



## Health Equity Audit of Maternity Care and Birth Outcomes in South Gloucestershire 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)<sup>1</sup> 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 baby<sup>2</sup> and women who breastfeed have lower rates of breast<sup>3</sup> and ovarian cancers.<sup>4</sup> 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 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'.

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

<sup>2</sup> 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

<sup>3</sup> 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

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

## 1.2 Health Inequalities

Whilst year on year improvements in the health of the population in England have been noted<sup>5</sup>, there is a general acknowledgement that health inequalities as measured by infant mortality<sup>6</sup> and life expectancy are worsening among those living in 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 between 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 audit<sup>7</sup> 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 in South Gloucestershire PCT and those pregnant women delivering at North Bristol Trust (NBT).

## 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<sup>8</sup> (see diagram 1).

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.

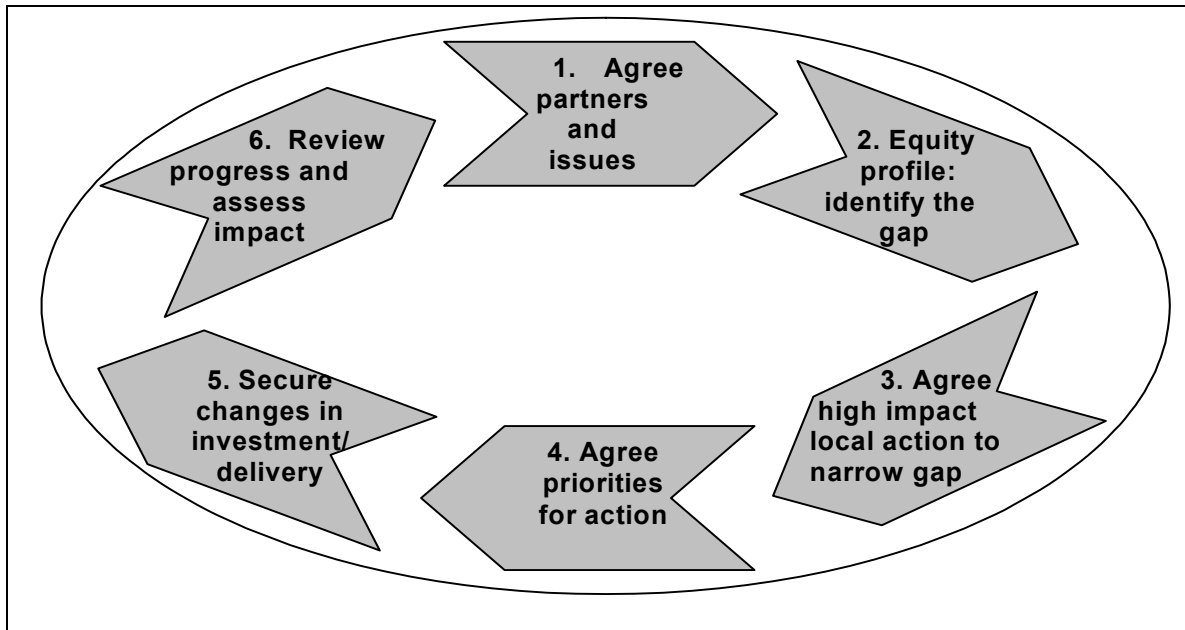
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<sup>5</sup> Age standardised mortality rate Figure B & IMR Figure C page 5. Health Statistics Quarterly. ONS Spring 2007. [http://www.statistics.gov.uk/downloads/theme\\_health/hsg33web.pdf](http://www.statistics.gov.uk/downloads/theme_health/hsg33web.pdf)

<sup>6</sup> Review of the Health Inequalities Infant Mortality PSA Target. 2007. DH. [www.dh.gov.uk/assetRoot/04/14/29/72/04142972.pdf](http://www.dh.gov.uk/assetRoot/04/14/29/72/04142972.pdf)

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

<sup>8</sup> mmmmmmmmm



**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 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 processes of maternity care for women from different ethnic groups and for women of different socio-economic status. Specifically;

- i) the percentage of women 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 undergoing emergency caesarean section
- 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 7,635 women who were registered with a South Gloucestershire PCT GP and who delivered singleton live babies between January 2003 and December 2005. This report also includes delivery data from NBT, although some South Gloucestershire women also deliver at UBHT (see Bristol 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 the 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 deprivation experienced. For the purpose of comparison the pregnant women from the most disadvantaged areas (Q5) were compared with the 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 antenatal care (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 their first visit is 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)<sup>1</sup> define normal delivery as;

‘birth without surgical intervention, use of instruments, induction, epidural or general anaesthetic’

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 DH 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 if 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 weight<sup>9</sup>.

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 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

<sup>9</sup> Kramer MS (1987) Determinants of low birth weight: methodological assessment and meta-analysis. *Bulletin of the World Health Organisation*; 65: 663-737

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 (after 18 weeks gestation in this study)<sup>10</sup>. 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)

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 delivery<sup>11</sup>. 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 section was found among smokers.<sup>12</sup>

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

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<sup>10</sup> 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*

<sup>11</sup> 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*

<sup>12</sup> 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*

#### *2.4.4 The percentage of women initiating breastfeeding*

A Scandinavian study in 1983 (Tamminen et al) 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 normally<sup>13</sup>. This study also found that young and old mothers breastfed less well than mothers in general. Therefore mode of delivery, low birth weight and mothers 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.

#### *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.

#### *2.4.7 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 section<sup>14</sup>. 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.

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<sup>13</sup> 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

<sup>14</sup> 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

### **Potential Confounders**

<b>Name</b>	<b>Definition</b>
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**

## **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-demographic<sup>15</sup> 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.

<sup>15</sup> Socio-demographic variables include: Ethnicity, place of birth and socio-economic status

### 3.0 Results for South Gloucestershire 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 7,635 pregnant women who were registered with a GP from South Gloucestershire Primary Care Trust delivered a singleton baby between January 2003 and December 2005. These women formed part of the sample for this health equity audit (an additional 15,315 women from Bristol PCT & 5959 women from North Somerset PCT, made up the total audit population of 28,909 women.

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 health equity audit by locality change to HN version**

6.3 percent of South Gloucestershire PCT's sample was of BME origin, whilst 8.5 percent of women in South Gloucestershire PCT were born outside the UK. An equal proportion of women in the audit from South Gloucestershire PCT were from areas that made up the most and least disadvantaged quintiles (21.3%:21.5%). Approximately 3 percent mothers were in the 'risk age' (i.e. either less than 18 years or over 40 years of age), with the mean age of women at delivery being 29.6 years.

#### 3.2 Booking late at antenatal care

Approximately a third (30.7%) of all women from South Gloucestershire PCT in the health equity audit booked late at antenatal care. Women of Black & Minority Ethnic (BME) origin (OR=1.74, CI=1.44-2.10) and those born outside the UK (OR=1.75, CI=1.48-2.06) 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 with the inclusion of socio-demographic variables, parity, and 'risk age', with the difference between Caucasian and BME women losing statistical significance. 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=1.34, CI=1.15-1.55) with this difference reaching statistical significance. Addition of the above cited intermediate variables did not attenuate this difference.

<b>Women booking late at antenatal care</b>						
		N (%)	OR	95%CI	p-value	% Missing
Ethnicity	Caucasian	2135 (29.8)	1.00	-	-	0.10
	BME	204 (42.6)	1.74	1.44-2.10	0.000	0.42
Place of Birth	UK	2052 (29.6)	1.00	-	-	0.06
	Non UK	274 (42.4)	1.75	1.48-2.06	0.000	0.00
SES	Q1 - least disadvantaged	439 (27.1)	1.00	-	-	0.06
	Q5 - most disadvantaged	533 (33.2)	1.34	1.15-1.55	0.000	0.19

**Table 5: Women booking late at antenatal care in South Gloucestershire PCT**

The findings for Bristol 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 1.99 and 1.80 respectively, both remaining statistically significant after adjustments for intermediate variables.

