to improve equity of access to maternity services, which aims to increase the survival rates and life chances of children from disadvantaged backgrounds.

There is a differentiation in this area of work between 'equity' which is the fair distribution of resources across the population and 'equality' where resources are distributed *between the population* on the basis of need.

Following concerns expressed by midwifery staff at North Bristol Trust (NBT), a local audit⁷ was conducted to identify inequalities in access to maternity services and health outcomes for mothers and babies at NBT. The audit data related to women who were provided with maternity care by NBT midwives in 2004. This audit found, among other factors studied, that Black and Minority Ethnic (BME) women were less likely to receive an elective caesarean section (OR: 0.59; CI 0.41-0.83) but more likely to undergo an emergency caesarean section (OR: 1.34; CI 1.05-1.73) than Caucasian women.

The initial findings of the audit provided the rationale for conducting a BNSSG wide health equity audit (HEA) on maternity services. This report covers pregnant women who were registered with a GP from Bristol PCT and women delivering at United Bristol Hospital Trust (UBHT).

1.3 Health Equity Audit Process

A health equity audit 'identifies how fairly services or other resources are distributed in relation to the health needs of different groups and areas, and the priority action to provide services relative to need' (see diagram 1).

⁵ Age standardised mortality rate Figure B & IMR Figure C page 5. Health Statistics Quarterly. ONS Spring 2007. http://www.statistics.gov.uk/downloads/theme_health/hsg33web.pdf

⁶ Review of the Health Inequalities Infant Mortality PSA Target. 2007. DH. www.dh.gov.uk/assetRoot/04/14/29/72/04142972.pdf

⁷ Audit of Pregnancy & Birth Outcomes for Women from Black & Minority Ethnic Groups. North Bristol NHS Trust, Maternity Services. 2004.

To ensure that inequalities identified as part of this audit are addressed in both service commissioning and provision, partners across the geographical area were involved from the beginning of the health equity audit process. These partners agreed the data collection protocol and validated preliminary findings. It is hoped that audit findings will assist in the prioritisation of activities for action. Action will be coordinated through the Bristol North Somerset and South Gloucestershire (BNSSG) Maternity and Neonates Working Party and the Bristol Health Services Plan (BHSP) Maternity and Newborn Review Inequalities group.

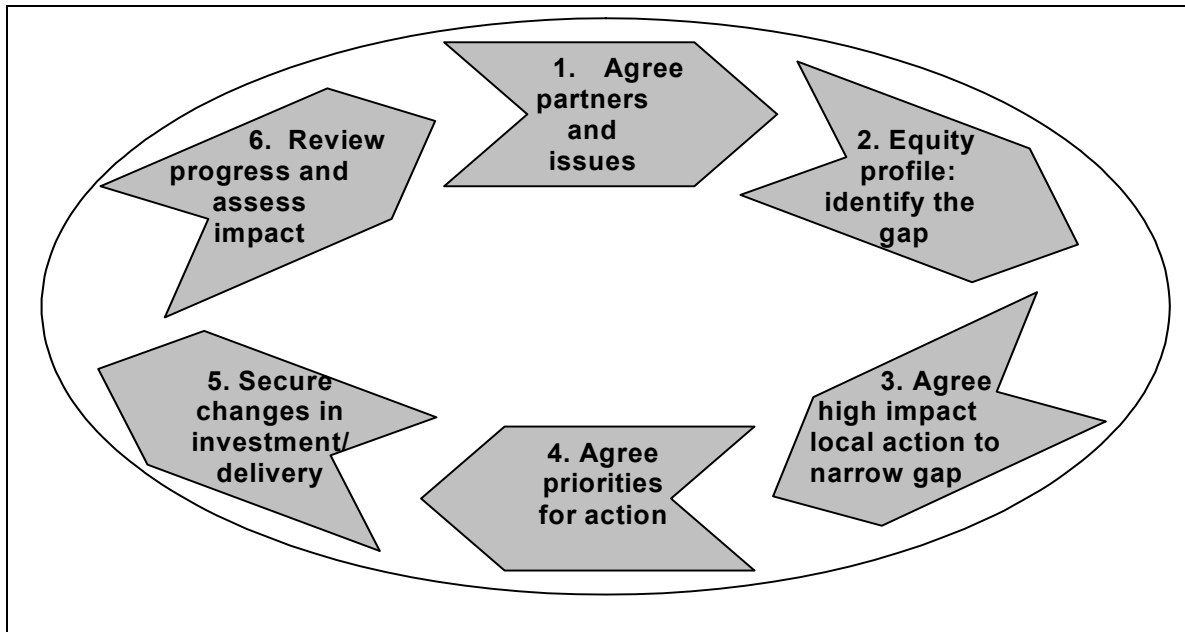


Diagram 1: The health equity audit process. [Source; Department of Health. *Health Equity Audit A Guide for the NHS*. 2003. London: Department of Health]

The aim of this audit was to highlight those pregnant women with greatest health need. The objectives of this maternity services health equity audit are to: compare local health service indicators against current national averages, around antenatal and intrapartum care for all pregnant women; and to identify differences in the process of maternity care for women from different ethnic groups and for women of different socio-economic status. Specifically;

- i) the percentage of woman booking late and very late at antenatal care
- ii) the percentage of women delivering normally
- iii) the percentage of women delivering by caesarean section and what proportion are undertaken as an emergency
- iv) breastfeeding rates, at both initiation and 6-week check
- v) the percentage of pregnant women continuing to smoke cigarettes during pregnancy
- vi) the percentage of low birth weight babies.

These indicators have been selected from the recent expert paper on 'Modernising Maternity Care' (2006), which was endorsed by the Royal College of Obstetricians and Gynaecologists, the Royal College of Midwives and the National Childbirth Trust.

2.0 Methods

2.1 Participants and setting

This was a retrospective analysis of 15,315 women who were registered with a GP in Bristol PCT who delivered singleton live babies between January 2003 and December 2005. This report also includes delivery data from UBHT, although some Bristol PCT women also deliver at NBT (see South Gloucestershire report). Women who were referred from other PCTs were excluded from this analysis.

All PCTs and Trusts gave their consent for their routine data to be utilized for this purpose and were engaged in the process throughout. Non patient identifiable data was accessed through the STORK system, which is the maternity information system in the acute trusts.

Records were excluded from this study if a woman delivered prematurely (less than 37 weeks gestation) or post term (after 42 weeks gestation). Records were also excluded if the woman delivered multiple babies or a still birth. These records were excluded from the analysis as this report represents a 'best scenario' of full term deliveries resulting in the birth of a single live baby. Home births were also excluded from the analysis, as there was uncertainty about the completeness of data.

2.2 Exposures – see table 1

2.2.1 Ethnicity

Being of different ethnic origins has different implications for maternity care and outcomes, as it will influence the susceptibility to genetic diseases, physical build, cultural practices and beliefs regarding health and the use of health services. There are many studies that document poorer health outcomes associated with being from Black or Minority Ethnic (BME) groups. In the Chief Medical Officers (CMOs) 2006 annual report the chapter on intrapartum deaths illustrates this point for maternity outcomes. It reports that 'women from Black or Asian ethnic groups have higher rates of (intrapartum) loss than white women'.

A pregnant woman's ethnicity is reported by the woman to her midwife at the booking appointment. There were some differences in the categories used between hospital trusts; NBT use STORK categories and UBHT use census categories. To enable comparison, all women who delivered at NBT had their ethnicity status manually recoded to census categories. For the purpose of this audit women were then assigned to either the BME or Caucasian group for comparison. This approach was required as numbers were small in many of the

ethnic groups. It is acknowledged that both the BME and 'Caucasian' groupings are not homogenous.

2.2.2 Country of Birth

In an effort to measure inequality from a different perspective and capture possible language barriers and other difficulties in accessing maternity services, country of birth was also used as an exposure variable. This is reported by the pregnant woman to her midwife at the booking appointment. This was converted into a binary variable, born in the UK or born outside the UK.

2.2.3 Socio-economic status

This variable was based on the postcode of residence of the pregnant woman at the time of delivery, which is allocated an Indices of Multiple Deprivation (2004) score. These scores are divided into quintiles, so that using a look up table a postcode will be assigned a number from one to five depending on the level of disadvantaged experienced. For the purpose of comparison the pregnant women from the most disadvantaged areas (Q5) were compared with pregnant women from the least disadvantaged areas (Q1).

Name	Definition
Ethnicity	The ethnicity a woman reports herself as at booking – using the ONS Census Classification. Coded as 'Caucasian' or 'Black & Minority Ethnic' (BME).
Place of birth	The country a woman reports as being born in. Coded as 'UK' or 'Non-UK'.
Socio-economic status	National Indices of Multiple Deprivation score given to postcode of residence of woman. Grouped into centiles, 'most disadvantaged' and 'least disadvantaged'.
PCT	Primary Care Trust in which the GP of the pregnant woman is registered.
Trust	Hospital Trust the pregnant woman delivers at.

Table 1: Exposure variables and definitions for maternity health equity audit

2.3 Outcomes – see table 2

These outcomes of interest were selected from the recent expert paper on Modernising Maternity Care (2006).

2.3.1 The percentage of women booking late and very late at antenatal care

Early entry for ANC enables promotion of the woman's health and detection of factors that may have an adverse outcome on the pregnancy. In the UK first ANC visit is recommended within the first 12 weeks of pregnancy and women are considered to be very late attendees if they first visit after 20 weeks gestation. The Modernising Maternity Care document notes that late booking at ANC is associated with social exclusion and domestic abuse.

2.3.2 The percentage of women having a normal delivery

The Department of Health (2006) define normal delivery as;

'birth without surgical intervention, use of instruments, induction, epidural or general anaesthetic'¹

The STORK database records method of labour onset, analgesia used and method of delivery. The data from each of these variables were combined to produce a code for normal delivery. Nationally rates of normal delivery have been declining but the Department of Health are encouraging maternity units to aim for a year on year rise. This is in line with the NSF aim of 'promoting the normality of childbirth' as a normal delivery does not expose the woman or the baby to the risks and complications of general anaesthesia, surgery and other interventions.

2.3.3 The percentage of women having a caesarean section and the proportion undertaken as an emergency

This is coded in the STORK data base (based on OPCS4 surgical code) under method of delivery. Nationally the caesarean section rate has risen over the last 20 years. Explanations given for this are varied including; older primigravida, a greater proportion of multiple births (largely due to the effects of fertility treatment), a greater proportion of women from ethnic minorities and women's choice. The real reasons are not fully understood, but are likely to be a combination of the above factors.

