

# **Which women are at an increased risk of operative birth in the UK?**

## **Volume 2 of 2: The tables**

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## **CHAPTER 2:**

Literature review:

The maternal and fetal characteristics associated with mode of birth

Table A2.2: Parity and mode of birth

Author(s)	Country	Period of data collection	Study sample	Explanatory factor(s)	Outcome measure(s)	Co-factors	Effect of mothers' parity on mode of birth
Alves and Sheikh (2005)	England	1996-2000	516,892; 92 hospitals	Parity  Primips vs. multips	Elective caesarean section.	Regression model: age, deprivation, birth weight and gestation.	Compared to primiparous mothers, multiparous mothers were 1.6 times more likely to have an elective CS (adjOR=1.6, 95% CI=1.5-1.7).
Behague et al (2002)	Brazil	1993	5,304 and sub-sample of 80	Parity  Primips vs. multips	Caesarean section (all).	None.	Rates of CS for primiparous mothers (34.0%) were higher than for multiparous mothers (28.7%, p<0.001).
Gareen et al (2003)	USA	1988	6,805	Parity  Primips vs. multips	Caesarean section (all).	Regression model: age, gestation, birth weight, parity, history of CS, multiple birth, placental problems, hypertension, pre-eclampsia, diabetes, breech, malpresentation, herpes, fetal distress, height, weight, history of pregnancy wantedness, insurance type, treatment for infertility, marital status, ethnicity, education, income, worked during pregnancy, antenatal care, exercise during	When adjusted for in the full model, mothers who were multiparous (vs. primiparous) were less likely to have a CS (adjRR=0.76, 95% CI 0.64-0.91).

						pregnancy, epidural.	
Gomes et al (1999)	Brazil	1978-1979 and 1994	6,750 (1978-79) and 2,846 (1994)	Parity 4+ (reference), 3, 2, 1.	Caesarean section (all).	Regression model: occupational group, family income, education, insurance status, maternal occupation (home vs. other), hospital type, day of birth, antenatal visits, marital status, age, previous termination, previous stillbirth, no. of live births, gestational age and birth weight.	<p><i>1978-79:</i> In the unadjusted analyses parity was not significant (OR=1.17 95% CI=0.98-1.39 for 3, OR=1.11 95% CI=0.95-1.30 for 2 and OR=1.25 95% CI=1.08-1.45 for 1 compared to mothers who had had 4 or more previous births). In the adjusted analyses, compared to mothers who had had 4 or more previous successful births, adjusted rates indicated mothers who had had 3 previous births were less likely to have a CS (adjOR=0.65, 95% CI=0.44-0.96). Adjusted results for mothers who had had 1 or 2 previous births were not significant (adjOR=0.76, 95% CI=0.43-1.32 for 2 and adjOR=0.67, 95% CI=0.30-1.51 for 1).</p> <p><i>1994:</i> In the unadjusted analyses, compared to mothers who had had 4 or more previous births, risk of CS increased with decreasing parity (OR=1.50 95% CI=1.14-1.95 for 3, OR=1.62 95% CI=1.29-2.03 for 2 and OR=1.88 95% CI=1.51-2.34 for 1). Compared to mothers who had had 4 or more previous successful</p>



							births, adjusted rates indicated mothers who had had 2 previous births were less likely to have a CS (adjOR=0.31 95% CI=0.10-0.98). Adjusted results for mothers who had had 1 or 3 previous births were not significant (adjOR=0.56, 95% CI=0.26-1.20 for 3 and adjOR=0.30, 95% CI=0.06-1.62 for 1).
Johnson and Slade (2002)	England	2000	346	Parity  Primips vs. multips	Emergency caesarean section.	Regression model for emergency CS vs. unassisted vaginal: age, medical risk (multiple birth, breech or malposition, diabetes, induction of labour for reason other than postdates), previous CS, fear of childbirth, had a reason to expect a CS.	When included in the regression model, primiparous mothers were over 9 times more likely to have an emergency CS (adjOR=9.11 95% CI= 3.78-21.96).
Joseph et al (2006)	Canada	1988-1995	76,440	Parity  0, 1 (reference), 2, ≥3.	Caesarean section (all; including overall and primary).  Two regression models: one examining income with	Age, pre-pregnancy weight, family income, investments, previous CS, previous perinatal death, hypertension, gestational diabetes, diabetes mellitus, placenta praevia, placental abruption, attending physician,	It appears from adjusted analyses that compared to mothers who had had one previous birth, mothers for whom the study child was their first were at an increased risk of CS <u>or</u> labour induction (adj rate ratio=1.54 95% CI=1.49-1.59). Increasing parity above 1 did not have a significant impact on risk of CS <u>or</u> induction (adj rate ratio=1.01 95% CI=0.95-1.05 for 2

					induction, overall CS and primary CS as outcomes, and one with labour induction or CS as outcome.	epidural anaesthesia, time period, smoking status at birth, marital status, rural residence, antenatal class attendance, previous low birth weight infant, other chronic medical disease adjusted for in regression.	and adj rate ratio=0.97 95% CI=0.91-1.04 for 3 or more).
Patel et al (2005)	England	1990/1991	12,944 singleton, term.	Parity	Elective and emergency caesarean section.	Regression models: <i>Final model (all CS):</i> age, previous CS, outcome of last pregnancy, diabetes mellitus, birth weight, neonatal head circumference, gestational age, fetal presentation. <i>Final model (elective CS):</i> age, previous CS, diabetes mellitus, gestational age, fetal presentation. <i>Final model (emergency CS):</i> age, previous CS, outcome of last pregnancy, birth weight, neonatal head circumference, fetal presentation, in preferred labour	In all adjusted analyses increasing parity decreased the odds of CS. For the overall CS rate (elective and emergency) compared to vaginal birth, odds of CS decreased 37% per unit increase in parity (adjOR=0.63, 95% CI 0.53-0.75). The odds of an emergency CS decreased by 54% per unit increase in parity (adjOR=0.46, 95% CI 0.33-0.63). Parity was not significant in the final model for elective CSs.

						position, epidural.	
Roberts et al (2002)	Australia	1990-1997	616,303 live, singleton, cephalic presenting infants at term.	Parity  Primips vs. multips	Elective or emergency caesarean, vacuum extraction, forceps.  Adjusted ORs are for overall operative births (i.e. all of the above).	None.  Regression models were stratified by parity; however, only the model for primiparous mothers is presented, as the model fit for multiparous mothers was not adequate.	Crude rates indicated that compared to multiparous mothers, primiparous mothers were more likely to have a forceps birth (16.7% vs. 3.1%), vacuum extraction (5.7% vs. 1.6%), or an emergency CS (11.3% vs. 3.9%), but <i>less</i> likely to have an <i>elective</i> CS (3.0% vs. 9.0%).
Simonsen et al (2005)	USA	1995-2001	299,710 live, singleton births.	Parity  0, 1 (reference), 2-4, 5-9, 10+.	Caesarean section (all; including primary and repeat), instrumental birth.	Regression model: age, marital status, education, race, ethnicity, tobacco use, antenatal care, induction of labour, augmentation of labour, pre-eclampsia and gestational diabetes.  (Instrumental births were adjusted for all factors above +birth weight.)	<i>Primary caesarean:</i> Compared to mothers who had had one previous birth, mothers who had never given birth before were more than 5 times more likely to have a CS (adjOR=5.32 95% CI=5.11-5.55). Increasing parity on the other hand reduced the risk of CS (adjOR=0.70 95% CI=0.66-0.74 for parity 2-4, adjOR=0.55 95% CI=0.46-0.65 for parity 5-9 and adjOR=0.57 95% CI=0.23-1.42 for parity 10+).  <i>Repeat caesarean:</i> As with primary caesarean rates, repeat caesareans were less likely for mothers who had had more than one previous birth

							<p>(adjOR=0.84 95% CI=0.81-0.87 for parity 2-4, adjOR=0.33 95% CI=0.29-0.38 for parity 5-9 and adjOR=0.40 95% CI=0.21-0.76 for parity 10+).</p> <p><i>Instrumental birth:</i>  Compared to mothers who had had one previous birth, mothers who had never given birth before were around 3 times more likely to have an instrumental birth (adjOR=2.94 95% CI=2.85-3.02). Increasing parity on the other hand reduced the risk of instrumental birth (adjOR=0.61 95% CI=0.58-0.63 for parity 2-4, adjOR=0.37 95% CI=0.32-0.43 for parity 5-9 and adjOR=0.39 95% CI=0.17-0.89 for parity 10+).</p>
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	No effect
	Primiparous mothers are more likely to have intervention
	Multiparous mothers are more likely to have intervention

Table A2.3: Maternal age and mode of birth

Author(s)	Country	Period of data collection	Study sample	Explanatory factor(s)	Outcome measure(s)	Co-factors	Effect of mothers' age on mode of birth
Alves and Sheikh (2005)	England	1996-2000	516,892; 92 hospitals	Age  Assessed increases in elective CS for each additional year.	Elective caesarean section.	Regression model: parity, deprivation, birth weight and gestation.	For each additional year of age, mothers were 6% more likely to have an elective CS (OR=1.06, 95% CI=1.06-1.07).
Braveman et al (1995)	USA	1991	217,461 singleton first-born live births.	Age  ≤19, 20-34, ≥35 (reference).	Caesarean section (all).	Regression model: type of insurance, poverty, ethnicity, education, marital status, antenatal care, non-English speaking areas, birth weight, mechanical medical risk factors, fetal stress, other medical complications, birth volume of hospital, teaching status of hospital, type of hospital, region.	Compared to women aged 35 and over, women aged 20-34 and women aged 19 or younger were much less likely to have a CS (OR for 20-34=0.46, 95% CI=0.43-0.48, OR for ≤19=0.27, 95% CI=0.26-0.29).
Cesaroni et al (2008)	Italy	1990-1996	88,698 first-born live births.	Age  <25 (reference), 25-29, 30-34, >34.	Caesarean section (all).	None.	Crude estimates indicate that CS rates increased with age. Compared to women aged 25 or younger, women aged 25-29, 30-34 and >34 were 1.28 (OR=1.28, 95% CI=1.22-1.33), 1.69 (OR=1.69, 95% CI=1.62-1.77) and 3.24 (OR=3.24, 95% CI=3.06-3.42) times more likely to have a CS.

Cleary-Goldman et al (2005)	USA	1999-2002	36,056	Age ≤35 (reference), 35-39, ≥40.	Caesarean section (all) and instrumental vaginal birth.	Regression model: site, race, parity, BMI, education, marital status, smoking, pre-existing medical condition, previous adverse pregnancy outcome and use of assisted conception.	<p><i>Caesarean section:</i> The percentage of caesarean births increased by age group; with rates of 21.7%, 31.4% and 40.5% for age &lt;35yrs, 35-39yrs and 40 or more years, respectively (p&lt;0.001).</p> <p>In a final regression model, compared to mothers aged less than 35, mothers aged 35-39 were 1.6 times more likely to have a CS and mothers aged 40 or above were twice as likely (OR=1.6 p&lt;0.001 and OR=2.0 p&lt;0.001).</p> <p><i>Instrumental vaginal birth:</i> There were no significant differences in rates of instrumental vaginal birth between age groups.</p>
Cnattingius et al (1998)	Sweden	1992-1993	92,623  Primiparous, singleton births.	Age <19 (reference), 20-29, 30-34, 35+.	Elective and emergency caesarean section.	Height, pre-pregnancy BMI, education, country of birth and type of hospital included in regression model.	<p><i>Elective caesarean:</i> In the adjusted analyses, increasing age increased the risk of elective CS (adjOR=1.4 95% CI=1.1-1.8 for 20-29, adjOR=2.6 95% CI=2.0-3.6 for 30-34 and adjOR=4.7 95% CI=3.6-6.2 for 35+ years).</p> <p><i>Emergency caesarean:</i> In the adjusted analyses, increasing age increased the risk of emergency CS (adjOR=1.6 95% CI=1.4-1.9 for 20-29, adjOR=2.7 95% CI=2.3-3.2 for 30-34 and adjOR=4.3 95% CI=3.5-5.2 for</p>

							35+ years).
Ecker et al (2001)	USA	1998	3,715  Primiparous women with term pregnancies.	Age  25, 25-34, 35-39, ≥40.	Elective and emergency caesarean section.	None.  Stratified analyses to compare women who had a trial of labour, and those who did not.  Unadjusted associations are presented.	The risk of CS rose continuously with age. Overall the CS rate was 11.5%, 20.4%, 30.7% and 43.1% for women aged less than 25, 25-34, 35-39 and 40 and older, respectively (p=0.001 for trend). Within the overall rate, both elective and emergency CS rates increased with age:  <i>Emergency caesarean;</i> The emergency CS rate was 7.9%, 12.8%, 20.1% and 22.0% for women aged less than 25, 25-34, 35-39 and 40 and older, respectively.  <i>Elective caesarean;</i> The elective CS rate was 3.6%, 7.6%, 10.6% and 21.1% for women aged less than 25, 25-34, 35-39 and 40 and older, respectively.
Gareen et al (2003)	USA	1988	6,805	Age (selected ages)  20 (reference), 25, 30, 35, 40.	Caesarean section (all).	Regression models: <i>Obstetrical model:</i> gestation, birth weight, parity, history of CS, multiple birth, placental problems, hypertension, pre-eclampsia, diabetes, breech, malpresentation, herpes, fetal distress. <i>Full model:</i> (factors in obstetrical model)+ height,	<i>Obstetrical model:</i> When adjusted for obstetrical complications and other factors, increasing age increased the risk of CS. Compared to <i>primiparous</i> women aged 20, women aged 25 (adjRR=1.21, 95% CI 1.02-1.43), 30 (adjRR=1.51, 95% CI 1.27-1.81), 35 (adjRR=2.13, 95% CI 1.61-2.81) and 40 (adjRR=2.82, 95% CI 1.96-4.04) were

						weight, history of pregnancy wantedness, insurance type, treatment for infertility, marital status, ethnicity, education, income, worked during pregnancy, antenatal care, exercise during pregnancy, epidural included. <u>Full model + dystocia</u>	increasingly more likely to have a CS. The results were similar for <i>multiparous</i> women; 25 (adjRR=1.22, 95% CI 1.02-1.46), 30 (adjRR=1.30, 95% CI 1.09-1.56), 35 (adjRR=1.45, 95% CI 1.16-1.81) and 40 (adjRR=1.61, 95% CI 1.17-2.21). <u>Full model:</u> When the analyses were repeated adjusting for all factors in the full model, age was no longer a significant factors for women having a later born child. For the primiparous women, age was still significant but only for the 35 and 40 age groups who were 1.74 and 2.37 times more likely to have a CS than women aged 20 (adjRR=1.74, 95% CI 1.25-2.43 and adjRR=2.37, 95% CI 1.51-3.72). <u>Full model + dystocia:</u> When dystocia and its interactions were included in the model, the positive association between age and CS remained. Primiparous mothers aged 35 were 1.37 times more likely to have a caesarean birth (RR=1.37, 95% CI= 0.98-1.93) than primiparous mothers aged 20.
Gomes et al (1999)	Brazil	1978-1979 and 1994	6,750 (1978-79) and 2,846 (1994)	Age <20	Caesarean section (all).	Regression model: occupational group, family income, education,	1978-79: Compared to mothers aged 20 or younger, risk of CS increased with



				(reference), 20-24, 25-29, 30+.		insurance status, maternal occupation (home vs. other), hospital type, day of birth, antenatal visits, marital status, parity, previous termination, previous stillbirth, no. of live births, gestational age and birth weight.	increasing age (adjOR=1.39 95% CI=1.06-1.83 for 20-24, adjOR=2.00 95% CI=1.49-2.68 for 25-29 and adjOR=3.43 95% CI=2.49-4.73 for mothers aged 30+).  <i>1994:</i> Compared to mothers aged 20 or younger, risk of CS was higher for mothers in the oldest age group of over 30 (adjOR=2.66 95% CI=1.63-4.34). Results for the other two age categories were not significantly related to mode of birth in this model (adjOR=1.19 95% CI=0.79-1.79 for 20-24 and adjOR=1.47 95% CI=0.94-2.30 for 25-29).
Gould et al (1989)	USA	1982-1983	245,854	Age  <18, 18-34, >34.	Caesarean section (all; primary only).	None.	The CS rate increased with increasing age; 13.0% for mothers aged less than 18, 17.5% for mothers aged 18-34 and 24.0% for mothers older than 34.
Guihard and Blondel (2001)	France	1981 and 1995	5,410 (1981) and 13,318 (1995)	Age  <25, 25-29 (reference), 30-34, ≥35.	Caesarean section (all).	Regression model: weight before pregnancy, nationality, education, birth weight, breech presentation, size of maternity unit, status of maternity unit (public/private).	<i>1981</i> Compared to mothers aged 25-29, mothers aged <25 were slightly less likely to have a CS (adjOR=0.7 95% CI=0.5-0.9) and mothers aged 35 or older were over 3 times as likely to have a CS (adjOR=3.5 95% CI=1.5-8.4). The result for mothers aged 30-34 was not significant (adjOR=0.9 95%

							CI=0.5-1.6). 1995 Compared to mothers aged 25-29, mothers' risks of having a CS increased with increasing age (adjOR=1.4 95% CI=1.1-1.8 for 30-34 and adjOR=2.4 95% CI=1.8-3.3 for 35 and older). The result for mothers aged <25 was not significant (adjOR=0.8 95% CI=0.7-1.0).
Joseph et al (2006)	Canada	1988-1995	76,440	Age <20, 20-24 (reference), 25-29, 30-34, 35-39, ≥40.	Caesarean section (all; including overall and primary).  Two regression models: one examining income with induction, overall CS and primary CS as outcomes, and one with labour induction <u>or</u> CS as outcome.	Parity, pre-pregnancy weight, family income, investments, previous CS, previous perinatal death, hypertension, gestational diabetes, diabetes mellitus, placenta praevia, placental abruption, attending physician, epidural anaesthesia, time period, smoking status at birth, marital status, rural residence, antenatal class attendance, previous low birth weight infant, other chronic medical disease adjusted for in regression.	It appears from adjusted analyses that there is a gradient of increasing risk of CS <u>or</u> labour induction with increasing age. Compared to women aged 20-24, younger women were less likely to have a CS <u>or</u> induction (adj rate ratio=0.78, 95% CI=0.72-0.83) and older mothers were more likely to have a CS <u>or</u> induction (adj rate ratio=1.08, 95% CI=1.04-1.12 for 25-29, adj rate ratio=1.15, 95% CI=1.10-1.20 for 30-34, adj rate ratio=1.23, 95% CI=1.16-1.31 for 35-39 and adj rate ratio=1.48, 95% CI=1.31-1.66 for 30-34).
Kirz et al (1985)	USA	1981-1983	6,366	Age	Caesarean section (all	None.	Compared to women aged 20-25, healthy multiparous women aged

			(1,023 women aged $\geq 35$ years compared to 5,343 women aged 20-25 years).	20-25 (reference), $\geq 35$ .	inc. primary and repeat), forceps and vacuum extraction.	Stratified analyses by parity and health of the mothers (healthy mothers defined as those without hypertension, diabetes, obesity, multiple gestation, cardiovascular disease or incompetent cervix and antenatal care).  Unadjusted rates are presented.	35 or older had significantly ( $p < 0.05$ ) higher rates of forceps (8.6% vs. 6.6%), vacuum extraction (9.0% vs. 5.8%), primary CS (11.1% vs. 5.6%) repeat CS (21.8% vs. 16.7%), and lower rates of unassisted vaginal birth (49.2% vs. 65.1%).  Older healthy primiparous women had significantly ( $p < 0.05$ ) higher rates of CS (39.2% vs. 21.6%) and lower rates of unassisted vaginal birth (31.2% vs. 47.8%).  The results for all multiparous and all primiparous women were similar.
Lialios et al (1999)	Greece	1994-1998	5,075  Primiparous women, singleton live births.	Age  20-29, 30-34, $\geq 35$ .	Caesarean section (all).	None.	Three age groups were compared; 20-29, 30-34 and 35+ and the CS rates were 14.83%, 19.85% and 33.99% respectively ( $p < 0.001$ in chi squared analyses). Although the authors did not statistically adjust for any other factors, they found that there were no significant differences in pregnancy outcomes and pregnancy or labour complications for the three groups.
Linton et al (2004)	USA	1996-2002	Approx. 90,000 births per study year.	Age  <20, 20-24, 25-29,	Caesarean section (all; primary and VBAC).	None.	Rates of CS are given for each year for 1996-2002. For every year there was a gradient of increasing rates of CS with increasing age of mothers (e.g. for 1996; 13.6% for

				30-34, 35-39, 40-54.			<20, 15.8% for 20-24, 18.0% for 25-29, 21.7% for 30-34, 26.1% for 35-39 and 31.0% for 40-54 years). Over the years, the overall CS rate increased. Increases can be seen within each age bracket. However, when examining the percentage changes of the years, the size of the percentage increase in the CS rate increased with increasing age (e.g. %change for 1996-2002 for mothers <20= +22.1% and for 40-54= +28.1%).
Main et al (2000)	USA	1992-1998	8,496 primiparous women, singleton births, at term, cephalic, spontaneous.	Age <20 (reference), 20-25, 25-30, 30-35, 35-40, ≥40.	Emergency caesarean section and instrumental vaginal birth.	Regression models: <i>Caesarean section:</i> epidural anaesthesia, birth weight, ethnicity included in regression model. <i>Instrumental birth:</i> ethnicity, epidural anaesthesia.	<i>Emergency caesarean:</i> After adjustment, the odds of emergency CS increased with maternal age. Compared to women aged less than 20, women aged 30-35, 35-40, and 40+ were around 2 (adjOR=2.18 95% CI=1.20-3.96), 3 (adjOR=2.97 95% CI=1.62-5.45) and 5 (adjOR=4.68 95% CI=2.43-9.04) times more likely to have an emergency CS, respectively. Results for mothers aged 20-25 and 25-30 were not significant (adjOR=0.98 95% CI=0.51-1.89 for 20-25 and adjOR=1.42 95% CI=0.77-2.60 for 25-30).  <i>Instrumental vaginal birth:</i> After adjustment, the odds of instrumental vaginal birth were higher for mothers in the eldest age

							groups. Compared to women aged less than 20, women aged 35-40 and 40+ were more likely to have an instrumental vaginal birth (adjOR=1.68 95% CI=1.12-2.52 for 35-40 and adjOR=1.72 95% CI=1.08-2.76 for 40+ years). Results for mothers aged 20-25, 25-30 and 30-35 were not significant (adjOR=0.97 95% CI=0.63-1.49 for 20-25, adjOR=1.19 95% CI=0.80-1.78 for 25-30 and adjOR=1.46 95% CI=0.98-2.17).
Martel et al (1987) #	Canada	1984-1985	3,458  Women with multiple gestation, stillbirth, placenta praevia, breech and repeat CS excluded.	Age  ≤24 (reference), 25-34, ≥35.	Caesarean section (all, but with only primary rates).	Regression model: meconium staining of amniotic fluid, induction of labour, epidural anaesthesia and fetal distress.	Among primiparous mothers; compared to mothers younger than 25 years, mothers aged 25-34 were twice as likely (adjOR=2.00, 95% CI= 1.37-2.63), and mothers aged over 35 were more than 3 times as likely (adjOR=3.56, 95% CI= 1.66-5.46) to have a CS.  Among multiparous mothers, although odds of CS increased with age, the adjusted odds ratios were not significant (adjOR=1.27, 95% CI= 0.55-1.96 for 23-34 and adjOR=3.49, 95% CI= 0.39-6.59).
Paranjothy et al (2005)	England and Wales	2000	147,087 Singleton pregnancies.	Age  12-19, 20-24, 25-29	Caesarean section before labour and caesarean section during	Regression model: age, ethnicity, number of previous vaginal births, number of previous CS, gestation, mode of onset of	<i>CS before labour:</i> Risk of CS before labour increased with increasing age. Compared to mothers aged 25-29 mothers aged 20-24 and 12-19 were less likely to

				(reference), 30-34, 35-39, 40-50.	labour.	labour, presentation and birth weight.	<p>have a CS before labour (adjOR=0.77 95% CI=0.71-0.82 for 20-24 and adjOR=0.54 95% CI=0.48-0.61 for 12-19) and older mothers were more likely (adjOR=1.30 95% CI=1.23-1.37 for 30-34, adjOR=1.60 95% CI=1.48-1.72 for 35-39 and adjOR=2.34 95% CI=2.06-2.67 for 40-50).</p> <p><i>CS during labour:</i> Risk of CS during labour increased with increasing age. Compared to mothers aged 25-29 mothers aged 20-24 and 12-19 were less likely to have aCS (adjOR=0.72 95% CI=0.68-0.77 for 20-24 and adjOR=0.54 95% CI=0.50-0.59 for 12-19) and older mothers were more likely (adjOR=1.21 95% CI=1.15-1.26 for 30-34, adjOR=1.48 95% CI=1.40-1.58 for 35-39 and adjOR=1.73 95% CI=1.53-1.96 for 40-50).</p>
Patel et al (2005)	England	1990/1991	12,944 singleton, term.	Age  Assessed increases in intervention related to each additional year.	Elective and emergency caesarean section.	Regression models: <i>Final model (all caesarean birth):</i> previous CS, outcome of last pregnancy, parity, diabetes mellitus, birth weight, neonatal head circumference, gestational age, fetal presentation. <i>Final model (elective CS):</i>	In all adjusted analyses increasing maternal age increased the odds of CS. For the overall CS rate (elective and emergency) compared to vaginal birth, odds of CS increased 7% per year (adjOR=1.07, 95% CI 1.04-1.09). The odds of an elective CS increased 4% per year

						previous CS, diabetes mellitus, gestational age, fetal presentation. <i>Final model (emergency CS):</i> previous CS, outcome of last pregnancy, parity, birth weight, neonatal head circumference, fetal presentation, in preferred labour position, epidural.	(adjOR=1.04, 95% CI 1.01-1.08) and the odds of an emergency CS increased by 11% per year (adjOR=1.11, 95% CI 1.08-1.15).
Read et al (1994)	Australia	1987	3,641	Age <20 (reference), 20-24, 25-29, 30-34, 35+.	Emergency caesarean section and instrumental vaginal birth (vacuum or forceps).	Race, area of residence, height, marital status, public or private care, infant gender, birth weight, length of labour, labour complications and anaesthesia included in regression model.	<i>Emergency caesarean:</i> Compared to mothers younger than 20 years old, risk of emergency CS increased for increasing age groups (adjOR=1.96 95% CI=1.12-3.42 for 20-24, adjOR=2.85 95% CI=1.60-5.06 for 25-29, adjOR=3.31 95% CI=1.73-6.35 for 30-34 and adjOR=11.87 95% CI=5.24-26.88 for 35+).  <i>Instrumental vaginal birth:</i> Compared to mothers younger than 20 years old, risk of instrumental birth increased for increasing age groups (adjOR=1.44 95% CI=1.05-1.99 for 20-24, adjOR=1.59 95% CI=1.14-2.21 for 25-29, adjOR=2.03 95% CI=1.39-2.97 for 30-34 and adjOR=2.94 95% CI=1.68-5.15 for 35+).
Roberts et al (2002)	Australia	1990-1997	616,303 live, singleton, cephalic	Age <20,	Elective or emergency caesarean,	Regression model: Type of care (public/private), obstetric complication,	Crude rates of each type of operative birth increased with maternal age. For <20 years, 20-34

			presenting infants at term.	20-34 (reference), $\geq 35$ .	vacuum extraction, forceps.  Adjusted ORs are for overall operative births (i.e. all of the above).	type of labour, epidural, birth weight, gestational age.	<p>years and <math>\geq 35</math> years respectively, the rates were 5.5%, 6.7% and 8.1% for emergency caesarean, 1.8%, 6.1% and 12.0% for elective caesarean, 2.5%, 3.2% and 3.6% for vacuum extraction and 7.2%, 8.6% and 7.8% for forceps. The most extreme gradient was for elective CS and the least extreme was for forceps.</p> <p>In the adjusted model (for primiparous women only in 1997), compared to women aged 20-34 years, women aged <math>&lt; 20</math> years were less likely to have any type of operative birth (adjOR=0.52, 95% CI= 0.47-0.58) and women aged 35 or over were much more likely (adjOR=1.97, 95% CI=1.79-2.18). Results for primiparous women in 1990 were very similar.</p>
Zahniser et al (1992)	USA	1980-1987	Data from 400 hospitals throughout USA.	Age 15-19, 20-34 (reference), 35-44.	Caesarean section (all), forceps, vacuum extraction.	None.  Rates presented are crude. Authors report that results adjusted for both age and race were similar.	<p><i>Caesarean section:</i> Compared to mothers aged 20-34, younger mothers were less likely to have a CS (rate ratio=0.8 95% CI=0.7-0.8) and older mothers were more likely to have a CS (rate ratio=1.3 95% CI=1.2-1.4).</p> <p><i>Forceps:</i> Age was not significantly related to forceps births (rate ratio=1.0 95% CI=0.7-1.4 for mothers aged 15-19 and rate ratio=0.9 95% CI=0.6-1.2</p>



							for mothers aged 35-44, compared to mothers aged 20-34). <i>Vacuum Extraction:</i> Age was not significantly related to vacuum extraction (rate ratio=1.2 95% CI=0.8-1.9 for mothers aged 15-19 and rate ratio=1.2 95% CI=0.7-2.1 for mothers aged 35-44, compared to mothers aged 20-34).
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# Martel et al reported standard errors so the confidence intervals reported have been calculated subsequently. Although the authors report that all analyses were highly significant ( $p < 0.0005$ ), the confidence intervals for multiparous women do cross 1.

	No effect
	Older mothers are more likely to have intervention
	Younger mothers are more likely to have intervention

Table A2.4: Mothers' deprivation and mode of birth

Author(s)	Country	Period of data collection	Study sample	Determinant(s)	Outcome measure(s)	Co-factors	Effect of mothers' income on mode of birth
Alves and Sheikh (2005)	England	1996-2000	516,892	Index of multiple deprivation (IMD)	Elective caesarean section.	Age, parity, birth weight and gestation in regression model.	After adjustment, increasing affluence was associated with higher odds of elective CS, with mothers from the most affluent quintile being 26% more likely to have a CS than mothers from the most deprived quintile (adjOR=1.26, 95% CI:1.10-1.45).
Barley et al (2004)	England	2001-2002	336,324	IMD	Elective and emergency caesarean section.	Age, birth weight, ethnicity, multiple births, parity and stillbirth in regression.	After adjustment, the odds of having an elective CS were lower for women in the least affluent area, compared to most affluent ones (adjOR=0.86, 95% CI: 0.82-0.89). No association was found between deprivation levels and emergency CS.
Bragg et al (2010)	England	2008	620,604	IMD	Caesarean section (all).	Age, ethnicity, parity, presentation, fetal distress, dystocia, diabetes, gestational diabetes, hypertension, eclampsia/pre-eclampsia, placenta praevia/placental abruption, preterm birth.	Unadjusted rates of CS were lowest for women living in the most deprived areas (22%) and increased with increasing affluence, with rates of CS in the most affluent areas at 26%.  After adjustment, deprivation was no longer significantly related to caesarean section rates (compared to women in the least deprived areas (1), adjOR=1.01 95% CI: 0.97-1.06 for 2, adjOR=1.02 95% CI: 0.96-1.08 for 3, adjOR=1.02 95% CI: 0.96-1.09 for 4 and adjOR=1.00 95% CI: 0.93-1.07 for 5).
Fairley et al (2011)	Scotland	1980-81 1990-91 1999-2000	133,555 128,933 102,285	Carstairs	Elective and emergency caesarean	Age, height, parity, gestational age and marital status and	Odds ratios presented are for the relative index of inequality (RII) which compares the most deprived quintile to the most affluent.

			364,733 total		section.	social class.	<p><i>Emergency caesarean:</i> In 1980-81 and 1990-91 women living in more deprived areas were at an increased risk of having an emergency CS (adjOR=1.18 95% CI 1.05-1.32 in 1980-81 and adjOR=1.13 95% CI 1.02-1.26 in 1990-91). However, in 1999-2000 the relationship was non-significant (adjOR 1.02 95% CI 0.93-1.13).</p> <p><i>Elective caesarean:</i> In 1980-81 women living in more deprived areas were at an increased risk of having an elective CS (adjOR=1.19 95% CI 1.03-1.38). In 1990-91 there was no effect (adjOR=1.00 95% CI 0.87-1.14) and in 1999-2000 women in more deprived areas were at a <i>decreased</i> risk compared to women in the most affluent areas (adjOR=0.85 95% CI 0.73-0.99).</p>
Redshaw et al (2007)	England	2006	Around 3,000	IMD	Caesarean section (all), forceps, vacuum extraction.	None.	Women in the most deprived quintile were more likely to have a normal vaginal birth (70.9%), than mothers from the four other less deprived quintiles (63.0%). Of the mothers who had a CS, mothers from the most deprived quintile were more likely to have this due to unforeseen circumstances (62.1%), than mothers from the less deprived quintiles (51.6%).
Wilkinson et al (1998)	Scotland	1994-1995	8,369 women who had a caesarean section	Carstairs	Caesarean section (all).	None.	Unadjusted total CS rates differed little by deprivation category. The range was 15.6% to 16.7%. Women in the most affluent areas had a rate of 16.7% compared to 16.6% in the most deprived.