### **3.3 Booking very late at antenatal care**

In total, 4.4% of all South Gloucestershire PCT women in the audit booked very late at antenatal care. Women of Black & Minority Ethnic (BME) origin (OR=2.24, CI=1.59-3.13) and those born outside the UK (OR=2.24, CI=1.66-3.03) were over two-times more likely to book antenatal care very late as women of Caucasian origin. Although after adjusting for socio-demographic variables, the difference was modified by parity, and 'risk age', the significant associations between both ethnicity and booking very late at antenatal care remained in the final logistic regression model; this was not the case for place of birth. Those women residing in areas that make up the most disadvantaged quintile were no more likely to book very late than those in the least disadvantaged quintile (3.8%:4.4%).

<b>Women booking very late at antenatal care</b>						
		N (%)	OR	95%CI	p-value	% Missing
Ethnicity	Caucasian	294 (4.1)	1.00	-	-	0.10
	BME	42 (8.8)	2.24	1.59-3.13	0.000	0.42
Place of Birth	UK	276 (3.9)	1.00	-	-	0.06
	Non UK	55 (8.5)	2.24	1.66-3.03	0.000	0.00
SES	Q1 - least disadvantaged	61 (3.8)	1.00	-	-	0.00
	Q5 - most disadvantaged	71 (4.4)	1.18	0.83-1.68	0.348	0.19

**Table 6: Women booking very late at antenatal care in South Gloucestershire**

The findings for Bristol PCT showed a similar association between ethnicity and booking very late for antenatal care. However in contrast to South Gloucestershire PCT, both place of birth and 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**

Approximately half (49.7%) of all South Gloucestershire 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=1.10, CI=0.92-1.32). 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. The results for mother's place of birth were similar (OR=1.06, CI=0.91-1.25).

<b>Women having a normal delivery</b>						
		N (%)	OR	95%CI	p-value	% Missing
Ethnicity	Caucasian	3541 (49.5)	1.00	-	-	0.00
	BME	250 (51.9)	1.10	0.92-1.32	0.29	0.00
Place of Birth	UK	3442 (49.5)	1.00	-	-	0.00
	Non UK	330 (51.0)	1.06	0.91-1.25	0.474	0.00
SES	Q1 - least disadvantaged	768 (47.4)	1.00	-	-	0.00
	Q5 - most disadvantaged	851 (52.9)	1.25	1.08-1.43	0.002	0.00

**Table 7: Women having a normal delivery in South Gloucestershire PCT**

Women residing in areas that make up the most disadvantaged quintile were found to be more likely to have a normal delivery than those from the least disadvantaged area (OR=1.25, CI=1.08-1.43). However, this association was modified and lost statistical significance with the inclusion of intermediate variables and in particular smoking during pregnancy, and birth weight.

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

### 3.5 Women having an elective or emergency caesarean section

In total, 24.3% of all South Gloucestershire PCT women in the audit had a caesarean section. There was no statistically significant association between either ethnicity (OR=1.17, CI=0.95-1.45) or mother's place of birth (OR=1.11, CI=0.92-1.33) and having a caesarean section.

<b>Women having a caesarean section</b>						
		N (%)	OR	95%CI	p-value	% Missing
Ethnicity	Caucasian	1729 (24.2)	1.00	-	-	0.00
	BME	131 (27.2)	1.17	0.95-1.45	0.130	0.00
Place of Birth	UK	1682 (24.2)	1.00	-	-	0.00
	Non UK	169 (26.1)	1.11	0.92-1.33	0.278	0.00
SES	Q1 - least disadvantaged	411 (25.4)	1.00	-	-	0.00
	Q5 - most disadvantaged	328 (20.4)	0.75	0.64-0.89	0.001	0.00

**Table 8: Women having a caesarean section in South Gloucestershire PCT**

Although unadjusted results indicated that women from South Gloucestershire PCT residing in the most disadvantaged quintile were 25% less likely to undergo a caesarean section than those residing in the least disadvantaged quintile (OR=0.75, CI=0.64-0.89), when smoking during pregnancy and, birth weight and all other intermediate variables combined were adjusted for in the logistic regression model, the association was modified.

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

### 3.6 Women having an emergency caesarean section

In total, 12.8% of all women in South Gloucestershire PCT underwent an emergency caesarean section. There was a statistically significant association between ethnicity (OR=1.39, CI=1.08-1.78). Women born outside the UK were more likely to have an emergency caesarean section than those born in the UK (OR=1.28, CI=1.02-1.61). 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. There was no statistically significant relationship between socio-economic status and emergency caesarean sections before or after adjustments.

<b>Women having an emergency caesarean section</b>						
		N (%)	OR	95%CI	p-value	% Missing
Ethnicity	Caucasian	898 (12.6)	1.00	-	-	0.00
	BME	80 (16.6)	1.39	1.08-1.78	0.010	0.00
Place of Birth	UK	873 (12.6)	1.00	-	-	0.00
	Non UK	101 (15.6)	1.28	1.02-1.61	0.027	0.00
SES	Q1 - least disadvantaged	214 (13.2)	1.00	-	-	0.00
	Q5 - most disadvantaged	187 (11.6)	0.86	0.70-1.07	0.174	0.00

**Table 9: Women having an emergency caesarean section in South Gloucestershire PCT**

The results for Bristol PCT show no statistically significant associations between the variables in consideration following adjustments.

### 3.7 Women initiating breast feeding

Approximately three-quarters (74.9%) of South Gloucestershire PCT women in the audit initiated breast feeding. Women of BME origin were more likely to initiate breast feeding than Caucasian women (OR=1.73, CI=1.35-2.22), similarly, those women born outside the UK were over two-times more likely to initiate breast feeding than those born in the UK (OR=2.13, CI=1.69-2.68), and those women residing in the most disadvantaged quintile were significantly less likely to initiate breast feeding than those in the least disadvantaged quintile (OR=0.45, CI=0.38-0.53). The latter two 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 association between ethnicity and breast feeding initiation was modified by the inclusion of intermediate variables.

<b>Women initiating breast feeding</b>						
		N (%)	OR	95%CI	p-value	% Missing
Ethnicity	Caucasian	5131 (74.4)	1.00	-	-	3.59
	BME	393 (83.4)	1.73	1.35-2.22	0.000	2.08
Place of Birth	UK	4956 (73.9)	1.00	-	-	3.51
	Non UK	537 (85.8)	2.13	1.69-2.68	0.000	3.25
SES	Q1 - least disadvantaged	1247 (80.5)	1.00	-	-	4.32
	Q5 - most disadvantaged	1014 (65.2)	0.45	0.38-0.53	0.000	3.17

**Table 10: Women initiating Breastfeeding in South Gloucestershire**

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

### 3.8 Women smoking during pregnancy

13.7% of South Gloucestershire 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=0.25-0.54). Women born outside the UK were less likely to smoke during pregnancy than those born in the UK (OR=0.55, CI=0.41-0.73). Those women living in areas that make up the most disadvantaged quintile in Bristol were six-times more likely to smoke during pregnancy than those living in areas that make up the least disadvantaged quintile (OR=6.39, CI=4.99-8.20). The differences for ethnicity and socio-economic status remained statistically significant once adjustments for socio-demographic variables and 'risk age' were made; however, the association between place of birth and smoking was modified by the inclusion of the above cited variables. All results for Bristol PCT remained statistically significant following adjustments.