2.3.4 The percentage of women initiating breastfeeding and breastfeeding at 6 weeks

Women who initiate breastfeeding after delivery are recorded in the STORK database, but no data has been available on breastfeeding rates at 6 weeks for the women in this audit. The second part of this outcome therefore had to be dropped from the analysis.

2.3.5 The percentage of women continuing to smoke cigarettes during pregnancy

This information is self reported to the midwife and is recorded in the STORK system as, whether or not the woman is still a smoker at the time of delivery. It is therefore possible that some women in this audit, who are reported as non-smokers, have smoked for a part of their pregnancy. Some pregnant women may still be smoking at time of delivery but choose not to tell their midwife.

2.3.6 The percentage of women who deliver a low birth weight or very low birth weight baby

Low birth weight is defined internationally as a singleton baby born at term that weighs less than 2500g and a very low birth weight is a singleton baby born at term that weighs less than 1500g. Low birth weight babies are at increased risk

of perinatal and infant deaths compared with those babies delivering at 'normal' birth weight⁸.

It is acknowledged that there are problems with these cut offs, as there are genetic variations in birth weight associated with ethnicity. However, in the absence of agreement of what the adjusted cut-offs should be for babies of varying ethnic origins, the accepted international definition has been utilised for this audit.

Outcomes

Name	Definition
Women booking late at antenatal care	First ANC visit after 12 weeks gestation. Calculated using Estimated Due Date (EDD - 196)
Women booking very late at antenatal care	First ANC visit after 20 weeks gestation. Calculated using EDD-140
Women having a normal delivery	Birth without surgical intervention, use of instruments, induction, epidural or general anaesthetic
Women having a Caesarean Section	Singleton delivery of baby using surgical method
Women having an Emergency Caesarean Section	Singleton delivery of a baby via surgical method recorded as an emergency procedure
Breastfeeding initiated	Mothers known to have initiated breastfeeding at the time of birth
Women smoking during pregnancy	Mother reporting that she is still smoking at the time of delivery
Low birth weight baby	<2500g but =1500g birth weight of a singleton baby delivered at term
Very low birth weight baby	<1500g birth weight of a singleton baby delivered at term
Underweight baby	Birth weight <2500g of a singleton baby delivered at term

Table 2: Outcome variables and definitions for maternity health equity

2.4 Confounders – see table 3

A confounder is a factor that is associated with the exposure and independently associated with the outcome of interest, but the factor is not on the causal pathway. Confounders provide an alternative explanation for the association observed between an exposure and an outcome and therefore their effects must always be adjusted for in any analysis.

From the literature the following confounders have been identified, they are listed under the outcomes of interest and are defined in Table 3. These were included in logistic regression models for each outcome of interest. Birthweight was included as a confounder but this should be interpreted with caution given that one fifth of the data was missing.

2.4.1 The percentage of women booking late and very late at antenatal care

A study to identify factors that were predictive of late initiation of ANC in England and Wales, found that primiparous women of high obstetric risk were more likely to book late (after 10 weeks in this study) and even more likely to book very late

⁸ Kramer MS (1987) Determinants of low birth weight: methodological assessment and meta-analysis. *Bulletin of the World Health Organisation*; 65: 663-737

(after 18 weeks gestation in this study)⁹. This relationship was not found for multiparous women. The evidence presented in this study has been used to inform this current audit and the potential confounders for this outcome are: maternal age at booking, smoking status, ethnicity and nulliparity.

2.4.2 The percentage of women having a normal delivery

'birth without surgical intervention, use of instruments, induction, epidural or general anaesthetic' (DH 2006)¹

Possible confounders identified in the literature are parity, being of risk age, smoking during pregnancy and birthweight, see 2.4.3 for references and discussion on confounders related to mode of delivery.

2.4.3 The percentage of women having a caesarean section and the proportion undertaken as an emergency

There has been a dramatic rise in the caesarean section rate over the last decade to a national average of 22.7% in 2004-5 in the UK (MMC 2006). Pre-term labour, post date pregnancy, multiple pregnancy and maternal age were factors listed by American obstetricians as patient risk factors for primary caesarean delivery¹⁰. Other factors were listed in this review but these variables were not available in the Stork dataset.

A 2003 study looked at how nicotine consumption affected mode of birth among 7803 single full term babies. A higher incidence of caesarean sections was found among smokers.¹¹

A first caesarean section almost guarantees that subsequent pregnancies will be delivered by caesarean. Therefore being a multiparous woman is treated as proxy indicator for possible previous caesarean and a possible confounder for mode of delivery, as obstetric history is not available in the STORK dataset.

2.4.4 The percentage of women initiating breastfeeding

A Scandinavian study in 1983 suggested that women who delivered by caesarean section or with an assisted delivery, those giving birth to babies of low birth weight or those asphyxiated at birth were significantly less likely to start breast feeding, than healthy babies delivered normally¹². This study also found that young and old mothers breastfed less well than mothers in general. Therefore

⁹ Kupek. E, Petrou, S, Vause, S & Maresh M (2002) Clinical provider and socio-demographic predictors of late initiation of antenatal care in England and Wales. *BJOG March: 109 (3) pp265-73*

¹⁰ Bailit JL, Schulkin J and Dawson NV. (2007) Risk adjusted caesarean rates: what factors for caesarean delivery are important to practicing obstetricians. *Journal of Reproductive Medicine. 52 (3) 194-8*

¹¹ Kirchengast S & Hartmann B (2003) Nicotine consumption before and during pregnancy affects not only newborn size but also birth modus. *Journal of Biological Sciences 35 (2) 175-88*

¹² Tamminen T, Verronen P, Saarikoski S, Goransson A & Tuomiranat H (1983) The influence of perinatal factors on breast feeding. *Acta Paediatric Scandinavia. 72 (1) 9-12*

mode of delivery, low birth weight and mother's age were considered as confounders for breastfeeding initiation.

2.4.5 *The percentage of women continuing to smoke cigarettes during pregnancy*

Smoking during pregnancy is associated with maternal age and a woman's socio-economic status. Therefore these confounders were adjusted for.

2.4.6 *The percentage of women who deliver a low birth weight or very low birth weight baby*

The Kirchengast & Hartmann (2003) study also looked at other associations between nicotine consumption and the effects on newborns. Among 7803 single full term babies, nicotine consumption was associated with smaller lighter babies and a higher percentage of low birth weight babies. Among singleton births, low birth weight babies are strongly correlated with low social class and BME groups.

2.4.6 *Other possible confounders*

Socio-demographic variables (socio-economic status, country of birth and ethnicity) were considered as possible confounders for all outcomes of interest.

Certain co-morbidities could confound associations observed. For example there is a higher prevalence of diabetes amongst South Asian women (1999 Health Survey for England) and diabetic women are more likely to undergo caesarean section¹³. Other co-morbidities are likely to influence delivery outcome, such as epilepsy, genital herpes and HIV. However, data on co-morbidities in STORK was inconsistently coded, with multiple diagnosis being placed in one field (NBT) and so this data was unable to be utilised in this study.

Potential Confounders

Name	Definition
Socio-demographic variables	The Country of birth and ethnicity as reported by the woman at booking and the socio-economic status of the household she lives in (see definitions above)
Pregnant woman without GP	A women who is not registered with a GP at the time of booking
Nulliparous	A woman who has never given birth to a baby before this pregnancy
Co morbidities diagnosed in a pregnant woman	Any concurrent illness that is likely to affect birth outcome e.g. diabetes, HIV, pre-eclampsia, epilepsy
Age of woman at delivery	Age of the mother in years at time of delivery, < 18 years and > 40 years categorised as 'high risk mother' compared with those women not considered at risk due to their age
Normal delivery	Birth without surgical intervention, use of instruments, induction, epidural or general anaesthetic
Birth weight of baby	In singleton baby delivered at term was greater or equal to 2500g considered normal weight and if < 2500g considered underweight
Booking very late for ANC	First ANC visit after 20 weeks gestation. Calculated using EDD-140

Table 3: Confounders for maternity outcomes of interest and their definitions

¹³ Rosenberg TJ, Garbers S, Lipkind H & Chiasson MA (2005) Maternal obesity and diabetes as risk factors for adverse pregnancy outcomes: differences among 4 racial / ethnic groups. *American Journal of Public Health* 95 (9) 1545-51

2.5 Analysis

Initial analysis compared differences in access to maternity services and outcomes by the following dichotomised variables: mother's ethnic origin (BME:Caucasian), mother's country of birth (non-UK:UK), and socioeconomic status (least disadvantaged:most disadvantaged). Differences in proportions between the different sub-groupings were tested using the chi-square test.

Multivariate analysis and calculation of odds ratios and 95% confidence intervals were conducted using logistic regression models. The associations were then recalculated adjusting for socio-demographic¹⁴ variables and then again adjusting for other factors which potentially act as confounders. The inclusion of such confounders was evidence-based. STATA version 8.0 was used to conduct the analysis.

All analysis was undertaken by geographical area (PCT), as this would capture the birth experience of the majority of pregnant women delivering within that population during this time period (except those that delivered in the private health care system) and by hospital trust, to capture differences in models of care. This breakdown will also help to target interventions to the geographical areas, populations or hospitals where inequalities are demonstrated.

3.0 Results for Bristol PCT

For performance against national indicators see Annex I. Unadjusted findings are presented in the tables within this section. Models showing adjustments for potential confounding variables can be found in Annex II.

3.1 Demographics

A total of 15,315 women who delivered a singleton baby whilst registered with a Bristol PCT GP or delivered at UBHT between January 2003 and December 2005 (an additional 7,635 women from South Gloucestershire PCT & 5959 North Somerset women made up the 28,909 total sample in the audit). Just over a fifth of women from Bristol PCT were of BME origins, whilst 19.5% of women from Bristol PCT were born outside the UK.

Women in this dataset were twice as likely to reside in areas that make up the most disadvantaged quintile than in the least disadvantaged quintile (30.6%:14.7%). Just over 4 per cent of Bristol PCT mothers in the audit were at 'risk age' (i.e. either less than 18 years or over 40 years of age), with the mean age of mothers at delivery being 28.9 years.