	No effect
	Mothers from affluent areas are more likely to have intervention
	Mothers from deprived areas are more likely to have intervention

Table A2.5: Mothers' home ownership and mode of birth

Author(s)	Country	Period of data collection	Study sample	Determinant(s)	Outcome measure(s)	Co-factors	Effect of mothers' home ownership on mode of birth
Patel et al (2005)	England	1990-1991	12,944 singleton, term.	Home ownership.  Own/mortgage, private/rental, council/housing association, social, other.	Caesarean section (all) vs. vaginal (all); elective CS vs. attempted VD, emergency CS vs. unassisted VB.	Home ownership status, age, marital status, ethnicity, social class, smoking, medical history factors, obstetric history factors, fertility, activity levels, antenatal history, diet, birth weight, infant head circumference, infant length, gestation, fetal presentation included in regression.	<p><i>Overall caesarean:</i> Crude CS rates indicated that compared to mothers who own their own home, mothers who lived in council or housing association accommodation were less likely to have any type of CS (OR=0.77, 95% CI 0.64-0.93). However, in the adjusted analyses for overall CS, home ownership was not a significant factor.</p> <p><i>Elective caesarean:</i> Compared to mothers who owned their own home, mothers who lived in rented accommodation were less likely to have an elective CS (OR=0.36, 95% CI=0.21-0.63). Mothers who lived in council or housing association accommodation were also less likely to have an elective CS, but this was of borderline significance (OR=0.75, 95% CI=0.57-1.00). In adjusted analyses however, home ownership was not significant.</p> <p><i>Emergency caesarean:</i> Compared to mothers who owned their own home, mothers who lived in social accommodation were less likely to have an emergency CS (OR=0.72, 95%</p>

								CI=0.57-0.92). In adjusted analyses however, home ownership was not significant.
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	No effect
	Mothers who own their own home are more likely to have intervention
	Mothers who did not own their home are more likely to have intervention

Table A2.6: Mothers' social class/ occupational status and mode of birth

Author(s)	Country	Period of data collection	Study sample	Determinant(s)	Outcome measure(s)	Co-factors	Effect of mothers' home ownership on mode of birth
Fairley et al (2011)	Scotland	1980-81 1990-91 1999-2000	133,555 128,933 102,285  364,733 total	Social class (paternal if present, if not maternal).  Registrar General birth registration.	Elective and emergency caesarean section.	Age, height, parity, gestational age and marital status and deprivation.	Odds ratios presented are for the relative index of inequality (RII) which compares the lowest social class band to the highest. <i>Emergency caesarean:</i> In 1980-81 and 1990-91 women living in more deprived areas were at an increased risk of having an emergency CS (adjOR=1.14 95% CI 1.04-1.25 in 1980-81 and adjOR=1.13 95% CI 1.04-1.23 in 1990-91). However, in 1999-2000 the relationship was non-significant (adjOR 1.02 95% CI 0.93-1.12). <i>Elective caesarean:</i> In 1980-81 and 1990-91 CS was not significantly related to social class (adjOR=0.91 95% CI 0.80-1.03 for 1980-81 and adjOR=1.04 95% CI 0.92-1.18 for 1990-91). However, in 1999-2000 women in more deprived areas were at a <i>decreased</i> risk compared to women in the most affluent areas (adjOR=0.87 95% CI 0.76-1.00).
Patel et al (2005)	England	1990-1991	12,944 singleton, term.	Maternal social class (Registrar General's Social Scale; professional,	Caesarean section (all) vs. vaginal (all); elective	Home ownership status, age, marital status, ethnicity, smoking, medical history factors, obstetric	<i>Overall caesarean:</i> Crude CS rates indicated that compared to mothers with a professional occupation, mothers in a skilled manual

				managerial/technical, skilled non-manual, skilled manual, partly skilled, unskilled).	CS vs. attempted VD, emergency CS vs. unassisted VB.	history factors, fertility, activity levels, antenatal history, diet, birth weight, infant head circumference, infant length, gestation, fetal presentation included in regression.	position were less likely to have a CS (OR=0.57, 95% CI 0.36-0.90). No other levels of occupation were significant in the univariate analyses, and in the adjusted analyses, social class was not a significant factor. <i>Elective caesarean:</i> Social class was not significant in univariate analyses. <i>Emergency caesarean:</i> Crude CS rates indicated that compared to mothers with a professional occupation, mothers in a skilled manual position were less likely to have a CS (OR=0.50, 95% CI 0.28-0.88). No other levels of occupation were significant in the univariate analyses, and in the adjusted analyses, social class was not a significant factor.
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	No effect
	Mothers from a higher social class background are more likely to have intervention
	Mothers from a lower social class background are more likely to have intervention



Table A2.7: Ethnicity and mode of birth

Author(s)	Country	Period of data collection	Study sample	Determinant(s)	Outcome measure(s)	Co-factors	Effect of mothers' ethnicity on mode of birth
Bragg et al (2010)	England	2008	620,604	Ethnicity:  White, Afro-Caribbean, Asian, Other.	Caesarean section (all).	Age, area deprivation, parity, presentation, fetal distress, dystocia, diabetes, gestational diabetes, hypertension, eclampsia/pre-eclampsia, placenta praevia/placental abruption, preterm birth.	After adjustment, compared to White women, Afro-Caribbean women were more likely to have a CS (adjOR=1.47 95% CI 1.36-1.58). The risk for Asian women and women of Other ethnic background was not significantly different to that for White women (adjOR=1.04 95% CI 0.98-1.11 for Asian and adjOR=1.06 95% CI 0.98-1.14 for women of other ethnicity).
Ibison (2005)	England	1988-1997	27,667 low risk primiparous women.	Ethnicity  Caucasian, African, West Indian, Bangladeshi, Indian, Pakistani, Oriental, Other.	Caesarean section (all) and instrumental vaginal births.	Age, attendance to antenatal classes, booking >20 weeks, fetal sex, intrauterine growth restriction, induction, year of birth, hospital of birth.	<i>Caesarean section</i> Compared to White women, in unadjusted analyses African and West Indian women were at an increased risk of CS (OR=2.7 95% CI 2.4-3.0 for African women and OR=1.5 95% CI 1.3-1.7 for West Indian women), whereas Pakistani women were at a decreased risk (OR=0.8 95% CI 0.6-1.0).  When fully adjusted however, compared to White women, the risk of CS was higher for every non-White group except Oriental,

							<p>for whom there was no significant difference (adjOR=1.3 95% CI 1.0-1.8 for Oriental, adjOR=1.5 95% CI 1.1-2.0 for Pakistani, adjOR=1.6 95% CI 1.4-2.0 for Indian, adjOR=2.1 95% CI 1.7-2.5 for Bangladeshi, adjOR=1.7 95% CI 1.4-2.0 for West Indian and adjOR=2.8 95% CI 2.4-3.1 for African).</p> <p><i>Instrumental vaginal birth</i>  In unadjusted analyses, compared to White women all non-White groups had a reduced risk of instrumental birth except Oriental women (OR=0.9 95% CI 0.7-1.1 for Oriental, OR=0.7 95% CI 0.6-0.8 for Pakistani, OR=0.7 95% CI 0.6-0.8 for Indian, OR=0.6 95% CI 0.6-0.7 for Bangladeshi, OR=0.5 95% CI 0.4-0.6 for West Indian and OR=0.5 95% CI 0.5-0.6 for African).</p> <p>When fully adjusted, for African and West Indian women adjustment made little impact on their reduced risk of instrumental birth (adjOR=0.5 95% CI 0.4-0.6 for West Indian and adjOR=0.5 95% CI 0.4-0.6 for African).</p>
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							However Bangladeshi and Indian women were at an increased risk of instrumental birth after adjustment (adjOR=1.3 95% CI 1.1-1.5 for Pakistani and adjOR=1.3 95% CI 1.1-1.5 for Indian compared to White).
Paranjothy et al (2005)	England and Wales	2000	147,087 singleton pregnancies.	Ethnicity: White, Black African, Black Caribbean, Black Other, Bangladeshi, Indian, Pakistani, Chinese, Asian Other, Other.	Caesarean section before labour and caesarean section during labour.	Regression model: age, number of previous vaginal births, number of previous caesarean sections, gestation, mode of onset of labour, presentation and birth weight.	<p><i>CS before labour:</i> Compared to White mothers, Black African (OR=0.84, 95% CI=0.72-0.97)#, Black Caribbean (OR=0.76, 95% CI= 0.63-0.92), Bangladeshi (OR=0.73, 95% CI=0.58-0.90), Indian (OR=0.82, 95% CI=0.69-0.96), Pakistani (OR=0.66, 95% CI=0.57-0.76), Chinese (OR=0.63, 95% CI=0.45-0.88), Asian Other (OR=0.79, 95% CI=0.64-0.99) and Other (OR=0.78, 95% CI=0.66-0.92) mothers were less likely to have a CS before labour.</p> <p><i>CS during labour:</i> Compared to White mothers, Black African (OR=2.30, 95% CI=2.07-2.55), Black Caribbean (OR=1.66, 95% CI=1.42-1.93), Black Other (OR=1.68, 95% CI=1.45-1.96), Bangladeshi (OR=1.51, 95% CI=1.15-1.97), Indian (OR=1.34, 95% CI=1.17-1.55), Asian Other (OR=1.57, 95% CI=1.36-1.83) and Other (OR=1.24, 95% CI=1.10-1.40)</p>

							mothers were more likely to have a CS during labour.
Patel et al (2005)	England	1990/1991	12,944 singleton, term.	Ethnicity:  White, Black, Asian, Other.	Caesarean section (all) vs. vaginal (all); elective CS vs. attempted VD, emergency CS vs. unassisted VB.	Regression models: <u>Final model (all caesarean birth):</u> previous CS, outcome of last pregnancy, parity, diabetes mellitus, birth weight, neonatal head circumference, gestational age, fetal presentation. <u>Final model (elective CS):</u> previous CS, diabetes mellitus, gestational age, fetal presentation. <u>Final model (emergency CS):</u> previous CS, outcome of last pregnancy, parity, birth weight, neonatal head circumference, fetal presentation, in preferred labour position, epidural.	<i>Overall caesarean:</i> Crude odds ratios indicated that compared to White mothers, mothers of Asian origin were more than twice as likely to have a CS (OR=2.38, 95% CI=1.33-4.27). Results for Black and Other origins were not significant.  <i>Elective caesarean:</i> Ethnicity was not significant in univariate analyses with elective CS.  <i>Emergency caesarean:</i> Crude odds ratios indicated that compared to White mothers, non White mothers were almost twice as likely to have a CS (OR=1.80, 95% CI=1.19-2.73).  When included in regression models, ethnicity was not a significant factor for any of the outcomes.
Richardson and Mmata (2007)	England	2005-2006	NHS maternity statistics.	Ethnicity:  White (inc “not	Elective and emergency caesarean	None.  Crude percentages	The rate of elective CSs was highest for Black (12%) and White (11%) mothers and lower

				stated”), Black, Asian, Chinese and Other.	section and instrumental births.	are presented stratified by method of onset i.e. spontaneous, induced or caesarean section.	for Asian (9%) and Chinese/Other mothers (10%).  The rate of emergency CS for both induced and spontaneous onset was highest for Black mothers (6% compared to 4% for all other groups for induced and 10% compared to around 8% for all other groups for spontaneous).
							Instrumental rates where the method of onset was spontaneous were highest for White mothers (9%) and lowest for Black mothers (4%). Instrumental rates for mothers who were induced were similar across groups (2% for Asian and Black mothers and 3% for White and Chinese/Other mothers).

# The result for Black African mothers for elective caesarean sections may be incorrect as the authors state that the rate for White mothers is 10.2% and the rate for Black African mothers is 12.3%.

	No effect
	White mothers are more likely to have intervention
	Non-white mothers are more likely to have intervention

Table A2.8: Mothers' migration status and mode of birth

Author(s)	Country	Period of data collection	Study sample	Determinant(s)	Outcome measure(s)	Co-factors	Effect of mothers' ethnicity on mode of birth
Redshaw et al (2007)	England	2006	Around 3000	Nationality: Born in UK vs. not.	Caesarean section (all), forceps, vacuum extraction.	None.	There were no significant differences in the rates of any types of birth between White mothers born in the UK compared to BME mothers born outside the UK.

	No effect
	Mothers born outside their country of residence are more likely to have intervention
	Mothers residing in their country of birth are more likely to have intervention

Table A2.9: Mothers' height and mode of birth

Author(s)	Country	Period of data collection	Study sample	Determinant(s)	Outcome measure(s)	Co-factors	Effect of mothers' height on mode of birth
Cnattingius et al (1998)	Sweden	1992-1993	92,623  Primiparous, singleton births.	Self-reported height (cm)  <154, 155-164, 165-174, >175 (reference).	Elective and emergency caesarean section.	Age, pre-pregnancy BMI, education, nationality, type of hospital included in regression analysis.	<i>Elective caesarean:</i> Compared to the tallest mothers, mothers 155-164cm tall were 1.5 times more likely to have an elective CS and mothers shorter than 154cm were more than 4 times as likely (OR=1.5, 95% CI= 1.3-1.8 for mothers 155-164 and OR=4.1, 95% CI= 3.3-5.3 for <154). Mothers in the second tallest group were not significant (OR=1.1, 95% CI= 1.0-1.3). <i>Emergency caesarean:</i> For emergency CS there was a gradient effect with increasing risk for shorter mothers, even for those in the second tallest category. Compared to the tallest mothers, mothers 165-174cm tall were 1.4 times more likely to have an emergency CS, mothers 155-164cm were more than twice as likely and mothers shorter than 154cm were almost 5 times as likely (OR=1.4, 95% CI= 1.3-1.6 for mothers 165-174, OR=2.4, 95% CI= 2.1-2.7 for mothers 155-164 and OR=4.9, 95% CI= 4.1-5.9 for mothers <154).
Gareen et al	USA	1988	6,805	Self-reported	Caesarean	Regression model:	When included in a well-adjusted

(2003)				pre-pregnancy height 60 in vs. 64 in.	section (all).	<i>Full model:</i> age, gestation, birth weight, parity, history of CS, multiple birth, placental problems, hypertension, pre-eclampsia, diabetes, breech, malpresentation, herpes, fetal distress, height, weight, history of pregnancy wantedness, insurance type, treatment for infertility, marital status, ethnicity, education, income, worked during pregnancy, antenatal care, exercise during pregnancy, epidural.	regression model, shorter mothers were around 60% more likely to have a CS (adjOR=1.57, 95% CI=1.36-1.81).
Mahmood et al (1988)	Scotland	Not given	563 White, primiparous.	Height recorded at booking visit ≤153cm, 154-159cm, 160-165cm, 166-171cm, ≥ 172cm.	Emergency caesarean section.	None.	The rate of CS was significantly higher for mothers in the shortest two categories (18.9% for ≤153cm and 22.2% for 154-159cm) compared to women in the taller categories (8.8% for 160-165cm and 8.6% for 166-171cm and ≥ 172cm, p<0.01).
McGuinness and Trivedi	New Zealand	1994-1998	1,078	Height (cm).	Emergency caesarean	None.	The odds of CS gradually increased with decreasing height



(1999)					section.		(graph included in paper). For example, women 170cm tall had a risk of CS of around 5%, whereas the risk for a woman of 160cm was around 10%, 150cm was 17.5% and 140cm was around 30%.
Read et al (1994)	Australia	1987	3,641	Height (cm) <160, 160-164, 165+ (reference).	Emergency caesarean section and instrumental vaginal birth (vacuum or forceps).	Race, area of residence, marital status, age, public or private care, infant gender, birth weight, length of labour, labour complications and anaesthesia included in regression model.	<p><i>Emergency caesarean:</i> Compared to mothers 165cm or more, mothers 160-164cm tall were more than twice as likely to have an emergency CS and mothers shorter than 160cm were more than 5 times as likely (OR=2.43, 95% CI=1.70-3.48 for 160-164 and OR=5.30, 95% CI=3.72-7.56 for &lt;160).</p> <p><i>Instrumental birth:</i> Compared to mothers 165cm or more, mothers 160-164cm tall and mothers shorter than 160cm were around 30% more likely to have an instrumental birth (OR=1.38, 95% CI=1.14-1.68 for 160-164 and OR=1.32, 95% CI=1.07-1.64 for &lt;160).</p>

	No effect
	Shorter mothers are more likely to have intervention
	Taller mothers are more likely to have intervention

Table A2.10: Mothers' weight and mode of birth

Author(s)	Country	Period of data collection	Study sample	Determinant(s)	Outcome measure(s)	Co-factors	Effect of mothers' weight on mode of birth
Baeten et al (2001)  Also in reviews by Chu et al (2007) and Poobalan et al (2009)	USA	1992-1996	96,801	BMI calculated from self-reported height, and weight from medical records  <20.0 (lean), 20.0-24.9 (normal), 25.0-29.9 (overweight), ≥30.0 (obese).	Caesarean section (all).	Age, marital status, education, smoking, antenatal care timing, insurance status and weight gain in pregnancy included in regression model .	Compared to mothers with a "lean" BMI, the likelihood of CS increased with each increasing category of BMI. Mothers with a normal, overweight and obese BMI were 1.3, 1.8 and 2.9 times more likely to have a CS than mothers with a lean BMI (OR=1.3 95% CI=1.2-1.4 for normal mothers, OR=1.8 95% CI=1.7-2.0 for overweight mothers and OR=2.9 95% CI=2.7-3.1 for obese mothers).  Analyses were repeated excluding women with complications of chronic hypertension, pre-gestational and gestational diabetes, pre-eclampsia and eclampsia. Results were very similar. Compared to mothers with a "lean" BMI, mothers with a normal, overweight and obese BMI were 1.3, 1.8 and 2.7 times more likely to have a CS (OR=1.3 95% CI=1.2-1.3 for normal mothers, OR=1.8 95% CI=1.6-1.9 for overweight mothers and OR=2.7 95% CI=2.5-2.9 for obese mothers).
Bhattacharya et al (2007)	Scotland	1976-2005	24,241	BMI (Height and	Elective and emergency	"Relevant socio-demographic	<i>Elective caesarean:</i> After adjustment, morbidly obese

Also in review by Poobalan et al (2009)				weight of women recorded at their first antenatal visit.)  ≤19.9 (underweight), 20-24.9, 25-29.9, 30-34.9, >35.	caesarean section.	characteristics”, year of birth, pre-eclampsia and gestational hypertension included in regression model.	mothers were 3 times more likely to have an elective CS than mothers with a normal BMI (adjOR=3.1 95% CI=1.7-6.1). The results for underweight, overweight and obese women were not significant (adjOR=0.8 95% CI=0.6-1.0, adjOR=1.1 95% CI=0.9-1.3 and adjOR=1.4 95% CI=1.0-1.8 for underweight, overweight and obese women respectively). <i>Emergency caesarean:</i> After adjustment, overweight, obese and morbidly obese mothers were 1.5, 2 and 3 times more likely to have an emergency CS respectively, than mothers with a normal BMI (adjOR=1.5 95% CI=1.3-1.6 for overweight women, adjOR=2.0 95% CI=1.8-2.3 for obese women and adjOR=2.8 95% CI=2.0-3.9 for morbidly obese women). The result for underweight women was not significant (OR=0.9 95% CI=0.8-1.1).
Cnattingius et al (1998)	Sweden	1992-1993	92,623  Primiparous, singleton births.	BMI estimated at first antenatal visit  <20.0 (lean), 20.0-24.9 (normal), 25.0-29.9 (overweight),	Elective and emergency caesarean section.	Age, pre-pregnancy BMI, education, nationality, type of hospital included in regression analysis.	<i>Elective caesarean:</i> Compared to lean mothers, overweight mothers were 1.5 times more likely to have an elective CS and obese mothers were more than twice as likely (OR=1.5, 95% CI= 1.8-2.7 for overweight mothers and OR=2.2, 95% CI= 1.8-2.7 for obese mothers). The result for mothers with

				>30.0 (obese).			a normal BMI were not significant (OR=1.1, 95% CI= 1.0-1.3). <i>Emergency caesarean:</i> For emergency CS there was a gradient effect with increasing risk with increasing BMI, even for those in the normal category compared to lean. Compared to the lean mothers, normal mothers were 1.3 times more likely to have an emergency CS, overweight mothers were twice as likely and obese mothers were almost 3 times as likely (OR=1.3, 95% CI= 1.2-1.4 for normal mothers, OR=2.0, 95% CI= 1.8-2.3 for overweight mothers and OR=2.7, 95% CI= 2.3-3.0 for obese mothers).
Cnattingius and Lambe (2002)	Sweden	1992-1997	453,801  Singleton births.	BMI estimated at first antenatal visit  ≤24.9 (lean or normal), 25.0-29.9 (overweight), ≥30.0 (obese).	Caesarean section (all)	Age, parity, cohabitation with infant's father, education, mother's country of birth, height and smoking included in regression analysis.	Compared to mothers with a lean or normal BMI, overweight and obese mothers were 1.4 and 2 times more likely to have a CS, respectively (OR=1.4 95% CI=1.4-1.4 for overweight mothers and OR=2.0 95% CI=2.0-2.1 for obese mothers).
<b>Chu et al (2007)</b>  <b>Review paper</b>  4 studies (3 USA and 1	33 studies:  16 USA, 5 Denmark, 5 France , 2 Sweden, 1 UK,	Range from 1977-2003	1,391,654 from all studies.	Mixture of BMI and weight measurements comparing overweight and obese mothers to normal	Caesarean section (all).  Some studies differentiated between elective and	None.  Although the individual studies generally adjusted for other factors, due to the	The pooled estimate from all studies showed that compared to normal weight mothers, mothers who were overweight, obese and severely obese were 1.5, 2.0 and 2.9 times more likely to have a CS (OR=1.46 95% CI 1.34-1.60 for overweight

Denmark) included in the review were also in the later review by Poobalan et al (2008)	1 Canada, 1 Israel, 1 United Arab Emirates, 1 Poland.			weight mothers. Some studies also included a severely obese category.	emergency caesarean births but the study pooled the results.	differing risk measurements and the different factors adjusted for between studies, crude odds ratios were calculated.	mothers, OR=2.05 95% CI 1.86-2.27 for obese mothers and OR=2.89 95% CI 2.28-3.79 for severely obese mothers).
Gareen et al (2003)	USA	1988	6,805	Self-reported weight before pregnancy (lbs)  180 lbs vs. 140 lbs.	Caesarean section (all).	Regression model: <i>Full model:</i> age, gestation, birth weight, parity, history of CS, multiple birth, placental problems, hypertension, pre- eclampsia, diabetes, breech, malpresentation, herpes, fetal distress, height, weight, history of pregnancy wantedness, insurance type, treatment for infertility, marital status, ethnicity, education, income, worked during pregnancy, antenatal care,	When included in a well-adjusted regression model, heavier mothers were around 30% more likely to have a CS (adjOR=1.29, 95% CI=1.18-1.42).

						exercise during pregnancy, epidural.	
Guihard and Blondel (2001)	France	1981 and 1995	5,410 (1981) and 13,318 (1995)	Weight before pregnancy (kg)  <80 kg vs. ≥80 kg.	Caesarean section (all).	Regression model: age, nationality, education, birth weight, breech presentation, size of maternity unit, status of maternity unit (public/private).	Two national surveys were conducted in 1981 and 1995, including data regarding births in public and private maternity units. After adjusting for maternal characteristics and hospital factors, the risk of CS for heavier women was twice that of the lighter women in 1995 (adjOR=2.2, 95% CI=1.6-3.1). Weight was not a significant factor in the earlier 1981 sample (adjOR=1.3, 95% CI=0.4-4.5).
Joseph et al (2006)	Canada	1988-1995	76,440	Weight before pregnancy (kg)  <55, 55-59, 60-69, 70-74, ≥ 75.	Caesarean section (all; including overall and primary).  Two regression models: one examining income with induction, overall CS and primary CS as outcomes, and one with labour induction <u>or</u>	Age, parity, family income, investments, previous CS, previous perinatal death, hypertension, gestational diabetes, diabetes mellitus, placenta praevia, placental abruption, attending physician, epidural anaesthesia, time period, smoking status at birth, marital status,	It appears from adjusted analyses that there is a gradient of increasing risk of CS <u>or</u> labour induction with increasing weight. Compared to women weighing 60-69 kg, women weighing 55-59 kg and less than 55 kg are less likely to have a CS or induction (adj rate ratio=0.94, 95% CI=0.91-0.98 and adj rate ratio=0.92, 95% CI=0.89-0.96, respectively). Conversely, women weighing 70-74 kg and more than 75 kg are more likely to have a CS or induction (adj rate ratio=1.12, 95% CI=1.07-1.18 and adj rate ratio=1.35, 95% CI=1.30-1.40, respectively).

					CS as outcome.	rural residence, antenatal class attendance, previous low birth weight infant, other chronic medical disease adjusted for in regression.	
Naftalin and Paterson-Brown (2008)	England	2006	126 (99 non-obese and 27 obese).  Singleton cephalic nullipara spontaneously labouring at term.	BMI >30 obese.	Emergency caesarean section and instrumental.	Birth weight adjusted for.	<i>Instrumental:</i> Compared to mothers who gave birth vaginally, mothers who had an instrumental birth were over 70% more likely to be obese (adjRRR=1.74 95% CI=0.64-4.72). <i>Emergency caesarean:</i> Compared to mothers who gave birth vaginally, mothers who had an emergency CS were over 5 times more likely to be obese (adjRRR=5.34 95% CI=1.50-18.97).
<b>Poobalan et al (2009)</b>  <b>Review paper</b>	11 studies:  3 UK, 5 USA, 1 Denmark, 1 Sweden, 1 Reunion (France).	Range from 1976-2005	209,193 from all studies  Primiparous single pregnancies.	BMI: 20-25 (normal), 25-30 (overweight), 30-35 (obese), >35 (morbidly obese).	Caesarean section (all), separate analyses pooling results of 4 of the studies that distinguished elective and emergency CS.	None.  Although the individual studies generally adjusted for other factors, due to the differing risk measurements and the different factors adjusted for between studies, crude	<i>Caesarean section:</i> Compared to women with a normal BMI, overweight, obese and morbidly obese women were 1.53, 2.26 and 3.38 times more likely to have a CS (OR= 1.53 95% CI=1.48-1.58 for overweight women, OR=2.26 95% CI=2.04-2.51 for obese women and OR=3.38 95% CI=2.49-4.57). <i>Elective caesarean:</i> Compared to women with a normal BMI, overweight and obese women

						odds ratios were calculated.	were 1.32 and 1.87 times more likely to have a CS (OR= 1.32 95% CI=1.21-1.45 for overweight women and OR=1.87 95% CI=1.64-2.12 for obese women). <i>Emergency caesarean:</i> Compared to women with a normal BMI, overweight and obese women were 1.64 and 2.23 times more likely to have a CS (OR= 1.64 95% CI=1.55-1.73 for overweight women and OR=2.23 95% CI=2.07-2.42 for obese women).
Rosenberg et al (2005)	USA	1999-2001	329,988 Singleton births.	Weight before pregnancy (lb) <100, 100-149 (reference group), 150-199, 200-299 (overweight), ≥300 (obese).  Weight gain during pregnancy (lb) <41 (reference), ≥41 (excess weight gain).	Primary caesarean section (all).	Age, marital status, education, nationality, insurance status, social risk, parity, trimester antenatal care began, diabetes, gestational diabetes, hypertension and pre-eclampsia.	A gradient effect was noted with the risk of CS increasing with increasing weight. Compared to women who weighed 100-149 lb, women who weighed 150-199, 200-299 and greater than 300 lb were 1.3 1.9 and 2.6 times more likely to have a CS, respectively (adjOR= 1.32 95% CI=1.29-1.36 for 150-199 lb, adjOR= 1.89 95% CI=1.81-1.97 for 200-299 and adjOR= 2.59 95% CI=2.13-3.15 for ≥300 lb). Results for the lowest weight women were not significant (adjOR=0.96 95% CI=0.91-1.03).  Compared to women who did not gain more than the recommended 40 lb, women who gained more during pregnancy were 1.4 times more likely to have a CS (OR= 1.38 95%



							CI= 1.34-1.41).
Weiss et al (2004)	USA	1999-2002	16,102  (5,142 primiparous women for caesarean birth rates.)	BMI: <30 (control group), 30-34.9 (obese), ≥35 (morbidly obese).	Caesarean section (all) and instrumental vaginal birth.	<i>Caesarean section:</i> None.  <i>Instrumental vaginal birth:</i> Age, race, education, marital status, parity, use of assisted reproductive technology, gestational age, birth weight included in regression model.	<i>Caesarean section:</i> Compared to controls (women with a BMI less than 30), women who were obese were 70% more likely to have a CS and morbidly obese women were 3 times as likely (ORs= 1.7, 95% CI=1.4-2.2 and 3.0, 95% CI=2.2-4.0). <i>Instrumental vaginal birth:</i> After adjusting for other maternal characteristics, compared to control women, morbidly obese women were 70% more likely to have an instrumental vaginal birth (adjOR=1.7, 95% CI=1.2-2.2). There was no significant difference for obese women (adjOR=1.0, 95% CI=0.8-1.3).

	No effect
	Heavier mothers are more likely to have intervention
	Lighter mothers are more likely to have intervention

Table A2.11: Diabetes and mode of birth

Author(s)	Country	Period of data collection	Study sample	Determinant(s)	Outcome measure(s)	Co-factors	Effect of mothers' diabetes on mode of birth
Feig et al (2006)	Canada	1996-2001	Not given.  Mothers with gestational diabetes excluded.	PGD.	Caesarean section (all).	Age, parity, previous CS included in regression model.	Mothers with PGD were almost twice as likely to have a CS than mothers without (OR=1.78 95% CI=1.60-1.98).
Gareen et al (2003)	USA	1988	6,805	Diabetes.	Caesarean section (all).	Regression model: <i>Full model:</i> age, gestation, birth weight, parity, history of CS, multiple birth, placental problems, hypertension, pre-eclampsia, diabetes, breech, malpresentation, herpes, fetal distress, height, weight, history of pregnancy wantedness, insurance type, treatment for infertility, marital status, ethnicity, education,	Compared to non-diabetic mothers, diabetic mothers were more likely to have a CS (adj risk ratio=1.69, 95% CI=1.33-2.16), when included in a well-adjusted regression model.

						income, worked during pregnancy, antenatal care, exercise during pregnancy, epidural.	
Hawthorne et al (1997)	England	1994	111 women with diabetes were compared to the background population at several hospitals.	PGD.	Caesarean section (all).	None.	The CS rate among the study participants was 62% compared to rates of 10.4-17.5% in the background population of the participating hospitals.
Jensen et al (2004)	Denmark	1993-1999	1,215 pregnancies in mothers with diabetes compared to background population births (70,089).	PGD (type 1).	Caesarean section (all).	None.	Mothers with diabetes were over 4 times more likely to have a CS (RR=4.4 95% CI=4.1-4.8).
Joseph et al (2006)	Canada	1988-1995	76,440	Gestational diabetes and diabetes mellitus.	Caesarean section (all; including overall and primary).  Two regression models: one examining income with induction,	Age, parity, weight, family income, investments, previous CS, previous perinatal death, hypertension, placenta praevia, placental abruption, attending	Mothers with gestational diabetes and diabetes mellitus are at increased risk of CS or labour induction (rate ratio=1.55 95% CI=1.46-1.64 for mothers with gestational diabetes and rate ratio =2.07 95% CI=1.75-2.34 for mothers with diabetes mellitus).

					overall CS and primary CS as outcomes, and one with labour induction or CS as outcome.	physician, epidural anaesthesia, time period, smoking status at birth, marital status, rural residence, antenatal class attendance, previous low birth weight infant, other chronic medical disease adjusted for in regression.	
Patel et al (2005)	England	1990-1991	12,944 singleton, term.	Diabetes.  None, gestational or pre-gestational.	Caesarean section (all) vs. vaginal (all); elective CS vs. attempted VD, emergency CS vs. unassisted VD.	Home ownership status, age, marital status, ethnicity, social class, medical history factors, obstetric history factors, fertility, activity levels, antenatal history, diet, birth weight, infant head circumference, infant length, gestation, fetal presentation included in regression.	<p><i>Caesarean section:</i> In the adjusted analyses, mothers who had any type of diabetes were over 4 times more likely to have a CS than mothers without diabetes (adjOR=4.51 95% CI=2.18-9.31).</p> <p><i>Elective caesarean:</i> In the adjusted analyses, mothers who had any type of diabetes were 4 times more likely to have an elective CS than mothers without diabetes (adjOR=4.05 95% CI=1.46-11.20).</p> <p><i>Emergency caesarean:</i> In the univariate analyses mothers with diabetes were around 3 times more likely to have an emergency</p>

							CS than mothers without (OR=3.09 95% CI=1.65-5.79). However, when included in the adjusted analyses, diabetes was no longer significant.
Rosenberg et al (2005)	USA	1999-2001	329,988 Singleton births.	Chronic diabetes and gestational diabetes.	Primary caesarean section (all).	Age, marital status, education, nationality, insurance status, social risk, parity, antenatal care, weight and weight gain, hypertension, pre-eclampsia included in regression model.	Mothers with chronic diabetes and gestational diabetes were 2.4 and 1.5 times more likely to have a CS, respectively (adjOR=2.37 95% CI=2.05-2.75 for chronic and adjOR=1.47 95% CI=1.40-1.55 for gestational diabetes).

	No effect
	Diabetic mothers are more likely to have intervention
	Non-diabetic mothers are more likely to have intervention

Table A2.12: Herpes and mode of birth

Author(s)	Country	Period of data collection	Study sample	Determinant(s)	Outcome measure(s)	Co-factors	Effect of mothers' herpes on mode of birth
Gareen et al (2003)	USA	1988	6,805	Herpes.	Caesarean section (all).	Regression model: <i>Full model</i> : age, gestation, birth weight, parity, history of CS, multiple birth, placental problems, hypertension, pre-eclampsia, diabetes, breech, malpresentation, herpes, fetal distress, height, weight, history of pregnancy wantedness, insurance type, treatment for infertility, marital status, ethnicity, education, income, worked during pregnancy, antenatal care, exercise during pregnancy, epidural.	In univariate analyses, compared to mothers without herpes, mothers with herpes were more than 8 times more likely to have a CS (risk ratio=8.30, 95% CI=4.26-16.00). When included in a well-adjusted regression model, herpes remained a significant factor, although the risk was attenuated (adj risk ratio=5.27 95% CI=4.12-6.73).

No effect
Mothers with herpes are more likely to have intervention
Mothers without herpes are more likely to have intervention

Table A2.13: Hypertension/ pre-eclampsia and mode of birth

Author(s)	Country	Period of data collection	Study sample	Determinant (s)	Outcome measure(s)	Co-factors	Effect of mothers' pre-eclampsia or hypertension on mode of birth
Gareen et al (2003)	USA	1988	6,805	Hypertension and pre-eclampsia.	Caesarean section (all).	Regression model: <i>Full model:</i> age, gestation, birth weight, parity, history of CS, multiple birth, placental problems, hypertension, pre-eclampsia, diabetes, breech, malpresentation, herpes, fetal distress, height, weight, history of pregnancy wantedness, insurance type, treatment for infertility, marital status, ethnicity, education, income, worked during pregnancy, antenatal care, exercise during pregnancy,	<p><i>Hypertension:</i> In unadjusted analyses, compared to mothers without hypertension, mothers with hypertension were twice as likely to have a CS (risk ratio=2.04 95% CI=1.77-2.36). When included in a well-adjusted regression model however, hypertension was no longer significant (adj risk ratio=1.16 95% CI=0.93-1.45).</p> <p><i>Pre-eclampsia:</i> In unadjusted analyses, compared to mothers without pre-eclampsia, mothers with pre-eclampsia were over 3 times as likely to have a CS (risk ratio=3.42 95% CI=2.88-4.07). When included in a well-adjusted regression model, pre-eclampsia remained significant, but the risk was attenuated (adj risk ratio=2.22 95% CI=1.78-2.77).</p>

						epidural.	
Joseph et al (2006)	Canada	1988-1995	76,440	Hypertension	Caesarean section (all; including overall and primary).  Two regression models: one examining income with induction, overall CS and primary CS as outcomes, and one with labour induction <u>or</u> CS as outcome.	Age, parity, weight, family income, investments, previous CS, diabetes, previous perinatal death, placenta praevia, placental abruption, attending physician, epidural anaesthesia, time period, smoking status at birth, marital status, rural residence, antenatal class attendance, previous low birth weight infant, other chronic medical disease adjusted for in regression.	Mothers with hypertension were at increased risk of CS <u>or</u> labour induction compared to mothers without hypertension (adj rate ratio=1.95 95% CI=1.85-2.04).
Rosenberg et al (2005)	USA	1999-2001	329,988  Singleton births.	Chronic hypertension, pregnancy hypertension and pre-eclampsia (women with	Primary caesarean section (all).	Age, marital status, education, nationality, insurance status, social risk, parity, antenatal care, diabetes,	Mothers with chronic hypertension, pregnancy hypertension and pre-eclampsia were 1.6, 1.4 and 2.5 times more likely to have a CS than mothers without these problems, respectively (adjOR=1.57 95%



				eclampsia were excluded).		hypertension, pre-eclampsia.	CI=1.43-1.73 for mothers with chronic hypertension, adjOR=1.35 95% CI=1.25-1.46 for mothers with pregnancy hypertension and adjOR=2.50 95% CI=2.36-2.65).
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	No effect
	Mothers with hypertension or pre-eclampsia are more likely to have intervention
	Mothers without hypertension or pre-eclampsia are more likely to have intervention

Table A2.14: Smoking in pregnancy and mode of birth

Author(s)	Country	Period of data collection	Study sample	Determinant(s)	Outcome measure(s)	Co-factors	Effect of mothers' smoking on mode of birth
Cnattingius et al (1998)	Sweden	1992-1993	92,623 Primiparous, singleton births.	Smoking recorded at first antenatal visit.  None (not daily smoking),  Moderate (1-9 cigarettes per day),  Heavy (10+ cigarettes per day).	Elective and emergency caesarean section.	Age, pre-pregnancy BMI, education, nationality, type of hospital included in regression analysis.	Smoking was not significantly related to overall CS in univariate analyses, and therefore was not included in further regression models for elective and emergency CS (OR=1.0 95% CI=0.98-1.1 for 1-9 cig/day and OR=1.0 95% CI=0.95-1.1 for 10+ cigs/day compared to mothers who did not smoke).
Cnattingius and Lambe (2002)	Sweden	1992-1997	453,801 Singleton births.	Smoking recorded at first antenatal visit.  None (not daily smoking),  moderate (1-9 cigarettes per day),  heavy (10+ cigarettes per day).	Caesarean section (all).	Age, parity, cohabitation with infant's father, education, mother's country of birth, height and BMI included in regression analysis.	Compared to mothers who did not smoke, mothers who smoked between 1 and 9 cigarettes per day had a slight increased risk of having a CS (OR=1.1 95% CI=1.1-1.2). The result for mothers who smoked more than 10 cigarettes per day was not significant (OR=1.1 95% CI=1.0-1.1).