Women smoking during pregnancy						
		N (%)	OR	95%CI	p-value	% Missing
Ethnicity	Caucasian	986 (14.2)	1.00	-	-	2.95
	BME	27 (5.7)	0.36	0.25-0.54	0.000	1.46
Place of Birth	UK	956 (14.2)	1.00	-	-	2.85
	Non UK	52 (8.3)	0.55	0.41-0.73	0.000	10.97
SES	Q1 - least disadvantaged	83 (5.3)	1.00	-	-	3.27
	Q5 - most disadvantaged	414 (26.4)	6.39	4.99-8.20	0.000	2.30

**Table 11: Women smoking during pregnancy in South Gloucestershire**

### 3.9 Women giving birth to low birth weight babies

Less than two percent of South Gloucestershire PCT women in the audit were recorded as giving birth to a low birth weight baby. BME women were two-times more likely to give birth to a baby of low weight than Caucasian women (OR=2.42, CI=1.34-4.39). 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=1.83, CI=1.03-2.07). However, neither of the above two associations remained statistically significant once adjustments for intermediate variables were made. Note that approximately 15% of babies did not have a birthweight recorded.

<b>Women giving birth to low birth weight babies</b>						
		N (%)	OR	95%CI	p-value	% Missing
Ethnicity	Caucasian	80 (1.4)	1.00	-	-	17.35
	BME	13 (3.2)	2.42	1.34-4.39	0.004	16.01
Place of Birth	UK	79 (1.4)	1.00	-	-	17.54
	Non UK	14 (2.5)	1.84	1.03-3.27	0.038	13.60
SES	Q1 - least disadvantaged	22 (1.6)	1.00	-	-	15.63
	Q5 - most disadvantaged	16 (1.2)	0.76	0.39-1.45	0.402	18.73

**Table 12: Women giving birth to low birth weight babies in South Gloucestershire**

Women living in areas that make up the most disadvantaged quintile were no more likely to give birth to a low birth weight baby than those living in areas that make up the least disadvantaged quintile (OR=0.76, CI=0.39-1.45). The unadjusted findings for Bristol PCT were similar to those observed for South Gloucestershire PCT, however once adjustments for the above cited variables were made, differences by ethnicity, place of birth and socio-economic status retained statistical significance. It should be noted that approximately 15% of all data for the variable 'low birth weight' was missing.

#### **4.0 Results NBT**

For performance against national indicators see Annex I

#### **4.1 Demographics**

A total of 12,887 pregnant women who delivered a singleton baby at North Bristol Trust (NBT) between January 2003 and December 2005 formed over half of the sample for this HEA (an additional 10,776 women from UBHT & 972 from WAHT made up the total sample in the audit). A tenth of women from NBT were of Black & Minority Ethnic (BME) origins, whilst 11.3% of women were born outside the UK. Women that delivered at NBT were more likely to reside in the areas that make up the most disadvantaged quintile than the least disadvantaged quintile (22.8%:19.2%). Just over 3 percent of NBT 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 women at delivery being 29.4 years. See table 4 above

#### **4.2 Booking late at antenatal care**

Over a third (37.5%) of all women from NBT in the health equity audit booked late at antenatal care. Women of Black & Minority Ethnic (BME) origin (OR=1.85, CI=1.65-2.08) and those born outside the UK (OR=1.62, CI=1.45-1.80) were over one and a half 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=1.25, CI=1.12-1.40) with this difference reaching statistical significance, and remained statistically significant when socio-demographic variables, parity and 'risk age' were adjusted for in the logistic regression model.

<b>Women booking late at antenatal care</b>						
		N (%)	OR	95%CI	p-value	% Missing
Ethnicity	Caucasian	4144 (35.5)	1.00	-	-	0.08
	BME	639 (50.5)	1.85	1.65-2.08	0.000	0.63
Place of Birth	UK	4051 (35.6)	1.00	-	-	0.07
	Non UK	684 (47.2)	1.62	1.45-1.80	0.000	0.21
SES	Q1 - least disadvantaged	844 (34.6)	1.00	-	-	0.04
	Q5 - most disadvantaged	1153 (39.9)	1.25	1.12-1.40	0	0.24

**Table 13: Women booking late for antenatal care at NBT**

In comparison to the results for women from NBT, the findings for UBHT showed a similar pattern with the unadjusted odds ratios for women of BME origin and those born outside the UK booking late at antenatal care being 2.29 and 2.10 respectively. However, unlike for women from NBT, the direction of association between socioeconomic status and booking late for women from UBHT lost 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, 5.5% of all NBT women in the audit booked very late at antenatal care. Women of Black & Minority Ethnic (BME) origin (OR=2.61, CI=2.15-3.15) and those born outside the UK (OR=2.47, CI=2.05-2.97) were approximately two and a half times more likely to book antenatal care very late as women of Caucasian origin. Although after adjusting for 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. 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=1.50, CI=1.17-1.93). The statistically significant association between socioeconomic status and booking very late remained after adjustments for socioeconomic variables, parity and 'risk age'.

<b>Women booking very late at antenatal care</b>						
		N (%)	OR	95%CI	p-value	% Missing
Ethnicity	Caucasian	557 (4.8)	1.00	-	-	0.08
	BME	147 (11.6)	2.61	2.15-3.15	0.000	0.63
Place of Birth	UK	541 (4.8)	1.00	-	-	0.07
	Non UK	159 (10.9)	2.47	2.05-2.97	0.000	0.21
SES	Q1 - least disadvantaged	101 (4.1)	1.00	-	-	0.04
	Q5 - most disadvantaged	176 (6.1)	1.50	1.17-1.93	0.002	0.24

**Table 14: Women booking very late at antenatal care at NBT**

The findings for UBHT showed a similar association between ethnicity and booking very late for antenatal care. However in contrast to NBT, socioeconomic status did not 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 over half (52.1%) of all NBT women in the audit had a normal delivery. BME women in the audit were more likely to have a normal delivery than Caucasian women (OR=1.17, CI=1.03-1.31). The difference became even greater after adjustments were made for socioeconomic variables, parity, 'risk age', birth weight and mothers smoking during pregnancy. Unadjusted analysis indicated no association between mother's place of birth and having a normal delivery, with women born in the UK being no more likely to have a normal birth than those born outside the UK (OR=1.03, CI=0.92-1.13). 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=1.28, CI=1.15-1.42). However, this association was modified and became non-significant with the inclusion of all intermediate variables in the final logistic regression model. The findings for UBHT showed no statistically significant associations between ethnicity, place of birth or socioeconomic status and normal delivery after adjustments for intermediate variables.

Women having a normal delivery						
		N (%)	OR	95%CI	p-value	% Missing
Ethnicity	Caucasian	6005 (51.7)	1.00	-	-	0.00
	BME	708 (55.6)	1.17	1.03-1.31	0.009	0.00
Place of Birth	UK	5921 (52.0)	1.00	-	-	0.00
	Non UK	766 (52.8)	1.03	0.92-1.15	0.605	0.00
SES	Q1 - least disadvantaged	1200 (49.2)	1.00	-	-	0.00
	Q5 - most disadvantaged	1603 (55.4)	1.28	1.15-1.42	0.000	0.00

**Table 15: Women having a normal delivery at NBT**

#### 4.5 Women having an elective or emergency caesarean section

In total, 23.6% of all NBT women in the audit had a caesarean section. There was no statistically significant association between either ethnicity (OR=1.03, CI=0.90-1.18) or mother's place of birth (OR=1.07, CI=0.94-1.22) and having a caesarean section. Although unadjusted results indicated that women from NBT 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=0.84, CI=0.74-0.95), when smoking during pregnancy and, birth weight and all other intermediate variables combined were adjusted for in the logistic regression model, the association was modified. The findings for women in the audit from UBHT mirror those observed for NBT.