¹⁴ Socio-demographic variables include: ethnicity, place of birth and socio-economic status

Characteristics	Primary Care Trust			Hospital Trust		
	Bristol	S. Gloucs	N.Somerset	NBT	UBHT	Weston
Caucasian	11904 (77.7)	7154 (93.7)	5519 (92.6)	11613 (90.1)	8031 (74.5)	890 (91.6)
BME	3411 (22.3)	481 (6.3)	440 (7.4)	1274 (9.9)	2745 (25.5)	82 (8.4)
UK born	12259 (80.5)	6949 (91.5)	5479 (92.3)	11379 (88.7)	8420 (78.9)	888 (91.9)
Born outside the UK	2963 (19.5)	647 (8.5)	456 (7.7)	1452 (11.3)	2251 (21.1)	78 (8.1)
Resident in least deprived quintile	2236 (14.7)	1619 (21.5)	1283 (21.5)	2438 (19.2)	1427 (14.0)	177 (18.2)
Resident in most deprived quintile	4665 (30.6)	1607 (21.3)	1034 (17.4)	2896 (22.8)	3394 (33.4)	113 (11.6)
Nulliparous	8301 (54.2)	4167 (54.6)	3376 (56.7)	6976 (54.1)	5837 (54.2)	656 (67.5)
Mean age of mother at delivery	28.99	29.66	29.73	29.44	28.96	28.00
Mothers in risk age*	673 (4.4)	223 (2.9)	226 (3.8)	445 (3.4)	489 (4.5)	33 (3.4)

* Mothers' risk age - <18 years and >40 years

Table 4: Characteristics of mothers in the maternity HEA by primary care trust or hospital trust

3.2 Booking late at antenatal care

Over a third (40.8%) of all women from Bristol PCT in the health equity audit booked late at antenatal care. Women of Black & Minority Ethnic (BME) origin (OR=1.99) and those born outside the UK (OR=1.80) were approximately twice as likely to book antenatal care late as women of Caucasian origin and women born in the UK, respectively. These differences were attenuated slightly by socio-demographic variables, parity, and 'risk age', but both remained statistically significant in their final regression models.

Unadjusted analysis indicated that women residing in the most disadvantaged areas were more likely to book late than women living in the least disadvantaged areas (44.5%:39.8%) with this difference reaching statistical significance. However, when the other socio-demographic variables, parity and 'risk age' were adjusted for in the logistic regression model, the association between socioeconomic status and booking late was no longer statistically significant.

Women booking late at antenatal care						
		N (%)	OR	95%CI	p-value	Missing (%)
Ethnicity	Caucasian	4408 (37.1)	1.00	-	-	0.13
	BME	1833 (53.9)	1.99	1.84-2.15	0.000	0.35
Place of Birth	UK	4651 (37.9)	1.00	-	-	0.07
	Non UK	1550 (52.4)	1.80	1.66-1.95	0.000	0.20
SES	Q1 - least disadvantaged	888 (39.8)	1.00	-	-	0.18
	Q5 - most disadvantaged	2071 (44.5)	1.21	1.09-1.34	0.000	0.21

Table 5: Women booking late at antenatal care in Bristol PCT

The findings for South Gloucestershire PCT showed a similar pattern of results with the unadjusted odds ratios for women of BME origin and those born outside the UK booking late at antenatal care being 1.74 and 1.75 respectively. However, unlike for women from Bristol PCT, the direction of association between socioeconomic status and booking late for women from South Gloucestershire PCT remained statistically significant even after adjusting for all other variables in the logistic regression model as cited above.

3.3 Booking very late at antenatal care

In total, 7.1% of all Bristol PCT women in the audit booked very late at antenatal care. Women of BME origin (OR=2.39) and those born outside the UK (OR=2.54) were over two-times more likely to book antenatal care very late as women of Caucasian origin. Although after adjusting for other socio-demographic variables, the difference was modified by parity, and 'risk age', the significant associations between both ethnicity/place of birth and booking very late at antenatal care remained in the final logistic regression model.

Women booking very late at antenatal care						
		N (%)	OR	95%CI	p-value	% Missing
Ethnicity	Caucasian	667 (5.6)	1.00	-	-	0.13
	BME	423 (12.4)	2.39	2.10-2.72	0.000	0.35
Place of Birth	UK	689 (5.6)	1.00	-	-	0.07
	Non UK	390 (13.2)	2.54	2.23-2.90	0.000	0.20
SES	Q1 - least disadvantaged	136 (6.1)	1.00	-	-	0.18
	Q5 - most disadvantaged	424 (9.1)	1.54	1.26-1.89	0.000	0.21

Table 6: Women booking very late at antenatal care in Bristol PCT

Those women from Bristol PCT residing in areas that make up the most disadvantaged quintile were more likely to book very late than those in the least

disadvantaged quintile (OR=1.54, CI=1.26-1.89). The statistically significant association between socioeconomic status and booking very late remained after adjustments for socioeconomic variables, parity and 'risk age'.

The findings for South Gloucestershire PCT showed a similar association between ethnicity and booking very late for antenatal care. However in contrast to Bristol PCT, neither place of birth nor socioeconomic status showed statistically significant associations with booking very late at antenatal care once the other variables had been adjusted for.

3.4 Women having a normal delivery

Overall, just under half (48.3%) of all Bristol PCT women in the audit had a normal delivery. Caucasian women in the audit were no more likely to have a normal delivery than BME women (OR=1.01, CI=0.94-1.09). The absence of statistical association between ethnicity and normal delivery remained after adjustments were made for socioeconomic variables, parity, 'risk age', birth weight and mothers smoking during pregnancy. Unadjusted analysis indicated a borderline association between mother's place of birth and having a normal delivery, with women born in the UK being slightly more likely to have a normal birth than those born outside the UK (OR=0.92, CI=0.85-0.99). However, this difference was modified by the inclusion of birth weight in particular, and did not indicate statistical significance once all intermediate variables were included in the final model of the logistic regression. Women residing in the most disadvantaged areas were found to be more likely to have a normal delivery than those from the least disadvantaged area (OR=1.35, CI=1.02-1.26). However, this association was modified by the inclusion of confounding variables and in particular, parity.

Women having a normal delivery						
		N (%)	OR	95%CI	p-value	% Missing
Ethnicity	Caucasian	5744 (48.3)	1.00	-	-	0.00
	BME	1658 (48.6)	1.01	0.94-1.09	0.715	0.00
Place of Birth	UK	5978 (48.8)	1.00	-	-	0.00
	Non UK	1384 (46.7)	0.92	0.85-0.99	0.045	0.00
SES	Q1 - least disadvantaged	1037 (46.4)	1.00	-	-	0.00
	Q5 - most disadvantaged	2311 (49.5)	1.35	1.02-1.26	0.014	0.00

Table 7: Women having a normal delivery in Bristol PCT

The findings for South Gloucestershire PCT showed a similar pattern, with no statistically significant associations between ethnicity, place of birth or socioeconomic status and normal delivery after adjustments for confounders.

3.5 Women having an elective or emergency caesarean section

In total, 21.6% of all Bristol PCT women in the audit had a caesarean section. There was no statistically significant association between either ethnicity (OR=0.99, CI=0.91-1.09) or place of birth (OR=1.09, CI=0.99-1.21) and having a caesarean section. Although unadjusted results indicated that women from Bristol PCT residing in the most disadvantaged quintile of Bristol were less likely to undergo a caesarean section than those residing in the least disadvantaged quintile (OR=0.83, CI=0.73-0.93), when smoking during pregnancy and, birth weight and all other confounders were adjusted for in the logistic regression model, the association was modified.

The findings for women in the audit from South Gloucestershire PCT mirror those observed for Bristol PCT.

Women having a caesarean section						
		N (%)	OR	95%CI	p-value	% Missing
Ethnicity	Caucasian	2575 (21.6)	1.00	-	-	0.00
	BME	735 (21.6)	0.99	0.91-1.09	0.917	0.00
Place of Birth	UK	2613 (21.3)	1.00	-	-	0.00
	Non UK	680 (22.9)	1.09	0.99-1.21	0.053	0.00
SES	Q1 - least disadvantaged	532 (23.7)	1.00	-	-	0.00
	Q5 - most disadvantaged	957 (20.5)	0.83	0.73-0.93	0.002	0.00

Table 8: Women having a caesarean section in Bristol PCT

3.6 Women having an emergency caesarean section

In total, 12.1% of all women in Bristol PCT underwent an emergency caesarean section. There was no statistically significant association between ethnicity (OR=1.07, CI=0.96-1.20) or socioeconomic status (OR=0.95, CI=0.81-1.10) and having a caesarean section. Women born outside the UK were more likely to have an emergency caesarean section than those born in the UK (OR=1.19, CI=1.06-1.34). However, this association was largely explained by differences in smoking during pregnancy and birth weight, the inclusion of these and all the other intermediate variables modified the overall difference in caesarean section rates significantly.

Women having an emergency caesarean section						
		N (%)	OR	95%CI	p-value	% Missing
Ethnicity	Caucasian	1417 (11.9)	1.00	-	-	0.00
	BME	432 (12.7)	1.07	0.96-1.20	0.229	0.00
Place of Birth	UK	1431 (11.7)	1.00	-	-	0.00
	Non UK	404 (13.6)	1.19	1.06-1.34	0.003	0.00
SES	Q1 - least disadvantaged	279 (12.4)	1.00	-	-	0.00
	Q5 - most disadvantaged	554 (11.9)	0.95	0.81-1.10	0.473	0.00

Table 9: Women having an emergency caesarean section in Bristol PCT

The results for South Gloucestershire PCT show non-UK born women being more likely to have emergency caesarean section than women born in the UK, with this difference remaining statistically significant after adjustment for all other variables. The findings for ethnicity and socioeconomic status reflect those for Bristol PCT.

3.7 Women initiating breast feeding

Approximately three-quarters (74.7%) of Bristol PCT women in the audit initiated breast feeding. Women of BME origin were two-times more likely to initiate breast feeding than Caucasian women (OR=2.12, CI=1.91-2.35), similarly, those women born outside the UK were over three-times more likely to initiate breast feeding than those born in the UK (OR=3.55, CI=3.12-4.03). Women residing in the most disadvantaged quintile were significantly less likely to initiate breast feeding than those in the least disadvantaged quintile (OR=0.24, CI=0.21-0.28). These associations remained statistically significant after adjusting for socioeconomic variables, normal delivery, 'risk age' of mother, smoking during pregnancy, birth weight and all variables together in the final logistic regression model.

Women initiating breast feeding						
		N (%)	OR	95%CI	p-value	% Missing
Ethnicity	Caucasian	8119 (71.9)	1.00	-	-	5.14
	BME	2775 (84.5)	2.12	1.91-2.35	0.000	3.66
Place of Birth	UK	8279 (71.1)	1.00	-	-	4.99
	Non UK	2558 (89.7)	3.55	3.12-4.03	0.000	3.78
SES	Q1 - least disadvantaged	1247 (80.5)	1.00	-	-	4.79
	Q5 - most disadvantaged	1014 (72.88)	0.24	0.21-0.28	0.000	4.57

Table 10: Women initiating breastfeeding in Bristol PCT

The results for South Gloucestershire PCT reflect those for Bristol PCT, except the association between ethnicity and breast feeding initiation loses statistical significance once socio-demographic variables and each of the other variables are adjusted for.