Patel et al (2005)	England	1990-1991	12,944 singleton, term.	Cigarettes per day.	Caesarean section (all) vs. vaginal (all); elective CS vs. attempted VD, emergency CS vs. unassisted VD.	Home ownership status, age, marital status, ethnicity, social class, medical history factors, obstetric history factors, fertility, activity levels, antenatal history, diet, birth weight, infant head circumference, infant length, gestation, fetal presentation included in regression.	<p><i>Elective caesarean:</i>  In the univariate analyses mothers who had an elective CS smoked less cigarettes per day compared to mothers who attempted a normal VD (OR=0.67 95% CI=0.52-0.86).  When included in the regression model however, smoking was not a significant factor (data not shown).</p> <p>Smoking was not significant in any other models (data not available).</p>
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	No effect
	Mothers who smoked during pregnancy are more likely to have intervention
	Non-smoking mothers are more likely to have intervention

Table A2.15: Placental problems and mode of birth

Author(s)	Country	Period of data collection	Study sample	Determinant(s)	Outcome measure(s)	Co-factors	Effect of mothers' placental problems on mode of birth
Gareen et al (2003)	USA	1988	6,805	Placenta praevia and placental abruption.	Caesarean section (all).	Regression model: <i>Full model:</i> age, gestation, birth weight, parity, history of CS, multiple birth, placental problems, hypertension, pre-eclampsia, diabetes, breech, malpresentation, herpes, fetal distress, height, weight, history of pregnancy wantedness, insurance type, treatment for infertility, marital status, ethnicity, education, income, worked during pregnancy, antenatal care, exercise during pregnancy, epidural.	Compared to mothers with no placental problems, mothers with placental abruption were around twice as likely to have a CS and mothers with placenta praevia were around 5 times as likely (adj risk ratio= 1.94 95% CI= 1.46-2.60 for mothers with placental abruption and adj risk ratio= 5.37 95% CI= 4.42-6.52).

Joseph et al (2006)	Canada	1988-1995	76,440	Placenta praevia and placental abruption.	Caesarean section (all; including overall and primary).  Two regression models: one examining income with induction, overall CS and primary CS as outcomes, and one with labour induction <u>or</u> CS as outcome.	Age, parity, weight, family income, investments, previous CS, hypertension, diabetes, previous perinatal death, attending physician, epidural anaesthesia, time period, smoking status at birth, marital status, rural residence, antenatal class attendance, previous low birth weight infant, other chronic medical disease adjusted for in regression.	Compared to mothers without placental problems, mothers with placental abruption and placenta praevia were around 1.7 and 3 times more likely to have a CS <u>or</u> induction of labour, respectively (rate ratio=1.66 95% CI=1.50-1.81 for placental abruption and rate ratio=2.93 95% CI=2.81-2.99 for placenta praevia).
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No effect
Mothers with placental problems are more likely to have intervention
Mothers without placental problems are more likely to have intervention

Table A2.16: Fetal distress and mode of birth

Author(s)	Country	Period of data collection	Study sample	Determinant(s)	Outcome measure(s)	Co-factors	Effect of fetal distress on mode of birth
Braveman et al (1995)	USA	1991	217,461 singleton first live births.	Fetal stress (moderate or heavy meconium, cord prolepses, and/or fetal distress).	Caesarean section (all).	Regression model: age, type of insurance, ethnicity, poverty, education, marital status, antenatal care, non-English speaking areas, birth weight, mechanical medical risk factors, other medical complications, birth volume of hospital, teaching status of hospital, type of hospital, region.	In the adjusted analyses, compared to mothers who did not have fetal stress, mothers who did have fetal stress noted were over 4 times more likely to have a CS (adjOR=4.80 95% CI=4.64-4.97).
Gareen et al (2003)	USA	1988	6,805	Fetal distress.	Caesarean section (all).	Regression model: <i>Full model:</i> age, gestation, birth weight, parity, history of CS, multiple birth, placental problems, hypertension, pre-	Compared to mothers who did not have fetal distress, mothers who did were almost 4 times more likely to have a CS (adjOR=3.87 95% CI=3.39-4.42).

						eclampsia, diabetes, breech, malpresentation, herpes, fetal distress, height, weight, history of pregnancy wantedness, insurance type, treatment for infertility, marital status, ethnicity, education, income, worked during pregnancy, antenatal care, exercise during pregnancy, epidural.	
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	No effect
	Mothers who had fetal distress during birth are more likely to have intervention
	Mothers who did not have fetal distress during birth are more likely to have intervention

Table A2.17: Fetal presentation and mode of birth

Author(s)	Country	Period of data collection	Study sample	Determinant(s)	Outcome measure(s)	Co-factors	Effect of fetal presentation on mode of birth
Cesaroni et al (2008)	Italy	1990-1996	88,698 first-born live births.	Presentation  Vertex vs. malpresentation.	Caesarean section (all).	None.	Compared to mothers giving birth to a vertex presenting baby, mothers giving birth to a malpresented baby were around 14 times more likely to have a CS (OR=14.25 95% CI=13.04-15.56).
Gareen et al (2003)	USA	1988	6,805	Presentation  Breech vs. none  and  Malpresentation vs. none (transverse lie, face presentation and prolapsed arm presentation).	Caesarean section (all).	Regression model: <i>Full model:</i> age, gestation, birth weight, parity, history of CS, multiple birth, placental problems, hypertension, pre-eclampsia, diabetes, breech, malpresentation, herpes, fetal distress, height, weight, history of pregnancy wantedness, insurance type, treatment for infertility, marital status, ethnicity, education,	<i>Breech:</i> In adjusted analyses, mothers whose fetus was in the breech presentation were around 6 times more likely to have a CS compared to mothers without breech presentation (adj risk ratio=6.49 95% CI=5.60-7.52).  <i>Malpresentation::</i> In adjusted analyses, mothers whose fetus was malpresented were around 4 times more likely to have a CS compared to mothers without malpresentation (adj risk ratio=3.92 95% CI=3.32-4.63).



						income, worked during pregnancy, antenatal care, exercise during pregnancy, epidural.	
Guihard and Blondel (2001)	France	1981 and 1995	5,410 (1981) and 13,318 (1995)	Presentation.  Breech – yes or no.	Caesarean section (all).	Regression model: age, weight, nationality, education, birth weight, size of maternity unit, status of maternity unit (public/private).	<i>1981:</i> After adjusting for maternal characteristics and hospital factors, compared to mothers who gave birth to a baby not in the breech position, the risk of CS for mothers giving birth to a baby who was in the breech position was more than 22 times higher (adjOR=22.2, 95% CI=13.7-36.1).  <i>1995:</i> In the later 1995 data, the higher risk for mothers who gave birth to a baby in the breech position was still much higher than those who did not, although slightly attenuated (adjOR=13.8 95% CI=10.2-18.7).
Paranjothy et al (2005)	England and Wales	2000	147,087 singleton pregnancies.	Presentation.  Cephalic (reference), breech or transverse.	Caesarean section before labour and caesarean section during labour.	Regression model: age, ethnicity, number of previous vaginal births, number of previous CS, gestation, mode of onset of labour,	<i>CS before labour:</i> Compared to mothers who gave birth to a cephalic presenting baby, mothers who gave birth to a breech or transverse lie baby were over 20 times more likely to have an CS before labour (adjOR=26.43 95% CI=24.17-28.90 for breech and adjOR= 22.20 95% CI=17.32-

						and birth weight.	28.44 for transverse).  <i>CS during labour:</i> Compared to mothers who gave birth to a cephalic presenting baby, mothers who gave birth to a breech baby were over 35 times more likely to have a CS during labour (adjOR=35.93 95% CI=31.54-40.85). Of the mothers who delivered by emergency CS, 100% of mothers who had a transverse lie baby delivered by emergency CS.
Patel et al (2005)	England	1990/1991	12,944 singleton, term.	Presentation.  Cephalic (reference), breech or other.	Caesarean section (all) vs. vaginal (all); elective CS vs. attempted VD, emergency CS vs. unassisted VD.	Regression models: <i>Final model (all caesarean birth):</i> previous CS, outcome of last pregnancy, parity, diabetes mellitus, birth weight, neonatal head circumference, gestational age, fetal presentation. <i>Final model (elective CS):</i> previous CS, diabetes mellitus, gestational age, fetal presentation. <i>Final model (emergency CS):</i>	<i>Overall caesarean:</i> Compared to mothers who gave birth to a cephalic presenting baby, mothers who gave birth to a breech baby or a baby presenting in an “other” way were around 37 and 49 times more likely to have a CS, respectively (adjOR= 36.6 95% CI=26.8-50.0 for breech and adjOR= 49.3 95% CI=20.6-118.0 for other).  <i>Elective caesarean:</i> Compared to mothers who gave birth to a cephalic presenting baby, mothers who gave birth to a breech baby or a baby presenting in an “other” way were around 86 and 22 times more likely to have a CS, respectively (adjOR= 86.4 95% CI=58.5-128.0 for breech and

						previous CS, outcome of last pregnancy, parity, birth weight, neonatal head circumference, fetal presentation, in preferred labour position, epidural.	adjOR= 21.5 95% CI=6.56-70.1 for other).  <i>Emergency caesarean:</i> Compared to mothers who gave birth to a cephalic presenting baby, mothers who gave birth to a breech baby or a baby presenting in an “other” way were around 10 and 90 times more likely to have a CS, respectively (adjOR= 9.58 95% CI=6.06-15.1 for breech and adjOR= 89.8 95% CI=29.4-274.0 for other).
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	No effect
	Mothers who have a non-cephalic presenting fetus are more likely to have intervention
	Mothers who have a cephalic presenting fetus are more likely to have intervention

Table A2.18: Multiple birth and mode of birth

Author(s)	Country	Period of data collection	Study sample	Determinant(s)	Outcome measure(s)	Co-factors	Effect of multiple birth on mode of birth
Gareen et al (2003)	USA	1988	6,805	Multiple birth  Multiple birth vs. single birth (reference).	Caesarean section (all).	Regression model: <i>Full model:</i> age, gestation, birth weight, parity, history of CS, multiple birth, placental problems, hypertension, pre-eclampsia, diabetes, breech, malpresentation, herpes, fetal distress, height, weight, history of pregnancy wantedness, insurance type, treatment for infertility, marital status, ethnicity, education, income, worked during pregnancy, antenatal care, exercise during pregnancy, epidural.	Compared to mothers who had a single birth, mothers who had a multiple birth were more than 3 times more likely to have a CS (OR=3.69 95% CI=3.06-4.46). When included in the regression model, mothers who had a multiple birth were almost twice as likely to have a CS than mothers who had a single birth (adjOR=1.81 95% CI=1.42-2.32).

	No effect
	Mothers who have a multiple birth are more likely to have intervention
	Mothers who have a single birth are more likely to have intervention

Table A2.19: Previous caesarean section and current mode of birth

Author(s)	Country	Period of data collection	Study sample	Determinant(s)	Outcome measure(s)	Co-factors	Effect of mothers' previous CS on mode of birth
Behague et al (2002)	Brazil	1993	5,304 and sub-sample of 80.	Previous caesarean section vs. previous normal birth.	Caesarean section (all).	None.	In a sample of over 5,000 women who gave birth in several hospitals, crude rates indicated mothers who had a CS were much more likely to have had a previous CS (83.3%) than to have had a previous normal birth (14.0%, $p < 0.001$ ).
Gareen et al (2003)	USA	1988	6,805	Previous caesarean section vs. none.	Caesarean section (all).	Regression model: <i>Full model:</i> age, gestation, birth weight, parity, history of CS, multiple birth, placental problems, hypertension, pre-eclampsia, diabetes, breech, malpresentation, herpes, fetal distress, height, weight, history of pregnancy wantedness, insurance type, treatment for infertility, marital status, ethnicity,	Compared to mothers who had never had a CS before, mothers who had had a previous CS were more than 9 times more likely to have a CS (OR=9.3 95% CI=8.11-10.6). When included in the regression model, mothers who had had a previous CS were more than 7 times as likely to have a CS than mothers who had not (adjOR=7.63 95% CI=6.62-8.79).

						education, income, worked during pregnancy, antenatal care, exercise during pregnancy, epidural.	
Johnson and Slade (2002)	England	2000	346	Previous caesarean section.	Emergency caesarean, elective caesarean, forceps/ventouse.	Regression model for emergency CS vs. unassisted vaginal: age, medical risk (multiple birth, breech or malposition, diabetes, induction of labour for reason other than postdates), parity, fear of childbirth, had a reason to expect a CS.	When included in the regression model, mothers who had had a previous CS were almost 10 times as likely to have an emergency CS (adjOR=9.94 95% CI= 2.83-34.93).
Joseph et al (2006)	Canada	1988-1995	76,440	Previous caesarean section.	Caesarean section (all; including overall and primary).  Two regression models: one examining income with	Age, parity, weight, family income, investments, diabetes, previous perinatal death, hypertension, placenta praevia, placental abruption, attending	Compared to mothers who never had a CS, mothers who had had a previous CS were more than twice as likely to have a CS <u>or</u> induction (adj rate ratio=2.56 95% CI=2.51-2.61).

					induction, overall CS and primary CS as outcomes, and one with labour induction or CS as outcome.	physician, epidural anaesthesia, time period, smoking status at birth, marital status, rural residence, antenatal class attendance, previous low birth weight infant, other chronic medical disease adjusted for in regression.	
Paranjothy et al (2005)	England and Wales	2000	147,087 singleton pregnancies.	Number of previous caesarean section(s)  0 (reference), 1, $\geq 2$ .	Caesarean section before labour and caesarean section during labour.	Regression model: age, ethnicity, number of previous vaginal births, gestation, mode of onset of labour, presentation and birth weight.	<p><i>CS before labour:</i> Compared to mothers who had never had a previous CS, mothers who had had 1 previous CS were over 13 times more likely to have a CS before labour (adjOR=13.07 95% CI=12.21-14.00) and mothers who had had 2 or more previous CS were more than 88 times more likely to have a CS before labour (adjOR= 88.40 95% CI=77.73-100.53).</p> <p><i>CS during labour:</i> Compared to mothers who had never had a previous CS, mothers who had had 1 previous CS were over 3 times more likely to have an CS during labour (adjOR=3.49</p>

							95% CI=3.28-3.71) and mothers who had had 2 or more previous CS were more than 18 times more likely to have a CS during labour (adjOR= 18.19 95% CI=13.06-25.35).
Patel et al (2005)	England	1990/1991	12,944 singleton, term.	Previous caesarean section.	Caesarean section (all) vs. vaginal (all); elective CS vs. attempted VD, emergency CS vs. unassisted VD.	Regression models: <u>Final model (all caesarean birth):</u> previous CS, outcome of last pregnancy, parity, diabetes mellitus, birth weight, neonatal head circumference, gestational age, fetal presentation. <u>Final model (elective CS):</u> previous CS, diabetes mellitus, gestational age, fetal presentation. <u>Final model (emergency CS):</u> previous CS, outcome of last pregnancy, parity, birth weight, neonatal head circumference, fetal presentation,	<i>Overall caesarean:</i> Compared to mothers who had never had a CS, mothers who had had a previous CS were over 27 times more likely to have a CS (adjOR= 27.8 95% CI=20.9-37.0). <i>Elective caesarean:</i> Compared to mothers who had never had a CS, mothers who had had a previous CS were over 54 times more likely to have an elective CS (adjOR= 54.5 95% CI=38.4-77.5). <i>Emergency caesarean:</i> Compared to mothers who had never had a CS, mothers who had had a previous CS were 13 times more likely to have an emergency CS (adjOR= 13.0 95% CI=7.76-21.7).



						in preferred labour position, epidural.	
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	No effect
	Mothers who have had a previous CS are more likely to have intervention
	Mothers who have not had a previous CS are more likely to have intervention

Table A2.20: Previous vaginal birth and current mode of birth

Author(s)	Country	Period of data collection	Study sample	Determinant(s)	Outcome measure(s)	Co-factors	Effect of mothers' previous vaginal birth on mode of birth
Paranjothy et al (2005)	England and Wales	2000	147,087 singleton pregnancies.	Number of previous vaginal births  0 (reference), ≥1.	Caesarean section before labour and caesarean section during labour.	Regression model: age, ethnicity, number of previous CS, gestation, mode of onset of labour, presentation and birth weight.	<p><i>CS before labour:</i> Compared to mothers who had never had a previous vaginal birth, mothers who had had 1 or more previous vaginal births were less likely to have a CS before labour (adjOR=0.58 95% CI=0.55-0.61).</p> <p><i>CS during labour:</i> Compared to mothers who had never had a previous vaginal birth, mothers who had had 1 or more previous vaginal births were less likely to have a CS during labour (adjOR=0.21 95% CI=0.20-0.22).</p>

No effect
Mothers who have not had a previous vaginal birth are more likely to have intervention
Mothers who have had a previous vaginal birth are more likely to have intervention

Table A2.21: Previous stillbirth or perinatal death and current mode of birth

Author(s)	Country	Period of data collection	Study sample	Determinant(s)	Outcome measure(s)	Co-factors	Effect of mothers' fetus presentation on mode of birth
Gomes et al (1999)	Brazil	1978-1979 and 1994	6,750 (1978-79) and 2,846 (1994)	Previous stillbirth.	Caesarean section (all).	Regression model: occupational group, family income, education, insurance status, maternal occupation (home vs. other), hospital type, day of birth, antenatal visits, marital status, age, parity, previous stillbirth, no. of live births, gestational age and birth weight.	<p><i>1978-1979:</i> Crude rates indicated that compared to mothers who had never had a previous stillbirth, mothers who had had a previous stillbirth were slightly more likely to have a CS (OR=1.38 95% CI=1.01-1.88). Although the confidence intervals were close to 1, therefore indicating that the difference may not be significant. After adjustment for maternal characteristics and health service factors, previous stillbirth remained significant (adjOR=1.77 95% CI=1.12-2.80).</p> <p><i>1994:</i> When the survey was repeated in 1994 however, previous stillbirth was no longer a significant factor in either crude or adjusted results, despite similar factors being included in the model (adjOR=1.23 95% CI=0.48-3.13).</p>
Joseph et al (2006)	Canada	1988-1995	76,440	Previous perinatal death.	Caesarean section (all; including overall and primary).	Age, parity, weight, family income, investments, diabetes, previous CS, hypertension, placenta praevia,	Compared to mothers who had never had a previous perinatal death, mothers who had had a previous perinatal death were more than 50% more likely to have a CS or induction (adj rate ratio=1.58 95%

					Two regression models: one examining income with induction, overall CS and primary CS as outcomes, and one with labour induction <u>or</u> CS as outcome.	placental abruption, attending physician, epidural anaesthesia, time period, smoking status at birth, marital status, rural residence, antenatal class attendance, previous low birth weight infant, other chronic medical disease adjusted for in regression.	CI=1.46-1.71).
Patel et al (2005)	England	1990/1991	12,944 singleton, term.	Previous stillbirth (yes or no)  and  Outcome of last pregnancy: Child alive (reference), no previous pregnancy, miscarriage/ termination, stillbirth/ child died.	Caesarean section (all) vs. vaginal (all); elective CS vs. attempted VD, emergency CS vs. unassisted VD.	Regression models: <u>Final model (all caesarean birth):</u> previous CS, outcome of last pregnancy, parity, diabetes mellitus, birth weight, neonatal head circumference, gestational age, fetal presentation. <u>Final model (elective CS):</u> previous CS, diabetes mellitus, gestational age, fetal presentation. <u>Final model</u>	<i>Overall caesarean:</i> In the unadjusted analyses, compared to mothers who had never had a stillbirth, mothers who had had a previous stillbirth were more than twice as likely to have a CS (OR= 2.16 95% CI=1.29-3.60). When included in the regression model, compared to mothers whose child was alive after their last pregnancy, mothers were more likely to have an emergency CS if they had a stillbirth or their child died in their last pregnancy (adjOR= 4.01 95% CI=1.88-8.53). <i>Elective caesarean:</i> In the unadjusted analyses, compared to mothers who had never had a stillbirth, mothers who had

						<p><i>(emergency CS):</i> previous CS, outcome of last pregnancy, parity, birth weight, neonatal head circumference, fetal presentation, in preferred labour position, epidural.</p>	<p>experienced a previous stillbirth were more than three times as likely to have a CS (OR= 3.89 95% CI=2.16-7.01). When included in the regression model, neither stillbirth nor outcome of last pregnancy, were a significant predictor of elective CS (data not given).</p> <p><i>Emergency caesarean:</i> In the unadjusted analyses, compared to mothers whose child was alive after their last pregnancy, mothers were around 4 times as likely to have an emergency CS if they had experienced a stillbirth or their child died after their last pregnancy (OR= 3.91 95% CI=1.76-8.71). When included in the regression model, although outcome of previous pregnancy was a significant factor, previous stillbirth or child death was not a significant predictor of emergency CS (adjOR=2.56 95% CI=0.44-15.0).</p>
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	No effect
	Mothers who have had a previous stillbirth are more likely to have intervention
	Mothers who have never had a previous stillbirth are more likely to have intervention

Table A2.22: Previous termination or miscarriage and current mode of birth

Author(s)	Country	Period of data collection	Study sample	Determinant(s)	Outcome measure(s)	Co-factors	Effect of mothers' previous miscarriage on mode of birth
Bhattacharya et al (2008)	Scotland	1986-2000	-1,561 mothers who had a miscarriage in their first pregnancy. -Control group A: 10,549 women who had a live birth beyond 24 weeks in their first pregnancy. -Control group B: 21,118 mothers for whom the study birth was their first.	Miscarriage in the first pregnancy.	Elective caesarean section or instrumental birth in the following pregnancy.	Regression model: age, year of birth, interpregnancy interval, marital status, BMI, partner's social class, smoking.	Compared to mothers who had a live birth in their first pregnancy (group A), mothers who had experienced a miscarriage were much more likely to have an instrumental birth (adjOR=5.9, 95% CI= 5.0–6.9) but were less likely to have an elective CS (adjOR=0.5 95% CI=0.3-0.6).  Compared to mothers who were having their first baby (group B), mothers who had had a previous miscarriage did not have significantly different rates of either instrumental births or elective CS (OR=1.1 95% CI=0.9-1.2 for instrumental and OR=1.2 95% CI=0.9-1.6 for elective CS).
Gomes et al (1999)	Brazil	1978-1979 and 1994	6,750 (1978-79) and 2,846 (1994)	Previous termination.	Caesarean section (all).	Regression model: occupational group, family income, education, insurance status, maternal occupation (home vs. other),	1978-1979: Crude rates indicated that compared to mothers who had never had a termination, mothers who had had a previous termination were around 20% more likely to have a CS (OR=1.23 95% CI=1.08-1.41). After adjustment for maternal characteristics and health service factors however,

						hospital type, day of birth, antenatal visits, marital status, age, parity, previous stillbirth, no. of live births, gestational age and birth weight.	previous termination was no longer significant (adjOR=1.16 95% CI=0.86-1.56).  <i>1994:</i> When the survey was repeated in 1994 however, previous termination was no longer a significant factor in either crude or adjusted results, despite similar factors being included in the model (adjOR=0.72 95% CI=0.38-1.36).
Patel et al (2005)	England	1990/1991	12,944 singleton, term.	Number of previous miscarriage and  outcome of last pregnancy: child alive (reference), no previous pregnancy, miscarriage/ termination, stillbirth/ child died.	Caesarean section (all) vs. vaginal (all); elective CS vs. attempted VD, emergency CS vs. unassisted VD.	Regression models: <u><i>Final model (all caesarean birth):</i></u> previous CS, outcome of last pregnancy, parity, diabetes mellitus, birth weight, neonatal head circumference, gestational age, fetal presentation. <u><i>Final model (elective CS):</i></u> previous CS, diabetes mellitus, gestational age, fetal presentation. <u><i>Final model (emergency CS):</i></u> previous CS,	<i>Overall caesarean:</i> In the unadjusted analyses, mothers who had a CS were slightly more likely to have miscarried previously (OR= 1.17 95% CI=1.08-1.26). When included in the regression model, compared to mothers whose child was alive after their last pregnancy, mothers were more likely to have an emergency CS if they had had a miscarriage or termination in their last pregnancy (adjOR= 1.78 95% CI=1.31-2.42).  <i>Elective caesarean:</i> In the unadjusted analyses, mothers who had a CS were slightly more likely to have miscarried previously (OR= 1.34 95% CI=1.21-1.48). However, when included in the regression

						<p>outcome of last pregnancy, parity, birth weight, neonatal head circumference, fetal presentation, in preferred labour position, epidural.</p>	<p>model, previous miscarriage was no longer a significant predictor of mode of birth (data not provided).</p> <p><i>Emergency caesarean:</i> In the unadjusted analyses, compared to mothers whose child was alive after their last pregnancy, mothers were twice as likely to have an emergency CS if they had had a miscarriage or termination in their last pregnancy (OR= 2.67 95% CI=2.11-3.38). When included in the regression model, previous miscarriage or termination was still a significant predictor of emergency CS (adjOR=2.22 95% CI=1.37-3.58).</p>
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	No effect
	Mothers who have had a previous miscarriage are more likely to have intervention
	Mothers who have not had a previous miscarriage are more likely to have intervention



Table A2.23: Treatment for infertility and current mode of birth

Author(s)	Country	Period of data collection	Study sample	Determinant(s)	Outcome measure(s)	Co-factors	Effect of mothers' previous infertility treatment on mode of birth
Basso and Baird (2003)	Denmark	1997-2001	55,905 singleton live births (2,584 had treatment for infertility).	Mothers who reported having treatment for infertility with a time to pregnancy of >12 months.	Elective and emergency caesarean section.	Regression model: age, pre-pregnancy BMI, smoking, social status, fetal sex, age at menarche, cycle regularity and length, parity.	<p><i>Elective caesarean:</i> After adjustment for other factors, infertility treatment was not related to elective CS for <i>primiparous</i> mothers (adjOR=1.13 95% CI=0.85-1.49) or <i>multiparous</i> mothers (adjOR=1.29 95% CI=0.94-1.79).</p> <p><i>Emergency caesarean:</i> Infertility treatment was unrelated to emergency CS for <i>primiparous</i> mothers (adjOR=0.99 95% CI=0.83-1.19) but <i>multiparous</i> mothers were more likely to have an emergency CS if they had had treatment for infertility (adjOR=1.86 95% CI=1.37-2.54)</p>
Chambers et al (2007)	Australia	2003	5,005 mothers who had ART# treatment vs. non-ART reference population of 254,249 mothers.	Births resulting from in vitro fertilisation techniques.	Caesarean section (all).	Adjusted for maternal age.	ART mothers were more likely to have a CS than non-ART mothers, for those who had singleton (adjOR=1.60 95% CI=1.58-1.61) and twin pregnancies (adjOR=1.56 95% CI=1.40-1.73).
Gareen et al (2003)	USA	1988	6,805	Treatment for infertility preceding the	Caesarean section (all).	Regression model: <i>Full model:</i> age,	Compared to mothers who had not had treatment for infertility before, mothers who had had treatment for

				index pregnancy.		gestation, birth weight, parity, history of CS, multiple birth, placental problems, hypertension, pre-eclampsia, diabetes, breech, malpresentation, herpes, fetal distress, height, weight, history of pregnancy wantedness, insurance type, treatment for infertility, marital status, ethnicity, education, income, worked during pregnancy, antenatal care, exercise during pregnancy, epidural.	infertility previously were around 40% more likely to have a CS (OR=1.43 95% CI=1.25-1.63). When included in the regression model, the increased risk for mothers who had had previous infertility treatment remained, although the risk was attenuated and less significant (adjOR=1.21 95% CI=1.01-1.45).
<b>Helmerhorst et al (2004)</b> <b>Review paper</b>	19 studies; 2 England, 1 USA, 1 Belgium, 2 Finland, 2 The Netherlands,	Range from 1978-1999.	Range from 32 to 3,048 within each study.	Assisted conception.	Caesarean section (all).	None.	Published studies were identified which assessed birth outcomes after assisted conception and used a control comparison group from the same population. Some studies matched their control group on maternal characteristics and others did not.

	1 Switzerland, 1 Iceland and Scotland, 3 France, 1 Norway, 1 Belgium, 4 Israel.						<p><i>Singleton births:</i> Overall, for the 10 studies with a matched control group, mothers who had had assisted conception were around 1.5 times more likely to have a CS (OR=1.54 95% CI=1.44-1.66) and for the 2 non-matched studies mothers who had had an assisted conception were over twice as likely (OR=2.33 95% CI=1.95-2.79).</p> <p><i>Twin births:</i> Overall, for the 5 studies with a matched control group, mothers who had had assisted conception were more likely to have a CS (OR=1.21 95% CI=1.11-1.32) and for the 6 non-matched studies, mothers who had had an assisted conception were also more likely to have a CS (OR=1.17 95% CI=1.06-1.29).</p>
Patel et al (2005)	England	1990/1991	12,944 singleton, term.	Treatment for infertility.	Caesarean section (all) vs. vaginal (all); elective CS vs. attempted VD, emergency CS vs. unassisted	Regression models: <i>Final model (all caesarean birth):</i> previous CS, outcome of last pregnancy, parity, diabetes mellitus, birth weight, neonatal head	<i>Overall caesarean:</i> In the unadjusted analyses, compared to mothers who had not had fertility treatment, mothers who had had fertility treatment were more likely to have a CS (OR= 1.17 95% CI=1.20-2.33). When included in the regression model, fertility was not a significant factor (data not

					VD.	<p>circumference, gestational age, fetal presentation.</p> <p><u>Final model (elective CS):</u> previous CS, diabetes mellitus, gestational age, fetal presentation.</p> <p><u>Final model (emergency CS):</u> previous CS, outcome of last pregnancy, parity, birth weight, neonatal head circumference, fetal presentation, in preferred labour position, epidural.</p>	<p>provided).</p> <p><i>Elective caesarean:</i> Fertility treatment was not significant in either unadjusted or adjusted analyses (data not provided).</p> <p><i>Emergency caesarean:</i> In the unadjusted analyses, compared to mothers who had not had fertility treatment, mothers who had had fertility treatment were more than twice as likely to have a CS (OR= 2.15 95% CI=1.44-3.20). When included in the regression model, fertility was not a significant factor (data not provided).</p>
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	No effect
	Mothers who have had previous infertility treatment are more likely to have intervention
	Mothers who have never had treatment for infertility are more likely to have intervention

# ART= Assisted reproductive technology

Table A2.24: Anxiety/ stress and mode of birth

Author(s)	Country	Period of data collection	Study sample	Determinant(s)	Outcome measure(s)	Co-factors	Effect of mothers' anxiety levels on mode of birth
Crandon (1979)	Australia	Not given	146	Anxiety (IPAT measure used).	Forceps use.	None.	Forceps birth was more common in the women who had high anxiety levels (16 births), compared to women with low anxiety levels (11 births, $p < 0.001$ ).
Johnson and Slade (2002)	England	2000	346	Anxiety (STAI measure used).	Emergency caesarean, elective caesarean, forceps/ventouse.	None.	In unadjusted analyses, mothers who had different modes of birth did not have significantly different STAI scores for either state (40.64 SD=10.35 for emergency CS, 41.87 SD=12.66 for elective CS, 41.88 SD=10.59 for forceps/ventouse and 40.94 SD=10.96 for normal birth, $p > 0.9$ ) or trait anxiety (39.58 SD=9.66 for emergency CS, 37.59 SD=9.38 for elective CS, 38.94 SD=9.82 for forceps/ventouse and 39.12 SD=10.06 for normal birth, $p > 0.8$ ).
Perkin et al (1993)	England	Not given	1515	Anxiety (GHQ used).	Non-spontaneous birth.  (Forceps, vacuum extraction, caesarean section and breech.)	Regression model: parity, age, height, depression, psychoticism, education, alcohol, blood pressure at 32 weeks gestation, partner's initial	In adjusted analyses, anxiety was unrelated to mode of birth (adjOR=1.12 95% CI=0.98-1.29).

						happiness with pregnancy.	
Ryding et al (1998)	Sweden	1992-1993	291  97 cases (had emergency CS) 194 controls (did not have an emergency CS were matched for age and parity).	Anxiety (STAI measure used).  Stress (SCI measure used).	Emergency caesarean.  (Mothers booked for an elective were excluded.)	None.	<i>Anxiety:</i> The average mean score was higher for the mothers who had an emergency CS, compared to the mothers who did not (36.7 SD=13.6 vs. 34.0 SD=9.1, p<0.05).  <i>Stress:</i> The average mean score was higher for the mothers who had an emergency CS, compared to the mothers who did not (172.4 SD=21.5 vs. 177.4 SD=21.6, p=0.05).

	No effect
	Mothers with higher anxiety levels are more likely to have intervention
	Mothers with lower anxiety levels are more likely to have intervention

Table A2.25: Unwanted pregnancy and mode of birth

Author(s)	Country	Period of data collection	Study sample	Determinant(s)	Outcome measure(s)	Co-factors	Effect of whether the mother planned her pregnancy on mode of birth
Gareen et al (2003)	USA	1988	6,805	Unwanted pregnancy.	Caesarean section (all).	Regression model: <i>Full model</i> : age, gestation, birth weight, parity, history of CS, multiple birth, placental problems, hypertension, pre-eclampsia, diabetes, breech, malpresentation, herpes, fetal distress, height, weight, history of pregnancy wantedness, insurance type, treatment for infertility, marital status, ethnicity, education, income, worked during pregnancy, antenatal care, exercise during pregnancy, epidural.	Compared to mothers who had a history of pregnancy wantedness, mothers who did not were 1.4 times more likely to have a CS (OR=1.39 95% CI=1.25-1.56). When included in the regression model, mothers who had a history of pregnancy wantedness were still more than 1.3 times more likely to have a CS than mothers who did not (adjOR=1.34 95% CI=1.13-1.58).