<b>Women having a caesarean section</b>						
		N (%)	OR	95%CI	p-value	% Missing
Ethnicity	Caucasian	2737 (23.6)	1.00	-	-	0.00
	BME	308 (24.2)	1.03	0.90-1.18	0.628	0.00
Place of Birth	UK	2670 (23.5)	1.00	-	-	0.00
	Non UK	359 (24.7)	1.07	0.94-1.22	0.287	0.00
SES	Q1 - least disadvantaged	603 (24.7)	1.00	-	-	0.00
	Q5 - most disadvantaged	626 (21.6)	0.84	0.74-0.95	0.007	0.00

**Table 16: Women having a caesarean section at NBT**

#### 4.6 Women having an emergency caesarean section

In total, 12.8% of all women in the audit from NBT underwent an emergency caesarean section. There was a statistically significant association between ethnicity and having an emergency caesarean section, women of BME origin were more likely to have an emergency caesarean than Caucasian women (OR=1.28, CI=1.08-1.50) but the association was attenuated, yet remained statistically significant, with the addition of socio-economic and other intermediate variables. There was no statistically significant association between socioeconomic status and having an emergency caesarean section, (OR=1.03, CI=0.88-1.21). Women born outside the UK were more likely to have an emergency caesarean section than those born in the UK (OR=1.21, CI=1.04-1.42). The inclusion of intermediate variables modified the overall difference in emergency caesarean sections, but the differences remained statistically significant in the final logistic regression model.

<b>Women having an emergency caesarean section</b>						
		N (%)	OR	95%CI	p-value	% Missing
Ethnicity	Caucasian	1455 (12.5)	1.00	-	-	0.00
	BME	197 (15.4)	1.28	1.08-1.50	0.003	0.00
Place of Birth	UK	1427 (12.5)	1.00	-	-	0.00
	Non UK	216 (14.9)	1.21	1.04-1.42	0.012	0.00
SES	Q1 - least disadvantaged	308 (12.6)	1.00	-	-	0.00
	Q5 - most disadvantaged	377 (13.0)	1.03	0.88-1.21	0.676	0.00

**Table 17: Women having an emergency caesarean section at NBT**

In contrast, the results for UBHT 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 (74.5%) of NBT women in the audit initiated breast feeding. Women of BME origin were two-times more likely to initiate breast feeding than

Caucasian women (OR=2.10, CI=1.78-2.47), similarly, those women born outside the UK were over two and a half times more likely to initiate breast feeding than those born in the UK (OR=2.72, CI=2.31-3.22), and those women residing in the most disadvantaged quintile were significantly less likely to initiate breast feeding than those in the least disadvantaged quintile (OR=0.30, CI=0.26-0.34). 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 UBHT reflect those observed for NBT.

<b>Women initiating breast feeding</b>						
		N (%)	OR	95%CI	p-value	% Missing
Ethnicity	Caucasian	8169 (73.4)	1.00	-	-	4.12
	BME	1053 (85.3)	2.10	1.78-2.47	0.000	3.06
Place of Birth	UK	7948 (72.8)	1.00	-	-	4.07
	Non UK	1234 (87.8)	2.72	2.31-3.22	0.000	3.37
SES	Q1 - least disadvantaged	1977 (85.1)	1.00	-	-	4.68
	Q5 - most disadvantaged	1772 (63.2)	0.30	0.26-0.34	0.000	3.14

**Table 18: Women initiating breastfeeding at NBT**

#### **4.8 Women smoking during pregnancy**

16.5% of NBT women in the audit were recorded as smoking during their pregnancy. BME women were less likely to smoke during pregnancy than Caucasian women (OR=0.32, CI=0.26-0.41). Women born outside the UK were less likely to smoke during pregnancy than those born in the UK (OR=0.34, CI=0.27-0.42). Those women living in areas that make up the most disadvantaged quintile in Bristol were over six and a half times more likely to smoke during pregnancy than those living in areas that make up the least disadvantaged quintile (OR=6.75, CI=5.54-8.23). 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. The results for NBT reflect those for UBHT.

<b>Women smoking during pregnancy</b>						
		N (%)	OR	95%CI	p-value	% Missing
Ethnicity	Caucasian	986 (14.2)	1.00	-	-	3.82
	BME	27 (5.7)	0.32	0.26-0.41	0.000	2.75
Place of Birth	UK	1943 (17.8)	1.00	-	-	3.78
	Non UK	96 (6.8)	0.34	0.27-0.42	0.000	3.10
SES	Q1 - least disadvantaged	125 (5.4)	1.00	-	-	4.27
	Q5 - most disadvantaged	779 (27.6)	6.75	5.54-8.23	0.000	2.69

**Table 19: Women smoking during pregnancy at NBT**

## 4.9 Women giving birth to low birth weight babies

1.5% of NBT 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=2.56, CI=1.74-3.76), 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 almost 20% of birth weight data is missing at NBT.

Women giving birth to low birth weight babies						
		N (%)	OR	95%CI	p-value	% Missing
Ethnicity	Caucasian	127 (1.3)	1.00	-	-	17.51
	BME	34 (3.3)	2.56	1.74-3.76	0.000	19.86
Place of Birth	UK	132 (1.4)	1.00	-	-	17.78
	Non UK	29 (2.4)	1.72	1.15-2.59	0.009	17.08
SES	Q1 - least disadvantaged	26 (1.3)	1.00	-	-	15.71
	Q5 - most disadvantaged	45 (1.9)	1.53	0.94-2.49	0.085	19.37

**Table 20: Women giving birth to low birth weight babies at NBT**

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=1.72, CI=1.15-2.59). 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 no more likely to give birth to a low birth weight baby than those living in areas that make up the least disadvantaged quintile (OR=1.53, CI=0.94-2.49). It should be noted that approximately 17% of all data for the variable 'low birth weight' was missing. The adjusted findings for UBHT were similar to those observed for NBT.

## 5.0 Discussion

### 5.1 Demographics South Gloucestershire PCT

Among the audit sample there is a higher percentage of BME women (6.3%) compared to the population as a whole (2.4% census 2001, source Avon IM&T). When looking at 2001 census data for women aged 18-44 years, in South Gloucestershire 2.9% of this age group self reported as being from a Black or Minority Ethnic Group (including mixed ethnicity). So BME women are more represented in a maternity dataset in that age group bracket alone.

### 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 South Gloucestershire PCT**

Those born outside the UK and those from the most disadvantaged quintile 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 or difficulties accessing service (Trinh & Rubin, 2006).

There was no statistically significant association with ethnicity following adjustments for confounders. This may be explained by the fact that many women that make up this group may be 2<sup>nd</sup> or 3<sup>rd</sup> generation descendents and therefore have had more experience of utilising healthcare service and less likely to have difficulties in communication.

### **5.2.2 NBT**

Over a third of women (37.5%) delivering at NBT registered late for ANC. Those born outside the UK, women from a BME origin and women living in the most disadvantaged areas 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).

## **5.3 Booking very late**

### **5.3.1 South Gloucestershire PCT**

The association between ethnicity / country of birth and booking for antenatal care is surprising because after adjustments non-UK born women are not more likely than UK born women to book very late (compared with booking late). Whereas BME women are significantly more likely to book very late. This is a confusing pattern of results and requires further investigation as one of the implications for women who book very late for antenatal care is that they are disadvantaged of the health benefits from preventative health programmes and screening programmes.

The fact that those women in the most disadvantaged areas are not more likely to book very late for antenatal care than those in the least disadvantaged areas may suggest that earlier difficulties in accessing antenatal services have been overcome.