3.8 Women smoking during pregnancy

Just under one-fifth (18.8%) of Bristol PCT women in the audit were recorded as smoking during their pregnancy. BME women were less likely to smoke during pregnancy than Caucasian women (OR=0.36, CI=0.31-0.41). Women born outside the UK were less likely to smoke during pregnancy than those born in the UK (OR=0.16, CI=0.14-0.20). Those women living in areas that make up the most disadvantaged quintile in Bristol were over five and a half times more likely to smoke during pregnancy than those living in areas that make up the least disadvantaged quintile (OR=5.75, CI=4.76-6.94). The differences remained statistically significant once adjustments for socio-demographic variables and 'risk age' were made, with the difference between the most and least disadvantaged quintiles becoming greater (adjusted OR=8.17). The results for Bristol PCT reflect those for South Gloucestershire PCT.

Women smoking during pregnancy						
		N (%)	OR	95%CI	p-value	% Missing
Ethnicity	Caucasian	2468 (21.6)	1.00	-	-	3.98
	BME	302 (9.0)	0.36	0.31-0.41	0.000	1.88
Place of Birth	UK	2622 (22.2)	1.00	-	-	3.76
	Non UK	132 (4.6)	0.16	0.14-0.20	0.000	2.40
SES	Q1 - least disadvantaged	131 (6.1)	1.00	-	-	3.76
	Q5 - most disadvantaged	1233 (27.2)	5.75	4.76-6.94	0.000	2.70

Table 11: Women smoking during pregnancy in Bristol PCT

3.9 Women giving birth to low birth weight babies

Less than two percent of Bristol PCT women in the audit were recorded as giving birth to a low birth weight baby. BME women were over two-times more likely to give birth to a baby of low weight than Caucasian women (OR=2.14, CI=1.63-2.81), with the difference becoming greater after adjustment for other socio-demographic variables, booking late at antenatal care, 'risk age' of mother, and smoking during pregnancy. Note that 20% of babies did not have a birthweight recorded.

Women giving birth to low birth weight babies						
		N (%)	OR	95%CI	p-value	% Missing
Ethnicity	Caucasian	145 (1.5)	1.00	-	-	19.86
	BME	85 (3.2)	2.14	1.63-2.81	0.000	22.25
Place of Birth	UK	170 (1.7)	1.00	-	-	20.21
	Non UK	59 (2.5)	1.45	1.07-1.96	0.014	20.59
SES	Q1 - least disadvantaged	19 (1.0)	1.00	-	-	17.31
	Q5 - most disadvantaged	98 (2.7)	2.70	1.64-4.42	0.000	22.89

Table 12: Women giving birth to low birth weight babies in Bristol PCT

Unadjusted findings indicated non-UK born women as being more likely to give birth to a low weight baby than those women born in the UK (OR=1.45, CI=1.07-1.96). However, once adjustments for the above cited variables were made, the difference was modified and lost statistical significance. Women living in areas that make up the most disadvantaged quintile in Bristol were just under three-times more likely to give birth to a low birth weight baby than those living in areas that make up the least disadvantaged quintile (OR=2.70, CI=1.64-4.42). This difference was however modified by the inclusion of smoking as a confounding variable in the logistic regression model. The unadjusted findings for South Gloucestershire PCT were similar to those observed for Bristol PCT, however once adjustments for the above cited variables were made, differences by ethnicity, place of birth and socio-economic status lost statistical significance. It should be noted that approximately 20% of all data for the variable 'low birth weight' was missing.

4.0 Results UBHT

For performance against national indicators see Annex I

4.1 Demographics

A total of 10,776 women who delivered a singleton baby at United Bristol Healthcare Trust (UBHT) between January 2003 and December 2005 formed over half of the sample for this HEA (an additional 12,887 women from NBT & 972 from WAHT made up the total sample in the audit). A quarter of women in the audit that received care from UBHT were of BME origins, whilst 21.1% of women were born outside the UK. Women that delivered at UBHT were more likely to reside in the areas that make up the most disadvantaged quintile than the least disadvantaged quintile (33.4%:14.0%). 4.5% of UBHT mothers in the audit were at 'risk age' (i.e. either less than 18 years or over 40 years of age), with the mean age of mothers being 28.9 years.

See Table 4 above

4.2 Booking late at antenatal care

Over a third (39.3%) of all women from UBHT in the health equity audit booked late at antenatal care. Women of BME origin (OR=2.29, CI=2.10-2.51) and those born outside the UK (OR=2.10, CI=1.92-2.31) were over two-times more likely to book antenatal care late as women of Caucasian origin and women born in the UK, respectively. These differences were attenuated slightly by socio-demographic variables, parity, and 'risk age', but both remained statistically significant in their final regression models. Unadjusted analysis indicated that women residing in the most disadvantaged areas were more likely to book late than women living in the least disadvantaged areas (OR=1.44, CI=1.27-1.64) with this difference reaching statistical significance. However the difference lost statistical significance when socio-demographic variables, parity and 'risk age' were adjusted for in the logistic regression model.

Women booking late at antenatal care						
		N (%)	OR	95%CI	p-value	% Missing
Ethnicity	Caucasian	2737 (34.2)	1.00	-	-	0.24
	BME	1488 (54.4)	2.29	2.10-2.51	0.000	0.29
Place of Birth	UK	2969 (35.3)	1.00	-	-	0.10
	Non UK	1201 (53.5)	2.10	1.92-2.31	0.000	0.18
SES	Q1 - least disadvantaged	489 (34.4)	1.00	-	-	0.28
	Q5 - most disadvantaged	1457 (43.0)	1.44	1.27-1.64	0.000	0.18

Table 13: Women booking late at antenatal care at UBHT

In comparison to the results for women in the audit from UBHT, the findings for NBT showed a similar pattern. However, unlike the findings for UBHT, the direction of association between socioeconomic status and booking late for women from NBT retained statistical significance after adjusting for all other variables in the logistic regression model as cited above.

4.3 Booking very late at antenatal care

In total, 8.9% of all UBHT women in the audit booked very late at antenatal care. Women of BME origin (OR=1.98, CI=1.72-2.27) and those born outside the UK (OR=2.12, 1.83-2.44) were approximately two-times more likely to book antenatal care very late as women of Caucasian origin. Although the difference was modified by socio-demographic variables, parity, and 'risk age', the significant associations between both ethnicity/place of birth and booking very late at antenatal care remained in the final logistic regression model.

Those women from Bristol PCT residing in areas that make up the most disadvantaged quintile were more likely to book very late than those in the least

disadvantaged quintile (OR=1.41, CI=1.11-1.78). The statistically significant association between socioeconomic status and booking very late was attenuated after adjustments for socioeconomic variables, parity and 'risk age' and was no longer significant.

Women booking very late at antenatal care						
		N (%)	OR	95%CI	p-value	% Missing
Ethnicity	Caucasian	589 (7.4)	1.00	-	-	0.24
	BME	371 (13.6)	1.98	1.72-2.27	0.000	0.29
Place of Birth	UK	612 (7.3)	1.00	-	-	0.10
	Non UK	320 (14.2)	2.12	1.83-2.44	0.000	0.18
SES	Q1 - least disadvantaged	98 (6.9)	1.00	-	-	0.28
	Q5 - most disadvantaged	319 (9.4)	1.41	1.11-1.78	0.005	0.18

Table 14: Women booking very late at antenatal care at UBHT

The findings for NBT showed a similar association between ethnicity and booking very late for antenatal care. However in contrast to UBHT, socioeconomic status did show a statistically significant association with booking very late at antenatal care once the other variables were adjusted for.

4.4 Women having a normal delivery

Overall, just under half (44.3%) of all UBHT women in the audit had a normal delivery. BME women in the audit were no more or less likely to have a normal delivery than Caucasian women (OR=1.07, CI=0.98-1.17). There was no association between mothers place of birth and having a normal delivery, with women born outside the UK being no more or less likely to have a normal birth than those born in the UK (OR=0.99, CI=0.90-1.08).

Women residing in the most disadvantaged areas were found to be more likely to have a normal delivery than those from the least disadvantaged area (OR=1.14, CI=1.00-1.29). However, this association was modified by the inclusion of all confounding variables in the final logistic regression model and was no longer statistically significant. The findings for NBT similarly showed no statistically significant associations between ethnicity, place of birth or socioeconomic status and normal delivery after adjustments for confounding variables.

Women having a normal delivery						
		N (%)	OR	95%CI	p-value	% Missing
Ethnicity	Caucasian	3523 (43.9)	1.00	-	-	0.00
	BME	1251 (45.6)	1.07	0.98-1.17	0.120	0.00
Place of Birth	UK	3737 (44.4)	1.00	-	-	0.00
	Non UK	993 (44.1)	0.99	0.90-1.08	0.820	0.00
SES	Q1 - least disadvantaged	611 (42.8)	1.00	-	-	0.00
	Q5 - most disadvantaged	1565 (46.1)	1.14	1.00-1.29	0.036	0.00

Table 15: Women having a normal delivery at UBHT

4.5 Women having an elective or emergency caesarean section

In total, 21.8% of all UBHT women in the audit had a caesarean section. There was no statistically significant association between either ethnicity (OR=0.99, CI=0.89-1.10) or place of birth (OR=1.10, CI=0.98-1.23) and having a caesarean section. Although unadjusted results indicated that women in the audit from UBHT residing in the most disadvantaged quintile of Bristol were less likely to undergo a caesarean section than those residing in the least disadvantaged quintile (OR=0.78, CI=0.67-0.90), when all confounding variables were adjusted for in the logistic regression model, the association was no longer significant. The findings for women in the audit from NBT mirror those observed for UBHT.

Women having a caesarean section						
		N (%)	OR	95%CI	p-value	% Missing
Ethnicity	Caucasian	1755 (21.8)	1.00	-	-	0.00
	BME	596 (21.7)	0.99	0.89-1.10	0.878	0.00
Place of Birth	UK	1808 (21.5)	1.00	-	-	0.00
	Non UK	520 (23.1)	1.10	0.98-1.23	0.097	0.00
SES	Q1 - least disadvantaged	341 (23.9)	1.00	-	-	0.00
	Q5 - most disadvantaged	667 (19.7)	0.78	0.67-0.90	0.001	0.00

Table 16: Women having a caesarean section at UBHT

4.6 Women having an emergency caesarean section

In total, 12.2% of all women in the audit from UBHT underwent an emergency caesarean section. There was no statistically significant association between ethnicity and having an emergency caesarean section (OR=1.04, CI=0.90-1.18). There was a statistically significant association between socioeconomic status and having an emergency caesarean section (OR=0.82, CI=0.68-0.99). Women born outside the UK were more likely to have an emergency caesarean section

than those born in the UK (OR=1.21, CI=1.05-1.39). The inclusion of intermediate variables modified the overall differences between ethnicity, place of birth, socio-economic status and emergency caesarean sections.