	No effect
	Mothers who had an unwanted pregnancy are more likely to have intervention
	Mothers who planned their pregnancy are more likely to have intervention

Table A2.26: Depression and mode of birth

Author(s)	Country	Period of data collection	Study sample	Determinant(s)	Outcome measure(s)	Co-factors	Effect of mothers' depression on mode of birth
Perkin et al (1993)	England	Not given	1515	Depression (GHQ used).	Non-spontaneous birth.  (Forceps, vacuum extraction, caesarean section and breech.)	Regression model: parity, age, height, depression, psychoticism, education, alcohol, blood pressure at 32 weeks gestation, partner's initial happiness with pregnancy.	In adjusted analyses, depression was unrelated to mode of birth (adjOR=1.08 95% CI=0.93-1.26).
Van de Pol et al (2006)	The Netherlands	2001-2003	354	Depression (CES-D used).  16 or higher used as a cut-off to indicate depression.	Emergency caesarean and instrumental vaginal birth.	Regression model: BMI, physical activity, birth weight, presentation, fetal distress, opinion of relationship with partner (emotional).	Unadjusted CES-D scores were not significantly different for mothers who had an emergency caesarean or an instrumental birth (9.15) to mothers who had a spontaneous vaginal birth (9.96, p=0.39).
Wu et al (2002)	USA	1996-1999	1,697	Depression (CES-D used).  16 or higher used as a cut-off to indicate depression (19 and 25 or higher included in	Caesarean section (all) and assisted vaginal birth.	Stratified by parity.  Age, race and marital status included in regression model.	In unadjusted analyses there was no statistically significant difference (p=0.34) in rates of CS (26.5% for depressed vs. 23.6% for not depressed) or assisted vaginal birth (8.0% for depressed vs. 10.4% for mothers who were not depressed).



				regression).			<p>Rates remained non-significant when stratified by parity.</p> <p>In the regression model, depression was not related to mode of birth.</p>
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	No effect
	Mothers who are depressed are more likely to have intervention
	Mothers who are not depressed more likely to have intervention

Table A2.27: Fear of childbirth and mode of birth

Author(s)	Country	Period of data collection	Study sample	Determinant(s)	Outcome measure(s)	Co-factors	Effect of mothers' fear of childbirth on mode of birth
Johnson and Slade (2002)	England	2000	346	W-DEQ (English version).	Emergency caesarean, elective caesarean, forceps/ventouse.	Regression model for emergency CS vs. spontaneous vaginal: age, medical risk (multiple birth, breech or malposition, diabetes, induction of labour for reason other than postdates), parity, previous CS, had a reason to expect a CS.	<p>In unadjusted analyses, mothers who had different modes of birth did not have significantly different W-DEQ scores (60.89 SD=20.11 for emergency CS, 62.81 SD=62.81 for elective CS, 64.08 SD=18.53 for forceps/ventouse and 60.19 SD=19.51 for normal birth, <math>p&gt;0.5</math>). Also, when subcategories of the W-DEQ were analysed, i.e. fear, lack of positive anticipation, isolation and riskiness, no significant association was found with mode of birth.</p> <p>When included in the regression model, W-DEQ score was not a significant predictor of emergency CS (adjOR=1.00 95% CI= 0.98-1.01).</p>
Ryding et al (1998)	Sweden	1992-1993	291  97 cases (had emergency CS) 194 controls (did not have an emergency CS were matched for age and parity).	W-DEQ version A.  Score of >84 considered to be serious fear of childbirth.	Emergency caesarean .  (Mothers booked for an elective were excluded.)	None.	The average mean score was higher for women who had an emergency CS (64.6 SD=22.2), compared to mothers who did not have an emergency CS (54.3 SD=19.8, $p<0.0001$ ). Even when women with possible confounding factors were excluded (infertility history, previous emergency CS, twin pregnancy), the results

							<p>remained similar (64.0 SD=20.6 vs. 53.9 SD=20.2).</p> <p>Compared to women who scored less than 84, women who scored more than 84 on the W-DEQ (serious fear of childbirth) were over 3 times more likely to have an emergency CS (OR=3.5 95% CI=1.6-7.3). After excluding two women who must have known there were serious complications with their pregnancy, the increased risk remained, although slightly attenuated (OR=3.0 95% CI=1.4-6.6).</p>
Waldenström et al (2006)	Sweden	1999-2000	2,662	<p>Women who responded 'very negative' to the question 'How do you feel when thinking about labour and birth?' were classed as having fear of childbirth.</p> <p>Counselling.</p> <p>Group A; very negative feelings, had counselling.</p>	Elective and emergency caesarean.	None.	<p><i>Elective caesarean:</i></p> <p>Compared to the reference group D with a rate of 4.9% elective CS, unadjusted rates of elective caesareans were significantly higher for mothers who had had counselling for fear of childbirth (29.8% for group A mothers who had had very negative feelings and had also had counselling <math>p&lt;0.001</math> and 14.0% for group C mothers who did not state that they had very negative feelings but did have counselling). Group B mothers who did not have counselling but did have very negative feelings were not significantly different (4.0%</p>

				<p>Group B; Very negative feelings, no counselling.</p> <p>Group C; Not very negative feelings, had counselling.</p> <p>Group D; Not very negative feelings, no counselling (reference).</p>			<p>p=0.97).</p> <p><i>Emergency caesarean:</i> Compared to the reference group D with a rate of 7.9% emergency CS, unadjusted rates of emergency caesareans were not significantly higher for mothers in any of the other groups (8.5% for group A mothers who had had very negative feelings and had also had counselling p=0.89 and 7.2% for group C mothers who did not state that they had very negative feelings but did have counselling). Group B mothers who did not have counselling but did have very negative feelings had a higher rate of 16.0% which reached borderline significance p=0.07.</p>
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	No effect
	Mothers who have a fear of childbirth are more likely to have intervention
	Mothers without a fear of childbirth are more likely to have intervention

Table A2.28: Baby gestational age and mode of birth

Author(s)	Country	Period of data collection	Study sample	Determinant(s)	Outcome measure(s)	Co-factors	Effect of babies gestational age on mode of birth
Alves and Sheikh (2005)	England	1996-2000	516,892; 92 hospitals	Gestational age (weeks)  37 (reference), 38, 39, 40, 41 and 42+.	Elective caesarean section.	Deprivation, age, parity, and birth weight in regression model.	Compared to mothers giving birth at 37 weeks, mothers giving birth at 38 weeks were more likely to have an elective CS (adjOR=1.7 95% CI=1.6-1.9), but for each additional week after that, mothers risk lessened (adjOR=0.42 95% CI=0.36-0.50 for 39 weeks adjOR=0.10 95% CI=0.08-0.09 for 40 weeks adjOR=0.08 95% CI=0.07-0.09 for 41 weeks and adjOR=0.10 95% CI=0.09-0.12 for 42+ weeks).
Cesaroni et al (2008)	Italy	1990-1996	88,698 first-born live births.	Gestational age  Preterm, term (reference), post-term.	Caesarean section (all).	None.	Crude estimates indicated that compared to mothers who gave birth at term, mothers who gave birth post-term were more likely to have a CS (OR=1.40 95% CI=1.31-1.49) and mothers who gave birth preterm were also more likely (OR=2.23 95% CI= 2.09-2.38).
Gareen et al (2003)	USA	1988	6,805	Gestational age  40 weeks vs. 44 weeks.	Caesarean section (all).	Regression model: <i>Full model:</i> age, gestation, birth weight, parity, history of CS, multiple birth,	In the adjusted analyses, compared to mothers who gave birth at 40 weeks, mothers who gave birth at 44 weeks were over twice as likely to have a CS (adj risk ratio=2.34 95% CI=1.71-3.20).

						placental problems, hypertension, pre-eclampsia, diabetes, breech, malpresentation, herpes, fetal distress, height, weight, history of pregnancy wantedness, insurance type, treatment for infertility, marital status, ethnicity, education, income, worked during pregnancy, antenatal care, exercise during pregnancy, epidural.	
Gomes et al (1999)	Brazil	1978-1979 and 1994	6,750 (1978-79) and 2,846 (1994)	Gestational age (weeks)  <32 (reference), 32-36, 37-41, 42+.	Caesarean section (all).	Regression model: occupational group, family income, education, insurance status, maternal occupation (home vs. other), hospital type, day of birth, antenatal	<i>1978-1979:</i> Crude rates indicated that compared to mothers who gave birth at less than 32 weeks, the risk of CS increased with increasing weeks (OR=3.03 95% CI=1.24-8.89 for 32-36 weeks, OR=4.56 95% CI=1.89-11.78 for 37-41 weeks and OR=4.79 95% CI=1.99-13.93 for 42+ weeks). After adjustment for maternal characteristics and health service

						visits, marital status, age, parity, previous termination, previous stillbirth, no. of live births, and birth weight.	factors, gestational age was no longer significant (adjOR=1.69 95% CI=0.61-4.73 for 32-36 weeks, adjOR=1.96 95% CI=0.72-5.29 for 37-41 weeks and adjOR=2.26 95% CI=0.81-6.31 for 42+ weeks).  <i>1994:</i> When the survey was repeated in 1994 however, gestational age was no longer a significant factor in either crude or adjusted results, despite similar factors being included in the model (adjOR=0.52 95% CI=0.18-1.55 for 32-36 weeks, adjOR=0.57 95% CI=0.20-1.65 for 37-41 weeks and adjOR=0.72 95% CI=0.23-2.26 for 42+ weeks).
Heffner et al (2003)	USA	1998-1999	14,409  (Complicated labours excluded; malpresentation, active herpes, prolapsed cord, fetal anomaly.)	Gestational age (weeks) 36, 37, 38, 39, 40 (reference), 41, 42+.	Caesarean section (all: primary only).	Regression model: age, induction of labour, birth weight, diabetes, hypertension, hospital.	Results were stratified by parity. For <i>primiparous</i> mothers, compared to those that delivered at 40 weeks, mothers who delivered before were generally less likely to have a CS (adjOR=0.44, 95% CI=0.28-0.71 for 36 weeks and adjOR=0.65, 95% CI=0.51-0.82 for 38 weeks), and mothers who delivered later were more likely to have a CS (adjOR=1.59, 95% CI=1.34-1.89 for 41 weeks and adjOR=1.79 95% CI=1.30-2.46 for 42+ weeks). Results were not

							<p>significant for some of the earlier gestations (adjOR=0.76, 95% CI=0.57-1.01 for 37 weeks and adjOR=0.88 95% CI=0.73-1.06).</p> <p>Among <i>multiparous</i> mothers, compared to those who delivered at 40 weeks, mothers who delivered at 41 weeks were more likely to have a CS (adjOR=1.53 95% CI=1.02-2.31). The results for all other gestational weeks were not significant (adjOR=1.06 95% CI=0.51-2.23 for 36 weeks, adjOR=1.12 95% CI=0.65-1.92 for 37 weeks, adjOR=0.76 95% CI=0.49-1.19 for 38 weeks, adjOR=0.73 95% CI=0.49-1.09 for 39 weeks and adjOR=1.10 95% CI=0.39-3.12 for 42+ weeks).</p>
Paranjothy et al (2005)	England and Wales	2000	147,087 singleton pregnancies.	<p>Gestational age (weeks)</p> <p>&lt;28, 28-32, 33-36, ≥37 (reference).</p>	Caesarean section before labour and caesarean section during labour.	Regression model: age, ethnicity, number of previous vaginal births, number of previous CS, birth weight, mode of onset of labour, and presentation.	<p><i>CS before labour:</i></p> <p>Compared to mothers who gave birth at term, the odds of CS before labour generally increased with decreasing gestational age (adjOR=2.33, 95% CI=2.12-2.57 for 33-36 weeks and adjOR=4.53, 95% CI=3.78-5.43 for 28-32 weeks). However, mothers who gave birth to a very preterm baby were significantly less likely to have a CS before labour (adjOR=0.42 95% CI=0.27-0.64).</p>



							<p><i>CS during labour:</i> Compared to mothers who gave birth at term, the odds of CS during labour increased slightly for mothers who were a few weeks premature (adjOR=1.22, 95% CI=1.10-1.35 for 33-36 weeks). However, mothers who gave birth to a very preterm baby were significantly less likely to have a CS during labour (adjOR=0.11 95% CI=0.07-0.84).</p>
Patel et al (2005)	England	1990/1991	12,944 singleton, term.	Gestational age (weeks – continuous variable).	Caesarean section (all) vs. vaginal (all); elective CS vs. attempted VD, emergency CS vs. spontaneous VD.	<p>Regression models: <i>Final model (all caesarean birth):</i> previous CS, outcome of last pregnancy, parity, diabetes mellitus, birth weight, neonatal head circumference, gestational age, fetal presentation. <i>Final model (elective CS):</i> previous CS, diabetes mellitus, gestational age, fetal presentation. <i>Final model (emergency CS):</i> previous CS,</p>	<p><i>Overall caesarean:</i> In the regression analysis, there was a decrease in the odds of CS with increasing gestational age (adjOR=0.86 95% CI=0.80-0.93).</p> <p><i>Elective caesarean:</i> As with overall CS, in the regression analysis, there was a decrease in the odds of elective CS with increasing gestational age (adjOR=0.52 95% CI=0.46-0.58).</p> <p><i>Emergency caesarean:</i> Gestational age was not a significant factor in the final regression model for emergency CS (data not given).</p>

						outcome of last pregnancy, parity, birth weight, neonatal head circumference, fetal presentation, in preferred labour position, epidural.	
Roberts et al (2002)	Australia	1990-1997	615,604 primiparous women who gave birth to a live, singleton, cephalic presenting infants at term.	Gestational age (weeks) 37-41 (reference), ≥42.	Instrumental birth (forceps, vacuum and caesarean births).	Age, type of care, obstetric complications, type of labour (spontaneous/augmented/induced), epidural, birth weight.	<i>1990:</i> Compared to mothers who gave birth at 37-41 weeks, mothers who gave birth at over 42 weeks were around 60% more likely to have an instrumental vaginal birth (adjOR=1.59 95% CI=1.41-1.79). <i>1997:</i> In the later sample, the risk was still increased for mothers giving birth at or after 42 weeks, although the risk was attenuated slightly (adjOR=1.38 95% CI=1.19-1.60).

	No effect
	Mothers with a shorter gestation period are more likely to have intervention
	Mothers with a longer gestation period are more likely to have intervention

Table A2.29: Birth weight and mode of birth

Author(s)	Country	Period of data collection	Study sample	Determinant(s)	Outcome measure(s)	Co-factors	Effect of babies' birth weight on mode of birth
Alves and Sheikh (2005)	England	1996-2000	516,892; 92 hospitals	Birth weight (kg)  2.5 to <3 (reference), 3 to <3.5, 3.5 to <4, 4 to <4.5, 4.5 to <7.	Elective caesarean section.	Deprivation, age, parity, and gestation in regression model.	Before adjustment, compared to mothers giving birth to the lowest birth weight babies, mothers giving birth to heavier babies were less likely to have an elective CS (OR=0.81 95% CI=0.77-0.86 for 3-3.5kg OR=0.66 95% CI=0.62-0.70 for 3.5 to 4kg and OR=0.65 95% CI=0.59-0.71 for 4-4.5kg). However, when included in the regression model, the relationship reversed with a gradient effect of increased risk of elective CS with increasing birth weight (adjOR=1.2 95% CI=1.1-1.2 for 3-3.5kg, adjOR=1.4 95% CI=1.3-1.4 for 3.5 to 4kg, adjOR=1.7 95% CI=1.6-1.8 for 4-4.5kg and adjOR=2.7 95% CI=2.4-3.0 for 4.5-7kg).
Braveman et al (1995)	USA	1991	217,461 singleton first live births.	Birth weight (g)  Low <2500, Normal 2500-4000 (reference), High >4000.	Caesarean section (all).	Regression model: age, ethnicity, type of insurance, poverty, education, marital status, antenatal care, non-English speaking areas, mechanical	In the adjusted analyses, compared to mothers giving birth to a normal weight baby, mothers giving birth to low birth weight (adjOR=1.61 95% CI=1.53-1.70) and high birth weight babies (adjOR=2.37 95% CI=2.28-2.47) were at increased risk of having a CS.

						medical risk factors, fetal stress, other medical complications, birth volume of hospital, teaching status of hospital, type of hospital, region.	
Cesaroni et al (2008)	Italy	1990-1996	88,698 first-born live births.	Birth weight (g) <2500, 2500-4000 (reference), >4000.	Caesarean section (all).	None.	Compared to mothers giving birth to a normal weight baby, mothers giving birth to low birth weight (OR=2.85 95% CI=2.68-3.03) and high birth weight babies (OR=1.80 95% CI=1.70-1.90) were at increased risk of having a CS.
Gareen et al (2003)	USA	1988	6,805	Birth weight (g) 2500 vs. 4000.	Caesarean section (all).	Regression model: <i>Full model:</i> age, gestation, birth weight, parity, history of CS, multiple birth, placental problems, hypertension, pre-eclampsia, diabetes, breech, malpresentation, herpes, fetal distress, height, weight, history of pregnancy	In the adjusted analyses, compared to mothers who gave birth to a 2500g baby, mothers who gave birth to a 4000g baby were more likely to have a CS (adj risk ratio=1.31 95% CI=1.08-1.60).

						wantedness, insurance type, treatment for infertility, marital status, ethnicity, education, income, worked during pregnancy, antenatal care, exercise during pregnancy, epidural.	
Gomes et al (1999)	Brazil	1978-1979 and 1994	6,750 (1978-79) and 2,846 (1994)	Birth weight (g) <3000 (reference), 3000-3499, 3500-3999, 4000+.	Caesarean section (all).	Regression model: occupational group, family income, education, insurance status, maternal occupation (home vs. other), hospital type, day of birth, antenatal visits, marital status, age, parity, previous termination, previous stillbirth, no. of live births, and gestational age.	<p><i>1978-1979:</i> Crude rates indicated that compared to mothers who gave birth to a baby weighing less than 3000g, the risk of CS increased with increasing birth weight (OR=1.39 95% CI=1.21-1.59 for 3000-3499g, OR=1.71 95% CI=1.47-1.98 for 3500-3999g and OR=2.24 95% CI=1.79-2.79 for 4000g+). After adjustment for maternal characteristics and health service factors, the relationship remained significant (adjOR=1.21 95% CI=1.00-1.46 for 3000-3499g, adjOR=1.36 95% CI=1.11-1.68 for 3500-3999 and adjOR=1.97 95% CI=1.47-2.65 for 4000g+).</p> <p><i>1994:</i> When the survey was repeated in</p>

							1994 however, the gradient relationship was not apparent in crude or adjusted data. In the adjusted analyses only mothers who gave birth to a baby weighing 3500-3999g were somewhat more likely to have a CS (adjOR=1.45 95% CI=1.01-2.06). Results for the other birth weights were not significant (adjOR=1.04 95% CI=0.77-1.39 for 3000-3499g and adjOR=1.63 95% CI=0.83-3.20 for 4000g+).
Guihard and Blondel (2001)	France	1981 and 1995	5,410 (1981) and 13,318 (1995)	Birth weight (g) <2500, 2500-2999, 3000-3499, 3500-3999 (reference), ≥4000.	Caesarean section (all).	Regression model: age, weight, nationality, education, breech presentation, size of maternity unit, status of maternity unit (public/private).	<p><i>1981:</i> After adjusting for maternal characteristics and hospital factors, compared to mothers who gave birth to a baby weighing 3500-3999g, the risk of CS for mothers giving birth to lighter weight babies was less (adjOR=0.5, 95% CI=0.3-0.7 for 3000-3499 and adjOR=0.6, 95% CI=0.4-0.9). Results for the extremes of birth weight were not significant (adjOR=0.9, 95% CI=0.4-1.7 for 2500-2999g and adjOR=1.6, 95% CI=0.9-2.8 for ≥4000g).</p> <p><i>1995:</i> In contrast, in the later 1995 data, mothers at the extremes of birth weight were twice as likely to have a CS (adj OR=2.1 95% CI=1.5-2.9 for &lt;2500g and adj OR=2.0 95%</p>

							CI=1.4-2.7 for $\geq 4000\text{g}$ ). Results for the other birth weights were not significant (adjOR=0.8, 95% CI=0.7-1.1 for 2500-2999g and adjOR=0.8, 95% CI=0.6-1.0 for 3000-3499g).
Heffner et al (2003)	USA	1998-1999	14,409  (Complicated labours excluded; malpresentation, active herpes, prolapsed cord, fetal anomaly.)	Birth weight (g)  <2201, 2201-4000 (reference), >4000.	Caesarean section (all: primary only).	Regression model: age, induction of labour, gestational age, diabetes, hypertension, hospital.	Results were stratified by parity. For <i>primiparous</i> mothers, compared to those who delivered a baby weighing 2201-4000g, mothers who gave birth to a lower birth weight baby (adjOR=2.28 95% CI=1.26-4.12 for <2201g) and a higher birth weight baby (adjOR=2.21 95% CI=1.86-2.64 for >4000g) were more likely to have a CS.  For <i>multiparous</i> mothers, compared to those who delivered a baby weighing 2201-4000g, mothers who gave birth to a lower birth weight baby (adjOR=6.61 95% CI=2.64-16.57 for <2201g) and a higher birth weight baby (adjOR=1.64 95% CI=1.16-2.33 for >4000g) were more likely to have a CS.
Main et al (2000)	USA	1992-1998	8,496 primiparous women, singleton births, at term, cephalic,	Birth weight (g)  2500-3800 (reference), <3800.	Emergency caesarean section and instrumental vaginal birth.	Regression models: <u>Caesarean section</u> : age, epidural anaesthesia, birth	<i>Emergency caesarean</i> : After adjustment, the odds of emergency CS for mothers with babies in the heavier category were twice that of mothers who gave birth to lighter babies

			spontaneous.			weight, ethnicity included in regression model. <i>Instrumental birth</i> : age, ethnicity, epidural anaesthesia.	(adjOR=2.25, 95% CI=1.91-2.67). <i>Instrumental vaginal birth</i> : Birth weight was not a significant predictor of instrumental birth when included in the regression model (data not given).
Paranjothy et al (2005)	England and Wales	2000	147,087 singleton pregnancies.	Birth weight (g) ≤2500, 2501-4000 (reference), >4000.	Caesarean section before labour and caesarean section during labour.	Regression model: age, ethnicity, number of previous vaginal births, number of previous CS, gestation, mode of onset of labour, and presentation.	<i>CS before labour</i> : Mothers who gave birth to a low birth weight baby were almost twice as likely to have had a CS before labour than mothers who gave birth to a normal weight baby (adjOR=1.80, 95% CI=1.62-2.00). Mothers who gave birth to a heavier baby were not significantly more likely to have a CS before labour (adjOR=0.99 95% CI=0.92-1.07). <i>CS during labour</i> : Mothers who gave birth to a low birth weight baby were around 20% more likely to have had a CS during labour than mothers who gave birth to a normal weight baby (adjOR=1.22, 95% CI=1.11-1.35). Mothers who gave birth to a heavier baby were around twice as likely to have a CS during labour (adjOR=1.96 95% CI=1.86-2.07).
Patel et al (2005)	England	1990/1991	12,944 singleton, term.	Birth weight (kg and kg <sup>2</sup> ). A quadratic	Caesarean section (all) vs. vaginal (all); elective	Regression models: <i>Final model (all caesarean birth)</i> :	<i>Overall caesarean</i> : In the regression analysis, there was an increase in the odds of CS at the extremes of birth weight,



				term was included for birth weight as the relationship was non-linear (J-shaped).	CS vs. attempted VD, emergency CS vs. spontaneous VD.	previous CS, outcome of last pregnancy, parity, diabetes mellitus, birth weight, neonatal head circumference, gestational age, fetal presentation. <i>Final model (elective CS):</i> previous CS, diabetes mellitus, gestational age, fetal presentation. <i>Final model (emergency CS):</i> previous CS, outcome of last pregnancy, parity, birth weight, neonatal head circumference, fetal presentation, in preferred labour position, epidural.	especially at the upper end (adjOR=0.01 95% CI=0.00-0.03 for kg and adjOR=2.12 95% CI=1.70-2.64 for kg <sup>2</sup> ).  <i>Elective caesarean:</i> Birth weight was not a significant factor in the regression analyses (data not given).  <i>Emergency caesarean:</i> As in the overall CS model, the extremes of birth weight were associated with an increase in the odds of emergency CS (adjOR=0.003 95% CI=0.0003-0.026 for kg and adjOR=2.37 95% CI=1.73-3.24 for kg <sup>2</sup> ).
Read et al (1994)	Australia	1987	3,641	Birth weight (g) <3000 (reference), 3000-3499, 3500+.	Emergency caesarean section and instrumental vaginal birth (vacuum or	Race, area of residence, marital status, age, public or private care, infant gender, maternal height,	<i>Emergency caesarean:</i> In the adjusted analyses, compared to mothers who gave birth to a baby weighing less than 3000g, the risk of emergency CS increased with increasing birth weight

					forceps).	length of labour, labour complications and anaesthesia included in regression model.	(adjOR=1.92 95% CI=1.24-2.99 for 3000-3499g, OR= 4.16 95% CI=2.66-6.51 for 3500g+). <i>Instrumental birth:</i> In the adjusted analyses, compared to mothers who gave birth to a baby weighing less than 3000g, the risk of instrumental birth increased with increasing birth weight (adjOR=1.52 95% CI=1.19-1.95 for 3000-3499g, OR= 2.52 95% CI=1.96-3.24 for 3500g+).
Roberts et al (2002)	Australia	1990-1997	615,604 primiparous women who gave birth to a live, singleton, cephalic presenting infants at term.	Birth weight (g) <2500, 2500-2999, 3000-3499 (reference), 3500-3999, 4000-4499, ≥4500.	Operative birth (forceps, vacuum and caesarean births).	Age, type of care, obstetric complications, type of labour (spontaneous/augmented/induced), epidural, gestational age.	<i>1990:</i> Risk of operative birth increased with increasing birth weight. Compared to mothers who gave birth to a baby weighing 3000-3499g, mothers who gave birth to a baby weighing less than that were less likely to have an operative birth (adjOR=0.82 95% CI=0.75-0.89 for 2500-2999g) and mothers who gave birth to heavier babies were more likely (adjOR=1.31 95% CI=1.26-1.43 for 3500-3999g adjOR=2.10 95% CI=1.88-2.34 for 4000-4499g and adjOR=3.28 95% CI=2.50-4.31 for ≥4500g). <i>1997:</i> As in the earlier year, risk of operative birth increased with increasing birth weight. Compared to mothers who gave birth to a

							<p>baby weighing 3000-3499g, mothers who gave birth to a baby weighing less, were less likely to have an operative birth (adjOR=0.78 95% CI=0.71-0.85 for 2500-2999g) and mothers who gave birth to heavier babies were more likely (adjOR=1.31 95% CI=1.23-1.40 for 3500-3999g adjOR=1.82 95% CI=1.65-2.01 for 4000-4499g and adjOR=3.65 95% CI=2.88-4.63 for <math>\geq</math>4500g).</p> <p>In both samples, babies weighing &lt;2500g did not have a significant impact on mode of birth (adjOR=1.06 95% CI=0.86-1.30 for 1990 and adjOR=1.16 95% CI=0.96-1.41 for 1997).</p>
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	No effect
	Mothers with high birth weight babies are more likely to have intervention
	Mothers with low birth weight babies are more likely to have intervention

Table A2.30: Fetal sex and mode of birth

Author(s)	Country	Period of data collection	Study sample	Determinant(s)	Outcome measure(s)	Co-factors	Effect of baby sex on mode of birth
Agarwal et al (2009)	England	2001-2003	658	Sex	Instrumental birth and emergency CS.	None presented.  The authors state that the association remained after adjusting for birth weight and head circumference, but do not present the results of the multiple regression.	The rate of emergency CS was significantly higher for male infants (14%) compared to females (9%, $p=0.001$ ), but there was no significant difference in instrumental birth rates.
Bekedam (2002)	The Netherlands	1990-1994	422,586	Sex	Operative birth for fetal distress (inc. emergency CS, vacuum extraction and forceps).	Gestational age and birth weight.	Operative births for fetal distress occurred for 9.3% of male infants and for 7.0% of female infants (OR= 1.36 95% CI 1.33-1.39). After adjustment for gestational age and birth weight the association remained (adjOR=1.48 95% CI 1.44-1.51).
Cesaroni et al (2008)	Italy	1990-1996	88,698 first-born live births.	Sex	Caesarean section (all).	None.	Crude estimates indicated that compared to mothers who gave birth to a boy, mothers who gave birth to a girl were less likely to have a CS (OR=0.89 95% CI=0.87-0.92).
Eogan et al (2003)	Ireland	1997-2000	8075	Sex	Caesarean section (all), vacuum extraction and forceps.	None presented.  The authors do discuss some adjusted analyses	Mothers who gave birth to male infants were more likely to have a CS (6.1% vs. 4.2%, $p=0.0002$ ), a forceps birth (8.0% vs. 6.4%, $p=0.009$ ) or a vacuum extraction (14.8% vs. 12.8%, $p=0.01$ ).

						with birth weight, duration of labour and use of epidural but the results are not presented.	The authors discuss that in a multiple regression analysis adjusting for confounding factors known to affect labour and birth (such as birth weight, duration of labour and epidural), there was a strong association between fetal sex and mode of birth. The results are not presented however.
Hall and Carr-Hill (1982)	Scotland	1961-1979	52,266 singleton live births.	Sex	Caesarean section and forceps.	None presented. The authors state that the higher incidence of CS in boys was not attributable to increased birth weight, but the analyses for this is not given.	Male infants were more likely to be born by CS than girls (6.8% vs. 6.2%, OR=1.12) and there was a similar increased rate of forceps births for male infants (14.3% vs. 11.8%, OR=1.24).
Lieberman et al (1997)	USA	1990-1994	2,439 (1246 male) primiparous.	Sex	Emergency caesarean section.	Birth weight, gestational age and head circumference.	<i>CS for failure to progress:</i> Unadjusted analyses indicated that mothers who had a male baby were 30% more likely to have a CS (OR=1.3 95% CI=1.0-1.8). When adjusted however, fetal sex was no longer a significant predictor of CS for failure to progress (adjOR=1.04 95% CI=0.8-1.4). <i>CS for fetal distress:</i> Unadjusted analyses indicated that mothers who had a male baby were 70% more likely to have a CS (OR=1.7 95% CI=1.0-3.0). When adjusted, the risk of

							CS for failure to progress increased for mothers who had a male baby (adjOR=2.2 95% CI=1.3-4.0).
Read et al (1994)	Australia	1987	3,641	Sex	Emergency caesarean section and instrumental birth (vacuum or forceps).	Race, area of residence, marital status, age, public or private care, birth weight, maternal height, length of labour, labour complications and anaesthesia included in regression model.	<p><i>Emergency caesarean:</i> Crude rates indicated that mothers who gave birth to a boy had a higher emergency CS rate (58% compared to 42% for girls). Infant gender however, was not a significant factor in adjusted analyses.</p> <p><i>Instrumental birth:</i> Crude rates indicated that mothers who gave birth to a boy had a higher operative birth rate (56% compared to 44% for girls). In the adjusted analyses, compared to mothers who gave birth to a baby girl, mothers who had a boy were over 30% more likely to have an operative birth (adjOR=1.33 95% CI=1.13-1.57).</p>
Viegas et al (2008)	Malaysia	2007	4,644 singleton vertex presenting births after spontaneous labour at term.	Sex	Emergency caesarean section.	None.	Males were more often born by CS (28% vs. 24% for females, OR= 1.25 95% CI 1.07-1.43).