### **5.3.2 NBT**

5.5% of pregnant women who delivered at NBT 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. When the effects of confounders were adjusted for these associations prevailed. 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 South Gloucestershire PCT**

Although there appears to be some variation in normal delivery rates between women from the most and least disadvantaged areas, this is no longer statistically significant after adjusting for confounding variables. This is broadly reassuring, however it should be noted that only 50% of women in South Gloucestershire PCT are having a normal

delivery. There were no statistically significant associations between either ethnicity or place of birth and normal delivery.

#### **5.4.2 NBT**

Women from BME groups are more likely to have a normal delivery than Caucasian women, this remains statistically significant after adjusting for confounding variables. Women living in more disadvantaged areas are more likely to have a normal delivery but this is not statistically significant after adjustment for confounders. There is no difference in normal delivery rates between women born in the UK and those not born in the UK. It should be noted that only 52.1% of women delivering at NBT are having a normal delivery.

### **5.5 All Caesarean sections**

#### **5.5.1 South Gloucestershire 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 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

#### **5.5.2 NBT**

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 16% 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 UBHT. 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'.(39 MMC)

### **5.6 Emergency caesarean sections**

#### **5.6.1 South Gloucestershire PCT**

Women of BME origin and those not born in the UK were 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 the association between place of birth and emergency caesarean section rate strengthens. Once again we observe the difference between women in the BME group and those women in the non-UK born group. This potentially suggests difficulties with communication. Similar findings have been observed in a previous local audit.

#### **5.6.2 NBT**

Women not born in the UK were 21% more likely to undergo an emergency caesarean section than women born in the UK and women from BME groups are 28% more likely to have an emergency caesarean than Caucasian women. Following adjustments for potentially confounding variables these associations remained significant.

These trends were different to those seen among women delivering at UBHT, where there was no association between ethnicity, place of birth or socio-economic status. Like UBHT more than half of all caesareans at NBT were conducted as emergencies.

### **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 South Gloucestershire PCT**

The current audit shows that non-UK born women and women from the least disadvantaged areas are more likely to breastfeed than those born in the UK 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 children from the most disadvantaged areas.

#### **5.7.2 NBT**

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 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, twice as likely to have 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 South Gloucestershire PCT**

Even after adjustments for confounding variables, women living in the most disadvantaged areas are more than six-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, however after adjustment for confounding variables the association between place of birth and smoking during pregnancy loses statistical significance. This may be due to European women (who have a higher prevalence of smoking) being classified as non-UK born. It is suspected that the majority of these European women are Caucasian. Note that 11% of smoking data is missing for non-UK born women compared to 2-3% for other groups.

### **5.8.2 NBT**

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- South Gloucestershire PCT and NBT**

Low birth weight infants are at increased risk of perinatal and infant death<sup>9</sup>. The outcome of very low birth weight babies is very poor (refs) 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 of the data (18-20%) missing, because of which we have been unable to draw reliable conclusions.

### **5.10 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'<sup>16</sup>. 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 also aimed 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.

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<sup>16</sup> 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

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 women<sup>17</sup>, which may have skewed this current analysis.

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<sup>17</sup> 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

## 6.0 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 NBT and South Gloucestershire PCT women, for this reason it was impossible to undertake a meaningful analysis of this data.

The conclusions drawn from the South Gloucestershire PCT and NBT maternity health equity audit are that

- Non UK born and women living in disadvantaged areas are significantly more likely to book late in both South Gloucestershire and NBT analysis, there was no such association seen for women from BME communities in South Gloucestershire, but there was at NBT.
- Women booking very late for ANC showed a very confusing picture in South Gloucestershire, as non UK born women and those living in the most disadvantaged areas were not more likely to book very late than UK born women and those living in least disadvantaged areas. But BME women were significantly more likely to book late. Whereas BME, non UK born and most disadvantaged women delivering at NBT were all significantly more likely to book very late than their counterparts, which was similar to the associations seen at UBHT.
- Only 50% of South Gloucestershire PCT women and 52.1% of NBT women had normal deliveries during this time period Only BME women were significantly more likely to have a normal delivery after adjusting for the effects of confounding.
- Caesarean section rates were 23.6% for NBT and 24.3% of South Gloucestershire PCT women, compared to UK average rate of 22.7% (MMC). There were no statistical associations seen between this mode of delivery and either ethnicity, mother's place of birth or level of deprivation.
- Half of all caesareans were conducted as emergencies. In both South Gloucestershire and NBT non-UK born women were more likely to undergo emergency CS than women born in the UK, even after adjustment. BME were only slightly more likely (5%) to undergo an emergency CS than Caucasian women at NBT but not within South Gloucestershire analysis.
- 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.

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

<b>Indicator</b>	<b>National average (MMC 2006)</b>	<b>NBT</b>	<b>UBHT</b>	<b>WAHT</b>	<b>SGlos PCT</b>	<b>Bristol</b>	<b>North Somerset</b>
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 <sup>18</sup>	5.5%	8.9%	5.1%	4.4%	7.1%	4.8%
Women having a normal delivery	46.4% (21.3-64%) <sup>19</sup>	52.1%	44.3%	98.1%	49.7%	48.3%	51%
Women having a Caesarean section	22.7% <sup>19</sup>	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% <sup>20</sup>	74.5%	75.2%	71.8%	74.9%	74.7%	75.1%
Women smoking during pregnancy	20% <sup>200</sup>	16.5%	17.7%	24.6%	13.7%	18.8%	15.1%
Low birth weight	Comparable data not available	1.5%	2.1%	<1%	<2%	<2%	1%

<sup>18</sup> 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](http://www.cemach.org.uk/publications/WMD2000_2002/content.htm)

<sup>19</sup> DH (2006) NHS Maternity Statistics 2004-5. [www.ic.nhs.uk/pubs/maternity/eng2005](http://www.ic.nhs.uk/pubs/maternity/eng2005)

<sup>20</sup> Hamlyn B, Brooker, S Oleinikova K et al (2002) *Infant Feeding 2000*. 6<sup>th</sup> Ed. London. TSO

## ANNEX II: Regression Models Showing Adjusted Findings.

### South Gloucestershire PCT:

Women booking late at antenatal care									
		OR <sup>a</sup>	95% CI	OR <sup>b</sup>	95% CI	OR <sup>c</sup>	95% CI	OR <sup>d</sup>	95% CI
Ethnicity	Caucasian	1.00	-	1.00	-	1.00	-	1.00	-
	BME	1.08	0.76-1.53	1.08	0.76-1.54	1.08	0.76-1.52	1.08	0.76-1.54
	<i>p value</i>		0.669		0.652		0.675		0.656
Place of Birth	UK	1.00	-	1.00	-	1.00	-	1.00	-
	Non UK	1.63	1.19-2.21	1.64	1.20-2.23	1.65	1.20-2.23	1.64	1.20-2.23
	<i>p value</i>		0.002		0.002		0.002		0.002
SES	Q1 - least disadvantaged	1.00	-	1.00	-	1.00	-	1.00	-
	Q5 - most disadvantaged	1.34	1.15-1.56	1.32	1.13-1.53	1.33	1.14-1.54	1.32	1.13-1.54
	<i>p value</i>		0.000		0.000		0.000		0.000

<sup>a</sup> Adjusting for other socio-demographic variables in the table

<sup>b</sup> Adjusting for other socio-demographic variables in the table and null iparous

<sup>c</sup> Adjusting for other socio-demographic variables in the table and 'risk age'

<sup>d</sup> Adjusting for other socio-demographic variables in the table and null iparous, 'risk age'