Women having an emergency caesarean section						
		N (%)	OR	95%CI	p-value	% Missing
Ethnicity	Caucasian	969 (12.1)	1.00	-	-	0.00
	BME	342 (12.5)	1.04	0.90-1.18	0.586	0.00
Place of Birth	UK	983 (11.7)	1.00	-	-	0.00
	Non UK	311 (13.8)	1.21	1.05-1.39	0.006	0.00
SES	Q1 - least disadvantaged	186 (13.0)	1.00	-	-	0.00
	Q5 - most disadvantaged	371 (10.9)	0.82	0.68-0.99	0.037	0.00

Table 17: Women having an emergency caesarean section at UBHT

In contrast, the results for NBT show no statistically significant associations of either ethnicity, place of birth, socio-economic status with having an emergency caesarean section once adjustments for all intermediate variables were made.

4.7 Women initiating breast feeding

Approximately three-quarters (75.2%) of UBHT women in the audit initiated breast feeding. Women of BME origin were approximately two-times more likely to initiate breast feeding than Caucasian women (OR=1.96, CI=1.75-2.20). Those women born outside the UK were three and a half times more likely to initiate breast feeding than those born in the UK (OR=3.49, CI=3.01-4.04). Those women residing in the most disadvantaged quintile were also significantly less likely to initiate breast feeding than those in the least disadvantaged quintile (OR=0.34, CI=0.29-0.40).

These associations remained statistically significant after adjusting for socioeconomic variables, normal delivery, 'risk age' of mother, smoking during pregnancy, birth weight and all variables in the final model of the logistic regression model. The results for NBT reflect those observed for UBHT.

Women initiating breast feeding						
		N (%)	OR	95%CI	p-value	% Missing
Ethnicity	Caucasian	5431 (72.2)	1.00	-	-	1.56
	BME	2188 (83.6)	1.96	1.75-2.20	0.000	0.36
Place of Birth	UK	5632 (71.3)	1.00	-	-	6.18
	Non UK	1932 (89.7)	3.49	3.01-4.04	0.000	4.26
SES	Q1 - least disadvantaged	1150 (84.4)	1.00	-	-	4.48
	Q5 - most disadvantaged	2093 (65.0)	0.34	0.29-0.40	0.000	5.13

Table 18; Women initiating breastfeeding at UBHT

4.8 Women smoking during pregnancy

17.7% of UBHT women in the audit were recorded as smoking during their pregnancy. BME women were less likely to smoke during pregnancy than Caucasian women (OR=0.42, CI=0.36-0.48). Women born outside the UK were less likely to smoke during pregnancy than those born in the UK (OR=0.17, CI=0.14-0.21). Those women living in areas that make up the most disadvantaged quintile in Bristol were over five-times more likely to smoke during pregnancy than those living in areas that make up the least disadvantaged quintile (OR=5.16, CI=4.11-6.48). The differences remained statistically significant once adjustments for socio-demographic variables and 'risk age' were made, with the difference between the most and least disadvantaged quintiles becoming greater (adjusted OR=8.17). The results for UBHT reflect those for NBT.

Women smoking during pregnancy						
		N (%)	OR	95%CI	p-value	% Missing
Ethnicity	Caucasian	1595 (20.5)	1.00	-	-	3.18
	BME	264 (9.8)	0.42	0.36-0.48	0.000	1.31
Place of Birth	UK	1743 (21.3)	1.00	-	-	2.83
	Non UK	97 (4.4)	0.17	0.14-0.21	0.000	2.00
SES	Q1 - least disadvantaged	90 (6.5)	1.00	-	-	2.38
	Q5 - most disadvantaged	870 (26.3)	5.16	4.11-6.48	0.000	2.50

Table 19: Women smoking during pregnancy at UBHT

4.9 Women giving birth to low birth weight babies

2.1% of UBHT women in the audit were recorded as giving birth to a low birth weight baby. BME women were approximately two-times more likely to give birth to a baby of low weight than Caucasian women (OR=1.94, CI=1.42-3.64), with the difference remaining statistically significant after adjustment for socio-

demographic variables, booking late at antenatal care, 'risk age' of mother, and smoking during pregnancy. Note more than 20% of birth weight data was missing at UBHT.

Women giving birth to low birth weight babies						
		N (%)	OR	95%CI	p-value	% Missing
Ethnicity	Caucasian	107 (1.7)	1.00	-	-	21.95
	BME	69 (3.3)	1.94	1.42-3.64	0.000	22.88
Place of Birth	UK	127 (1.9)	1.00	-	-	22.10
	Non UK	47 (2.7)	1.37	0.98-1.93	0.063	21.24
SES	Q1 - least disadvantaged	17 (1.5)	1.00	-	-	18.01
	Q5 - most disadvantaged	69 (2.7)	1.86	1.09-3.18	0.023	23.95

Table 20: Women giving birth to low birth weight babies at UBHT

Findings indicated non-UK born women as being no more or less likely to give birth to a low weight baby than those women born in the UK (OR=1.37, CI=0.98-1.93). Women living in areas that make up the most disadvantaged quintile in Bristol were more likely to give birth to a low birth weight baby than those living in areas that make up the least disadvantaged quintile (OR=1.86, CI=1.09-3.18), however the difference was attenuated by the inclusion of socio-demographic variables and all variables in the final logistic regression model. It should be noted that approximately 20% of all data for the variable 'low birth weight' was missing. The adjusted findings for NBT were similar to those observed for UBHT.

5.0 Discussion

5.1 Demographics Bristol PCT

Among the audit sample there is a higher percentage of BME women (19.5%) compared to the population as a whole (8.16% census 2001, source Avon IM&T). But when looking at 2001 census data for women aged 18-44 years, in Bristol 25.2% of this age group self reported as being from a BME Group (including mixed ethnicity) and so these findings are to be expected.

All women who received antenatal care within Bristol PCT or delivered at UBHT were registered with a GP.

5.2 Booking Late

A lack of midwives may mean that women end up having their booking appointment late simply due to a lack of staff, but this is likely to affect all women to the same extent and therefore is not considered part of the

explanation for these findings. However, this may explain the high levels of booking late across this population.

5.2.1 Bristol PCT

Over a third of women (40.8%) in Bristol registered late for ANC. Those born outside the UK and women from a BME origin were more likely to book late even after adjusting for the effects of socio-demographic variables, parity and 'risk age'. This may be due to lack of awareness of antenatal care, difficulties accessing service or different cultural beliefs regarding appropriate levels of medical care in early pregnancy (Trinh & Rubin, 2006).

There was no statistically significant association with socio-economic status following adjustments for confounders, unlike among the South Gloucestershire PCT population. This may be explained by the fact that Bristol is largely an urban area and health care facilities are frequently reachable by foot or public transport or a greater awareness of the need for early ANC among women in living in the Bristol area.

5.2.2 UBHT

Over a third of women (39.3%) delivering at UBHT registered late for ANC. Those born outside the UK and women from a BME origin were more likely to book late even after adjusting for the effects of socio-demographic variables, parity and 'risk age'. This may be due to lack of awareness of antenatal care, difficulties accessing service or different cultural beliefs regarding appropriate levels of medical care in early pregnancy (Trinh & Rubin, 2006).

No statistically significant association with socio-economic status following adjustments for confounders was seen. This is different to the statistically significant associations seen between booking late and socio-economic status of women delivering at NBT, even after adjusting for the effects of confounding. This may be explained by the fact that women delivering at UBHT are mainly an urban population and health care facilities are frequently reachable by foot or public transport, or that there is a greater awareness of the need for early ANC among women who deliver at UBHT.

5.3 Booking very late

5.3.1 Bristol PCT

7.1% of pregnant women booked very late for ANC in Bristol. BME women, women not born in the UK and women living in the most disadvantaged areas were all more likely than their respective comparison groups to book very late at ANC. The implications of booking very late for antenatal care is that health benefits from preventative health programmes and screening programmes are missed. This may have long term health consequences for both the woman and baby.

5.3.2 UBHT

8.9% of pregnant women who delivered at UBHT booked very late for ANC. BME women, women not born in the UK and women living in the most disadvantaged areas were all more likely than their respective comparison groups to book very late at ANC. However when the effects of confounders were adjusted for the association between socio-economic status and booking very late were no longer statistically significant. The implications of booking very late for antenatal care is that health benefits from preventative health programmes and screening programmes are missed. This may have long term health consequences for both the woman and baby.

5.4 Normal delivery

5.4.1 Bristol PCT

There appears to be some variation in normal delivery rates between women from the most and least disadvantaged areas and between women born in the UK and those not born in the UK, but these are no longer statistically significant after adjusting for confounding variables. This lack of association is broadly reassuring, however it should be noted that only 50% of women in Bristol PCT are having a normal delivery. There were no statistically significant associations between ethnicity and normal delivery.

5.4.2 UBHT

There appears to be no difference in normal delivery rates between women born in the UK and those not born in the UK and between Caucasian and BME women. Women from the most disadvantaged areas are slightly more likely to deliver normally than those from the least disadvantaged areas, but this is no longer statistically significant after adjusting for confounding variables. This lack of association is broadly reassuring, however it should be noted that less than 50% of women at UBHT are having a normal delivery

5.5 All Caesarean sections

5.5.1 Bristol PCT

Whilst there appears to be some variation in caesarean rates between women from the most and least disadvantaged areas, with women from the more disadvantaged areas being 17% less likely to undergo a caesarean, this is no longer statistically significant after adjusting for confounding variables. There were no statistically significant associations between either ethnicity or place of birth and women undergoing a caesarean section. Across the whole population rates of caesarean are high (21.6%).

5.5.2 UBHT

Whilst there appears to be some variation in caesarean rates between women from the most and least disadvantaged areas, with women from the more disadvantaged areas being 22% less likely to undergo a caesarean, this is no

longer statistically significant after adjusting for confounding variables. There were no statistically significant associations between either ethnicity or place of birth and women undergoing a caesarean section and this pattern was the same for NBT. Across the whole audit population rates of caesarean are high (21.8% - UBHT and 23.6% - NBT). In MMC the national average rate of caesarean section rates were 22.7%, but authors noted 'enormous variation throughout the country'.

5.6 Emergency caesarean sections

5.6.1 Bristol PCT

Women of BME origin and those not born in the UK were slightly more likely to undergo an emergency caesarean section than Caucasian and those women born outside the UK respectively. However, following adjustments for potentially confounding variables none of these associations remained significant. Unlike among South Gloucestershire population there was little difference between women in the BME group and those women in the non-UK born group. More than half of all caesareans were conducted as emergencies for Bristol PCT women.