	No effect
	Mothers giving birth to a male baby are more likely to have intervention
	Mothers giving birth to a female baby are more likely to have intervention

**CHAPTER 4:**  
The Millennium Cohort Study: Bivariate analyses

Table A4.2: Unadjusted maternal and infant characteristics by mode of birth, stratified by parity

Characteristics of mothers and their infants	Primiparous					Multiparous				
	<i>Unassisted vaginal birth</i>	<i>Instrumental birth</i>	<i>Planned CS</i>	<i>Emergency CS</i>	p-value	<i>Unassisted vaginal birth</i>	<i>Instrumental birth</i>	<i>Planned CS</i>	<i>Emergency CS</i>	p-value
	<i>N (%)</i>	<i>N (%)</i>	<i>N (%)</i>	<i>N (%)</i>		<i>N (%)</i>	<i>N (%)</i>	<i>N (%)</i>	<i>N (%)</i>	
	4,225 (56.5)	1,377 (19.4)	409 (5.1)	1,409 (19.1)		8,111 (76.7)	375 (3.8)	1,247 (12.1)	808 (7.5)	
<b>Socio-demographic factors</b>										
<b>Age at cohort member birth</b>										
<b>19 or younger</b>	996 (76.0)	164 (12.7)	32 (1.9)	135 (9.4)		189 (89.2)	5 (1.9)	11 (4.7)	10 (4.3)	
<b>20-24</b>	1,150 (66.7)	261 (14.6)	77 (4.2)	259 (14.5)		1,411 (85.2)	38 (2.4)	135 (7.3)	88 (5.1)	
<b>25-29</b>	1,088 (55.5)	430 (21.2)	119 (5.2)	399 (18.1)		2,348 (79.8)	95 (3.8)	283 (9.7)	204 (6.7)	
<b>30-34</b>	763 (46.9)	366 (22.5)	115 (5.8)	412 (24.7)		2,644 (74.7)	144 (3.8)	480 (13.6)	285 (7.9)	
<b>35-39</b>	213 (37.8)	139 (25.4)	54 (8.5)	172 (28.3)		1,307 (70.0)	87 (5.3)	286 (16.0)	183 (8.7)	
<b>40 and older</b>	14 (13.3)	16 (20.1)	12 (17.9)	31 (48.7)	<0.001	208 (69.8)	6 (1.9)	52 (15.4)	38 (13.0)	<0.001
<b>Age at first birth</b>										
<b>19 or younger</b>						2,120 (84.9)	64 (2.8)	176 (6.7)	151 (5.5)	
<b>20-24</b>						2,721 (79.9)	101 (3.0)	340 (9.7)	248 (7.3)	
<b>25-29</b>						2,079 (72.1)	140 (5.2)	415 (14.2)	260 (8.5)	
<b>30-34</b>						1,004 (71.1)	56 (3.9)	262 (17.6)	119 (7.4)	
<b>35-39</b>						167 (66.5)	14 (4.4)	50 (18.9)	27 (10.2)	
<b>40 and older</b>						7 (53.1)	0	2 (11.0)	3 (35.9)	<0.001
<b>Age of partner at cohort member birth</b>										
<b>19 or younger</b>	153 (75.6)	17 (9.3)	5 (3.1)	22 (11.8)		36 (84.2)	0	4 (7.8)	6 (8.1)	
<b>20-29</b>	1,525 (61.2)	442 (18.2)	142 (5.1)	403 (15.6)		1,975 (80.5)	88 (3.6)	229 (9.5)	148 (6.4)	
<b>30-39</b>	1,327 (48.8)	606 (22.5)	181 (6.0)	638 (22.7)		4,009 (74.7)	219 (4.4)	709 (13.5)	419 (7.5)	
<b>40 and older</b>	179 (44.6)	95 (22.7)	27 (6.2)	106 (26.4)	<0.001	775 (72.7)	37 (3.3)	153 (13.7)	121 (10.3)	<0.001

Table A4.2: Unadjusted maternal and infant characteristics by mode of birth, stratified by parity



<i>Ethnicity, language and migration</i>											
<b>Ethnicity</b>	<b>White</b>	3,628 (55.7)	1,265 (20.1)	355 (5.2)	1,212 (19.1)		6,670 (76.7)	325 (3.9)	1,061 (12.2)	635 (7.2)	
	<b>Mixed</b>	54 (70.0)	11 (17.1)	3 (3.7)	10 (9.3)		74 (69.2)	5 (5.8)	15 (15.1)	10 (9.8)	
	<b>Indian</b>	110 (57.9)	26 (16.6)	6 (3.4)	42 (22.2)		198 (73.8)	13 (5.8)	26 (9.7)	28 (10.7)	
	<b>Pakistani and Bangladeshi</b>	213 (68.6)	38 (10.9)	29 (7.5)	49 (13.0)		696 (81.7)	20 (2.2)	82 (10.1)	56 (5.9)	
	<b>Black</b>	120 (59.1)	14 (6.4)	9 (3.9)	66 (30.7)	<0.001	331 (72.1)	6 (1.7)	43 (13.2)	59 (13.0)	<0.05
<b>First language at home</b>	<b>English</b>	4,117 (56.4)	1,352 (19.5)	393 (5.0)	1,365 (19.1)		7,765 (76.7)	359 (3.8)	1,196 (12.1)	764 (7.4)	
	<b>Other language</b>	108 (59.7)	25 (10.0)	16 (8.9)	44 (21.3)	<0.05	346 (73.6)	16 (4.7)	51 (11.7)	44 (10.1)	0.32
<b>How long lived in the UK</b>	<b>Since birth</b>	2,953 (55.0)	1,030 (20.1)	298 (5.3)	1,019 (19.6)		5,591 (77.0)	256 (3.8)	874 (12.1)	532 (7.1)	
	<b>More than 5 years</b>	176 (56.1)	63 (18.8)	25 (5.6)	70 (19.5)		711 (72.2)	22 (3.3)	115 (13.2)	99 (11.3)	
	<b>Less than 5 years</b>	138 (58.4)	37 (15.0)	16 (5.5)	51 (21.1)	0.76	219 (76.2)	12 (4.9)	28 (12.7)	16 (6.3)	<0.05
<i>Socio-economic factors</i>											
<b>Educational level</b>	<b>NVQ level 4/5</b>	1,236 (49.6)	550 (22.0)	165 (6.1)	539 (22.3)		2,017 (73.9)	116 (4.2)	385 (13.9)	232 (8.0)	
	<b>NVQ level 3</b>	723 (58.9)	226 (18.8)	58 (4.5)	217 (17.8)		1,039 (78.5)	40 (3.7)	147 (10.9)	98 (6.9)	
	<b>NVQ level 2</b>	1,273 (59.1)	387 (19.0)	103 (4.7)	393 (17.3)		2,357 (76.3)	120 (4.1)	379 (12.5)	221 (7.2)	
	<b>NVQ level 1</b>	388 (63.3)	99 (17.3)	34 (4.1)	102 (15.3)		713 (79.4)	26 (3.0)	84 (9.5)	70 (8.1)	
	<b>None</b>	504 (68.4)	92 (11.9)	40 (3.9)	122 (15.8)		1,692 (79.5)	58 (3.0)	213 (10.3)	162 (7.2)	
	<b>Overseas qualification</b>	99 (56.3)	22 (14.7)	9 (5.5)	35 (23.6)	<0.001	276 (78.1)	15 (4.8)	38 (10.9)	23 (6.2)	<0.05

Table A4.2: Unadjusted maternal and infant characteristics by mode of birth, stratified by parity

<b>Highest NS SEC in household</b>	<b>Higher man and prof</b>	591 (49.3)	259 (21.6)	74 (5.7)	283 (23.4)		1,021 (75.2)	56 (4.3)	203 (13.3)	104 (7.2)	
	<b>Lower man and prof</b>	1,005 (51.7)	430 (22.0)	104 (4.8)	418 (21.6)		1,796 (75.0)	114 (4.6)	313 (13.1)	176 (7.4)	
	<b>Intermediate</b>	639 (57.6)	205 (19.1)	55 (5.4)	213 (18.0)		942 (76.1)	41 (3.7)	152 (13.0)	98 (7.2)	
	<b>Small emp and self-emp</b>	173 (54.6)	57 (18.6)	24 (7.9)	64 (19.0)		619 (74.2)	28 (3.5)	112 (14.4)	71 (7.9)	
	<b>Lower sup and tech</b>	370 (60.8)	106 (18.7)	40 (6.0)	93 (14.5)		793 (75.9)	33 (3.4)	117 (12.0)	90 (8.7)	
	<b>Semi-routine</b>	741 (66.1)	176 (15.3)	58 (3.8)	187 (14.8)		1,459 (80.5)	57 (3.0)	177 (9.4)	126 (7.0)	
	<b>Routine</b>	420 (66.8)	89 (13.9)	34 (4.2)	101 (15.1)		888 (78.4)	31 (3.5)	111 (10.2)	87 (7.9)	
	<b>Unclassified</b>	286 (69.5)	55 (14.2)	20 (3.8)	50 (12.6)	<0.001	593 (83.2)	15 (2.6)	62 (7.2)	56 (7.0)	<0.05
<b>Maternal height</b>											
<b>Height</b>	<b>&lt;154</b>	212 (47.6)	66 (15.5)	34 (6.6)	139 (30.3)		549 (70.0)	31 (3.8)	127 (16.5)	69 (9.7)	
	<b>154-159</b>	685 (51.5)	235 (18.4)	75 (5.9)	315 (24.2)		1,514 (72.6)	84 (4.1)	269 (13.1)	213 (10.1)	
	<b>160-165</b>	1,656 (56.3)	548 (19.9)	154 (5.0)	517 (19.0)		3,119 (76.7)	153 (4.2)	474 (12.3)	290 (6.9)	
	<b>166-171</b>	1,004 (59.8)	310 (18.7)	89 (4.7)	277 (16.9)		1,797 (78.6)	69 (3.4)	246 (11.2)	149 (6.7)	
	<b>&gt;172</b>	609 (58.8)	209 (22.1)	53 (4.8)	153 (14.3)	<0.001	989 (81.2)	33 (3.2)	116 (9.8)	77 (5.7)	<0.001
<b>Interpersonal factors</b>											
<b>Left home before 17</b>	<b>No</b>	3,634 (55.6)	1,241 (19.8)	361 (5.1)	1,262 (19.5)		6,847 (76.0)	334 (4.0)	1,100 (12.5)	685 (7.5)	
	<b>Yes</b>	587 (62.9)	135 (16.0)	47 (4.8)	147 (16.4)	<0.05	1,250 (80.5)	40 (2.7)	147 (9.6)	121 (7.2)	<0.05
<b>Parents ever separated</b>	<b>No</b>	2,810 (55.2)	959 (19.3)	300 (5.4)	1,015 (20.1)		5,707 (75.9)	261 (3.6)	941 (13.1)	571 (7.4)	
	<b>Yes</b>	1,414 (59.3)	418 (19.5)	109 (4.4)	394 (16.8)	<0.05	2,403 (78.3)	114 (4.4)	306 (9.7)	237 (7.6)	<0.05
<b>Feelings about pregnancy</b>	<b>Happy</b>	3,411 (54.3)	1,200 (20.1)	374 (5.6)	1,241 (20.0)		6,450 (76.3)	319 (4.0)	1,033 (12.4)	637 (7.3)	
	<b>Unhappy or not bothered</b>	792 (70.0)	169 (14.6)	35 (2.5)	163 (13.3)	<0.001	1,555 (78.4)	54 (3.1)	208 (10.2)	169 (8.4)	<0.05

Table A4.2: Unadjusted maternal and infant characteristics by mode of birth, stratified by parity

<i>Pregnancy factors</i>											
<b>Fertility treatment</b>	<b>No</b>	4,108 (57.1)	1,324 (19.4)	381 (4.9)	1,328 (18.6)		8,023 (76.9)	369 (3.8)	1,213 (11.8)	797 (7.5)	
	<b>Yes</b>	116 (41.3)	53 (18.6)	28 (10.5)	81 (29.6)	<0.001	85 (59.5)	6 (5.2)	34 (29.2)	10 (6.1)	<0.001
<b>Planned pregnancy</b>	<b>Planned</b>	2,022 (51.1)	834 (21.9)	258 (5.9)	834 (21.1)		4,356 (75.9)	225 (4.0)	730 (12.9)	427 (7.1)	
	<b>Surprise</b>	2,197 (63.8)	540 (15.7)	151 (4.1)	574 (16.5)	<0.001	3,744 (77.7)	150 (3.5)	515 (10.8)	378 (7.9)	<0.05
<b>Antenatal care</b>	<b>Received care &amp; attended classes</b>	2,415 (53.0)	992 (22.1)	241 (4.9)	915 (20.1)		1,106 (73.2)	58 (4.5)	187 (13.1)	138 (9.2)	
	<b>Care, no classes</b>	1,628 (63.0)	356 (13.7)	156 (5.8)	457 (17.5)		6,671 (77.1)	307 (3.8)	1,027 (12.0)	633 (7.1)	
	<b>No care</b>	181 (70.5)	29 (13.3)	11 (2.9)	37 (13.2)	<0.001	328 (79.7)	10 (2.7)	33 (8.9)	37 (8.9)	0.05
<i>Health factors</i>											
<b>Pre-pregnancy BMI</b>	<b>Underweight</b>	348 (66.2)	77 (15.7)	20 (4.7)	79 (13.4)		407 (84.8)	11 (2.5)	30 (6.2)	39 (6.5)	
	<b>Normal</b>	2,799 (57.6)	955 (20.7)	260 (4.9)	808 (16.7)		4,891 (79.1)	235 (4.1)	638 (10.4)	409 (6.4)	
	<b>Overweight</b>	637 (51.4)	227 (19.0)	68 (5.1)	301 (24.5)		1,586 (73.8)	74 (3.3)	308 (15.0)	180 (8.0)	
	<b>Obese</b>	163 (45.9)	60 (15.4)	27 (6.1)	104 (32.6)		493 (67.9)	18 (3.4)	127 (18.4)	69 (10.3)	
	<b>Morbidly obese</b>	58 (40.0)	20 (16.8)	11 (7.2)	53 (36.5)	<0.001	179 (63.8)	11 (3.9)	52 (18.0)	43 (14.3)	<0.001
<b>Smoking in pregnancy</b>	<b>Never</b>	2,503 (54.0)	887 (20.0)	273 (5.6)	920 (20.4)		5,254 (75.7)	270 (4.2)	855 (12.6)	539 (7.5)	
	<b>Quit</b>	757 (58.7)	243 (19.7)	63 (3.8)	228 (17.8)		754 (75.9)	33 (3.0)	144 (13.7)	75 (7.4)	
	<b>Light</b>	608 (60.8)	174 (18.6)	47 (4.3)	172 (16.3)		1,053 (80.1)	35 (3.0)	126 (9.9)	88 (7.0)	
	<b>Heavy</b>	357 (66.7)	72 (13.4)	26 (5.0)	89 (15.0)	<0.001	1,048 (79.5)	36 (3.0)	121 (9.6)	106 (7.9)	<0.05
<b>Problem or illness during pregnancy:</b>	<b>No problem</b>	2,721 (58.9)	824 (19.1)	207 (4.3)	811 (17.7)		5,241 (78.9)	245 (4.0)	691 (10.7)	437 (6.4)	
	<b>Yes</b>	528 (48.1)	199 (17.8)	87 (6.9)	295 (27.3)	<0.001	805 (65.2)	45 (3.5)	227 (17.2)	181 (14.2)	<0.001
<i>CS risk factor</i>											

Table A4.2: Unadjusted maternal and infant characteristics by mode of birth, stratified by parity

<b>Problem or illness during pregnancy:</b>	<b>No problem</b>	2,721 (58.9)	824 (19.1)	207 (4.3)	811 (17.7)		5,241 (78.9)	245 (4.0)	691 (10.7)	437 (6.4)	
<i>Other</i>	<b>Yes</b>	1,204 (53.8)	445 (20.0)	154 (6.3)	441 (19.9)	<0.001	2,449 (76.0)	101 (3.4)	412 (12.9)	260 (7.7)	<0.05
<b>Labour and birth factors</b>											
<b>Labour induced</b>	<b>No</b>	2,875 (60.8)	792 (18.0)	337 (6.6)	705 (14.6)		5,795 (75.1)	237 (3.3)	1,090 (14.3)	564 (7.3)	
	<b>Yes</b>	1,347 (48.6)	584 (21.9)	71 (2.3)	702 (27.1)	<0.001	2,312 (81.3)	137 (5.3)	156 (5.5)	244 (8.0)	<0.001
<b>Companionship during labour and birth</b>	<b>Yes</b>	4,135 (57.0)	1,364 (19.7)	380 (4.9)	1,314 (18.4)		7,646 (77.6)	360 (3.9)	1,129 (11.8)	676 (6.6)	
	<b>No</b>	90 (39.7)	13 (5.4)	29 (13.8)	95 (47.2)	<0.001	465 (60.0)	15 (2.1)	118 (16.8)	132 (21.1)	<0.001
<b>Complications during labour and birth:</b>	<b>None</b>	3,217 (76.4)	503 (11.8)	234 (4.9)	315 (6.9)		6,489 (81.5)	145 (1.9)	1,031 (13.3)	285 (3.3)	
<i>Malpresentation</i>	<b>Yes</b>	104 (15.4)	152 (24.2)	131 (20.5)	262 (40.0)	<0.001	125 (29.4)	52 (12.2)	115 (30.3)	125 (28.1)	<0.001
<b>Complications during labour and birth:</b>	<b>None</b>	3,217 (76.4)	503 (11.8)	234 (4.9)	315 (6.9)		6,489 (81.5)	145 (1.9)	1,031 (13.3)	285 (3.3)	
<i>Fetal distress</i>	<b>Yes</b>	544 (31.1)	527 (32.0)	16 (0.6)	647 (36.2)	<0.001	875 (67.5)	131 (11.3)	27 (1.7)	254 (19.5)	<0.001
<b>Complications during labour and birth:</b>	<b>None</b>	3,217 (76.4)	503 (11.8)	234 (4.9)	315 (6.9)		6,489 (81.5)	145 (1.9)	1,031 (13.3)	285 (3.3)	
<i>Maternal/delay</i>	<b>Yes</b>	412 (31.5)	392 (30.8)	27 (1.9)	472 (35.8)	<0.001	615 (65.3)	84 (9.6)	32 (3.5)	209 (21.7)	<0.001
<b>Infant factors</b>											
<b>Birth weight</b>	<b>Low</b>	283 (51.2)	46 (9.6)	39 (6.5)	170 (32.7)		346 (55.2)	11 (1.7)	66 (9.9)	187 (33.3)	
	<b>Normal</b>	3,636 (58.7)	1,188 (20.0)	330 (5.1)	1,008 (16.3)		6,653 (78.4)	286 (3.6)	1,019 (12.3)	486 (5.6)	
	<b>High</b>	304 (42.1)	142 (20.9)	40 (4.6)	231 (32.3)	<0.001	1,099 (74.4)	78 (5.8)	159 (11.3)	135 (8.5)	<0.001
<b>Gestational age</b>	<b>Preterm</b>	283 (47.9)	67 (13.3)	32 (5.4)	180 (33.4)		412 (57.8)	15 (2.1)	76 (9.3)	205 (30.8)	

Table A4.2: Unadjusted maternal and infant characteristics by mode of birth, stratified by parity

	<b>Normal</b>	3,764 (57.8)	1,226 (19.6)	368 (5.3)	1,130 (17.3)		7,623 (77.9)	334 (3.9)	1,121 (12.4)	560 (5.8)	
	<b>Post-term</b>	153 (44.2)	81 (26.6)	7 (1.5)	92 (27.6)	<0.001	344 (81.7)	22 (4.0)	29 (7.7)	33 (6.7)	<0.001
<b>Sex</b>	<b>Male</b>	2,121 (54.6)	748 (20.4)	194 (4.5)	785 (20.5)		4,092 (75.2)	220 (4.5)	616 (11.8)	466 (8.6)	
	<b>Female</b>	2,104 (58.4)	629 (18.2)	215 (5.8)	624 (17.6)	<0.001	4,019 (78.2)	155 (3.1)	631 (12.4)	342 (6.3)	<0.001

Table A4.3: Test for trend coefficients

	Primiparous			Multiparous		
	Instrumental birth	Planned CS	Emergency CS	Instrumental birth	Planned CS	Emergency CS
Age at cohort member birth (19 or younger = 0)	0.36 **	0.51 **	0.47 **	0.21 **	0.30 **	0.25 **
Age at first birth (19 or younger = 0)				0.21 **	0.36 **	0.19 **
Age of partner at cohort member birth (19 or younger = 0)	0.39 **	0.36 **	0.51 **	0.08 (p=0.38)	0.26 **	0.29 **
Educational level <sup>a</sup> (NVQ level 4/5 = 0)	-0.17 **	-0.19 **	-0.17 **	-0.09 *	-0.09 *	-0.03 (p=0.26)
Highest NS SEC in household (Higher managerial and professional = 0)	-0.12 **	-0.09 *	-0.14 **	-0.08 *	-0.07 **	-0.005 (p=0.78)
Height (>172cm=0)	-0.004 (p=0.92)	0.14 *	0.24 **	0.11 *	0.15 **	0.20 **
Pre-pregnancy BMI (Underweight=0)	0.08 p=0.08	0.23 *	0.48 **	0.02 (p=0.79)	0.39 **	0.33 **
Smoking in pregnancy (Never = 0)	-0.15	-0.18	-0.18	-0.16	-0.11	-0.01

	*	*	**	(p=0.06)	*	(p=0.75)
<b>Antenatal care (Received care and attended classes = 0)</b>	-0.58 **	-0.10 (p=0.43)	-0.32 **	-0.24 (p=0.14)	-0.17 (p=0.06)	-0.22 (p=0.06)
<b>Birth weight (kg) (LBW = 0)</b>	0.37 **	-0.05 (p=0.75)	0.24 *	0.48 *	-0.05 (p=0.50)	-0.96 **
<b>Gestational age (weeks) (Preterm = 0)</b>	0.34 *	-0.32 *	-0.30 *	0.12 (p=0.53)	-0.20 (p=0.05)	-1.74 **

\*\* = p<0.001 \* = p<0.05

<sup>a</sup> Overseas qualification excluded for trend analysis

## **CHAPTER 5:**

The Millennium Cohort Study: The inter-relationship between age, socio-economic status and mode of birth



Table A5.1: The effect of maternal age on pregnancy and labour outcomes for *primiparous* women

Pregnancy and labour factors Frequencies (weighted percentages) or Mean	19 or younger	20-24	25-29	30-34	35 and older	Test for trend	
						Coefficient	p-value
<b>Problem during pregnancy</b> CS risk factor Other	171 (13.6)	245 (14.8)	346 (18.3)	238 (14.4)	112 (17.9)	0.05	0.10
	415 (33.1)	564 (33.7)	591 (30.0)	485 (29.5)	190 (29.3)	-0.06	<0.05
<b>Labour induced</b> No Yes	846 (63.9)	1,110 (64.8)	1,315 (65.8)	1,050 (64.2)	392 (61.3)	Comparator 0.02	0.46
	483 (36.1)	639 (35.2)	721 (34.2)	606 (35.8)	259 (38.7)		
<b>Complications during labour</b> Malpresentation Fetal distress Other	74 (5.5)	135 (8.7)	206 (10.4)	169 (10.9)	68 (10.7)	0.16	<0.001
	224 (18.4)	327 (21.2)	499 (25.6)	493 (30.7)	193 (31.6)	0.20	<0.001
	173 (13.7)	279 (16.2)	369 (18.9)	355 (22.3)	129 (21.4)	0.16	<0.001
<b>Length of labour (hours)</b> Coefficient <sup>a</sup>	12.5 Reference	12.6 0.09	13.4 0.90	13.7 1.18*	13.5 0.99		

<sup>a</sup>Coefficients from unadjusted regression analysis, \*p<0.05

Table A5.2: The effect of maternal age on pregnancy and labour outcomes for *multiparous* women

Pregnancy and labour factors		19 or younger	20-24	25-29	30-34	35 and older	Test for trend	
Frequencies (weighted percentages) or Mean							Coefficient	p-value
Problem during pregnancy	CS risk factor	27 (13.5)	178 (11.6)	341 (12.7)	440 (12.4)	275 (12.7)	0.01	0.68
	Other	72 (34.4)	535 (35.3)	879 (32.4)	1,106 (32.2)	637 (30.9)	-0.05	<0.05
Labour induced	No	160 (73.1)	1,231 (73.8)	2,118 (73.5)	2,596 (75.0)	1,595 (75.6)	Comparator	
	Yes	57 (26.9)	443 (26.2)	816 (26.5)	962 (25.0)	573 (24.4)	-0.04	0.11
Complications during labour	Malpresentation	2 (0.9)	46 (2.6)	122 (4.5)	142 (4.3)	115 (6.8)	0.29	<0.001
	Fetal distress	21 (10.2)	212 (14.3)	355 (12.8)	427 (13.0)	274 (13.3)	-0.002	0.95
	Other	21 (10.5)	148 (10.0)	244 (8.7)	319 (9.4)	210 (10.4)	0.03	0.64
Length of labour (hours)		7.6	6.8	6.2	6.3	6.0		
Coefficient <sup>a</sup>		Reference	-0.81	-1.41*	-1.38*	-1.69*		

<sup>a</sup>Coefficients from unadjusted regression analysis, \*p<0.05

Table A5.3: Mode of birth according to maternal age among *primiparous* mothers: multinomial logistic regression analyses

Base outcome =unassisted vaginal  Maternal age at cohort birth	Unadjusted		Adjusted for malpresentation		Adjusted for fetal distress		Adjusted for other complications	
	Relative risk ratio (95% CI)	p-value	Relative risk ratio (95% CI)	p-value	Relative risk ratio (95% CI)	p-value	Relative risk ratio (95% CI)	p-value
<i>Instrumental vaginal</i>								
<b>19 or younger</b>	0.44 (0.35-0.55)	<0.001	0.45 (0.36-0.56)	<0.001	0.46 (0.36-0.57)	<0.001	0.45 (0.36-0.56)	<0.001
<b>20-24</b>	0.58 (0.47-0.71)	<0.001	0.58 (0.46-0.71)	<0.001	0.59 (0.48-0.74)	<0.001	0.58 (0.47-0.72)	<0.001
<b>25-29</b>	1.00		1.00		1.00		1.00	
<b>30-34</b>	1.26 (1.03-1.55)	<0.05	1.29 (1.04-1.58)	<0.05	1.22 (0.99-1.51)	0.07	1.25 (1.01-1.54)	<0.05
<b>35 and older</b>	1.85 (1.42-2.40)	<0.001	1.90 (1.45-2.50)	<0.001	1.81 (1.37-2.38)	<0.001	1.86 (1.41-2.46)	<0.001
<i>Planned CS</i>								
<b>19 or younger</b>	0.27 (0.16-0.45)	<0.001	0.30 (0.18-0.49)	<0.001	0.27 (0.16-0.45)	<0.001	0.27 (0.16-0.45)	<0.001
<b>20-24</b>	0.67 (0.47-0.95)	<0.05	0.65 (0.44-0.95)	<0.05	0.64 (0.45-0.92)	<0.05	0.65 (0.46-0.93)	<0.05
<b>25-29</b>	1.00		1.00		1.00		1.00	
<b>30-34</b>	1.33 (0.98-1.80)	0.07	1.39 (1.01-1.91)	<0.05	1.34 (0.98-1.84)	0.06	1.33 (0.98-1.81)	0.07
<b>35 and older</b>	2.82 (1.96-4.07)	<0.001	3.09 (2.11-4.52)	<0.001	2.73 (1.88-3.96)	<0.001	2.70 (1.86-3.93)	<0.001
<i>Emergency CS</i>								
<b>19 or younger</b>	0.38 (0.30-0.48)	<0.001	0.37 (0.29-0.48)	<0.001	0.38 (0.29-0.49)	<0.001	0.37 (0.29-0.48)	<0.001
<b>20-24</b>	0.67 (0.54-0.82)	<0.001	0.68 (0.54-0.84)	<0.001	0.70 (0.57-0.87)	<0.001	0.69 (0.55-0.86)	<0.001
<b>25-29</b>	1.00		1.00		1.00		1.00	
<b>30-34</b>	1.62 (1.33-1.96)	<0.001	1.69 (1.38-2.07)	<0.001	1.58 (1.28-1.94)	<0.001	1.61 (1.32-1.98)	<0.001
<b>35 and older</b>	2.62 (2.05-3.34)	<0.001	2.81 (2.19-3.61)	<0.001	2.58 (2.02-3.29)	<0.001	2.68 (2.08-3.46)	<0.001

Table A5.3: Mode of birth according to maternal age among *primiparous* mothers: multinomial logistic regression analyses

Table A5.4: Mode of birth according to maternal age among *multiparous* mothers: multinomial logistic regression analyses

Base outcome =unassisted vaginal Maternal age at cohort birth	Unadjusted		Adjusted for malpresentation	
	Relative risk ratio (95% CI)	p-value	Relative risk ratio (95% CI)	p-value
<i>Instrumental vaginal</i>				
19 or younger	0.45 (0.16-1.27)	0.13	0.50 (0.18-1.42)	0.20
20-24	0.59 (0.37-0.95)	<0.05	0.62 (0.38-1.01)	0.06
25-29	1.00		1.00	
30-34	1.08 (0.78-1.50)	0.63	1.10 (0.79-1.54)	0.56
35 and older	1.45 (1.06-1.98)	<0.05	1.43 (1.04-1.95)	<0.05
<i>Planned CS</i>				
19 or younger	0.43 (0.21-0.87)	<0.05	0.42 (0.19-0.92)	<0.05
20-24	0.70 (0.54-0.91)	<0.05	0.75 (0.57-0.98)	<0.05
25-29	1.00		1.00	
30-34	1.51 (1.27-1.78)	<0.001	1.57 (1.32-1.86)	<0.001
35 and older	1.87 (1.50-2.33)	<0.001	1.82 (1.45-2.30)	<0.001
<i>Emergency CS</i>				
19 or younger	0.57 (0.28-1.14)	0.11	0.68 (0.35-1.32)	0.25
20-24	0.72 (0.51-1.01)	0.06	0.77 (0.54-1.10)	0.15
25-29	1.00		1.00	
30-34	1.26 (1.00-1.58)	0.05	1.29 (1.02-1.64)	<0.05
35 and older	1.59 (1.24-2.04)	<0.001	1.52 (1.18-1.96)	<0.001

Table A5.4: Mode of birth according to maternal age among *multiparous* mothers: multinomial logistic regression analyses

Table A5.5: Mode of birth according to socio-economic status among *primiparous* mothers: relative risk ratios and confidence intervals from multinomial logistic regression analyses

Mode of birth (Base outcome =unassisted vaginal)		Unadjusted		Adjusted for maternal age at birth	
		Relative risk ratio (95% CI)	p-value	Relative risk ratio (95% CI)	p-value
<b>Instrumental vaginal</b>					
Educational level	NVQ level 4/5	1.00		1.00	
	NVQ level 3	0.72 (0.58-0.89)	<0.05	0.95 (0.76-1.18)	0.63
	NVQ level 2	0.72 (0.59-0.89)	<0.05	0.99 (0.80-1.23)	0.96
	NVQ level 1	0.61 (0.47-0.80)	<0.001	0.98 (0.74-1.31)	0.91
	None	0.39 (0.29-0.54)	<0.001	0.71 (0.50-1.00)	<0.05
	Overseas qualification	0.59 (0.33-1.04)	0.07	0.75 (0.41-1.38)	0.36
Highest NS SEC in household	Higher man and prof	1.00		1.00	
	Lower man and prof	0.97 (0.77-1.21)	0.77	1.12 (0.90-1.40)	0.32
	Intermediate	0.75 (0.59-0.97)	<0.05	1.06 (0.82-1.37)	0.66
	Small emp and self-emp	0.77 (0.55-1.10)	0.15	1.05 (0.73-1.49)	0.80
	Lower sup and tech	0.70 (0.51-0.96)	<0.05	1.17 (0.85-1.62)	0.33
	Semi-routine	0.53 (0.40-0.69)	<0.001	0.99 (0.74-1.31)	0.92
	Routine	0.47 (0.35-0.65)	<0.001	0.94 (0.66-1.35)	0.75
	Unclassified	0.46 (0.32-0.67)	<0.001	0.96 (0.64-1.43)	0.83

Table A5.5: Mode of birth according to SES among *primiparous* mothers: multinomial logistic regression analyses

<b>Planned CS</b>					
Educational level	NVQ level 4/5	1.00		1.00	
	NVQ level 3	0.63 (0.43-0.92)	<0.05	0.93 (0.62-1.39)	0.72
	NVQ level 2	0.65 (0.47-0.91)	<0.05	1.02 (0.72-1.44)	0.91
	NVQ level 1	0.53 (0.32-0.88)	<0.05	1.05 (0.62-1.79)	0.86
	None	0.47 (0.31-0.72)	<0.05	1.10 (0.69-1.76)	0.68
	Overseas qualification	0.79 (0.36-1.74)	0.56	1.10 (0.48-2.52)	0.82
Highest NS SEC in household	Higher man and prof	1.00		1.00	
	Lower man and prof	0.80 (0.53-1.19)	0.27	1.00 (0.67-1.49)	0.98
	Intermediate	0.80 (0.52-1.24)	0.32	1.36 (0.89-2.09)	0.16
	Small emp and self-emp	1.24 (0.72-2.12)	0.44	1.94 (1.13-3.33)	<0.05
	Lower sup and tech	0.85 (0.51-1.42)	0.54	1.92 (1.14-3.24)	<0.05
	Semi-routine	0.50 (0.33-0.76)	<0.05	1.34 (0.87-2.06)	0.19
	Routine	0.54 (0.31-0.93)	<0.05	1.62 (0.92-2.85)	0.10
	Unclassified	0.47 (0.24-0.89)	<0.05	1.39 (0.70-2.77)	0.35
<b>Emergency CS</b>					
Educational level	NVQ level 4/5	1.00		1.00	
	NVQ level 3	0.67 (0.55-0.83)	<0.001	0.97 (0.78-1.20)	0.76
	NVQ level 2	0.65 (0.54-0.78)	<0.001	0.98 (0.82-1.18)	0.87
	NVQ level 1	0.54 (0.40-0.72)	<0.001	1.00 (0.74-1.35)	0.99
	None	0.51 (0.40-0.65)	<0.001	1.12 (0.87-1.45)	0.39
	Overseas qualification	0.93 (0.54-1.62)	0.80	1.27 (0.72-2.26)	0.41
Highest NS SEC in household	Higher man and prof	1.00		1.00	
	Lower man and prof	0.88 (0.72-1.08)	0.22	1.07 (0.87-1.31)	0.55
	Intermediate	0.66 (0.52-0.84)	<0.05	1.03 (0.81-1.31)	0.82
	Small emp and self-emp	0.73 (0.51-1.05)	0.09	1.08 (0.75-1.56)	0.68
	Lower sup and tech	0.50 (0.36-0.70)	<0.001	0.99 (0.71-1.38)	0.94

Table A5.5: Mode of birth according to SES among primiparous mothers: multinomial logistic regression analyses

Semi-routine	0.47 (0.37-0.60)	<0.001	1.07 (0.83-1.39)	0.59
Routine	0.48 (0.36-0.63)	<0.001	1.19 (0.89-1.60)	0.23
Unclassified	0.38 (0.26-0.56)	<0.001	0.96 (0.63-1.45)	0.84

Table A5.6: Mode of birth according to socio-economic status among *multiparous* mothers: relative risk ratios and confidence intervals from multinomial logistic regression

Mode of birth (Base outcome =unassisted vaginal)		Unadjusted		Adjusted for maternal age at birth	
		Relative risk ratio (95% CI)	p-value	Relative risk ratio (95% CI)	p-value
<b>Instrumental vaginal</b>					
Educational level	NVQ level 4/5	1.00		1.00	
	NVQ level 3	0.81 (0.56-1.17)	0.27	0.91 (0.62-1.33)	0.63
	NVQ level 2	0.93 (0.65-1.32)	0.68	1.05 (0.73-1.50)	0.80
	NVQ level 1	0.66 (0.39-1.12)	0.12	0.79 (0.46-1.36)	0.40
	None	0.65 (0.44-0.95)	<0.05	0.76 (0.51-1.13)	0.18
	Overseas qualification	1.06 (0.56-2.02)	0.86	1.19 (0.62-2.28)	0.59
Highest NS SEC in household	Higher man and prof	1.00		1.00	
	Lower man and prof	1.07 (0.73-1.56)	0.73	1.13 (0.77-1.65)	0.54
	Intermediate	0.86 (0.49-1.50)	0.59	0.96 (0.55-1.68)	0.89
	Small emp and self-emp	0.83 (0.49-1.40)	0.48	0.91 (0.54-1.54)	0.73
	Lower sup and tech	0.78 (0.45-1.36)	0.39	0.93 (0.53-1.64)	0.81
	Semi-routine	0.65 (0.40-1.05)	0.08	0.80 (0.49-1.30)	0.36
	Routine	0.77 (0.44-1.37)	0.38	0.97 (0.54-1.74)	0.91
	Unclassified	0.55 (0.28-1.09)	0.09	0.68 (0.34-1.37)	0.28
<b>Planned CS</b>					
Educational level	NVQ level 4/5	1.00		1.00	
	NVQ level 3	0.74 (0.57-0.96)	<0.05	0.87 (0.68-1.13)	0.30

Table A5.6: Mode of birth according to SES among multiparous mothers: multinomial logistic regression analyses



Highest NS SEC in household	NVQ level 2	0.87 (0.73-1.04)	0.13	1.03 (0.87-1.24)	0.71
	NVQ level 1	0.64 (0.46-0.87)	<0.05	0.84 (0.60-1.16)	0.28
	None	0.69 (0.56-0.85)	<0.05	0.87 (0.70-1.08)	0.21
	Overseas qualification	0.74 (0.48-1.15)	0.18	0.88 (0.57-1.37)	0.57
	Higher man and prof	1.00		1.00	
	Lower man and prof	0.99 (0.80-1.23)	0.92	1.07 (0.86-1.33)	0.54
	Intermediate	0.97 (0.75-1.24)	0.79	1.15 (0.89-1.49)	0.28
	Small emp and self-emp	1.10 (0.83-1.47)	0.50	1.28 (0.96-1.70)	0.09
	Lower sup and tech	0.90 (0.67-1.20)	0.46	1.19 (0.89-1.58)	0.25
	Semi-routine	0.66 (0.52-0.85)	<0.05	0.92 (0.71-1.19)	0.52
Routine	0.74 (0.54-1.00)	<0.05	1.05 (0.77-1.42)	0.76	
Unclassified	0.49 (0.34-0.72)	<0.001	0.68 (0.46-0.99)	<0.05	
<b>Emergency CS</b>					
Educational level	NVQ level 4/5	1.00		1.00	
	NVQ level 3	0.80 (0.60-1.07)	0.14	0.93 (0.70-1.24)	0.63
	NVQ level 2	0.86 (0.70-1.07)	0.18	1.01 (0.81-1.26)	0.91
	NVQ level 1	0.93 (0.67-1.30)	0.68	1.20 (0.86-1.66)	0.28
	None	0.84 (0.66-1.07)	0.16	1.04 (0.81-1.34)	0.76
	Overseas qualification	0.73 (0.44-1.23)	0.24	0.85 (0.50-1.44)	0.55
	Highest NS SEC in household	Higher man and prof	1.00		1.00
Lower man and prof	1.03 (0.78-1.34)	0.86	1.11 (0.84-1.46)	0.45	
Intermediate	0.99 (0.72-1.37)	0.97	1.18 (0.86-1.63)	0.31	
Small emp and self-emp	1.11 (0.76-1.62)	0.58	1.29 (0.88-1.89)	0.19	
Lower sup and tech	1.20 (0.85-1.68)	0.30	1.58 (1.12-2.23)	<0.05	
Semi-routine	0.91 (0.67-1.24)	0.56	1.27 (0.92-1.74)	0.15	
Routine	1.06 (0.77-1.47)	0.72	1.51 (1.08-2.10)	<0.05	
Unclassified	0.88 (0.60-1.28)	0.49	1.21 (0.82-1.78)	0.34	

Table A5.6: Mode of birth according to SES among multiparous mothers: multinomial logistic regression analyses

Table A5.7: Mode of birth according to smoking status in pregnancy: relative risk ratios and confidence intervals from multinomial logistic regression analyses

Parity	Mode of birth (Base outcome =unassisted vaginal)		Model A (Unadjusted)		Model B*		Model C*	
			Relative risk ratio (95% CI)	p-value	Relative risk ratio (95% CI)	p-value	Relative risk ratio (95% CI)	p-value
Primiparous	Instrumental vaginal	Never	1.00		1.00		1.00	
		Quit	0.90 (0.75-1.10)	0.31	1.13 (0.93-1.38)	0.21	1.11 (0.91-1.34)	0.31
		Light	0.82 (0.64-1.06)	0.14	1.18 (0.90-1.54)	0.24	1.24 (0.94-1.62)	0.12
		Heavy	0.54 (0.39-0.75)	<0.001	0.86 (0.62-1.20)	0.38	0.91 (0.65-1.26)	0.56
	Planned CS	Never	1.00		1.00		1.00	
		Quit	0.63 (0.45-0.88)	<0.05	0.84 (0.59-1.18)	0.32	0.84 (0.59-1.19)	0.33
		Light	0.69 (0.46-1.01)	0.06	1.01 (0.66-1.54)	0.97	0.98 (0.64-1.48)	0.91
		Heavy	0.71 (0.43-1.20)	0.20	1.17 (0.67-2.04)	0.57	1.13 (0.65-1.96)	0.66
	Emergency CS	Never	1.00		1.00		1.00	
		Quit	0.80 (0.66-0.97)	<0.05	1.07 (0.87-1.33)	0.52	1.06 (0.86-1.32)	0.57
		Light	0.71 (0.58-0.87)	<0.05	1.10 (0.87-1.37)	0.43	1.11 (0.88-1.39)	0.38
		Heavy	0.59 (0.45-0.79)	<0.05	0.99 (0.73-1.35)	0.95	1.00 (0.73-1.37)	0.99
Multiparous	Instrumental vaginal	Never	1.00		1.00		1.00	
		Quit	0.71 (0.46-1.08)	0.11	0.77 (0.51-1.16)	0.21	0.77 (0.51-1.17)	0.22
		Light	0.67 (0.40-1.13)	0.13	0.78 (0.47-1.29)	0.33	0.84 (0.51-1.37)	0.48
		Heavy	0.68 (0.43-1.08)	0.10	0.81 (0.52-1.26)	0.36	0.88 (0.56-1.36)	0.55

Table A5.7: Mode of birth according to smoking status in pregnancy: multinomial logistic regression analyses

	<b>Planned CS</b>	<b>Never</b>	1.00		1.00		1.00	
		<b>Quit</b>	1.08 (0.85-1.38)	0.53	1.23 (0.96-1.58)	0.10	1.23 (0.96-1.58)	0.11
		<b>Light</b>	0.74 (0.59-0.94)	<0.05	0.89 (0.69-1.15)	0.37	0.85 (0.65-1.09)	0.20
		<b>Heavy</b>	0.72 (0.57-0.91)	<0.05	0.90 (0.70-1.14)	0.37	0.85 (0.67-1.08)	0.18
	<b>Emergency CS</b>	<b>Never</b>	1.00		1.00		1.00	
		<b>Quit</b>	1.00 (0.75-1.32)	0.98	1.10 (0.83-1.47)	0.50	1.05 (0.79-1.39)	0.74
		<b>Light</b>	0.88 (0.64-1.22)	0.45	0.99 (0.71-1.36)	0.93	0.77 (0.56-1.07)	0.12
		<b>Heavy</b>	1.01 (0.78-1.31)	0.94	1.11 (0.84-1.47)	0.46	0.87 (0.66-1.14)	0.30

\*Model B adjusted for maternal age at birth, educational attainment and social class, Model C additionally adjusted for infant birth weight.