Women booking very late at antenatal care									
		OR <sup>a</sup>	95% CI	OR <sup>b</sup>	95% CI	OR <sup>c</sup>	95% CI	OR <sup>d</sup>	95% CI
Ethnicity	Caucasian	1.00	-	1.00	-	1.00	-	1.00	-
	BME	2.14	1.11-4.11	2.11	1.10-4.05	2.13	1.11-4.07	2.09	1.09-3.99
	<i>p value</i>		0.023		0.025		0.022		0.026
Place of Birth	UK	1.00	-	1.00	-	1.00	-	1.00	-
	Non UK	1.38	0.73-2.62	1.40	0.74-2.64	1.48	0.78-2.78	1.49	0.79-2.80
	<i>p value</i>		0.314		0.298		0.225		0.213
SES	Q1 - least disadvantaged	1.00	-	1.00	-	1.00	-	1.00	-
	Q5 - most disadvantaged	1.18	0.83-1.67	1.20	0.84-1.72	1.11	0.78-1.59	1.12	0.79-1.60
	<i>p value</i>		0.363		0.307		0.569		0.524

<sup>a</sup> Adjusting for other socio-demographic variables in the table

<sup>b</sup> Adjusting for other socio-demographic variables in the table and null iparous

<sup>c</sup> Adjusting for other socio-demographic variables in the table and 'risk age'

<sup>d</sup> Adjusting for other socio-demographic variables in the table and null iparous, 'risk age'

Women having a normal delivery													
		OR <sup>a</sup>	95% CI	OR <sup>b</sup>	95% CI	OR <sup>c</sup>	95% CI	OR <sup>d</sup>	95% CI	OR <sup>e</sup>	95% CI	OR <sup>f</sup>	95% CI
Ethnicity	Caucasian	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	BME	1.04	0.75-1.45	1.08	0.77-1.52	1.04	0.75-1.45	1.08	0.77-1.51	1.07	0.74-1.55	1.12	0.77-1.64
	<i>p value</i>		0.802		0.650		0.799		0.639		0.718		0.545
Place of Birth	UK	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	Non UK	0.99	0.74-1.45	0.98	0.73-1.33	0.99	0.74-1.33	1.03	0.76-1.39	1.02	0.74-1.39	1.04	0.75-1.45
	<i>p value</i>		0.969		0.913		0.951		0.842		0.926		0.816
SES	Q1 - least disadvantaged	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	Q5 - most disadvantaged	1.23	1.07-1.41	1.19	1.03-1.37	1.23	1.08-1.42	1.16	1.01-1.35	1.17	1.00-1.36	1.08	0.92-1.28
	<i>p value</i>		0.003		0.016		0.003		0.037		0.045		0.342

<sup>a</sup> Adjusting for other socio-demographic variables in the table

<sup>b</sup> Adjusting for other socio-demographic variables in the table and null iparous

<sup>c</sup> Adjusting for other socio-demographic variables in the table and 'risk age'

<sup>d</sup> Adjusting for other socio-demographic variables in the table and smoking during pregnancy

<sup>e</sup> Adjusting for other socio-demographic variables in the table and birthweight

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

Women having a caesarean section																	
		OR <sup>a</sup>	95% CI	OR <sup>b</sup>	95% CI	OR <sup>c</sup>	95% CI	OR <sup>d</sup>	95% CI	OR <sup>e</sup>	95% CI	OR <sup>f</sup>	95% CI	OR <sup>g</sup>	95% CI	OR <sup>h</sup>	95% CI
Ethnicity	Caucasian	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	BME	1.08	0.74-1.59	1.06	0.72-1.57	1.10	0.75-1.63	1.08	0.73-1.59	1.08	0.74-1.60	1.04	0.71-1.54	1.13	0.73-1.74	1.10	0.71-1.70
	<i>p value</i>		0.682		0.755		0.604		0.702		0.683		0.825		0.578		0.666
Place of Birth	UK	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	Non UK	1.03	0.73-1.47	1.08	0.76-1.53	1.04	0.73-1.48	1.04	0.73-1.46	1.04	0.73-1.47	1.02	0.72-1.45	1.17	0.80-1.71	1.19	0.82-1.75
	<i>p value</i>		0.848		0.676		0.809		0.843		0.838		0.898		0.413		0.353
SES	Q1 - least disadvantaged	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	Q5 - most disadvantaged	0.76	0.65-0.90	0.76	0.64-0.89	0.77	0.65-0.89	0.77	0.65-0.91	0.76	0.64-0.89	0.80	0.67-0.95	0.81	0.67-0.97	0.85	0.70-1.04
	<i>p value</i>		0.001		0.001		0.001		0.002		0.001		0.012		0.026		0.111

<sup>a</sup> Adjusting for other socio-demographic variables in the table

<sup>b</sup> Adjusting for other socio-demographic variables in the table and post-term delivery

<sup>c</sup> Adjusting for other socio-demographic variables in the table and book very late

<sup>d</sup> Adjusting for other socio-demographic variables in the table and null iparous

<sup>e</sup> Adjusting for other socio-demographic variables in the table and 'risk age'

<sup>f</sup> Adjusting for other socio-demographic variables in the table and smoking during pregnancy

<sup>g</sup> Adjusting for other socio-demographic variables in the table and birthweight

<sup>h</sup> 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 <sup>a</sup>	95% CI	OR <sup>b</sup>	95% CI	OR <sup>c</sup>	95% CI	OR <sup>d</sup>	95% CI	OR <sup>e</sup>	95% CI	OR <sup>f</sup>	95% CI	OR <sup>g</sup>	95% CI	OR <sup>h</sup>	95% CI
Ethnicity	Caucasian	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	BME	1.14	0.72-1.80	1.07	0.67-1.72	1.15	0.72-1.83	1.11	0.69-1.77	1.13	0.72-1.80	1.12	0.70-1.78	1.21	0.72-2.05	1.20	0.71-2.05
	<i>p value</i>		0.585		0.749		0.556		0.666		0.586		0.632		0.459		0.481
Place of Birth	UK	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	Non UK	1.38	0.91-2.07	1.47	0.98-2.23	1.38	0.92-2.08	1.40	0.93-2.12	1.38	0.92-2.09	1.37	0.91-2.07	1.65	1.05-2.57	1.73	1.09-2.71
	<i>p value</i>		0.127		0.062		0.122		0.112		0.120		0.131		0.028		0.018
SES	Q1 - least disadvantaged	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	Q5 - most disadvantaged	0.87	0.71-1.08	0.85	0.69-1.06	0.88	0.71-1.08	0.91	0.74-1.13	0.87	0.70-1.07	0.87	0.70-1.09	0.91	0.71-1.15	0.95	0.74-1.24
	<i>p value</i>		0.207		0.146		0.217		0.405		0.185		0.234		0.428		0.725

<sup>a</sup> Adjusting for other socio-demographic variables in the table

<sup>b</sup> Adjusting for other socio-demographic variables in the table and post-term delivery

<sup>c</sup> Adjusting for other socio-demographic variables in the table and book very late

<sup>d</sup> Adjusting for other socio-demographic variables in the table and null iparous

<sup>e</sup> Adjusting for other socio-demographic variables in the table and 'risk age'

<sup>f</sup> Adjusting for other socio-demographic variables in the table and smoking during pregnancy

<sup>g</sup> Adjusting for other socio-demographic variables in the table and birthweight

<sup>h</sup> 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 <sup>a</sup>	95% CI	OR <sup>b</sup>	95% CI	OR <sup>c</sup>	95% CI	OR <sup>d</sup>	95% CI	OR <sup>e</sup>	95% CI	OR <sup>f</sup>	95% CI
Ethnicity	Caucasian	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	BME	1.29	0.83-2.03	1.30	0.83-2.03	1.31	0.84-2.06	1.21	0.77-1.89	1.47	0.88-2.48	1.34	0.79-2.25
	<i>p value</i>		0.254		0.251		0.235		0.407		0.140		0.273
Place of Birth	UK	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	Non UK	2.63	1.70-4.05	2.62	1.70-4.05	2.58	1.67-3.97	2.59	1.68-4.00	2.49	1.56-3.99	2.46	1.53-3.94
	<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	0.46	0.39-0.54	0.46	0.39-0.54	0.46	0.39-0.54	0.55	0.46-0.65	0.44	0.37-0.53	0.52	0.43-0.63
	<i>p value</i>		0.000		0.000		0.000		0.000		0.000		0.000