5.6.2 UBHT

Women not born in the UK were slightly more likely to undergo an emergency caesarean section than women born in the UK and women from the most disadvantaged areas were less likely to undergo an emergency caesarean section than those women living in the least disadvantaged areas. Yet, following adjustments for potentially confounding variables none of these associations remained significant. There was no association between ethnicity and rates of emergency caesarean section.

These trends were different to those seen among women delivering at NBT, where ethnicity and being born outside of the UK were both associated with an increased likelihood of an emergency caesarean section. More than half of all caesareans were conducted as emergencies for UBHT women.

5.7 Women initiating breast feeding

Breastfeeding is seen as one of the key interventions to prevent infant mortality and promoting breastfeeding is one of the ways in which the widening inequalities in infant mortality can be addressed (DH 2007).

5.7.1 Bristol PCT

The current audit shows that non-UK born women, BME women and women from the least disadvantaged areas are significantly more likely to breastfeed than those born in the UK, Caucasians and those from the most disadvantaged areas respectively. Because of the long-term benefits of breastfeeding for both the mother and the baby, the observed differences may contribute to longer

term health inequalities particularly amongst those women and children from the most disadvantaged areas.

5.7.2 UBHT

The current audit shows that non-UK born women, BME women and women from the least disadvantaged areas are significantly more likely to breastfeed than those born in the UK, Caucasians and those from the most disadvantaged areas respectively. Because of the long-term benefits of breastfeeding for both the mother and the baby, the observed differences may contribute to longer term health inequalities particularly amongst those women and children from the most disadvantaged areas.

5.8 Smoking during pregnancy

Smoking during pregnancy is known to increase the risk of a baby being born prematurely, and to increase the risk of having a low birth weight and in the longer term up to three times as likely to die from Sudden Unexpected Death in Infancy (SUDI) (DH 2007).

5.8.1 Bristol PCT

Even after adjustments for confounding variables, women living in the most disadvantaged areas are more than eight-times more likely to smoke during pregnancy than women from the least disadvantaged areas. The literature documents the association between smoking in pregnancy and deprivation, however quantifying the strength of this association locally may help to justify further targeting of interventions.

Both BME women and those women born outside the UK are less likely to smoke during pregnancy. After adjustment for confounding variables the associations remain statistically significant.

5.8.2 UBHT

Even after adjustments for confounding variables, women living in the most disadvantaged areas are more than eight-times likely to smoke during pregnancy than women from the least disadvantaged areas. The literature documents the association between smoking in pregnancy and deprivation, however quantifying the strength of this association locally may help to justify further targeting of interventions.

Both BME women and those women born outside the UK are less likely to smoke during pregnancy. After adjustment for confounding variables the associations remain statistically significant.

5.9 Low birth weight- Bristol PCT and UBHT

Low birth weight infants are at increased risk of perinatal and infant death⁸. However even in a dataset of this size, numbers are very small which makes data analysis unreliable. For this reason we have concentrated this analysis on low birth weight babies but note that there is a large proportion (between 18 and 23%) of the data missing we have been unable to draw reliable conclusions.

6.0 General Discussion Issues

Many general issues arose during the course of this audit that the audience of this report should be aware of.

There is a debate about how best to capture ethnicity. Most authors agree that the use of administrative categorisations such as census groupings have 'no scientific or anthropological validity'.¹⁵ However, this audit relied on routinely collected data so had to utilise the information in the available format (census groupings) whilst acknowledging its shortcomings.

We were unable to use co-morbidity data, due to data quality/coding issues, but these are likely to also have a confounding effect on the outcomes under investigation, particularly birth weight and mode of delivery. We would also have liked to have analysed teenage pregnancy separately but numbers in each geographical area were small. Instead the variable 'mothers at risk age' was used, which grouped women who were under 18 years or over 40 years. Obesity status pre-pregnancy is not currently recorded in the STORK system but this may have also confounded outcomes and as such should have been analysed appropriately had data been available.

Smoking during pregnancy was considered as a confounder for low birth weight, but some authors may reject this and argue that this variable is on the causal pathway. We have documented our actions and if people believe that this should be reanalysed please inform us.

All premature deliveries were excluded from this analysis, but some authors suggest that BME women are more likely to have shorter gestational length than Caucasian women¹⁶, which may have skewed this current analysis.

¹⁵ Bhopal R & Donaldson L (1998) White, European, Western, Caucasian, or what? Inappropriate labelling in research on race, ethnicity and health. *American Journal of Public Health* 88 (9) 1303-1307

¹⁶ Patel, R Steer, P, Doyle, P, Little M and Elliott P (2004) Does gestation vary by ethnic group? *International Journal of Epidemiology*. Feb; 33 (1) pp107-13

7.0 Conclusion & recommendations

To enable future study and monitoring in this area the authors of this audit make the following recommendations:

- Better recording and coding of co-morbidity data to enable future study
- Improved recording of birthweight data, as currently 20% of this data was missing from both UBHT and Bristol PCT women. For this reason it was impossible to undertake a meaningful analysis of this data.

The conclusions drawn from the Bristol PCT and UBHT maternity health equity audit are that:

- BME women and non-UK born women are significantly more likely to book late than Caucasian and UK born women
- BME, NUB and the most disadvantaged women were all more likely to book very late than their comparison groups. However after adjusting for confounders in UBHT women living in disadvantaged areas, they were no more likely to book very late than the least disadvantaged women.
- Only 50% of Bristol PCT women and 44% of UBHT women had normal deliveries during this time period and caesarean section rates were 21.8% for UBHT and 21.6% of Bristol PCT, compared to UK average rate of 22.7%. There was no statistical association between mode of delivery and either ethnicity, mother's place of birth or level of deprivation
- Half of all caesareans were conducted as emergencies, but there were no associations between ethnicity, place of birth or socio-economic status
- Breastfeeding rates are significantly higher, even after adjusting for the effects of confounders, among BME women, women born outside the UK or those women living in the least disadvantaged areas
- Smoking during pregnancy is very strongly associated with living in areas of deprivation. BME women and non-UK born women are statistically significantly less likely to smoke during pregnancy.

Report compiled by Habib Naqvi, Alison Bell & Chris Hine, September 2007.

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ANNEX I: BNSSG Maternity Health Equity Audit: Local Performance Against National Averages.

Indicator	National average (MMC 2006)	NBT	UBHT	WAHT	SGlos PCT	Bristol	North Somerset
Booking late	Not available	37.5%	39.3%	49.7%	30.7%	40.8%	39.2%
Booking very late	11% Caucasian and 20% BME women ¹⁷	5.5%	8.9%	5.1%	4.4%	7.1%	4.8%
Women having a normal delivery	46.4% (21.3-64%) ¹⁸	52.1%	44.3%	98.1%	49.7%	48.3%	51%
Women having a Caesarean section	22.7% ¹⁸	23.6%	21.8%	-	24.3%	21.6%	23.3%
Women having an emergency Caesarean section	Not available	12.8%	12.2%	-	12.8%	12.1%	12.2%
Women initiating breastfeeding	71% ¹⁹	74.5%	75.2%	71.8%	74.9%	74.7%	75.1%
Women smoking during pregnancy	20% ¹⁹	16.5%	17.7%	24.6%	13.7%	18.8%	15.1%
Low birth weight	7.6% ²⁰	1.5%	2.1%	<1%	<2%	<2%	1%

¹⁷ Lewis G & Drife J (2004) Why Mothers Die 2000-2002 the sixth report of the Confidential Enquiries into Maternal Deaths in the UK. London. RCOG. www.cemach.org.uk/publications/WMD2000_2002/content.htm

¹⁸ DH (2006) NHS Maternity Statistics 2004-5. www.ic.nhs.uk/pubs/maternity/eng2005

¹⁹ Hamlyn B, Brooker, S Oleinikova K et al (2002) *Infant Feeding 2000*. 6th Ed. London. TSO

²⁰ Macfarlane A & Mugford M (2000) *Birth Count: Statistics of Pregnancy and Childbirth*. Vol 1 text 2nd Ed. London. TSO

ANNEX II: Regression Models Showing Adjusted Findings.

Bristol PCT:

Women booking late at antenatal care									
		OR ^a	95% CI	OR ^b	95% CI	OR ^c	95% CI	OR ^d	95% CI
Ethnicity	Caucasian	1.00	-	1.00	-	1.00	-	1.00	-
	BME	1.62	1.41-1.87	1.60	1.38-1.84	1.63	1.41-1.88	1.60	1.39-1.85
	<i>p value</i>		0.000		0.000		0.000		0.000
Place of Birth	UK	1.00	-	1.00	-	1.00	-	1.00	-
	Non UK	1.31	1.13-1.52	1.32	1.14-1.53	1.32	1.14-1.52	1.33	1.15-1.54
	<i>p value</i>		0.000		0.000		0.000		0.000
SES	Q1 - least disadvantaged	1.00	-	1.00	-	1.00	-	1.00	-
	Q5 - most disadvantaged	1.02	0.92-1.14	0.99	0.89-1.10	1.02	0.91-1.13	0.99	0.88-1.09
	<i>p value</i>		0.692		0.901		0.763		0.792

^a Adjusting for other socio-demographic variables in the table

^b Adjusting for other socio-demographic variables in the table and null iparous

^c Adjusting for other socio-demographic variables in the table and 'risk age'

^d Adjusting for other socio-demographic variables in the table and null iparous, 'risk age'

Women booking very late at antenatal care									
		OR ^a	95% CI	OR ^b	95% CI	OR ^c	95% CI	OR ^d	95% CI
Ethnicity	Caucasian	1.00	-	1.00	-	1.00	-	1.00	-
	BME	1.39	1.08-1.78	1.40	1.09-1.80	1.39	1.09-1.79	1.41	1.10-1.81
	<i>p value</i>		0.009		0.007		0.008		0.007
Place of Birth	UK	1.00	-	1.00	-	1.00	-	1.00	-
	Non UK	1.84	1.44-2.34	1.83	1.43-2.34	1.86	1.46-2.37	1.85	1.45-2.36
	<i>p value</i>		0.000		0.000		0.000		0.000
SES	Q1 - least disadvantaged	1.00	-	1.00	-	1.00	-	1.00	-
	Q5 - most disadvantaged	1.26	1.01-1.56	1.29	1.04-1.59	1.25	1.01-1.55	1.27	1.02-1.58
	<i>p value</i>		0.033		0.021		0.042		0.029

^a Adjusting for other socio-demographic variables in the table

^b Adjusting for other socio-demographic variables in the table and null iparous

^c Adjusting for other socio-demographic variables in the table and 'risk age'