Table A5.8: Mode of birth according to paternal age: relative risk ratios and confidence intervals from multinomial logistic regression analyses

Parity	Mode of birth (Base outcome =unassisted vaginal)		Unadjusted		Adjusted for maternal age	
			RRR (95% CI)	p-value	RRR (95% CI)	p-value
Primiparous	Instrumental vaginal	<i>20-29</i>	1.00		1.00	
		<i>30-39</i>	1.55 (1.30-1.86)	<0.001	1.02 (0.83-1.26)	0.85
		<i>40 and older</i>	1.71 (1.22-2.41)	<0.05	0.95 (0.66-1.37)	0.77
	Planned CS	<i>20-29</i>	1.00		1.00	
		<i>30-39</i>	1.48 (1.13-1.93)	<0.05	0.78 (0.57-1.06)	0.11
		<i>40-49</i>	1.68 (0.99-2.83)	0.05	0.66 (0.38-1.16)	0.15
	Emergency CS	<i>20-29</i>	1.00		1.00	
		<i>30-39</i>	1.82 (1.56-2.14)	<0.001	1.06 (0.86-1.30)	0.58
		<i>40-49</i>	2.32 (1.73-3.11)	<0.001	1.06 (0.76-1.48)	0.73
Multiparous	Instrumental vaginal	<i>20-29</i>	1.00		1.00	
		<i>30-39</i>	1.29 (0.96-1.74)	0.09	1.00 (0.70-1.43)	0.99
		<i>40-49</i>	1.01 (0.62-1.63)	0.97	0.67 (0.38-1.17)	0.16
	Planned CS	<i>20-29</i>	1.00		1.00	
		<i>30-39</i>	1.54 (1.26-1.87)	<0.001	1.09 (0.87-1.36)	0.46
		<i>40-49</i>	1.60 (1.19-2.15)	<0.05	0.91 (0.65-1.28)	0.58
	Emergency CS	<i>20-29</i>	1.00		1.00	
		<i>30-39</i>	1.27 (1.01-1.58)	<0.05	0.95 (0.73-1.23)	0.67
		<i>40-49</i>	1.79 (1.32-2.43)	<0.001	1.11 (0.76-1.63)	0.58

**CHAPTER 6:**  
The Millennium Cohort Study: Ethnicity

Table A6.3: The effect of ethnicity on mode of birth: Frequencies and weighted percentages, and relative risk ratios from unadjusted multinomial logistic regression analyses

	Ethnicity	Instrumental vaginal birth		Planned caesarean section		Emergency caesarean section	
		N (weighted %)	RRR (95% CI)	N (weighted %)	RRR (95% CI)	N (weighted %)	RRR (95% CI)
<b>Primiparous</b>	<b>White</b>	1,265 (20.1)	1.00	355 (5.2)	1.00	1,212 (19.1)	1.00
	<b>Mixed</b>	11 (17.1)	0.68 (0.32-1.42)	3 (3.7)	0.57 (0.18-1.81)	10 (9.3)	0.39 (0.17-0.92)
	<b>Indian</b>	26 (16.6)	0.80 (0.45-1.40)	6 (3.4)	0.64 (0.24-1.68)	42 (22.2)	1.12 (0.65-1.94)
	<b>Pakistani and Bangladeshi</b>	38 (10.9)	0.44 (0.29-0.66)	29 (7.5)	1.19 (0.78-1.82)	49 (13.0)	0.55 (0.36-0.86)
	<b>Black or Black British</b>	14 (6.4)	0.30 (0.16-0.56)	9 (3.9)	0.71 (0.33-1.51)	66 (30.7)	1.52 (1.02-2.27)
<b>Multiparous</b>	<b>White</b>	325 (3.9)	1.00	1,061 (12.2)	1.00	635 (7.2)	1.00
	<b>Mixed</b>	5 (5.8)	1.64 (0.52-5.25)	15 (15.1)	1.38 (0.67-2.84)	10 (9.8)	1.52 (0.69-3.36)
	<b>Indian</b>	13 (5.8)	1.55 (0.73-3.28)	26 (9.7)	0.82 (0.51-1.33)	28 (10.7)	1.55 (0.97-2.48)
	<b>Pakistani and Bangladeshi</b>	20 (2.2)	0.53 (0.31-0.93)	82 (10.1)	0.78 (0.59-1.03)	56 (5.9)	0.77 (0.55-1.08)
	<b>Black or Black British</b>	6 (1.7)	0.47 (0.16-1.40)	43 (13.2)	1.16 (0.79-1.69)	59 (13.0)	1.94 (1.34-2.79)

Table A6.3: The effect of ethnicity on mode of birth: Frequencies and weighted percentages, and relative risk ratios from multinomial logistic regression models

Table A6.4: Mode of birth stratified by age, ethnicity and parity: frequencies and weighted percentages\*

Characteristics of mothers		Primiparous				Multiparous			
Ethnicity	Age at birth	Unassisted vaginal birth (weighted %)	Instrumental birth (weighted %)	Planned CS (weighted %)	Emergency CS (weighted %)	Unassisted vaginal birth (weighted %)	Instrumental birth (weighted %)	Planned CS (weighted %)	Emergency CS (weighted %)
White	≤19	896 (75.8)	153 (13.0)	25 (1.8)	<b>120 (9.4)</b>	164 (88.2)	5 (2.1)	11 (5.1)	<b>10 (4.7)</b>
	20-24	901 (65.8)	222 (15.3)	62 (4.2)	<b>201 (14.7)</b>	1,126 (85.6)	27 (2.4)	115 (7.3)	<b>66 (4.7)</b>
	25-29	936 (54.2)	402 (22.1)	104 (5.3)	<b>352 (18.4)</b>	1,847 (79.2)	83 (4.0)	236 (10.1)	<b>165 (6.8)</b>
	30-34	693 (46.9)	342 (22.9)	103 (5.7)	<b>370 (24.5)</b>	2,235 (74.9)	125 (3.9)	416 (13.7)	<b>230 (7.5)</b>
	≥35	202 (35.8)	145 (25.8)	61 (9.6)	<b>169 (28.9)</b>	1,297 (70.8)	85 (4.9)	283 (15.6)	<b>164 (8.6)</b>
Mixed	≤19	25 (88.9)	3 (7.7)	0	2 (3.4)	2 (100.0)	0	0	0
	20-24	14 (61.3)	3 (20.3)	1 (6.4)	4 (12.1)	7 (39.4)	0	1 (4.4)	5 (56.2)
	25-29	6 (58.5)	3 (23.1)	1 (9.2)	1 (9.2)	19 (63.4)	1 (3.6)	7 (22.7)	2 (10.3)
	30-34	7 (59.9)	2 (25.2)	1 (2.3)	1 (12.6)	28 (79.4)	3 (7.0)	5 (9.6)	2 (4.0)
	≥35	2 (79.8)	0	0	2 (20.2)	18 (70.1)	1 (9.6)	2 (19.2)	1 (1.1)
Indian	≤19	4 (66.9)	1 (33.1)	0	0	1 (100.0)	0	0	0
	20-24	43 (67.2)	5 (13.5)	1 (1.0)	12 (18.4)	27 (71.1)	1 (1.8)	3 (21.7)	1 (5.4)
	25-29	46 (66.9)	11 (13.5)	2 (1.4)	15 (18.3)	81 (86.2)	1 (2.9)	4 (2.2)	8 (8.6)
	30-34	15 (44.6)	5 (16.9)	3 (11.9)	10 (26.6)	60 (74.5)	8 (8.2)	10 (9.1)	8 (8.2)
	≥35	2 (7.6)	4 (39.6)	0	5 (52.8)	29 (51.4)	3 (9.3)	9 (17.9)	11 (21.2)
	≤19	39 (74.2)	3 (4.1)	7 (9.5)	7 (12.2)	12 (100.0)	0	0	0
	20-24	131 (74.1)	22 (9.0)	11 (5.8)	23 (11.1)	196 (87.4)	8 (2.5)	12 (4.4)	13 (5.6)

Table A6.4: Mode of birth stratified by age, ethnicity and parity: frequencies and weighted percentages

<b>Pakistani/ Bangladeshi</b>	<b>25-29</b>	36 (70.3)	6 (5.6)	8 (9.8)	11 (14.3)	269 (84.3)	8 (2.9)	30 (8.6)	17 (4.2)
	<b>30-34</b>	5 (31.7)	6 (41.4)	3 (11.5)	5 (15.4)	158 (73.5)	4 (1.9)	27 (17.5)	16 (7.2)
	<b>≥35</b>	1 (12.7)	1 (37.3)	0	2 (50.0)	58 (74.9)	0	13 (14.0)	10 (11.1)
<b>Black/ Black British</b>	<b>≤19</b>	22 (69.4)	3 (12.6)	0	<b>6 (18.0)</b>	6 (100.0)	0	0	<b>0</b>
	<b>20-24</b>	35 (70.2)	5 (8.5)	1 (1.0)	<b>14 (20.4)</b>	35 (79.5)	5 (4.4)	1 (10.3)	<b>14 (5.9)</b>
	<b>25-29</b>	31 (76.7)	1 (2.9)	2 (1.7)	<b>13 (18.7)</b>	89 (88.3)	2 (2.3)	4 (3.5)	<b>9 (5.9)</b>
	<b>30-34</b>	20 (37.6)	5 (9.4)	4 (10.4)	<b>15 (42.7)</b>	113 (71.7)	2 (0.7)	13 (10.8)	<b>22 (16.7)</b>
	<b>≥35</b>	12 (40.1)	0	2 (5.3)	<b>18 (54.6)</b>	85 (60.6)	1 (1.8)	23 (22.2)	<b>26 (15.4)</b>

\*Highlighted groups had significantly different operative birth rates to white women in Table A6.3, groups in **bold** were compared in Figures 6.9 and 6.10.



Table A6.5: Mode of birth according to maternal height: relative risk ratios and confidence intervals from multinomial logistic regression analyses

Parity	Mode of birth (Base outcome =unassisted vaginal)	Height (cm)	Unadjusted			Adjusted for birth weight		
			Relative risk ratio (RRR)	95% CI	p-value	Relative risk ratio (RRR)	95% CI	p-value
Primiparous	Instrumental vaginal	<154	0.92 (0.66-1.29)		0.64	1.02 (0.73-1.42)		0.92
		154-159	1.02 (0.84-1.23)		0.86	1.08 (0.89-1.31)		0.89
		160-165	1.00			1.00		
		166-171	0.89 (0.73-1.07)		0.22	0.85 (0.70-1.03)		0.70
		>172	1.07 (0.86-1.33)		0.55	1.00 (0.80-1.25)		0.99
	Planned CS	<154	1.57 (0.95-2.58)		0.08	1.52 (0.92-2.52)		0.11
		154-159	1.30 (0.91-1.87)		0.15	1.27 (0.89-1.82)		0.19
		160-165	1.00			1.00		
		166-171	0.88 (0.64-1.23)		0.46	0.90 (0.65-1.24)		0.51
		>172	0.92 (0.65-1.31)		0.65	0.94 (0.66-1.34)		0.73
	Emergency CS	<154	1.88 (1.43-2.48)		<0.001	1.98 (1.50-2.62)		<0.001
		154-159	1.39 (1.15-1.69)		<0.05	1.44 (1.18-1.75)		<0.001
		160-165	1.00			1.00		
		166-171	0.83 (0.69-1.01)		0.06	0.82 (0.67-0.99)		<0.05
		>172	0.72 (0.58-0.90)		<0.05	0.69 (0.56-0.86)		<0.05

Table A6.5: Mode of birth according to maternal height: multinomial logistic regression analyses

<b>Multiparous</b>	<b>Instrumental vaginal</b>	<b>&lt;154</b>	1.00 (0.63-1.89)	1.00	1.11 (0.69-1.78)	0.67
		<b>154-159</b>	1.04 (0.77-1.42)	0.78	1.10 (0.81-1.49)	0.55
		<b>160-165</b>	1.00		1.00	
		<b>166-171</b>	0.80 (0.57-1.12)	0.19	0.76 (0.54-1.06)	0.11
		<b>&gt;172</b>	0.73 (0.48-1.13)	0.16	0.68 (0.43-1.07)	0.10
	<b>Planned CS</b>	<b>&lt;154</b>	1.47 (1.15-1.89)	<0.05	1.44 (1.13-1.85)	<0.05
		<b>154-159</b>	1.13 (0.93-1.37)	0.21	1.11 (0.92-1.35)	0.28
		<b>160-165</b>	1.00		1.00	
		<b>166-171</b>	0.89 (0.74-1.09)	0.26	0.90 (0.74-1.09)	0.29
		<b>&gt;172</b>	0.76 (0.59-0.98)	<0.05	0.77 (0.59-0.99)	<0.05
	<b>Emergency CS</b>	<b>&lt;154</b>	1.53 (1.09-2.14)	<0.05	1.27 (0.90-1.78)	0.17
		<b>154-159</b>	1.55 (1.24-1.93)	<0.001	1.40 (1.12-1.75)	<0.05
		<b>160-165</b>	1.00			
		<b>166-171</b>	0.95 (0.75-1.20)	0.66	1.05 (0.83-1.32)	0.70
		<b>&gt;172</b>	0.78 (0.57-1.05)	0.11	0.89 (0.66-1.20)	0.44

Table A6.6: Mode of birth according to maternal height among *White* women: relative risk ratios and confidence intervals from multinomial logistic regression analyses

Parity	Mode of birth (Base outcome =unassisted vaginal)	Height (cm)	Unadjusted			Adjusted for birth weight		
			Relative risk ratio (RRR)	95% CI	p-value	Relative risk ratio (RRR)	95% CI	p-value
Primiparous	Instrumental vaginal	<154	0.97 (0.66-1.42)		0.87	1.06 (0.72-1.55)		0.77
		154-159	1.04 (0.85-1.28)		0.70	1.10 (0.90-1.35)		0.36
		160-165	1.00			1.00		
		166-171	0.86 (0.71-1.04)		0.13	0.83 (0.68-1.01)		0.06
		>172	1.07 (0.85-1.34)		0.56	1.01 (0.80-1.27)		0.94
	Planned CS	<154	1.57 (0.87-2.81)		0.13	1.51 (0.84-2.73)		0.17
		154-159	1.24 (0.84-1.84)		0.28	1.21 (0.82-1.79)		0.35
		160-165	1.00			1.00		
		166-171	0.88 (0.63-1.24)		0.48	0.90 (0.64-1.26)		0.53
		>172	0.93 (0.65-1.33)		0.70	0.95 (0.66-1.37)		0.80
	Emergency CS	<154	2.01 (1.46-2.75)		<0.001	2.12 (1.54-2.92)		<0.001
		154-159	1.40 (1.13-1.72)		<0.05	1.45 (1.17-1.79)		<0.05
		160-165	1.00			1.00		
		166-171	0.81 (0.65-0.99)		<0.05	0.79 (0.64-0.97)		<0.05
		>172	0.69 (0.55-0.87)		<0.05	0.67 (0.53-0.84)		<0.05

Table A6.6: Mode of birth according to maternal height among *White* women: multinomial logistic regression analyses

<b>Multiparous</b>	<b>Instrumental vaginal</b>	<b>&lt;154</b>	1.13 (0.69-1.86)	0.62	1.23 (0.74-2.05)	0.43
		<b>154-159</b>	1.09 (0.77-1.53)	0.63	1.13 (0.81-1.59)	0.47
		<b>160-165</b>	1.00		1.00	
		<b>166-171</b>	0.85 (0.60-1.22)	0.38	0.82 (0.57-1.17)	0.27
		<b>&gt;172</b>	0.78 (0.50-1.21)	0.26	0.73 (0.45-1.16)	0.18
	<b>Planned CS</b>	<b>&lt;154</b>	1.57 (1.18-2.09)	<0.05	1.54 (1.16-2.05)	<0.05
		<b>154-159</b>	1.15 (0.94-1.41)	0.18	1.13 (0.92-1.40)	0.24
		<b>160-165</b>	1.00		1.00	
		<b>166-171</b>	0.86 (0.70-1.06)	0.16	0.87 (0.71-1.07)	0.20
		<b>&gt;172</b>	0.72 (0.55-0.94)	<0.05	0.73 (0.56-0.96)	<0.05
	<b>Emergency CS</b>	<b>&lt;154</b>	1.34 (0.86-2.08)	0.19	1.14 (0.73-1.78)	0.56
		<b>154-159</b>	1.69 (1.34-2.13)	<0.001	1.54 (1.22-1.94)	<0.001
		<b>160-165</b>	1.00		1.00	
		<b>166-171</b>	1.00 (0.78-1.27)	0.97	1.08 (0.85-1.39)	0.52
		<b>&gt;172</b>	0.75 (0.54-1.06)	0.10	0.86 (0.61-1.20)	0.37

Table A6.7: Mode of birth according to maternal height among *non-White* mothers: relative risk ratios and confidence intervals from multinomial logistic regression analyses

Parity	Mode of birth (Base outcome =unassisted vaginal)	Height (cm)	Unadjusted			Adjusted for birth weight		
			Relative risk ratio (RRR)	95% CI	p-value	Relative risk ratio (RRR)	95% CI	p-value
Primiparous	Instrumental vaginal	<154	1.03 (0.42-2.56)		0.94	1.08 (0.44-2.65)		0.87
		154-159	0.92 (0.45-1.89)		0.81	0.94 (0.46-1.94)		0.87
		160-165	1.00			1.00		
		166-171	1.06 (0.53-2.14)		0.86	0.98 (0.49-1.96)		0.95
		>172	0.65 (0.23-1.82)		0.41	0.61 (0.22-1.68)		0.33
	Planned CS	<154	1.91 (0.71-5.12)		0.20	1.98 (0.76-5.14)		0.16
		154-159	1.99 (0.75-5.26)		0.17	2.04 (0.79-5.24)		0.14
		160-165	1.00			1.00		
		166-171	0.71 (0.22-2.26)		0.55	0.69 (0.21-2.25)		0.54
		>172	0.52 (0.11-2.38)		0.39	0.61 (0.22-1.68)		0.35
	Emergency CS	<154	1.65 (0.89-3.05)		0.11	1.56 (0.82-2.98)		0.17
		154-159	1.45 (0.80-2.64)		0.22	1.40 (0.77-2.56)		0.27
		160-165	1.00			1.00		
		166-171	1.17 (0.74-1.86)		0.50	1.21 (0.76-1.90)		0.42
		>172	1.12 (0.47-2.68)		0.80	1.20 (0.51-2.83)		0.67

Table A6.7: Mode of birth according to maternal height among *non-White* mothers: multinomial logistic regression analyses

<b>Multiparous</b>	<b>Instrumental vaginal</b>	<b>&lt;154</b>	0.55 (0.17-1.74)	0.31	0.68 (0.21-2.17)	0.51
		<b>154-159</b>	0.81 (0.35-1.85)	0.62	0.90 (0.41-1.95)	0.79
		<b>160-165</b>	1.00		1.00	
		<b>166-171</b>	0.31 (0.10-1.03)	0.06	0.29 (0.09-0.95)	<0.05
		<b>&gt;172</b>	0.27 (0.03-2.16)	0.21	0.27 (0.03-2.14)	0.27
	<b>Planned CS</b>	<b>&lt;154</b>	1.26 (0.73-2.19)	0.41	1.23 (0.70-2.17)	0.46
		<b>154-159</b>	1.09 (0.66-1.80)	0.75	1.07 (0.65-1.77)	0.79
		<b>160-165</b>	1.00		1.00	
		<b>166-171</b>	1.32 (0.80-2.17)	0.28	1.27 (0.75-2.15)	0.37
		<b>&gt;172</b>	1.39 (0.67-2.82)	0.37	1.38 (0.67-2.86)	0.38
	<b>Emergency CS</b>	<b>&lt;154</b>	1.69 (0.89-3.21)	0.11	1.39 (0.73-2.64)	0.31
		<b>154-159</b>	0.88 (0.51-1.52)	0.65	0.81 (0.47-1.40)	0.45
		<b>160-165</b>	1.00		1.00	
		<b>166-171</b>	0.75 (0.37-1.52)	0.42	0.84 (0.42-1.65)	0.61
		<b>&gt;172</b>	1.22 (0.57-2.61)	0.61	1.23 (0.56-2.72)	0.61

Table A6.7: Mode of birth according to maternal height among non-White mothers: multinomial logistic regression analyses

Table A6.8: The effect of ethnicity on pregnancy and labour outcomes for *primiparous* women

Pregnancy and labour factors Frequencies (weighted percentages)			White	Mixed	Indian	Pakistani/ Bangladeshi	Black	$\chi^2$ p-value
<b>Pre-pregnancy BMI</b>	<b>Underweight</b>		401 (5.8)	8 (11.3)	27 (13.0)	47 (18.0)	16 (11.3)	<0.001
	<b>Ideal</b>		4,251 (69.1)	51 (67.9)	117 (70.4)	188 (64.9)	118 (60.4)	
	<b>Overweight</b>		1,103 (17.6)	8 (12.3)	23 (14.9)	42 (14.4)	38 (21.0)	
	<b>Obese</b>		462 (7.5)	6 (8.5)	6 (1.7)	6 (2.7)	14 (7.3)	
<b>Problem or illness during pregnancy</b>	<b>No problem</b>	<b>No</b>	2,556 (40.3)	25 (34.7)	54 (32.7)	87 (24.7)	80 (41.3)	<0.001
		<b>Yes</b>	3,911 (59.7)	52 (65.3)	131 (67.3)	242 (75.3)	130 (58.7)	
	<b>CS risk factor</b>	<b>No</b>	5,447 (83.7)	69 (85.1)	166 (86.5)	304 (92.7)	186 (85.7)	0.09
		<b>Yes</b>	1,020 (16.3)	8 (14.9)	19 (13.5)	25 (7.3)	24 (14.3)	
	<b>Other problem</b>	<b>No</b>	4,468 (68.6)	56 (73.1)	143 (74.7)	57 (79.0)	141 (64.7)	<0.05
		<b>Yes</b>	1,999 (31.4)	21 (26.9)	42 (25.3)	72 (21.0)	69 (35.3)	
<b>Labour induced</b>	<b>No</b>		4,074 (64.1)	49 (52.9)	124 (76.0)	209 (66.0)	141 (63.9)	<0.05
	<b>Yes</b>		2,391 (35.9)	29 (47.1)	59 (24.0)	120 (34.0)	68 (36.1)	
<b>Complications during labour</b>	<b>No complication</b>	<b>No</b>	2,732 (44.8)	28 (45.2)	58 (34.7)	84 (25.2)	69 (37.4)	<0.001
		<b>Yes</b>	3,617 (55.2)	48 (54.8)	124 (65.3)	236 (74.8)	138 (62.6)	
	<b>Malpresentation</b>	<b>No</b>	5,755 (90.3)	72 (93.4)	169 (93.4)	304 (96.5)	192 (91.2)	<0.05
		<b>Yes</b>	594 (9.8)	4 (6.6)	13 (6.7)	16 (3.5)	15 (8.8)	
	<b>Fetal distress</b>	<b>No</b>	4,758 (73.6)	60 (75.4)	153 (80.7)	284 (88.6)	167 (79.4)	<0.05
		<b>Yes</b>	1,591 (26.4)	16 (24.6)	29 (19.3)	36 (11.5)	40 (20.6)	
<b>Other</b>	<b>No</b>	5,167 (80.8)	66 (82.7)	159 (85.8)	274 (86.1)	182 (85.7)		

Table A6.8: The effect of ethnicity on pregnancy and labour outcomes for *primiparous* women

<b>Yes</b>	1,182 (19.2)	10 (17.3)	23 (14.2)	46 (13.9)	25 (14.3)	0.24
<b>Length of labour (hours)</b>	13.3	13.8	12.0	10.7	14.1	
<b>Coefficient<sup>a</sup></b>	Reference	0.49	-1.35	-2.63*	0.82	

<sup>a</sup>Coefficients from unadjusted regression analysis, \*p<0.05



Table A6.9: The effect of ethnicity on pregnancy and labour outcomes for *multiparous* women

Pregnancy and labour factors Frequencies (weighted percentages)			White	Mixed	Indian	Pakistani/ Bangladeshi	Black	$\chi^2$ p-value
<b>Pre-pregnancy BMI</b>	<b>Underweight</b>		381 (4.3)	7 (5.4)	22 (6.8)	51 (7.3)	12 (3.5)	<0.001
	<b>Ideal</b>		5,328 (65.3)	57 (60.2)	163 (70.3)	367 (54.3)	168 (45.5)	
	<b>Overweight</b>		1,775 (20.8)	19 (23.2)	40 (16.5)	173 (26.7)	106 (31.8)	
	<b>Obese</b>		817 (9.6)	11 (11.2)	16 (6.5)	77 (11.7)	65 (19.2)	
<b>Problem or illness during pregnancy</b>	<b>No problem</b>	<b>No</b>	3,328 (39.7)	37 (39.6)	93 (37.1)	257 (32.4)	145 (38.3)	<0.05
		<b>Yes</b>	5,373 (60.3)	68 (60.4)	173 (62.9)	598 (67.6)	294 (61.7)	
	<b>CS risk factor</b>	<b>No</b>	7,637 (87.4)	91 (86.3)	232 (87.3)	780 (91.4)	390 (87.9)	0.11
		<b>Yes</b>	1,064 (12.6)	14 (13.8)	34 (12.7)	75 (8.6)	49 (12.2)	
	<b>Other problem</b>	<b>No</b>	5,937 (67.0)	77 (69.1)	190 (69.5)	650 (73.7)	331 (70.7)	<0.05
		<b>Yes</b>	2,764 (33.0)	28 (30.9)	76 (30.5)	205 (26.3)	108 (29.4)	
<b>Labour induced</b>	<b>No</b>		6,271 (74.2)	82 (77.8)	196 (73.2)	658 (78.8)	348 (79.6)	0.05
	<b>Yes</b>		2,434 (25.9)	23 (22.2)	68 (26.8)	196 (21.2)	90 (20.4)	
<b>Complications during labour</b>	<b>No complication</b>	<b>No</b>	2,044 (24.6)	29 (33.6)	38 (16.8)	110 (14.0)	94 (26.0)	<0.001
		<b>Yes</b>	6,454 (75.4)	74 (66.4)	225 (83.2)	727 (86.0)	326 (74.0)	
	<b>Malpresentation</b>	<b>No</b>	8,118 (95.3)	100 (95.5)	257 (97.8)	821 (97.9)	406 (95.0)	0.09
		<b>Yes</b>	380 (4.7)	3 (4.5)	6 (2.2)	16 (2.1)	14 (5.0)	
	<b>Fetal distress</b>	<b>No</b>	7,350 (86.4)	91 (86.1)	245 (93.2)	783 (92.4)	378 (88.4)	<0.001
		<b>Yes</b>	1,148 (13.6)	12 (13.9)	18 (6.8)	54 (7.6)	42 (11.6)	

Table A6.9: The effect of ethnicity on pregnancy and labour outcomes for *multiparous* women

<b>Other</b>	<b>No</b>	7,697 (90.4)	86 (82.1)	242 (90.1)	791 (94.9)	377 (89.9)	<0.05
	<b>Yes</b>	801 (9.6)	17 (17.9)	21 (10.0)	46 (5.1)	43 (10.1)	
<b>Length of labour (hours)</b>		6.3	7.9	5.5	6.4	6.3	
<b>Coefficient<sup>a</sup></b>		Reference	1.64	-0.74	0.16	0.01	

<sup>a</sup>Coefficients from unadjusted regression analysis, \*p<0.05

Table A6.10: Mode of birth according to ethnicity among *primiparous* mothers: multinomial logistic regression analyses adjusting for pregnancy factors

Base outcome =unassisted vaginal  Ethnicity	Unadjusted		Adjusted for BMI		Adjusted for 'other' pregnancy complications	
	Relative risk ratio (95% CI)	p-value	Relative risk ratio (95% CI)	p-value	Relative risk ratio (95% CI)	p-value
<i>Instrumental vaginal</i>						
White	<b>1.00</b>		1.00		1.00	
Mixed	<b>0.68 (0.32-1.42)</b>	<b>0.30</b>	0.69 (0.33-1.48)	0.34	0.71 (0.34-1.47)	0.35
Indian	<b>0.80 (0.45-1.40)</b>	<b>0.43</b>	0.86 (0.48-1.52)	0.60	0.80 (0.45-1.41)	0.44
Pakistani /Bangladeshi	<b>0.44 (0.29-0.66)</b>	<b>&lt;0.001</b>	0.47 (0.30-0.73)	<0.05	0.45 (0.30-0.67)	<0.001
Black	<b>0.30 (0.16-0.56)</b>	<b>&lt;0.001</b>	0.32 (0.18-0.59)	<0.001	0.30 (0.16-0.56)	<0.001
<i>Planned CS</i>						
White	<b>1.00</b>		1.00		1.00	
Mixed	<b>0.57 (0.18-1.81)</b>	<b>0.34</b>	0.62 (0.19-1.98)	0.42	0.60 (0.19-1.92)	0.39
Indian	<b>0.64 (0.24-1.68)</b>	<b>0.36</b>	0.73 (0.28-1.93)	0.53	0.65 (0.25-1.75)	0.40
Pakistani/Bangladeshi	<b>1.19 (0.78-1.82)</b>	<b>0.42</b>	1.11 (0.66-1.87)	0.69	1.25 (0.82-1.91)	0.31
Black	<b>0.71 (0.33-1.51)</b>	<b>0.37</b>	0.79 (0.36-1.74)	0.56	0.70 (0.33-1.49)	0.35
<i>Emergency CS</i>						
White	<b>1.00</b>		1.00		1.00	
Mixed	<b>0.39 (0.17-0.92)</b>	<b>&lt;0.05</b>	0.41 (0.17-1.01)	0.05	0.41 (0.18-0.95)	<0.05
Indian	<b>1.12 (0.65-1.94)</b>	<b>0.68</b>	1.34 (0.76-2.35)	0.31	1.13 (0.66-1.95)	0.66
Pakistani/Bangladeshi	<b>0.55 (0.36-0.86)</b>	<b>&lt;0.05</b>	0.59 (0.37-0.92)	<0.05	0.56 (0.36-0.87)	<0.05
Black	<b>1.52 (1.02-2.27)</b>	<b>&lt;0.05</b>	1.52 (1.03-2.25)	<0.05	1.52 (1.01-2.27)	<0.05

Table A6.10: Mode of birth according to ethnicity among *primiparous* mothers: multinomial logistic regression analyses adjusting for pregnancy factors