<sup>a</sup> Adjusting for other socio-demographic variables in the table

<sup>b</sup> Adjusting for other socio-demographic variables in the table and normal delivery

<sup>c</sup> Adjusting for other socio-demographic variables in the table and 'risk age'

<sup>d</sup> Adjusting for other socio-demographic variables in the table and smoking during pregnancy

<sup>e</sup> Adjusting for other socio-demographic variables in the table and birthweight

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

Women smoking during pregnancy					
		OR <sup>a</sup>	95% CI	OR <sup>b</sup>	95% CI
Ethnicity	Caucasian	1.00	-	1.00	-
	BME	0.41	0.22-0.76	0.41	0.22-0.76
	<i>p value</i>		0.005		0.005
Place of Birth	UK	1.00	-	1.00	-
	Non UK	0.81	0.50-1.32	0.82	0.51-1.34
	<i>p value</i>		0.410		0.436
SES	Q1 - least disadvantaged	1.00	-	1.00	-
	Q5 - most disadvantaged	6.44	5.02-8.27	6.37	4.96-8.17
	<i>p value</i>		0.000		0.000

<sup>a</sup> Adjusting for other socio-demographic variables in the table

<sup>b</sup> Adjusting for other socio-demographic variables in the table and 'risk age'

Women giving birth to low birth weight babies											
		OR <sup>a</sup>	95% CI	OR <sup>b</sup>	95% CI	OR <sup>c</sup>	95% CI	OR <sup>d</sup>	95% CI	OR <sup>e</sup>	95% CI
Ethnicity	Caucasian	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	BME	1.45	0.39-5.37	1.44	0.39-5.35	1.45	0.39-5.33	1.63	0.45-5.95	1.62	0.44-5.87
	<i>p value</i>		0.574		0.578		0.574		0.459		0.462
Place of Birth	UK	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	Non UK	1.30	0.39-4.27	1.25	0.38-4.09	1.32	0.41-4.32	1.32	0.41-4.24	1.31	0.41-4.22
	<i>p value</i>		0.660		0.716		0.639		0.642		0.649
SES	Q1 - least disadvantaged	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	Q5 - most disadvantaged	0.76	0.39-1.45	0.74	0.38-1.42	0.75	0.39-1.43	0.58	0.28-1.16	0.56	0.28-1.13
	<i>p value</i>		0.406				0.389		0.125		0.107

<sup>a</sup> Adjusting for other socio-demographic variables in the table

<sup>b</sup> Adjusting for other socio-demographic variables in the table and book late

<sup>c</sup> Adjusting for other socio-demographic variables in the table and 'risk age'

<sup>d</sup> Adjusting for other socio-demographic variables in the table and smoking during pregnancy

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

NBT:

Women booking late at antenatal care									
		OR <sup>a</sup>	95% CI	OR <sup>b</sup>	95% CI	OR <sup>c</sup>	95% CI	OR <sup>d</sup>	95% CI
Ethnicity	Caucasian	1.00	-	1.00	-	1.00	-	1.00	-
	BME	1.36	1.09-1.70	1.37	1.10-1.72	1.36	1.09-1.71	1.37	1.10-1.71
	<i>p value</i>		0.006		0.005		0.006		0.005
Place of Birth	UK	1.00	-	1.00	-	1.00	-	1.00	-
	Non UK	1.34	1.08-1.66	1.34	1.08-1.66	1.36	1.09-1.68	1.36	1.09-1.68
	<i>p value</i>		0.006		0.007		0.005		0.005
SES	Q1 - least disadvantaged	1.00	-	1.00	-	1.00	-	1.00	-
	Q5 - most disadvantaged	1.21	1.08-1.35	1.20	1.07-1.33	1.20	1.07-1.35	1.18	1.06-1.33
	<i>p value</i>		0.001		0.000		0.001		0.003

<sup>a</sup> Adjusting for other socio-demographic variables in the table

<sup>b</sup> Adjusting for other socio-demographic variables in the table and null iparous

<sup>c</sup> Adjusting for other socio-demographic variables in the table and 'risk age'

<sup>d</sup> Adjusting for other socio-demographic variables in the table and null iparous, 'risk age'

Women booking very late at antenatal care									
		OR <sup>a</sup>	95% CI	OR <sup>b</sup>	95% CI	OR <sup>c</sup>	95% CI	OR <sup>d</sup>	95% CI
Ethnicity	Caucasian	1.00	-	1.00	-	1.00	-	1.00	-
	BME	2.00	1.33-3.00	1.98	1.32-2.97	2.00	1.33-3.01	1.99	1.32-2.98
	<i>p value</i>		0.001		0.001		0.001		0.001
Place of Birth	UK	1.00	-	1.00	-	1.00	-	1.00	-
	Non UK	1.47	0.98-2.20	1.48	0.99-2.22	1.54	1.02-2.30	1.54	1.03-2.98
	<i>p value</i>		0.001		0.057		0.038		0.001
SES	Q1 - least disadvantaged	1.00	-	1.00	-	1.00	-	1.00	-
	Q5 - most disadvantaged	1.38	1.07-1.78	1.42	1.09-1.83	1.37	1.04-1.74	1.37	1.06-1.78
	<i>p value</i>		0.013		0.007		0.022		0.015

<sup>a</sup> Adjusting for other socio-demographic variables in the table

<sup>b</sup> Adjusting for other socio-demographic variables in the table and null iparous

<sup>c</sup> Adjusting for other socio-demographic variables in the table and 'risk age'

<sup>d</sup> Adjusting for other socio-demographic variables in the table and null iparous, 'risk age'

Women having a normal delivery													
		OR <sup>a</sup>	95% CI	OR <sup>b</sup>	95% CI	OR <sup>c</sup>	95% CI	OR <sup>d</sup>	95% CI	OR <sup>e</sup>	95% CI	OR <sup>f</sup>	95% CI
Ethnicity	Caucasian	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	BME	1.17	0.94-1.46	1.21	0.97-1.53	1.18	0.94-1.46	1.28	1.02-1.60	1.27	0.99-1.63	1.42	1.09-1.84
	<i>p value</i>		0.153				0.153		0.033		0.055		0.008
Place of Birth	UK	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	Non UK	0.97	0.79-1.47	0.95	0.77-1.18	0.97	0.78-1.19	0.97	0.78-1.21	0.92	0.73-1.16	0.91	0.72-1.84
	<i>p value</i>		0.774		0.665		0.762		0.808		0.530		0.490
SES	Q1 - least disadvantaged	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	Q5 - most disadvantaged	1.26	1.12-1.40	1.20	1.07-1.34	1.26	1.13-1.40	1.22	1.09-1.37	1.22	1.08-1.38	1.13	0.99-1.29
	<i>p value</i>		0.000		0.001		0.000		0.001		0.001		0.063

<sup>a</sup> Adjusting for other socio-demographic variables in the table

<sup>b</sup> Adjusting for other socio-demographic variables in the table and null iparous

<sup>c</sup> Adjusting for other socio-demographic variables in the table and 'risk age'

<sup>d</sup> Adjusting for other socio-demographic variables in the table and smoking during pregnancy

<sup>e</sup> Adjusting for other socio-demographic variables in the table and birthweight