^d Adjusting for other socio-demographic variables in the table and null iparous, 'risk age'

Women having a normal delivery													
		OR ^a	95% CI	OR ^b	95% CI	OR ^c	95% CI	OR ^d	95% CI	OR ^e	95% CI	OR ^f	95% CI
Ethnicity	Caucasian	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	BME	1.07	0.93-1.23	1.03	0.89-1.19	1.07	0.93-1.23	1.13	0.97-1.30	1.04	0.88-1.22	1.05	0.89-1.24
	<i>p value</i>		0.331		0.616		0.339		0.111		0.653		0.548
Place of Birth	UK	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	Non UK	0.83	0.72-0.96	0.84	0.72-0.97	0.83	0.71-0.96	0.84	0.72-0.98	0.85	0.73-1.01	0.87	0.73-1.03
	<i>p value</i>		0.013		0.019		0.011		0.024		0.058		0.096
SES	Q1 - least disadvantaged	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	Q5 - most disadvantaged	1.14	1.03-1.27	1.07	0.97-1.20	1.15	1.03-1.27	1.13	1.01-1.27	1.13	1.00-1.27	1.08	0.95-1.23
	<i>p value</i>		0.013		0.163		0.011		0.030		0.046		0.246

^a Adjusting for other socio-demographic variables in the table

^b Adjusting for other socio-demographic variables in the table and null iparous

^c Adjusting for other socio-demographic variables in the table and 'risk age'

^d Adjusting for other socio-demographic variables in the table and smoking during pregnancy

^e Adjusting for other socio-demographic variables in the table and birthweight

^f Adjusting for other socio-demographic variables in the table and null iparous, 'risk age', smoking during pregnancy, birthweight

Women having a caesarean section																	
		OR ^a	95% CI	OR ^b	95% CI	OR ^c	95% CI	OR ^d	95% CI	OR ^e	95% CI	OR ^f	95% CI	OR ^g	95% CI	OR ^h	95% CI
Ethnicity	Caucasian	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	BME	1.01	0.85-1.19	1.01	0.85-1.20	1.01	0.85-1.19	1.02	0.87-1.22	1.01	0.85-1.20	0.94	0.79-1.11	1.02	0.84-1.25	0.96	0.78-1.18
	<i>p value</i>		0.918		0.887		0.912		0.746		0.903		0.473		0.805		0.722
Place of Birth	UK	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	Non UK	1.15	0.96-1.37	1.15	0.96-1.37	1.15	0.96-1.37	1.14	0.96-1.36	1.15	0.97-1.37	1.10	0.92-1.31	1.17	0.96-1.25	1.12	0.91-1.38
	<i>p value</i>		0.120		0.109		0.112		0.141		0.111		0.287		0.131		0.262
SES	Q1 - least disadvantaged	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	Q5 - most disadvantaged	0.81	0.72-0.93	0.81	0.71-0.92	0.81	0.72-0.93	0.84	0.74-0.96	0.81	0.71-0.92	0.87	0.76-0.99	0.85	0.73-0.98	0.93	0.80-1.08
	<i>p value</i>		0.002		0.001		0.002		0.008		0.001		0.045		0.024		0.342

^a Adjusting for other socio-demographic variables in the table

^b Adjusting for other socio-demographic variables in the table and post-term delivery

^c Adjusting for other socio-demographic variables in the table and book very late

^d Adjusting for other socio-demographic variables in the table and null iparous

^e Adjusting for other socio-demographic variables in the table and 'risk age'

^f Adjusting for other socio-demographic variables in the table and smoking during pregnancy

^g Adjusting for other socio-demographic variables in the table and birthweight

^h Adjusting for other socio-demographic variables in the table and post-term delivery, null iparous, 'risk age', smoking during pregnancy, birthweight

Women having an emergency caesarean section																	
		OR ^a	95% CI	OR ^b	95% CI	OR ^c	95% CI	OR ^d	95% CI	OR ^e	95% CI	OR ^f	95% CI	OR ^g	95% CI	OR ^h	95% CI
Ethnicity	Caucasian	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	BME	1.03	0.83-1.28	1.02	0.82-1.28	1.02	0.82-1.28	1.11	0.89-1.38	1.03	0.83-1.28	0.97	0.78-1.21	1.10	0.86-1.42	1.12	0.86-1.46
	<i>P value</i>		0.767		0.800		0.800		0.319		0.775		0.786		0.451		0.384
Place of Birth	UK	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	Non UK	1.27	1.02-1.57	1.26	1.02-1.56	1.26	1.02-1.56	1.25	1.00-1.54	1.26	1.02-1.57	1.24	0.99-1.55	1.17	0.91-1.51	1.10	0.85-1.44
	<i>P value</i>		0.030		0.040		0.040		0.048		0.031		0.057		0.227		0.464
SES	Q1 - least disadvantaged	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	Q5 - most disadvantaged	0.92	0.78-1.08	0.92	0.78-1.08	0.92	0.78-1.08	1.04	0.88-1.23	0.92	0.78-1.08	0.95	0.80-1.13	0.94	0.78-1.14	1.14	0.93-1.39
	<i>p value</i>		0.302		0.227		0.227		0.632		0.314		0.594		0.544		0.223

^a Adjusting for other socio-demographic variables in the table

^b Adjusting for other socio-demographic variables in the table and post-term delivery

^c Adjusting for other socio-demographic variables in the table and book very late

^d Adjusting for other socio-demographic variables in the table and null iparous

^e Adjusting for other socio-demographic variables in the table and 'risk age'

^f Adjusting for other socio-demographic variables in the table and smoking during pregnancy

^g Adjusting for other socio-demographic variables in the table and birthweight

^h Adjusting for other socio-demographic variables in the table and post-term delivery, null iparous, 'risk age', smoking during pregnancy, birthweight

Women initiating breast feeding													
		OR ^a	95% CI	OR ^b	95% CI	OR ^c	95% CI	OR ^d	95% CI	OR ^e	95% CI	OR ^f	95% CI
Ethnicity	Caucasian	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	BME	2.09	1.75-2.49	2.08	1.75-2.49	2.08	1.74-2.49	1.87	1.56-2.24	2.16	1.77-2.65	1.96	1.59-2.41
	<i>p value</i>		0.000		0.000		0.000		0.000		0.000		0.000
Place of Birth	UK	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	Non UK	3.41	2.76-4.21	3.41	2.77-4.21	3.39	2.75-4.18	2.85	2.30-3.53	3.30	2.59-4.20	2.82	2.22-3.60
	<i>p value</i>		0.000		0.000		0.000		0.000		0.000		0.000
SES	Q1 - least disadvantaged	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	Q5 - most disadvantaged	0.16	0.14-0.19	0.16	0.14-0.19	0.17	0.14-0.19	0.22	0.18-0.25	0.15	0.13-0.18	0.19	0.16-0.23
	<i>p value</i>		0.000		0.000		0.000		0.000		0.000		0.000

^a Adjusting for other socio-demographic variables in the table

^b Adjusting for other socio-demographic variables in the table and normal delivery

^c Adjusting for other socio-demographic variables in the table and 'risk age'

^d Adjusting for other socio-demographic variables in the table and smoking during pregnancy

^e Adjusting for other socio-demographic variables in the table and birthweight

^f Adjusting for other socio-demographic variables in the table and normal delivery, 'risk age', smoking during pregnancy, birthweight

Women smoking during pregnancy					
		OR ^a	95% CI	OR ^b	95% CI
Ethnicity	Caucasian	1.00	-	1.00	-
	BME	0.46	0.38-0.57	0.46	0.38-0.57
	<i>p value</i>		0.000		0.000
Place of Birth	UK	1.00	-	1.00	-
	Non UK	0.16	0.12-0.22	0.16	0.12-0.21
	<i>p value</i>		0.000		0.000
SES	Q1 - least disadvantaged	1.00	-	1.00	-
	Q5 - most disadvantaged	8.23	6.79-9.98	8.17	6.73-9.90
	<i>p value</i>		0.000		0.000

^a Adjusting for other socio-demographic variables in the table

^b Adjusting for other socio-demographic variables in the table and 'risk age'

Women giving birth to low birth weight babies											
		OR ^a	95% CI	OR ^b	95% CI	OR ^c	95% CI	OR ^d	95% CI	OR ^e	95% CI
Ethnicity	Caucasian	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	BME	2.13	1.32-3.44	2.09	1.29-3.38	2.14	1.33-3.46	2.64	1.64-4.25	2.60	1.61-4.19
	<i>p value</i>		0.002		0.003		0.002		0.000		0.000
Place of Birth	UK	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	Non UK	0.67	0.40-1.12	0.66	0.39-1.11	0.68	0.41-1.15	1.06	0.62-1.81	1.03	0.61-1.78
	<i>p value</i>		0.132		0.118		0.157		0.829		0.890
SES	Q1 - least disadvantaged	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	Q5 - most disadvantaged	2.41	1.42-4.05	2.41	1.43-4.07	2.37	1.40-3.99	1.41	0.82-2.45	1.39	0.80-2.41
	<i>p value</i>		0.001		0.001		0.001		0.215		0.237

^a Adjusting for other socio-demographic variables in the table

^b Adjusting for other socio-demographic variables in the table and book late

^c Adjusting for other socio-demographic variables in the table and 'risk age'

^d Adjusting for other socio-demographic variables in the table and smoking during pregnancy

^e Adjusting for other socio-demographic variables in the table and book late, 'risk age', smoking during pregnancy

UBHT:

Women booking late at antenatal care									
		OR ^a	95% CI	OR ^b	95% CI	OR ^c	95% CI	OR ^d	95% CI
Ethnicity	Caucasian	1.00	-	1.00	-	1.00	-	1.00	-
	BME	1.82	1.55-2.15	1.80	1.53-2.12	1.84	1.56-2.16	1.81	1.54-2.13
	<i>p value</i>		0.000		0.000		0.000		0.000
Place of Birth	UK	1.00	-	1.00	-	1.00	-	1.00	-
	Non UK	1.44	1.22-1.70	1.45	1.23-1.72	1.45	1.22-1.71	1.46	1.24-1.73
	<i>p value</i>		0.000		0.000		0.000		0.000
SES	Q1 - least disadvantaged	1.00	-	1.00	-	1.00	-	1.00	-
	Q5 - most disadvantaged	1.13	0.99-1.30	1.10	0.96-1.26	1.12	0.98-1.29	1.09	0.95-1.25
	<i>p value</i>		0.074		0.161		0.099		0.226

^a Adjusting for other socio-demographic variables in the table

^b Adjusting for other socio-demographic variables in the table and null iparous

^c Adjusting for other socio-demographic variables in the table and 'risk age'

^d Adjusting for other socio-demographic variables in the table and null iparous, 'risk age'