Table A6.11: Mode of birth according to ethnicity among *multiparous* mothers: multinomial logistic regression analyses adjusting for pregnancy factors

Base outcome =unassisted vaginal  Ethnicity	Unadjusted		Adjusted for BMI		Adjusted for 'other' pregnancy complications	
	Relative risk ratio (95% CI)	p-value	Relative risk ratio (95% CI)	p-value	Relative risk ratio (95% CI)	p-value
<i>Instrumental vaginal</i>						
White	<b>1.00</b>		1.00		1.00	
Mixed	<b>1.64 (0.52-5.25)</b>	<b>0.40</b>	1.80 (0.56-5.75)	0.32	1.64 (0.51-5.24)	0.40
Indian	<b>1.55 (0.73-3.28)</b>	<b>0.25</b>	1.38 (0.73-2.58)	0.32	1.54 (0.73-3.26)	0.26
Pakistani /Bangladeshi	<b>0.53 (0.31-0.93)</b>	<b>&lt;0.05</b>	0.51 (0.27-0.97)	<0.05	0.53 (0.30-0.92)	<0.05
Black	<b>0.47 (0.16-1.40)</b>	<b>0.18</b>	0.44 (0.16-1.24)	0.12	0.47 (0.16-1.39)	0.17
<i>Planned CS</i>						
White	<b>1.00</b>		1.00		1.00	
Mixed	<b>1.38 (0.67-2.84)</b>	<b>0.39</b>	1.34 (0.60-2.97)	0.48	1.39 (0.67-2.87)	0.38
Indian	<b>0.82 (0.51-1.33)</b>	<b>0.43</b>	0.86 (0.50-1.49)	0.59	0.83 (0.52-1.34)	0.45
Pakistani/Bangladeshi	<b>0.78 (0.59-1.03)</b>	<b>0.08</b>	0.75 (0.54-1.04)	0.08	0.79 (0.60-1.05)	0.10
Black	<b>1.16 (0.79-1.69)</b>	<b>0.46</b>	1.02 (0.70-1.48)	0.92	1.17 (0.80-1.71)	0.43
<i>Emergency CS</i>						
White	<b>1.00</b>		1.00		1.00	
Mixed	<b>1.52 (0.69-3.36)</b>	<b>0.30</b>	1.28 (0.51-3.24)	0.60	1.52 (0.69-3.36)	0.30
Indian	<b>1.55 (0.97-2.48)</b>	<b>0.07</b>	1.43 (0.84-2.42)	0.19	1.55 (0.97-2.49)	0.07
Pakistani/Bangladeshi	<b>0.77 (0.55-1.08)</b>	<b>0.14</b>	0.71 (0.48-1.05)	0.08	0.77 (0.54-1.08)	0.13
Black	<b>1.94 (1.34-2.79)</b>	<b>&lt;0.001</b>	1.63 (1.10-2.41)	<0.05	1.94 (1.35-2.80)	<0.001

Table A6.11: Mode of birth according to ethnicity among *multiparous* mothers: multinomial logistic regression analyses adjusting for pregnancy factors

Table A6.12: Mode of birth according to ethnicity among *primiparous* mothers: multinomial logistic regression analyses adjusting for labour factors

Base outcome =unassisted vaginal  Ethnicity	Unadjusted		Adjusted for induction or attempted induction		Adjusted for malpresentation		Adjusted for fetal distress	
	Relative risk ratio (95% CI)	p-value	Relative risk ratio (95% CI)	p-value	Relative risk ratio (95% CI)	p-value	Relative risk ratio (95% CI)	p-value
<i>Instrumental vaginal</i>								
White	<b>1.00</b>		1.00		1.00		1.00	
Mixed	<b>0.68 (0.32-1.42)</b>	<b>0.30</b>	0.64 (0.31-1.33)	0.23	0.73 (0.34-1.56)	0.41	0.70 (0.36-1.34)	0.28
Indian	<b>0.80 (0.45-1.40)</b>	<b>0.43</b>	0.84 (0.47-1.50)	0.55	0.84 (0.47-1.49)	0.56	0.92 (0.53-1.60)	0.77
Pakistani /Bangladeshi	<b>0.44 (0.29-0.66)</b>	<b>&lt;0.001</b>	0.44 (0.29-0.66)	<0.001	0.48 (0.32-0.72)	<0.001	0.54 (0.36-0.82)	<0.05
Black	<b>0.30 (0.16-0.56)</b>	<b>&lt;0.001</b>	0.31 (0.17-0.57)	<0.001	0.31 (0.17-0.57)	<0.001	0.34 (0.18-0.64)	<0.05
<i>Planned CS</i>								
White	<b>1.00</b>		1.00		1.00		1.00	
Mixed	<b>0.57 (0.18-1.81)</b>	<b>0.34</b>	0.62 (0.19-2.00)	0.43	0.64 (0.18-2.21)	0.48	0.62 (0.20-1.94)	0.41
Indian	<b>0.64 (0.24-1.68)</b>	<b>0.36</b>	0.59 (0.23-1.54)	0.28	0.75 (0.25-2.21)	0.60	0.63 (0.23-1.67)	0.35
Pakistani/Bangladeshi	<b>1.19 (0.78-1.82)</b>	<b>0.42</b>	1.19 (0.77-1.85)	0.42	1.59 (1.04-2.44)	<0.05	1.12 (0.73-1.74)	0.60
Black	<b>0.71 (0.33-1.51)</b>	<b>0.37</b>	0.71 (0.33-1.53)	0.38	0.72 (0.32-1.60)	0.41	0.65 (0.29-1.43)	0.28
<i>Emergency CS</i>								
White	<b>1.00</b>		1.00		1.00		1.00	
Mixed	<b>0.39 (0.17-0.92)</b>	<b>&lt;0.05</b>	0.35 (0.15-0.81)	<0.05	0.43 (0.17-1.10)	0.08	0.41 (0.17-0.97)	<0.05
Indian	<b>1.12 (0.65-1.94)</b>	<b>0.68</b>	1.24 (0.69-2.23)	0.46	1.23 (0.72-2.13)	0.45	1.36 (0.82-2.25)	0.24
Pakistani/Bangladeshi	<b>0.55 (0.36-0.86)</b>	<b>&lt;0.05</b>	0.55 (0.35-0.86)	<0.05	0.65 (0.42-1.01)	0.06	0.74 (0.48-1.14)	0.17
Black	<b>1.52 (1.02-2.27)</b>	<b>&lt;0.05</b>	1.56 (1.05-2.31)	<0.05	1.61 (1.07-2.42)	<0.05	1.80 (1.22-2.66)	<0.05

Table A6.12: Mode of birth according to ethnicity among *primiparous* mothers: multinomial logistic regression analyses adjusting for labour factors

Table A6.12 (continued)

Base outcome =unassisted vaginal  Ethnicity	Unadjusted		Adjusted for length of labour	
	Relative risk ratio (95% CI)	p-value	Relative risk ratio (95% CI)	p-value
<i>Instrumental vaginal</i>				
White	<b>1.00</b>		1.00	
Mixed	<b>0.68 (0.32-1.42)</b>	<b>0.30</b>	0.64 (0.29-1.39)	0.26
Indian	<b>0.80 (0.45-1.40)</b>	<b>0.43</b>	0.85 (0.48-1.53)	0.60
Pakistani /Bangladeshi	<b>0.44 (0.29-0.66)</b>	<b>&lt;0.001</b>	0.47 (0.31-0.71)	<b>&lt;0.001</b>
Black	<b>0.30 (0.16-0.56)</b>	<b>&lt;0.001</b>	0.29 (0.16-0.53)	<b>&lt;0.001</b>
<i>Planned CS</i>				
White	<b>1.00</b>		1.00	
Mixed	<b>0.57 (0.18-1.81)</b>	<b>0.34</b>	0.77 (0.23-2.53)	0.67
Indian	<b>0.64 (0.24-1.68)</b>	<b>0.36</b>	0.73 (0.28-1.91)	0.52
Pakistani/Bangladeshi	<b>1.19 (0.78-1.82)</b>	<b>0.42</b>	1.06 (0.63-1.79)	0.82
Black	<b>0.71 (0.33-1.51)</b>	<b>0.37</b>	0.54 (0.25-1.19)	0.13
<i>Emergency CS</i>				
White	<b>1.00</b>		1.00	
Mixed	<b>0.39 (0.17-0.92)</b>	<b>&lt;0.05</b>	0.36 (0.14-0.92)	<b>&lt;0.05</b>
Indian	<b>1.12 (0.65-1.94)</b>	<b>0.68</b>	1.21 (0.70-2.09)	0.50
Pakistani/Bangladeshi	<b>0.55 (0.36-0.86)</b>	<b>&lt;0.05</b>	0.56 (0.37-0.84)	<b>&lt;0.05</b>
Black	<b>1.52 (1.02-2.27)</b>	<b>&lt;0.05</b>	1.45 (0.92-2.27)	0.11

Table A6.13: Mode of birth according to ethnicity among *multiparous* mothers: multinomial logistic regression analyses adjusting for labour factors

Base outcome =unassisted vaginal  Ethnicity	Unadjusted		Adjusted for induction or attempted induction		Adjusted for fetal distress		Adjusted for other labour complications	
	Relative risk ratio (95% CI)	p-value	Relative risk ratio (95% CI)	p-value	Relative risk ratio (95% CI)	p-value	Relative risk ratio (95% CI)	p-value
<i>Instrumental vaginal</i>								
White	<b>1.00</b>		1.00		1.00		1.00	
Mixed	<b>1.64 (0.52-5.25)</b>	<b>0.40</b>	1.68 (0.53-5.34)	0.38	1.64 (0.51-5.27)	0.40	1.43 (0.44-4.59)	0.55
Indian	<b>1.55 (0.73-3.28)</b>	<b>0.25</b>	1.55 (0.74-3.28)	0.25	1.88 (0.86-4.14)	0.12	1.56 (0.71-3.41)	0.27
Pakistani /Bangladeshi	<b>0.53 (0.31-0.93)</b>	<b>&lt;0.05</b>	0.55 (0.31-0.96)	<0.05	0.59 (0.33-1.07)	0.08	0.55 (0.31-0.97)	<0.05
Black	<b>0.47 (0.16-1.40)</b>	<b>0.18</b>	0.49 (0.16-1.45)	0.20	0.50 (0.16-1.59)	0.24	0.47 (0.14-1.51)	0.20
<i>Planned CS</i>								
White	<b>1.00</b>		1.00		1.00		1.00	
Mixed	<b>1.38 (0.67-2.84)</b>	<b>0.39</b>	1.34 (0.65-2.77)	0.43	1.36 (0.48-1.24)	0.41	1.45 (0.68-3.06)	0.33
Indian	<b>0.82 (0.51-1.33)</b>	<b>0.43</b>	0.81 (0.49-1.33)	0.41	0.77 (0.48-1.24)	0.28	0.82 (0.50-1.33)	0.41
Pakistani/Bangladeshi	<b>0.78 (0.59-1.03)</b>	<b>0.08</b>	0.75 (0.57-0.99)	<0.05	0.69 (0.51-0.95)	<0.05	0.71 (0.52-0.97)	<0.05
Black	<b>1.16 (0.79-1.69)</b>	<b>0.46</b>	1.11 (0.76-1.63)	0.58	1.14 (0.79-1.65)	0.48	1.17 (0.81-1.68)	0.41
<i>Emergency CS</i>								
White	<b>1.00</b>		1.00		1.00		1.00	
Mixed	<b>1.52 (0.69-3.36)</b>	<b>0.30</b>	1.52 (0.69-3.36)	0.30	1.51 (0.68-3.34)	0.31	1.25 (0.52-3.01)	0.61
Indian	<b>1.55 (0.97-2.48)</b>	<b>0.07</b>	1.55 (0.97-2.48)	0.07	1.87 (1.14-3.04)	<0.05	1.59 (1.04-2.43)	<0.05
Pakistani/Bangladeshi	<b>0.77 (0.55-1.08)</b>	<b>0.14</b>	0.78 (0.55-1.09)	0.14	0.82 (0.57-1.20)	0.31	0.81 (0.56-1.17)	0.25
Black	<b>1.94 (1.34-2.79)</b>	<b>&lt;0.001</b>	1.95 (1.35-2.81)	<0.001	2.26 (1.54-3.32)	<0.001	2.15 (1.46-3.16)	<0.001

Table A6.13: Mode of birth according to ethnicity among *multiparous* mothers: multinomial logistic regression analyses adjusting for labour factors

**CHAPTER 7:**  
The Millennium Cohort Study: Fetal sex



Table A7.1: Unadjusted characteristics of male and female infants, pregnancy and labour complications, stratified by parity

Characteristics of infants, pregnancy and labour complications		Fetal sex					
		Primiparous			Multiparous		
		Male N (weighted %)	Female N (weighted %)	$\chi^2$	Male N (weighted %)	Female N (weighted %)	$\chi^2$
Gestational age (weeks)	<37	316 (8.3)	246 (7.0)	p=0.26	385 (7.2)	324 (5.8)	p<0.05
	37-41.9 (Normal)	3,353 (87.0)	3,145 (88.0)		4,722 (88.3)	4,574 (90.2)	
	>42	163 (4.7)	171 (5.0)		226 (4.5)	204 (4.0)	
Birth weight (kg)	LBW (<2.50)	258 (6.4)	280 (7.5)	p<0.001	291 (5.1)	320 (5.3)	p<0.001
	Normal (2.50-3.99)	3,140 (81.3)	3,030 (84.6)		4,186 (76.9)	4,274 (83.6)	
	High BW (>4.00)	453 (12.4)	267 (7.9)		918 (18.1)	558 (11.1)	
Complications during pregnancy: <i>CS risk factor</i>	No	3,277 (83.9)	3,039 (84.4)	p=0.64	4,751 (87.2)	4,543 (87.9)	p=0.40
	Yes	575 (16.1)	537 (15.6)		649 (12.8)	612 (12.1)	
Complications during pregnancy: <i>Other problem</i>	No	2,688 (68.9)	2,495 (69.2)	p=0.83	3,753 (68.0)	3,573 (67.2)	p=0.53
	Yes	1,164 (31.1)	1,081 (30.8)		1,647 (32.1)	1,582 (32.8)	
Complications during labour: <i>Malpresentation</i>	No	3,466 (91.5)	3,173 (89.5)	p<0.05	5,059 (95.3)	4,820 (95.4)	p=0.89
	Yes	307 (8.5)	345 (10.5)		216 (4.7)	211 (4.6)	
Complications during labour: <i>Fetal distress</i>	No	2,805 (72.3)	2,749 (76.6)	p<0.05	4,566 (86.1)	4,451 (87.8)	p<0.05
	Yes	968 (27.7)	769 (23.4)		709 (13.9)	580 (12.2)	
Complications during labour: <i>Other</i>	No	3,058 (80.3)	2,926 (82.2)	p=0.06	4,765 (89.8)	4,599 (91.2)	p=0.07
	Yes	715 (20.0)	592 (17.8)		510 (10.2)	432 (8.8)	

Table A7.2: Mode of birth according to fetal sex: relative risk ratios and confidence intervals from multinomial logistic regression analyses

	(Base outcome =unassisted vaginal)	Model A (Unadjusted)		Model B* (Fetal size)		Model B1*		Model B2*	
		Relative risk ratio (RRR)	p-value	Relative risk ratio (RRR)	p-value	Relative risk ratio (RRR)	p-value	Relative risk ratio (RRR)	p-value
Primiparous	<i>Instrumental vaginal</i>								
	Female	1.00		1.00		1.00		1.00	
	Male	1.20 (1.04-1.38)	<0.05	1.15 (0.99-1.33)	0.06	1.18 (1.02-1.36)	<0.05	1.10 (0.94-1.28)	0.24
	<i>Planned CS</i>								
	Female	1.00		1.00		1.00		1.00	
	Male	0.83 (0.64-1.07)	0.16	0.85 (0.66-1.09)	0.20	0.91 (0.70-1.18)	0.48	0.84 (0.65-1.08)	0.18
Multiparous	<i>Emergency CS</i>								
	Female	1.00		1.00		1.00		1.00	
	Male	1.25 (1.09-1.43)	<0.05	1.23 (1.08-1.41)	<0.05	1.29 (1.12-1.49)	<0.001	1.16 (0.99-1.36)	0.06
	<i>Instrumental vaginal</i>								
	Female	1.00		1.00		N/A		1.00	
	Male	1.48 (1.16-1.89)	<0.05	1.42 (1.12-1.82)	<0.05			1.38 (1.07-1.79)	<0.05
Multiparous	<i>Planned CS</i>								
	Female	1.00		1.00				1.00	
	Male	0.99 (0.85-1.15)	0.88	0.88 (0.76-1.04)	0.13			0.88 (0.75-1.04)	0.13
	<i>Emergency CS</i>								
	Female	1.00		1.00				1.00	
	Male	1.41 (1.19-1.67)	<0.001	1.40 (1.17-1.68)	<0.001			1.38 (1.14-1.67)	<0.05

\* Model adjustments: B = birth weight for primiparae and birth weight and gestational age for multiparae, B1 = B + malpresentation, B2 = B + fetal distress.

Table A7.2: Mode of birth according to fetal sex: relative risk ratios and confidence intervals from multinomial logistic regression analyses

## **CHAPTER 8:**

Literature review:

Maternity service factors and mode of birth

Table A8.4: Antenatal care and mode of birth

Author(s)	Country	Period of data collection	Study sample	Determinant(s)	Outcome measure(s)	Co-factors	Effect of antenatal care on mode of birth
Behague et al (2002)	Brazil	1993	5,304 and sub-sample of 80	Number of antenatal visits  0-4, 5-9, 10-20.	Caesarean section (all).	None.	Crude rates of CS were higher for women who had greater numbers of antenatal visits (16.6% for 0-4, 28.0% for 5-9 and 45.0% for women who had 10-20 visits).
Braveman et al (1995)	USA	1991	217,461 singleton first live births.	Antenatal care initiation: 1 <sup>st</sup> /2 <sup>nd</sup> trimester (ref) vs. 3 <sup>rd</sup> trimester/ no care.	Caesarean section (all).	Type of insurance, ethnicity, age, education, marital status, poverty, non-English speaking areas, birth weight, mechanical medical risk factors, fetal stress, other medical complications, delivery volume of hospital, teaching status of hospital, type of hospital, region included in regression model.	Compared to women who started their antenatal care in the 1 <sup>st</sup> or 2 <sup>nd</sup> trimester, women who started care in the 3 <sup>rd</sup> trimester, or had no care were less likely to have a CS after adjustment for other maternal factors (adj OR=0.91 95% CI 0.85-0.97).
Gareen et al (2003)	USA	1988	6,805	Antenatal care vs. none.	Caesarean section (all)	Regression model: <i>Full model:</i> Age, gestation, birth weight, parity, history of CS, multiple birth,	In crude analyses mothers who had any antenatal care were at slightly higher risk of CS (risk ratio=1.02 95% CI 1.01-1.03) compared to mothers who had no antenatal care.

						placental problems, hypertension, pre-eclampsia, diabetes, breech, malpresentation, herpes, fetal distress, height, weight, history of pregnancy wantedness, insurance type, treatment for infertility, marital status, ethnicity, education, income, worked during pregnancy, marital status, exercise during pregnancy, epidural.	After adjustment for maternal characteristics and medical risk factors, the risk of CS increased for mothers who had any antenatal care (adj risk ratio= 4.33 95% CI 1.84-10.2).
Gissler and Hemminki (1994)	Finland	1987	57,108 women with a singleton pregnancy.	Timing of first visit  &  Number of antenatal visits (gestation adjusted): few, average amount, many.	Caesarean section(all) and instrumental vaginal births.	County, urbanisation, smoking, age, marital status, education and parity.	<i>Timing of first visit</i> Compared to women who started care at an average time, women who started antenatal care earlier were significantly more likely to have a CS (adjOR=1.14 95% CI 1.08-1.21) or an instrumental vaginal birth (adjOR=1.14 95% CI 1.04-1.25). However, women who started care very late were also more likely to have a CS (adjOR=1.23 95% CI 1.09-1.38).  <i>Number of antenatal visits</i> Compared to women who attended an

							average number of antenatal visits, women who attended many were more likely to have a CS (adjOR=1.68 95% CI 1.57-1.80). There was no significant difference for women who attended few classes, or for instrumental vaginal births.
Gomes et al (1999)	Brazil	1978-1979 and 1994	6,750 (1978-79) and 2,846 (1994)	Number of antenatal visits:  <4 (ref) vs. 4+.	Caesarean section (all).	Regression model: Occupational group, family income, education, insurance status, maternal occupation (home vs. other), hospital type, day of delivery, antenatal visits, age, parity, previous termination, previous stillbirth, no. of live births, gestational age and birth weight.	<p>1978-79: Compared to mothers who had less than 4 antenatal visits, crude rates indicated mothers who had more than 4 visits were more likely to have a caesarean section (OR=2.50, 95% CI 2.14-2.92). When adjusted the association remained, although the risk was slightly attenuated (adjOR=1.73, 95% CI=1.38-2.17).</p> <p>1994: Compared to mothers who had less than 4 antenatal visits, crude rates indicated mothers who had more than 4 visits were more likely to have a caesarean section (OR=4.85, 95% CI 3.43-6.87). When adjusted the association remained, although the risk was attenuated (adjOR=2.08, 95% CI=1.02-4.26).</p>

Petrou et al (2003)	England and Wales	1994-1995	17,765	Number of antenatal visits (risks associated with each additional visit).	Caesarean section (all).	Effects of number of antenatal admissions, proteinuria, breech presentation, type of hospital at booking, planned pattern of antenatal care, changes in pattern of antenatal care, planned place of birth, ethnicity, smoking status, gestational age at booking, gestational age at birth, maternal age at booking.	<p><i>Primiparae:</i> With each additional antenatal visit there was around a 3-4% increased risk of CS (adjOR=1.04 95% CI 1.02-1.06 for all primiparae and adjOR 1.03 95% CI 1.00-1.06 for high risk primiparae). For low-risk primiparae the result was of borderline significance (adjOR=1.04 95% CI 0.99-1.07).</p> <p><i>Multiparae:</i> Similarly multiparous women were at an increased risk of CS with each additional antenatal visit, although the risk was smaller than for primiparous women (adjOR 1.02 95% CI 1.00-1.04 for all and adjOR=1.02 95% CI 1.00-1.04 for high risk women).</p>
Simoes et al (2005)	Germany	1998-2001	381,838	Antenatal visits (<5 compared to ≥5).	Caesarean section (all).	None.	In crude analyses, women who had less than 5 antenatal consultations were at greater risk of CS than mothers who had 5 or more consultations (RR=1.12 95% CI 1.08-1.16).
Villar et al (2001)  Systematic review and meta-analysis of 7 RCTs	Not given.  Some developing and some developed.	Not given.	Not given.  Low-risk women.	Lower vs. higher number of antenatal visits.	Caesarean section (all).	Not given.	In the pooled estimate no difference in the CS rates was seen between the groups allocated to less or more antenatal visits (total OR=0.98, 95% CI 0.86-1.11).

	No effect
	Mothers who receive less antenatal care are more likely to have intervention
	Mothers who receive more antenatal care are more likely to have intervention



Table A8.5: Antenatal education and mode of birth

Author(s)	Country	Period of data collection	Study sample	Determinant(s)	Outcome measure(s)	Co-factors	Effect of hospital ownership on mode of birth
Artieta-Pinedo et al (2010)	Spain	2005-2006	616 low-risk primiparous women	Antenatal education: None, 1-4 classes, 5+ classes.	Normal vaginal birth.	Age, nationality, social class, education, hospital of birth and personality.	<p>In unadjusted analyses women who attended no antenatal classes had the highest rate of normal vaginal births (76%) compared to women who attended 1-4 (60%) and 5 or more classes (56%).</p> <p>When adjusted for other maternal factors, the trend for lower risk of operative birth for non-attendees became non-significant (adjOR= 0.62 95% CI 0.23-1.73 for 1-4 classes and adjOR=0.49 95% CI 0.21-1.12 compared to 0 classes).</p>
Fabian et al (2005)	Sweden	1999-2000	1,197	Antenatal classes; attendance vs. non-attendance.	Emergency caesarean section vs. vaginal, instrumental and elective caesarean section.	Regression model: Preterm birth, native language other than Swedish, unemployment, smoking during pregnancy, having considered an abortion and having few antenatal checkups (less than 8).	<p>In crude analyses mothers who did not attend antenatal classes were at higher risk of emergency caesarean section than attendees (RR=1.6 95% CI 1.1-2.6). However, when adjusted for maternal factors antenatal class attendance was no longer significantly related to mode of birth (adjOR=1.7 95% CI 0.9-3.1).</p>

<p><b>Gagnon and Sandall (2007)</b></p> <p><b>Systematic review of nine RCTs</b></p>	<p>Not given.</p> <p>8 x USA 1 x Iran</p>	<p>Not given</p> <p>Prospective parents (studies with fathers also eligible).</p>	<p>2,284 across all nine trials.</p>	<p>Any trials assessing a structured education programme for either parent during pregnancy.</p>	<p>Variety of mode of birth outcomes.</p>	<p>Not given.</p>	<p>Studies were not pooled in a meta-analysis as they were heterogeneous in terms of interventions, design and outcomes.</p> <p>The largest (n=1,275) and best quality study assessed an educational intervention to increase VBACs. However, comparison between the two groups indicated no difference in VBAC rates (RR=1.08 95% CI 0.97-1.21).</p>
<p>Gareen et al (2003)</p>	<p>USA</p>	<p>1988</p>	<p>6,805</p>	<p>Childbirth class vs. none.</p>	<p>Caesarean section (all).</p>	<p>Regression model: <i>Full model:</i> Age, gestation, birth weight, parity, history of CS, multiple birth, placental problems, hypertension, pre-eclampsia, diabetes, breech, malpresentation, herpes, fetal distress, height, weight, history of pregnancy wantedness, insurance type, treatment for infertility, marital status, ethnicity,</p>	<p>Whether or not a woman had attended any childbirth classes had no effect on mode of birth (adj risk ratio=0.89 95% CI 0.77-1.03).</p>

						education, income, worked during pregnancy, marital status, exercise during pregnancy, epidural.	
Gunn et al (1983)	New Zealand	1981-1982	196 primiparous women.	Antenatal class attendance (yes vs. no).	Lower segment CS, Keillands forceps, low forceps, ventouse.	None. Sub-group analyses were presented for Polynesian women only which the authors stated accounted for race, age, and socio-economic status.	Rates of low forceps births were significantly higher among women who had not attended antenatal classes (32%) compared to attenders (7%, $p < 0.001$ ) in the total sample.  In the sub-group analysis among the 74 Polynesian women a similar trend although non-significant was observed with 23% of non-attendees having a low forceps birth compared to 6% of attendees.
Patel et al (2005)	England	1990-1991	12,944 singleton, term.	Antenatal class attendance (yes vs. no).	Caesarean section (all) vs. vaginal (all); elective CS vs. attempted VD, emergency CS vs. spontaneous VD.	Home ownership status, age, marital status, ethnicity, social class, smoking, medical history factors, obstetric history factors, fertility, activity levels, marital status, diet, birth weight, infant head	<i>Elective caesarean:</i> Compared to mothers who did attend antenatal classes, mothers who did not attend any classes were more likely to have an elective CS (risk ratio=1.76 95% CI=1.44-2.15). However, when included in a well-adjusted regression model, antenatal class attendance was not a significant predictor of CS.  <i>Emergency caesarean:</i>

						circumference, infant length, gestation, fetal presentation included in regression.	Compared to mothers who did attend antenatal classes, mothers who did not attend any classes were less likely to have an emergency CS (risk ratio=0.38 95% CI=0.31-0.46). However, when included in a well-adjusted regression model, antenatal class attendance was not a significant predictor of CS.
Sturrock and Johnson (1990)	USA	1986-1987	207 primiparous women.	2-4 classes vs. 0-1 classes.	Caesarean section and instrumental birth.	None.	Women who attended 2-4 classes had higher rates of instrumental births (17% vs. 8%) and caesarean sections (38% vs. 29%) when compared to women who attended 0-1 classes.

	No effect
	Mothers who received less antenatal education are more likely to have intervention
	Mothers who received more antenatal education are more likely to have intervention

Table A8.6: Induction/augmentation of labour and mode of birth

Author(s)	Country	Period of data collection	Study sample	Determinant(s)	Outcome measure(s)	Co-factors	Effect of method of labour onset on mode of birth
Behague et al (2002)	Brazil	1993	5,304 and sub-sample of 80	Induction.	Caesarean section (all).	None.	Crude rates of CS for mothers who were induced (15.5%) were lower than rates for mothers who were not induced (37.6%, $p < 0.001$ ).
Boulvain et al (2005)  <b>Systematic review and meta-analysis of 22 RCTs.</b>	Not given.	Not given.	2,797 across all 22 studies.  Pregnant women due for third trimester induction with a viable fetus.	Membrane sweeping vs. placebo/ no treatment or other method of induction.	Emergency caesarean section and instrumental vaginal birth.	Not given.	<i>Caesarean section:</i> No statistically significant difference between groups (RR=0.90 95% CI 0.70-1.15).  <i>Instrumental birth:</i> No statistically significant difference between groups (RR=1.15 95% CI 0.94-1.42).
Cammu et al (2002)	Belgium	1996-1997	Matched cohort study with 7683 in both the elective induction group and the spontaneous labour group.  Primiparous, low risk, singleton, cephalic presenting, live births.	Elective induction.	Emergency caesarean section and instrumental vaginal birth.	Epidural, admission to neonatal ward, neonatal death.	<i>Caesarean section:</i> Unadjusted rates indicated mothers in the induced labour group had a higher rate of CS (9.9%) than mothers in the spontaneous labour group (6.5% RR=1.37 95% CI 1.52-1.70). When adjusted this association remained (adjRR=1.31 95% CI=1.16-1.48).  <i>Instrumental birth:</i> Unadjusted rates indicated mothers in the induced labour group had a higher rate of instrumental vaginal

							birth (31.6%) than mothers in the spontaneous labour group (29.1% RR=1.09 95% CI 1.04-1.14).
Dublin et al (2000)	USA	1989-1993	12,534 (2,886 induced) singleton, low risk, cephalic presenting.	Elective induction.	Emergency caesarean section and instrumental vaginal birth.	CS analysis for primiparous mothers adjusted for birth weight. Other analyses unadjusted.	<p><i>Caesarean section:</i> Among primiparous women induction increased the risk of CS (adjRR=1.77 95% CI 1.50-2.08). Among multiparous women induction had no significant effect on CS rates (RR=1.07 95% CI 0.81-1.39).</p> <p><i>Instrumental birth:</i> Unadjusted rates indicated mothers in the induced labour group had a higher rate of instrumental vaginal birth (18.6%) than mothers in the spontaneous labour group (15.5% RR=1.20 95% CI 1.09-1.32).</p>
Gülmezoglu et al (2006)  Systematic review and meta-analysis of 18 RCTs	4 USA 1 Canada 2 China 2 Thailand 2 India 1 England 1 Scotland 1 Norway 1 France 1 Austria 1 Spain 1 Turkey	Not given.	7,685 across all 18 studies .  Low-risk women.	Elective induction vs. expectant management.	Emergency caesarean section and instrumental vaginal birth (10/18 studies also reported on instrumental births).	Not given.	<p>Sub-group meta-analyses were conducted by gestational age.</p> <p><i>Caesarean section:</i> <i>37-40 weeks:</i> Mothers who had an induction were less likely to have a CS than mothers in the expectant management groups (RR=0.58 95% CI 0.34-0.99). <i>41 weeks:</i> No statistically significant difference in groups (RR=0.92 95% CI=0.76-1.12).</p>

							<p><i>42 weeks:</i> No statistically significant difference in groups (RR=0.97 95% CI=0.72-1.31).</p> <p><i>Instrumental birth:</i> <i>37-40 weeks:</i> Mothers who had an induction were more likely to have an instrumental birth than mothers in the expectant management groups (RR=1.71 95% CI 1.23-2.39).</p> <p><i>41 weeks:</i> No statistically significant difference in groups (RR=1.05 95% CI=0.94-1.17).</p> <p><i>42 weeks:</i> No statistically significant difference in groups (RR=0.95 95% CI=0.65-1.38).</p>
Heffner et al (2003)	USA	1998-1999	14,409  (Complicated labours excluded; malpresentation, active herpes, prolapsed cord, fetal anomaly.)	Induction.	Caesarean section (all: primary only).	Regression model: Age, gestational age, birth weight, diabetes, hypertension, hospital.	<p>Results were stratified by parity. For <i>primiparous</i> mothers, compared to those with a spontaneous onset of labour, mothers who were induced were more likely to have a CS (adjOR=1.70, 95% CI=1.48-1.95).</p> <p>Among <i>multiparous</i> mothers, compared to those with a spontaneous onset of labour, mothers who were induced were also more likely to have a CS (adjOR=1.49,</p>

							95% CI=1.10-2.00).
Maslow and Sweeny (2000)	USA	1997-1998	1,135 (263 had elective induction).  Primiparous, term, singleton, cephalic, live born infants.	Elective induction.	Emergency caesarean section.	Birth weight, age, gestational age.	Mothers who had an elective induction were almost 3 times as likely to have a CS (adjOR=2.7 95% CI 1.3-5.6).
Roberts et al (2002)	Australia	1990-1997	615,604 primiparous women who gave birth to a live, singleton, cephalic presenting infants at term.	Induction inc. augmentation separately.	Operative birth (forceps, vacuum and caesarean births).	Age, type of care, obstetric complications, type of labour (spontaneous/augmented/induced), epidural, birth weight.	<i>1990:</i> Compared to mothers who had a spontaneous onset of labour, mothers who had augmentation of labour or who were induced were around 50% more likely to have an operative birth (adjOR=1.55 95% CI=1.43-1.68 for augmented and adjOR=1.52 95% CI=1.41-1.63 for induced). <i>1997:</i> In the later sample, a similar increased risk for mothers who had an augmented or induced onset of labour was found (adjOR=1.63 95% CI=1.52-1.76 for augmented and adjOR=1.61 95% CI=1.50-1.72 for induced).
Seyb et al (1999)	USA	1996-1997	1,561 Singleton, cephalic presenting, term.	Elective and medical inductions.	Emergency caesarean section.	Elective and medical induction, race, BMI, birth weight, epidural use, magnesium sulphate use,	Mothers who had either a medical or an elective induction were more likely to have a CS than mothers who entered labour spontaneously (adjOR 1.69 95% CI 1.13-2.54 for medical and adjOR=1.89 95% CI 1.12-3.18



						chorioamnionitis diagnosis.	for elective).
<b>Smyth et al (2007)</b>  <b>Systematic review and meta-analysis of 9 RCTs</b>	4 England 3 USA 2 Canada	Not given.	4370 women across all 9 trials.	Amniotomy for augmentation of labour vs. no amniotomy.	Emergency caesarean section.	Not given.	Women in the amniotomy group were at increased risk of having an emergency CS but it did not reach statistical significance (RR= 1.26 95% CI=0.98-1.62).
<b>Wei et al (2009)</b>  <b>Systematic review of 10 RCTs and 2 quasi-randomised trials</b>	Not given.	Not given.		Early amniotomy and early oxytocin vs. routine care or reduced amniotomy for augmentation of labour.	Emergency caesarean section or instrumental vaginal birth.	Not given.	<i>Caesarean section:</i> Women randomised to the early intervention group were less likely to have a CS but this was not significant (RR=0.89 95% CI=0.79-1.01). <i>Instrumental birth:</i> There was no statistically significant difference between the groups (risk ratio=1.01 95% CI=0.92-1.11).
Yeast et al (1999)	USA	1990-1997	18,055 singleton infants.	Elective and medical inductions.	Emergency caesarean section.	Maternal age, macrosomia, hypertension, postdate pregnancy, diabetes, abnormal antepartum test result, premature rupture of membranes.	Analyses were stratified by parity.  Cervical status: In unadjusted analyses according to cervical status, <i>primiparous</i> mothers with a favourable cervix were 1.7 times more likely to have a CS than mothers who entered labour spontaneously, and mothers with an unfavourable cervix were 2.8 times more likely (OR=1.7 95% CI 1.4-2.0 and OR=2.8 95% CI 2.5-3.2). <i>Multiparous</i> mothers with a