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

Women having a caesarean section																	
		OR <sup>a</sup>	95% CI	OR <sup>b</sup>	95% CI	OR <sup>c</sup>	95% CI	OR <sup>d</sup>	95% CI	OR <sup>e</sup>	95% CI	OR <sup>f</sup>	95% CI	OR <sup>g</sup>	95% CI	OR <sup>h</sup>	95% CI
Ethnicity	Caucasian	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	BME	1.10	0.85-1.43	1.08	0.83-1.40	1.11	0.85-1.43	1.10	0.85-1.43	1.11	0.85-1.44	1.03	0.79-1.34	0.96	0.71-1.29	0.92	0.68-1.25
	<i>p value</i>		0.444		0.573		0.444		0.469		0.444		0.834		0.798		0.599
Place of Birth	UK	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	Non UK	0.92	0.72-1.18	0.95	0.74-1.22	0.92	0.72-1.19	0.93	0.72-1.19	0.93	0.72-1.19	0.93	0.72-1.19	1.11	0.84-1.46	1.12	0.84-1.48
	<i>p value</i>		0.539		0.702		0.539		0.554		0.550		0.548		0.458		0.438
SES	Q1 - least disadvantaged	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	Q5 - most disadvantaged	0.84	0.74-0.96	0.84	0.74-0.96	0.84	0.74-0.96	0.85	0.75-0.97	0.84	0.74-0.95	0.87	0.76-0.99	0.88	0.76-1.02	0.92	0.78-1.07
	<i>p value</i>		0.010		0.008		0.010		0.016		0.009		0.039		0.084		0.294

<sup>a</sup> Adjusting for other socio-demographic variables in the table

<sup>b</sup> Adjusting for other socio-demographic variables in the table and post-term delivery

<sup>c</sup> Adjusting for other socio-demographic variables in the table and book very late

<sup>d</sup> Adjusting for other socio-demographic variables in the table and null iparous

<sup>e</sup> Adjusting for other socio-demographic variables in the table and 'risk age'

<sup>f</sup> Adjusting for other socio-demographic variables in the table and smoking during pregnancy

<sup>g</sup> Adjusting for other socio-demographic variables in the table and birthweight

<sup>h</sup> 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 <sup>a</sup>	95% CI	OR <sup>b</sup>	95% CI	OR <sup>c</sup>	95% CI	OR <sup>d</sup>	95% CI	OR <sup>e</sup>	95% CI	OR <sup>f</sup>	95% CI	OR <sup>g</sup>	95% CI	OR <sup>h</sup>	95% CI
Ethnicity	Caucasian	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	BME	1.29	0.95-1.76	1.26	0.92-1.73	1.29	0.95-1.76	1.27	0.93-1.74	1.29	0.95-1.76	1.22	0.88-1.66	1.09	0.76-1.57	1.05	0.73-1.54
	<i>p value</i>		0.104		0.144		0.109		0.137		0.104		0.223		0.628		0.764
Place of Birth	UK	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	Non UK	1.08	0.80-1.46	1.11	0.82-1.50	1.07	0.80-1.46	1.10	0.81-1.48	1.08	0.80-1.46	1.11	0.82-1.50	1.38	0.99-1.93	1.43	1.01-2.02
	<i>p value</i>		0.609		0.499		0.623		0.548		0.609		0.507		0.057		0.042
SES	Q1 - least disadvantaged	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	Q5 - most disadvantaged	1.02	0.86-1.19	1.00	0.85-1.18	1.02	0.87-1.20	1.07	0.91-1.27	1.02	0.86-1.19	0.99	0.84-1.19	1.04	0.86-1.26	1.09	0.89-1.34
	<i>p value</i>		0.839		0.977		0.820		0.377		0.839		0.995		0.709		0.368

<sup>a</sup> Adjusting for other socio-demographic variables in the table

<sup>b</sup> Adjusting for other socio-demographic variables in the table and post-term delivery

<sup>c</sup> Adjusting for other socio-demographic variables in the table and book very late

<sup>d</sup> Adjusting for other socio-demographic variables in the table and null iparous

<sup>e</sup> Adjusting for other socio-demographic variables in the table and 'risk age'

<sup>f</sup> Adjusting for other socio-demographic variables in the table and smoking during pregnancy

<sup>g</sup> Adjusting for other socio-demographic variables in the table and birthweight

<sup>h</sup> 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 <sup>a</sup>	95% CI	OR <sup>b</sup>	95% CI	OR <sup>c</sup>	95% CI	OR <sup>d</sup>	95% CI	OR <sup>e</sup>	95% CI	OR <sup>f</sup>	95% CI
Ethnicity	Caucasian	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	BME	1.63	1.21-2.21	1.63	1.21-2.20	1.64	1.21-2.21	1.48	1.09-2.01	1.85	1.30-2.63	1.71	1.20-2.43
	<i>p value</i>		0.001		0.001		0.001		0.010		0.001		0.003
Place of Birth	UK	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	Non UK	2.55	1.87-3.47	2.55	1.87-3.47	2.51	1.84-3.42	2.38	1.75-3.23	2.49	1.76-3.53	2.35	1.66-3.32
	<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	0.28	0.25-0.33	0.28	0.24-0.32	0.28	0.25-0.33	0.35	0.30-0.40	0.28	0.23-3.22	0.33	0.27-0.39
	<i>p value</i>		0.000		0.000		0.000		0.000		0.000		0.000

<sup>a</sup> Adjusting for other socio-demographic variables in the table

<sup>b</sup> Adjusting for other socio-demographic variables in the table and normal delivery

<sup>c</sup> Adjusting for other socio-demographic variables in the table and 'risk age'

<sup>d</sup> Adjusting for other socio-demographic variables in the table and smoking during pregnancy

<sup>e</sup> Adjusting for other socio-demographic variables in the table and birthweight

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

Women smoking during pregnancy					
		OR <sup>a</sup>	95% CI	OR <sup>b</sup>	95% CI
Ethnicity	Caucasian	1.00	-	1.00	-
	BME	0.32	0.21-0.48	0.31	0.21-0.48
	<i>p value</i>		0.000		0.000
Place of Birth	UK	1.00	-	1.00	-
	Non UK	0.53	0.36-0.77	0.54	0.37-0.78
	<i>p value</i>		0.001		0.001
SES	Q1 - least disadvantaged	1.00	-	1.00	-
	Q5 - most disadvantaged	7.37	6.03-9.00	7.31	5.98-8.93
	<i>p value</i>		0.000		0.000

<sup>a</sup> Adjusting for other socio-demographic variables in the table

<sup>b</sup> Adjusting for other socio-demographic variables in the table and and 'risk age'

Women giving birth to low birth weight babies											
		OR <sup>a</sup>	95% CI	OR <sup>b</sup>	95% CI	OR <sup>c</sup>	95% CI	OR <sup>d</sup>	95% CI	OR <sup>e</sup>	95% CI
Ethnicity	Caucasian	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	BME	3.16	1.51-6.65	3.09	1.47-6.51	3.18	1.51-6.69	3.91	1.88-8.12	3.81	1.82-7.96
	<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	0.74	0.33-1.67	0.73	0.32-1.64	0.76	0.34-1.71	0.89	0.40-1.98	0.88	0.39-1.96
	<i>p value</i>		0.474		0.443		0.506		0.781		0.764
SES	Q1 - least disadvantaged	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
	Q5 - most disadvantaged	1.39	0.85-2.27	1.37	0.84-2.25	1.37	0.84-2.24	0.88	0.52-1.51	0.86	0.50-1.47
	<i>p value</i>		0.189		0.205		0.209		0.653		0.589

<sup>a</sup> Adjusting for other socio-demographic variables in the table

<sup>b</sup> Adjusting for other socio-demographic variables in the table and book late

<sup>c</sup> Adjusting for other socio-demographic variables in the table and 'risk age'

<sup>d</sup> Adjusting for other socio-demographic variables in the table and smoking during pregnancy

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