Women booking very late at antenatal care									
		OR ^a	95% CI	OR ^b	95% CI	OR ^c	95% CI	OR ^d	95% CI
Ethnicity	Caucasian	1.00	-	1.00	-	1.00	-	1.00	-
	BME	1.32	0.99-1.76	1.32	1.00-1.76	1.33	1.01-1.77	1.33	1.01-1.78
	<i>p value</i>		0.052		0.049		0.045		0.044
Place of Birth	UK	1.00	-	1.00	-	1.00	-	1.00	-
	Non UK	1.95	1.48-2.57	1.95	1.48-2.56	1.97	1.49-2.59	1.97	1.49-2.58
	<i>p value</i>		0.000		0.000		0.000		0.000
SES	Q1 - least disadvantaged	1.00	-	1.00	-	1.00	-	1.00	-
	Q5 - most disadvantaged	1.12	0.87-1.45	1.13	0.87-1.46	1.11	0.86-1.43	1.11	0.86-1.44
	<i>p value</i>		0.371		0.350		0.425		0.414

^a Adjusting for other socio-demographic variables in the table

^b Adjusting for other socio-demographic variables in the table and null iparous

^c Adjusting for other socio-demographic variables in the table and 'risk age'

^d Adjusting for other socio-demographic variables in the table and null iparous, 'risk age'

Women having a normal delivery													
		OR ^a	95% CI	OR ^b	95% CI	OR ^c	95% CI	OR ^d	95% CI	OR ^e	95% CI	OR ^f	95% CI
Ethnicity	Caucasian	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	BME	1.14	0.97-1.34	1.11	0.95-1.30	1.14	0.97-1.34	1.16	0.99-1.37	1.07	0.89-1.29	1.07	0.89-1.29
	<i>p value</i>		0.109		0.200		0.116		0.068		0.410		0.475
Place of Birth	UK	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	Non UK	0.80	0.68-0.95	0.81	0.69-0.96	0.80	0.68-0.94	0.83	0.70-1.37	0.86	0.71-1.04	0.88	0.72-1.07
	<i>p value</i>		0.011		0.015		0.010		0.033		0.119		0.188
SES	Q1 - least disadvantaged	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	Q5 - most disadvantaged	1.13	0.99-1.29	1.09	0.96-1.25	1.14	1.00-1.30	1.09	0.95-1.25	1.11	0.96-1.28	1.06	0.90-1.24
	<i>p value</i>		0.053		0.191		0.045		0.221		0.177		0.478

^a Adjusting for other socio-demographic variables in the table

^b Adjusting for other socio-demographic variables in the table and null iparous

^c Adjusting for other socio-demographic variables in the table and 'risk age'

^d Adjusting for other socio-demographic variables in the table and smoking during pregnancy

^e Adjusting for other socio-demographic variables in the table and birthweight

^f Adjusting for other socio-demographic variables in the table and null iparous, 'risk age', smoking during pregnancy, birthweight

Women having a caesarean section																	
		OR ^a	95% CI	OR ^b	95% CI	OR ^c	95% CI	OR ^d	95% CI	OR ^e	95% CI	OR ^f	95% CI	OR ^g	95% CI	OR ^h	95% CI
Ethnicity	Caucasian	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	BME	1.02	0.84-1.25	1.03	0.85-1.26	1.02	0.84-1.25	1.05	0.86-1.28	1.02	0.84-1.25	0.96	0.78-1.17	1.11	0.88-1.39	1.05	0.83-1.33
	<i>p value</i>		0.832		0.767		0.820		0.635		0.798		0.680		0.374		0.673
Place of Birth	UK	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	Non UK	1.29	1.06-1.58	1.30	1.07-1.59	1.31	1.07-1.59	1.28	1.05-1.57	1.30	1.07-1.59	1.21	0.99-1.49	1.23	0.98-1.54	1.17	0.92-1.48
	<i>p value</i>		0.011		0.010		0.009		0.014		0.009		0.063		0.075		0.191
SES	Q1 - least disadvantaged	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	Q5 - most disadvantaged	0.74	0.63-0.86	0.74	0.63-0.87	0.74	0.63-0.87	0.77	0.66-0.90	0.73	0.63-0.86	0.82	0.69-0.97	0.75	0.62-0.90	0.85	0.71-1.03
	<i>p value</i>		0.000		0.000		0.000		0.001		0.000		0.021		0.002		0.105

^a Adjusting for other socio-demographic variables in the table

^b Adjusting for other socio-demographic variables in the table and post-term delivery

^c Adjusting for other socio-demographic variables in the table and book very late

^d Adjusting for other socio-demographic variables in the table and null iparous

^e Adjusting for other socio-demographic variables in the table and 'risk age'

^f Adjusting for other socio-demographic variables in the table and smoking during pregnancy

^g Adjusting for other socio-demographic variables in the table and birthweight

^h Adjusting for other socio-demographic variables in the table and post-term delivery, null iparous, 'risk age', smoking during pregnancy, birthweight

Women having an emergency cesarean section																	
		OR ^a	95% CI	OR ^b	95% CI	OR ^c	95% CI	OR ^d	95% CI	OR ^e	95% CI	OR ^f	95% CI	OR ^g	95% CI	OR ^h	95% CI
Ethnicity	Caucasian	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	BME	1.01	0.78-1.29	1.00	0.78-1.29	1.00	0.78-1.29	1.12	0.87-1.45	1.01	0.78-1.29	0.96	0.74-1.23	1.21	0.90-1.63	1.27	0.94-1.74
	<i>p value</i>		0.965		1.000		0.978		0.363		0.966		0.729		0.204		0.119
Place of Birth	UK	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	Non UK	1.49	1.16-1.91	1.50	1.17-1.92	1.48	1.15-1.90	1.44	1.12-1.85	1.49	1.15-1.91	1.40	1.08-1.81	1.21	0.90-1.62	1.11	0.82-1.51
	<i>p value</i>		0.002		0.001		0.002		0.004		0.002		0.010		0.210		0.499
SES	Q1 - least disadvantaged	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	Q5 - most disadvantaged	0.77	0.63-0.94	0.75	0.61-0.92	0.78	0.63-0.94	0.90	0.73-1.11	0.77	0.63-0.94	0.84	0.67-1.03	0.78	0.62-0.99	1.00	0.78-1.29
	<i>p value</i>		0.012		0.006		0.012		0.315		0.012		0.100		0.047		0.981

^a Adjusting for other socio-demographic variables in the table

^b Adjusting for other socio-demographic variables in the table and post-term delivery

^c Adjusting for other socio-demographic variables in the table and book very late

^d Adjusting for other socio-demographic variables in the table and null iparous

^e Adjusting for other socio-demographic variables in the table and 'risk age'

^f Adjusting for other socio-demographic variables in the table and smoking during pregnancy

^g Adjusting for other socio-demographic variables in the table and birthweight

^h Adjusting for other socio-demographic variables in the table and post-term delivery, null iparous, 'risk age', smoking during pregnancy, birthweight

Women initiating breast feeding													
		OR ^a	95% CI	OR ^b	95% CI	OR ^c	95% CI	OR ^d	95% CI	OR ^e	95% CI	OR ^f	95% CI
Ethnicity	Caucasian	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	BME	2.09	1.71-2.54	2.09	1.72-2.55	2.08	1.71-2.53	1.86	1.53-2.28	2.20	1.76-2.75	1.97	1.57-2.47
	<i>p value</i>		0.000		0.000		0.000		0.000		0.000		0.000
Place of Birth	UK	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	Non UK	3.78	2.98-4.79	3.76	2.97-4.77	3.76	2.97-4.77	3.10	2.43-3.94	3.60	2.75-4.71	3.00	2.28-3.93
	<i>p value</i>		0.000		0.000		0.000		0.000		0.000		0.000
SES	Q1 - least disadvantaged	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	Q5 - most disadvantaged	0.22	0.18-0.26	0.22	0.18-0.26	0.22	0.18-0.26	0.29	0.24-0.35	0.21	0.17-0.25	0.27	0.22-0.33
	<i>p value</i>		0.000		0.000		0.000		0.000		0.000		0.000

^a Adjusting for other socio-demographic variables in the table

^b Adjusting for other socio-demographic variables in the table and normal delivery

^c Adjusting for other socio-demographic variables in the table and 'risk age'

^d Adjusting for other socio-demographic variables in the table and smoking during pregnancy

^e Adjusting for other socio-demographic variables in the table and birthweight

^f Adjusting for other socio-demographic variables in the table and normal delivery, 'risk age', smoking during pregnancy, birthweight

Women smoking during pregnancy					
		OR ^a	95% CI	OR ^b	95% CI
Ethnicity	Caucasian	1.00	-	1.00	-
	BME	0.50	0.39-0.61	0.50	0.39-0.62
	<i>p value</i>		0.000		0.000
Place of Birth	UK	1.00	-	1.00	-
	Non UK	0.14	0.09-0.19	0.14	0.09-0.19
	<i>p value</i>		0.000		0.000
SES	Q1 - least disadvantaged	1.00	-	1.00	-
	Q5 - most disadvantaged	7.85	6.21-9.90	7.77	6.15-9.81
	<i>p value</i>		0.000		0.000

^a Adjusting for other socio-demographic variables in the table

^b Adjusting for other socio-demographic variables in the table and 'risk age'

Women giving birth to low birth weight babies											
		OR ^a	95% CI	OR ^b	95% CI	OR ^c	95% CI	OR ^d	95% CI	OR ^e	95% CI
Ethnicity	Caucasian	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	BME	1.96	1.12-3.39	1.92	1.10-3.35	1.97	1.13-3.41	2.37	1.37-4.09	2.37	1.36-4.12
	<i>p value</i>		0.017		0.021		0.016		0.002		0.002
Place of Birth	UK	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	Non UK	0.72	0.40-1.28	0.71	0.39-1.27	0.73	0.41-1.31	1.09	0.59-1.99	1.08	0.58-1.98
	<i>p value</i>		0.265		0.249		0.298		0.784		0.808
SES	Q1 - least disadvantaged	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	Q5 - most disadvantaged	1.67	0.94-2.97	1.67	0.94-2.97	1.64	0.93-2.92	1.06	0.58-1.94	1.04	0.57-1.91
	<i>p value</i>		0.078		0.078		0.089		0.848		0.889

^a Adjusting for other socio-demographic variables in the table

^b Adjusting for other socio-demographic variables in the table and book late

^c Adjusting for other socio-demographic variables in the table and 'risk age'

^d Adjusting for other socio-demographic variables in the table and smoking during pregnancy

^e Adjusting for other socio-demographic variables in the table and book late, 'risk age', smoking during pregnancy