							<p>favourable cervix were 1.3 times more likely to have a CS than mothers who entered labour spontaneously, and mothers with an unfavourable cervix were 3.5 times more likely (OR=1.3 95% CI 1.0-1.7 and OR=3.5 95% CI 2.8-4.2).</p> <p>In adjusted analyses <i>primiparous</i> mothers were 1.7 times more likely to have a CS than mothers who entered labour spontaneously, and <i>multiparous</i> mothers were 1.3 times more likely (adjOR=1.75 p&lt;0.001 and adjOR=1.31 p=0.033).</p>
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	No effect
	Mothers who are induced are more likely to have intervention
	Mothers who have spontaneous onset of labour are more likely to have intervention

Table A8.6: Induction/augmentation of labour

Table A8.7: Epidural and mode of birth

Author(s)	Country	Period of data collection	Study sample	Determinant(s)	Outcome measure(s)	Co-factors	Effect of method of pain relief on mode of birth
<b>Anim-Somuah et al (2005)</b>  <b>Systematic review and meta-analysis</b> <b>20 RCTs</b>	9 USA 2 Canada 2 England 1 France 1 Finland 1 Denmark 1 Sweden 1 Australia 1 India 1 China	Not given.	6534 across all 20 trials.	Epidural vs. other pain relief or no analgesia.	Emergency caesarean section and instrumental vaginal birth (17/20 studies also reported on instrumental births).	Not given.	<i>Caesarean section:</i> No evidence of a statistically significant difference in the risk of CS for mothers who had epidural analgesia and mothers who had other pain relief or no pain relief (RR=1.07 95% CI 0.93-1.23). <i>Instrumental vaginal birth:</i> Mothers who had epidural analgesia were more likely to have an instrumental vaginal birth (RR=1.38 95% CI 1.24-1.53).
Gareen et al (2003)	USA	1988	6,805	Epidural vs. none.	Caesarean section (all).	Regression model: <i>Full model:</i> Age, gestation, birth weight, parity, history of CS, multiple birth, placental problems, hypertension, pre-eclampsia, diabetes, breech, malpresentation, herpes, fetal distress, height, weight, history of	When included in a well-adjusted regression model, mothers who had an epidural were almost twice as likely to have a CS (adj risk ratio=1.70, 95% CI 1.40-2.07).

						pregnancy wantedness, family income, insurance type, treatment for infertility, marital status, ethnicity, education, income, worked during pregnancy, antenatal care, exercise during pregnancy.	
<p><b>Lieberman and O'Donoghue (2002)</b></p> <p><b>Literature review including 10 RCTs and 33 observational studies</b></p>	<p>23 USA 10 England 1 Wales 2 France 1 Finland 1 Denmark 1 Belgium 1 Ireland 1 Pakistan 2 Israel</p>	Not given.	Range from 20 to over 33,000 in each study.	Epidural.	Emergency caesarean section and instrumental vaginal birth.	Not given.	<p><i>Caesarean section:</i></p> <p><u>RCTs:</u> Across the 10 studies the association of epidural with CS varied dramatically with RRs ranging from 0.7-11.2.</p> <p><u>Observational studies:</u></p> <p>Across all the 33 studies there was agreement that epidural increased caesarean section, although there was again large variation with RRs ranging from 1.3-9.0.</p> <p><i>Instrumental vaginal birth:</i></p> <p><u>RCTs:</u> Across the 10 trials all showed an increased risk of instrumental birth for mothers who had an epidural with RRs ranging from 1.1-2.3 (although some results were non-significant).</p> <p><u>Observational studies:</u></p>

							All 27 studies showed an increased risk of instrumental birth for mothers who had an epidural with RRs ranging from 1.3-5.3. For only one study was the relationship not significant. The risk appeared to be higher for multiparous mothers (RRs 3.7-5.3).
Main et al (2000)	USA	1992-1998	8,496	Epidural.	Emergency caesarean section and instrumental vaginal birth.	Regression models: <i>Caesarean section</i> : Age, epidural anaesthesia, birth weight, ethnicity included in regression model. <i>Instrumental birth</i> : Age, ethnicity, epidural anaesthesia.	<i>Caesarean section</i> : After adjustment the odds of CS for mothers who had epidural anaesthesia were more than 3 times that of mothers who did not (adjOR=3.66 95% CI 3.06-4.37). <i>Instrumental vaginal birth</i> : After adjustment the odds of instrumental vaginal birth for mothers who had epidural anaesthesia were almost 3 times that of mothers who did not (adjOR=2.76 95% CI 2.45-3.12).
Read et al (1994)	Australia	1987	3,641	Epidural vs. none/other and general pain relief.	Emergency caesarean section and instrumental vaginal birth (vacuum or forceps).	Race, area of residence, height, age, marital status, public or private care, infant gender, birth weight, length of labour and labour complications included in	<i>Emergency caesarean</i> : In crude analyses, 62.2% of mothers had an epidural (the other 37.8% had a general anaesthetic). The authors state that they did not include pain relief in the regression model for emergency CS due to the high numbers who had epidural etc. <i>Instrumental vaginal birth</i> : Mothers who had an epidural were over 8 times more likely to have an

						regression model for instrumental vaginal birth.	instrumental vaginal birth than those who did not (adjOR=9.37 95% CI=6.73-10.41).
Roberts et al (2002)	Australia	1990-1997	616,303 live, singleton, cephalic presenting infants at term.	Epidural.	Elective or emergency caesarean, vacuum extraction, forceps.  Adjusted ORs are for overall operative births (i.e. all of the above).	Regression model: Type of care (public/private), obstetric complication, type of labour, epidural, birth weight, gestational age.	In the adjusted model (for primiparous women only), compared to women who did not have an epidural, women who did have an epidural were more than 5 times more likely to have any type of operative birth (adjOR=5.43, 95% CI= 5.10-5.79 in 1990 and adjOR=5.46, 95% CI= 5.15-5.79 in 1997).
Tracy et al (2007)	Australia	2000-2002	363,794 women aged 20-34, no history of hypertension or diabetes, live singleton cephalic infant, normal size, term.	4 groups: 1) no intervention/ no epidural 2) no epidural/ induction, 3) epidural/ no augmentation/ induction 4) epidural and augmentation/ induction.	Emergency caesarean section and instrumental births.	Age, indigenous status, private patient status, gestational age.	<i>Emergency caesarean section:</i> Compared to mothers who had no induction and no epidural during labour, mothers who had an epidural were around 48 times more likely to have a CS (adjOR=48.15 95% CI=42.87-54.09). <i>Instrumental birth:</i> Compared to mothers who had no induction and no epidural during labour, mothers who had an epidural were almost 8 times more likely to have an instrumental birth (adjOR=7.88 95% CI=7.37-8.44).

	No effect
	Mothers who have an epidural are more likely to have intervention
	Mothers who do not have an epidural are more likely to have intervention

Table A8.8: Fetal monitoring and mode of birth

Author(s)	Country	Period of data collection	Study sample	Determinant(s)	Outcome measure(s)	Co-factors	Effect of fetal monitoring on mode of birth
<b>Alfirevic et al (2006)</b>  <b>Systematic review and meta-analysis of 10 RCTs</b>	3 USA 2 Australia 1 England 1 Ireland 1 Denmark 1 Greece 1 Pakistan	Not given.	18,761 across 10 trials for CS.  18,515 across 9 trials for instrumental birth.	Continuous CTG vs. intermittent auscultation.	Emergency caesarean section or instrumental vaginal birth.	Not given.	<i>Emergency caesarean:</i> Mothers who had continuous CTG were more likely to have a CS than mothers who had intermittent auscultation during labour (RR=1.66 95% CI=1.30-2.13). <i>Instrumental vaginal birth:</i> Mothers who had continuous CTG were significantly more likely to have an instrumental vaginal birth than mothers who had intermittent auscultation during labour (RR=1.16 95% CI=1.01-1.32).
<b>Neilson (2006)</b>  <b>Systematic review and meta-analysis of 4 RCTs</b>		Not given.	3 trials for CS 4 trials for instrumental vaginal birth.	Continuous CTG + ECG vs. continuous CTG alone.	Emergency caesarean section or instrumental vaginal birth.	Not given.	<i>Emergency caesarean:</i> No difference in risk of emergency CS for mothers who had continuous CTG <u>and</u> ECG compared to mothers who had continuous CTG only (RR=0.97 95% CI=0.84-1.11). <i>Instrumental vaginal birth:</i> Mothers who had continuous CTG <u>and</u> ECG were significantly less likely to have an instrumental vaginal birth than mothers who had continuous CTG only during labour (RR=1.16 95% CI=1.01-1.32).

	No effect
	Mothers who have continuous fetal monitoring are more likely to have intervention
	Mothers who do not have continuous fetal monitoring are more likely to have intervention



Table A8.9: Active management of labour and mode of birth

Author(s)	Country	Period of data collection	Study sample	Determinant(s)	Outcome measure(s)	Co-factors	Effect of active management of labour on mode of birth
<b>Brown et al (2008)</b>  <b>Systematic review of 7 RCTs</b>	3 USA 1 Belgium 1 New Zealand 1 Thailand 1 Nigeria	Not given.	5,390 across 7 trials for CS.  3,575 across 6 trials for instrumental vaginal birth.	Two or more key elements of active management of labour vs. routine care.	Emergency caesarean section or instrumental vaginal birth.	Not given.	<i>Caesarean section:</i> Women randomised to the active management group were less likely to have a CS but this was not significant (risk ratio=0.8 95% CI=0.77-1.01). <i>Instrumental birth:</i> There was no statistically significant difference between the groups (risk ratio=0.99 95% CI=0.87-1.14).
<b>Wei et al (2009)</b>  <b>Systematic review of 10 RCTs and 2 quasi-randomised trials</b>	Not given.	Not given.		Early amniotomy and early oxytocin vs. routine care or reduced amniotomy.	Emergency caesarean section or instrumental vaginal birth.	Not given.	<i>Caesarean section:</i> Women randomised to the early intervention group were less likely to have a CS but this was not significant (RR=0.89 95% CI=0.79-1.01). <i>Instrumental birth:</i> There was no statistically significant difference between the groups (risk ratio=1.01 95% CI=0.92-1.11).

	No effect
	Mothers who have active management of labour are more likely to have intervention
	Mothers who do not have active management of labour are more likely to have intervention

Table A8.10: Social support during labour and mode of birth

Author(s)	Country	Period of data collection	Study sample	Determinant(s)	Outcome measure(s)	Co-factors	Effect of support during labour on mode of birth
<b>Hodnett et al (2007)</b>  <b>Systematic review and meta-analysis of 16 RCTs</b>	USA Canada Australia Belgium Finland France Greece Botswana Guatemala Mexico South Africa	Not given.	13,391 across 16 trials for CS.  13,357 across 15 trials for instrumental vaginal birth.	Continuous presence and support during labour from a health professional or lay person (e.g. family member) vs. routine care.	Emergency caesarean section or instrumental vaginal birth.	Not given.	<i>Caesarean section:</i> Women randomised to the support group were less likely to have a CS (RR=0.91 95% CI=0.83-0.99).  <i>Instrumental birth:</i> Women randomised to the support group were less likely to have an instrumental birth (RR=0.89 95% CI=0.83-0.99).

	No effect
	Mothers who are supported during labour are more likely to have intervention
	Mothers who have no social support during labour are more likely to have intervention

**CHAPTER 9:**  
The Millennium Cohort Study: Antenatal care

Table A9.2: Unadjusted frequencies and weighted percentages of mode of birth according to antenatal care

Antenatal care	Primiparaous <sup>a</sup>				Multiparous <sup>b</sup>			
	Unassisted vaginal birth N (%) (56.5)	Instrumental birth N (%) (19.4)	Planned CS N (%) (5.1)	Emergency CS N (%) (19.1)	Unassisted vaginal birth N (%) (76.7)	Instrumental birth N (%) (3.8)	Planned CS N (%) (12.1)	Emergency CS N (%) (7.5)
<b>Received care, attended classes</b>	2,415 (53.0)	992 (22.1)	241 (4.9)	915 (20.1)	1,106 (73.2)	58 (4.5)	187 (13.1)	138 (9.2)
<b>Received care, no classes</b>	1,628 (63.0)	356 (13.7)	156 (5.8)	457 (17.5)	6,671 (77.1)	307 (3.8)	1,027 (12.0)	633 (7.1)
<b>No care, no classes</b>	181 (70.5)	29 (13.3)	11 (2.9)	37 (13.2)	328 (80.0)	10 (2.6)	33 (8.9)	37 (8.9)

<sup>a</sup>P-value of chi-squared analysis relating to all data items <0.001

<sup>b</sup>P-value of chi-squared analysis relating to all data items = 0.05

Table A9.3: Unadjusted maternal characteristics of women who received different levels of antenatal care, stratified by parity: frequencies and weighted percentages

Characteristics of mothers		Primiparous				Multiparous			
		Received care and attended classes	Received care, no classes	Did not receive antenatal care	p-value	Received care and attended classes	Received care, no classes	Did not receive antenatal care	p-value
		N = 4,568 (67.5%)	N = 2,603 (29.8%)	N = 258 (2.7%)		N = 1,491 (14.5%)	N = 8,655 (82.6%)	N = 410 (2.9%)	
<i>Socio-demographic factors</i>									
<b>Age at cohort member birth</b>	<b>19 or younger</b>	414 (32.2)	813 (60.2)	103 (7.6)		29 (12.1)	168 (90.0)	20 (6.9)	
	<b>20-24</b>	813 (50.2)	853 (46.1)	85 (3.8)		182 (9.3)	1,400 (85.1)	92 (5.6)	
	<b>25-29</b>	1,489 (77.2)	504 (21.1)	43 (1.7)		372 (12.7)	2,419 (83.8)	141 (3.5)	
	<b>30-34</b>	1,346 (84.1)	296 (15.0)	15 (0.9)		537 (15.3)	2,915 (82.7)	106 (2.0)	
	<b>35-39</b>	449 (81.9)	121 (17.1)	9 (1.0)		321 (18.5)	1,500 (79.8)	45 (1.7)	
	<b>40 and older</b>	56 (80.4)	15 (17.7)	2 (1.9)	<0.001	50 (18.4)	249 (80.5)	6 (1.1)	<0.001
<b>Age at first birth</b>	<b>19 or younger</b>					299 (11.1)	2,084 (84.0)	131 (5.0)	
	<b>20-24</b>					434 (13.0)	2,809 (83.3)	171 (3.7)	
	<b>25-29</b>					454 (15.4)	2,364 (82.6)	84 (1.9)	
	<b>30-34</b>					251 (18.4)	1,170 (80.6)	20 (1.0)	
	<b>35-39</b>					48 (19.3)	207 (79.3)	3 (1.4)	
	<b>40 and older</b>					3 (33.0)	9 (67.0)	0 (0)	<0.001
<i>Ethnicity, language and migration</i>									
<b>Ethnicity</b>	<b>White</b>	4,169 (69.4)	2,111 (28.1)	189 (2.4)		1,283 (14.9)	7,208 (82.9)	215 (2.2)	
	<b>Mixed</b>	31 (49.5)	44 (44.5)	3 (6.0)		12 (11.2)	82 (80.1)	11 (8.6)	
	<b>Indian</b>	107 (64.9)	68 (31.3)	9 (3.7)		25 (11.4)	217 (81.8)	22 (6.7)	

Table A9.3: Unadjusted maternal characteristics of women who received different levels of antenatal care

	<b>Pakistani and Bangladeshi Black</b>	71 (24.2)	221 (67.8)	37 (8.0)		82 (9.3)	658 (79.5)	114 (11.2)	
		114 (55.7)	89 (41.3)	7 (3.0)	<0.001	71 (17.1)	337 (78.9)	30 (4.0)	<0.001
<b>First language at home</b>	<b>English</b>	4,507 (68.0)	2,487 (29.4)	243 (2.6)		1,452 (14.6)	8,281 (82.7)	366 (2.7)	
	<b>Other language</b>	61 (32.6)	116 (57.6)	15 (9.9)	<0.001	39 (8.7)	374 (90.0)	44 (10.3)	<0.001
<b>How long lived in the UK</b>	<b>Since birth</b>	3,469 (70.7)	1,695 (27.2)	144 (2.0)		1,061 (14.8)	6,037 (83.2)	168 (2.0)	
	<b>More than 5 years</b>	206 (71.3)	109 (23.9)	19 (4.8)		115 (14.1)	735 (78.0)	97 (7.9)	
	<b>Less than 5 years</b>	120 (60.5)	106 (35.3)	16 (4.2)	<0.05	24 (10.2)	214 (79.5)	36 (10.3)	<0.001
<i>Socio-economic factors</i>									
<b>Educational level</b>	<b>NVQ level 4/5</b>	2,066 (85.2)	399 (14.1)	26 (0.7)		481 (18.3)	2,232 (80.5)	42 (1.2)	
	<b>NVQ level 3</b>	798 (71.1)	388 (26.3)	39 (2.7)		237 (17.6)	1,068 (80.9)	20 (1.5)	
	<b>NVQ level 2</b>	1,208 (60.9)	875 (36.1)	78 (2.9)		419 (13.2)	2,586 (84.6)	80 (2.2)	
	<b>NVQ level 1</b>	223 (41.0)	357 (52.8)	44 (6.3)		122 (12.4)	734 (84.2)	39 (3.4)	
	<b>None</b>	204 (29.3)	495 (62.8)	61 (7.8)		198 (8.6)	1,728 (83.4)	200 (8.1)	
	<b>Overseas qualification</b>	68 (47.5)	86 (47.3)	10 (5.2)	<0.001	31 (8.7)	293 (84.0)	26 (7.3)	<0.001
<b>Highest NS SEC in household</b>	<b>Higher man and prof</b>	1,059 (89.7)	133 (9.3)	16 (1.0)		242 (17.8)	1,130 (81.6)	11 (0.7)	
	<b>Lower man and prof</b>	1,525 (80.3)	407 (18.5)	26 (1.2)		386 (16.2)	1,978 (82.4)	40 (1.4)	
	<b>Intermediate</b>	717 (68.2)	369 (29.7)	28 (2.1)		194 (15.5)	1,009 (82.4)	32 (2.1)	
	<b>Small emp and self-emp</b>	173 (58.6)	131 (37.9)	15 (3.6)		102 (12.6)	702 (84.9)	28 (2.6)	
	<b>Lower sup and</b>	302 (53.0)	284 (43.9)	23 (3.1)		149 (13.3)	846 (83.7)	39 (3.0)	

Table A9.3: Unadjusted maternal characteristics of women who received different levels of antenatal care

	<b>tech</b>								
	<b>Semi-routine</b>	448 (40.1)	649 (54.6)	67 (5.4)		231 (12.5)	1,495 (82.8)	97 (4.7)	
	<b>Routine</b>	218 (37.5)	376 (56.0)	52 (6.5)		123 (9.9)	925 (84.4)	71 (5.7)	
	<b>Unclassified</b>	126 (33.2)	254 (58.0)	31 (8.8)	<0.001	64 (9.9)	570 (79.2)	92 (10.8)	<0.001
<i>Psychosocial factors</i>									
<b>Feelings about pregnancy</b>	<b>Happy</b>	4,035 (70.9)	2,006 (26.9)	189 (2.26)		1,256 (15.3)	6,972 (82.1)	312 (2.6)	
	<b>Unhappy or not bothered</b>	515 (46.7)	583 (47.8)	66 (5.54)	<0.001	231 (10.6)	1,663 (85.3)	97 (4.2)	<0.001
<i>Pregnancy factors</i>									
<b>Planned pregnancy</b>	<b>Planned</b>	2,879 (78.4)	993 (20.2)	77 (1.4)		882 (16.2)	4,686 (81.7)	176 (2.1)	
	<b>Surprise</b>	1,683 (52.5)	1,607 (42.9)	180 (4.6)	<0.001	606 (12.0)	3,959 (84.0)	232 (4.0)	<0.001
<b>Smoking in pregnancy</b>	<b>Never</b>	3,175 (75.9)	1,282 (22.1)	130 (2.0)		1,060 (16.1)	5,588 (81.4)	275 (2.5)	
	<b>Quit</b>	786 (64.6)	479 (33.8)	27 (1.6)		150 (13.9)	833 (83.9)	25 (2.2)	
	<b>Light</b>	410 (42.9)	530 (51.1)	63 (6.0)		147 (10.9)	1,118 (86.0)	40 (3.1)	
	<b>Heavy</b>	196 (37.6)	312 (55.3)	38 (7.1)	<0.001	132 (8.9)	1,116 (85.7)	68 (5.4)	<0.001
<b>Complications during pregnancy</b>	<b>None</b>	2,765 (67.0)	1,606 (29.7)	198 (3.3)		895 (14.0)	5,412 (82.5)	316 (3.6)	
	<b>CS risk factor</b>	545 (68.5)	286 (29.5)	21 (2.0)		132 (13.9)	797 (83.7)	26 (2.4)	
	<b>Other problem</b>	1,257 (68.1)	709 (30.2)	39 (1.8)	<0.05	464 (15.7)	2,442 (82.7)	67 (1.6)	<0.001

Table A9.3: Unadjusted maternal characteristics of women who received different levels of antenatal care

Table A9.4: The characteristics of *primiparous* women who did not receive antenatal care: relative risk ratios and confidence intervals from multinomial logistic regression analyses

Characteristics of women		Unadjusted		Adjusted for other factors in same domain		Fully adjusted	
Base outcome = received antenatal care and attended classes		RRR (95% CI)	P-value	RRR (95% CI)	P-value	RRR (95% CI)	P-value
<b>Socio-demographic factors</b>							
<b>Age at cohort member birth</b>	<b>19 or younger</b>	10.65 (6.32-17.95)	<0.001			4.00 (2.01-7.92)	<0.001
	<b>20-24</b>	3.38 (1.98-5.78)	<0.001			1.97 (1.00-3.86)	<0.05
	<b>25-29</b>	1.00				1.00	
	<b>30-34</b>	0.48 (0.24-0.95)	<0.05			0.52 (0.22-1.23)	0.14
	<b>35 and older</b>	0.61 (0.26-1.40)	0.24			0.85 (0.32-2.23)	0.74
<b>Ethnicity, language and migration</b>							
<b>Ethnicity</b>	<b>White</b>	1.00		1.00		1.00	
	<b>Mixed</b>	3.44 (0.99-11.95)	0.05	3.61 (0.95-13.76)	0.06	2.65 (0.55-12.72)	0.22
	<b>Indian</b>	1.62 (0.79-3.30)	0.19	1.69 (0.69-4.10)	0.25	2.38 (0.80-7.06)	0.12
	<b>Pakistani and Bangladeshi</b>	9.36 (4.87-17.99)	<0.001	8.88 (3.59-21.94)	<0.001	6.25 (2.36-16.55)	<0.001
	<b>Black</b>	1.53 (0.74-3.19)	0.25	1.97 (0.88-4.44)	0.10	1.93 (0.75-4.95)	0.17
<b>First language at home</b>	<b>English</b>	1.00		1.00		1.00	
	<b>Other language</b>	7.85 (3.46-17.80)	<0.001	3.06 (0.96-9.76)	0.06	2.65 (0.65-10.81)	0.17

Table A9.4: The characteristics of *primiparous* women who did not receive antenatal care: multinomial logistic regression analyses



<b>How long lived in the UK</b>	<b>Since birth</b>	1.00		1.00		1.00	
	<b>More than 5 years</b>	2.37 (1.27-4.44)	<0.05	1.44 (0.72-2.89)	0.30	2.44 (1.18-5.06)	<0.05
	<b>Less than 5 years</b>	2.43 (1.21-4.88)	<0.05	0.80 (0.34-1.86)	0.60	0.71 (0.24-2.09)	0.54
<b>Socio-economic factors</b>							
<b>Educational level</b>	<b>NVQ level 4 &amp; 5</b>	1.00		1.00		1.00	
	<b>NVQ level 3</b>	4.61 (2.68-7.91)	<0.001	3.25 (1.77-5.98)	<0.001	3.10 (1.50-6.39)	<0.05
	<b>NVQ level 2</b>	5.82 (3.35-10.10)	<0.001	3.45 (1.83-6.51)	<0.001	2.89 (1.27-6.59)	<0.05
	<b>NVQ level 1</b>	18.63 (10.12-34.30)	<0.001	8.04 (4.03-16.05)	<0.001	6.65 (2.84-15.60)	<0.001
	<b>None</b>	32.46 (18.44-57.13)	<0.001	10.72 (5.40-21.31)	<0.001	7.95 (3.26-19.37)	<0.001
	<b>Overseas qualification</b>	13.37 (5.35-33.39)	<0.001	7.12 (2.70-18.75)	<0.001	8.79 (2.40-32.19)	<0.05
<b>Highest NS SEC in household</b>	<b>Higher man and prof</b>	1.00		1.00		1.00	
	<b>Lower man and prof</b>	1.33 (0.65-2.71)	0.43	1.05 (0.50-2.19)	0.90	0.75 (0.31-1.81)	0.52
	<b>Intermediate</b>	2.76 (1.26-6.04)	<0.05	1.48 (0.63-3.48)	0.36	1.15 (0.47-2.83)	0.76
	<b>Small emp and self-emp</b>	5.48 (2.23-13.51)	<0.001	2.75 (1.04-7.24)	<0.05	1.38 (0.46-4.13)	0.57
	<b>Lower sup and tech</b>	5.21 (2.49-10.92)	<0.001	2.36 (1.07-5.23)	<0.05	0.86 (0.39-1.89)	0.70
	<b>Semi-routine</b>	12.02 (5.60-25.79)	<0.001	4.84 (2.06-11.36)	<0.001	1.49 (0.62-3.63)	0.37
	<b>Routine</b>	15.60 (7.37-32.99)	<0.001	5.34 (2.26-12.62)	<0.001	1.96 (0.80-4.81)	0.14
	<b>Unclassified</b>	23.87 (11.30-50.43)	<0.001	7.51 (3.23-17.42)	<0.001	1.92 (0.79-4.67)	0.15

Table A9.4: The characteristics of primiparous women who did not receive antenatal care: multinomial logistic regression analyses

<b>Psychosocial factors</b>							
<b>Feelings about pregnancy</b>	<b>Happy</b> <b>Unhappy or not bothered</b>	1.00 2.51 (1.61-3.93)	<0.001			1.00 0.84 (0.45-1.57)	0.59
<b>Pregnancy factors</b>							
<b>Planned pregnancy</b>	<b>Planned</b> <b>Surprise</b>	1.00 5.13 (3.64-7.22)	<0.001	1.00 4.23 (3.04-5.90)	<0.001	1.00 1.46 (0.94-2.27)	0.09
<b>Smoking in pregnancy</b>	<b>Never</b> <b>Quit</b> <b>Light</b> <b>Heavy</b>	1.00 0.95 (0.59-1.54) 5.36 (3.47-8.29) 7.15 (4.01-12.76)	0.84 <0.001 <0.001	1.00 0.72 (0.45-1.16) 3.84 (2.50-5.90) 5.00 (2.78-9.01)	0.18 <0.001 <0.001	1.00 0.48 (0.24-0.98) 2.67 (1.52-4.66) 2.98 (1.34-6.64)	<0.05 <0.05 <0.05
<b>Complications during pregnancy: CS risk factor</b>	<b>No</b> <b>Yes</b>	1.00 0.63 (0.39-1.02)	0.06				
<b>Complications during pregnancy: Other</b>	<b>No</b> <b>Yes</b>	1.00 0.61 (0.43-0.87)	<0.05	1.00 0.56 (0.39-0.81)	<0.05	1.00 0.69 (0.45-1.05)	0.08

Table A9.4: The characteristics of primiparous women who did not receive antenatal care: multinomial logistic regression analyses

Table A9.5: The characteristics of *primiparous* women who received antenatal care but did not attend classes: relative risk ratios and confidence intervals from multinomial logistic regression analyses

Characteristics of women		Unadjusted		Adjusted for other factors in same domain		Fully adjusted	
Base outcome = received antenatal care and attended classes		RRR (95% CI)	P-value	RRR (95% CI)	P-value	RRR (95% CI)	P-value
<b>Socio-demographic factors</b>							
<b>Age at cohort member birth</b>	<b>19 or younger</b>	6.85 (5.65-8.30)	<0.001			2.36 (1.81-3.09)	<0.001
	<b>20-24</b>	3.37 (2.81-4.03)	<0.001			1.80 (1.44-2.26)	<0.001
	<b>25-29</b>	1.00				1.00	
	<b>30-34</b>	0.65 (0.53-0.80)	<0.001			0.74 (0.58-0.95)	<0.05
	<b>35 and older</b>	0.77 (0.60-0.99)	<0.05			1.00 (0.72-1.39)	0.99
<b>Ethnicity, language and migration</b>							
<b>Ethnicity</b>	<b>White</b>	1.00		1.00		1.00	
	<b>Mixed</b>	2.22 (1.27-3.89)	<0.05	2.14 (1.11-4.11)	<0.05	1.37 (0.64-2.91)	0.42
	<b>Indian</b>	1.19 (0.80-1.78)	0.39	1.31 (0.83-2.07)	0.24	1.79 (1.05-3.06)	<0.05
	<b>Pakistani and Bangladeshi</b>	6.92 (4.80-9.98)	<0.001	9.04 (5.69-14.38)	<0.001	7.20 (4.45-11.67)	<0.001
	<b>Black</b>	1.83 (1.34-2.49)	<0.001	1.46 (0.92-2.34)	0.11	1.29 (0.75-2.24)	0.35

Table A9.5: The characteristics of *primiparous* women who received antenatal care but did not attend classes: multinomial logistic regression analyses

<b>First language at home</b>	<b>English</b>	1.00		1.00		1.00	
	<b>Other language</b>	4.09 (2.68-6.24)	<0.001	2.00 (1.16-3.45)	<0.05	1.80 (0.96-3.35)	0.07
<b>How long lived in the UK</b>	<b>Since birth</b>	1.00		1.00		1.00	
	<b>More than 5 years</b>	0.87 (0.66-1.16)	0.34	0.56 (0.40-0.80)	<0.05	0.90 (0.61-1.32)	0.59
	<b>Less than 5 years</b>	1.52 (1.04-2.20)	<0.05	0.71 (0.47-1.08)	0.11	0.68 (0.38-1.22)	0.20
<b>Socio-economic factors</b>							
<b>Educational level</b>	<b>NVQ level 4 &amp; 5</b>	1.00		1.00		1.00	
	<b>NVQ level 3</b>	2.23 (1.79-2.78)	<0.001	1.44 (1.14-1.81)	<0.05	1.14 (0.87-1.49)	0.34
	<b>NVQ level 2</b>	3.58 (2.93-4.36)	<0.001	1.98 (1.61-2.44)	<0.001	1.51 (1.17-1.96)	<0.05
	<b>NVQ level 1</b>	7.77 (6.24-9.68)	<0.001	3.29 (2.60-4.15)	<0.001	2.38 (1.77-3.20)	<0.05
	<b>None</b>	12.92 (9.92-16.83)	<0.001	4.60 (3.47-6.10)	<0.001	3.15 (2.22-4.47)	<0.001
	<b>Overseas qualification</b>	6.00 (3.91-9.20)	<0.001	3.17 (2.00-5.02)	<0.001	2.98 (1.60-5.53)	<0.05
<b>Highest NS SEC in household</b>	<b>Higher man and prof</b>	1.00		1.00		1.00	
	<b>Lower man and prof</b>	2.23 (1.67-2.99)	<0.001	1.99 (1.48-2.67)	<0.001	1.55 (1.14-2.11)	<0.05
	<b>Intermediate</b>	4.22 (3.03-5.87)	<0.001	3.00 (2.14-4.19)	<0.001	1.83 (1.27-2.65)	<0.05
	<b>Small emp and self-emp</b>	6.26 (4.29-9.13)	<0.001	4.19 (2.82-6.20)	<0.001	2.73 (1.76-4.23)	<0.001
	<b>Lower sup and tech</b>	8.01 (5.59-11.48)	<0.001	5.02 (3.47-7.26)	<0.001	2.78 (1.89-4.08)	<0.001
	<b>Semi-routine</b>	13.18 (9.82-17.68)	<0.001	7.60 (5.59-10.34)	<0.001	3.04 (2.15-4.28)	<0.001
	<b>Routine</b>	14.45 (10.41-20.05)	<0.001	7.29 (5.20-10.24)	<0.001	2.98 (2.06-4.33)	<0.001
	<b>Unclassified</b>	16.87 (11.56-24.61)	<0.001	7.79 (5.23-11.59)	<0.001	2.71 (1.64-4.50)	<0.001

Table A9.5: The characteristics of primiparous women who received antenatal care but did not attend classes: multinomial logistic regression analyses

<b>Psychosocial factors</b>							
<b>Feelings about pregnancy</b>	<b>Happy</b> <b>Unhappy or not bothered</b>	1.00 2.45 (2.02-2.98)	<0.001			1.00 1.04 (0.79-1.37)	0.77
<b>Pregnancy factors</b>							
<b>Planned pregnancy</b>	<b>Planned</b> <b>Surprise</b>	1.00 3.18 (2.82-3.58)	<0.001	1.00 2.59 (2.28-2.94)	<0.001	1.00 1.46 (1.22-1.76)	<0.001
<b>Smoking in pregnancy</b>	<b>Never</b> <b>Quit</b> <b>Light</b> <b>Heavy</b>	1.00 1.80 (1.51-2.14) 4.08 (3.42-4.87) 5.04 (3.97-6.41)	<0.001 <0.001 <0.001	1.00 1.47 (1.22-1.76) 3.19 (2.65-3.84) 3.85 (2.99-4.98)	<0.001 <0.001 <0.001	1.00 1.20 (0.97-1.48) 2.04 (1.59-2.62) 2.19 (1.60-3.01)	0.09 <0.001 <0.001
<b>Complications during pregnancy: CS risk factor</b>	<b>No</b> <b>Yes</b>	1.00 1.01 (0.86-1.19)	0.90				
<b>Complications during pregnancy: Other</b>	<b>No</b> <b>Yes</b>	1.00 1.04 (0.92-1.19)	0.50	1.00 0.98 (0.85-1.13)	0.78	1.00 1.01 (0.85-1.20)	0.89

Table A9.5: The characteristics of primiparous women who received antenatal care but did not attend classes: multinomial logistic regression analyses

Table A9.6: The characteristics of *multiparous* women who did not receive antenatal care: relative risk ratios and confidence intervals from multinomial logistic regression analyses

Characteristics of women		Unadjusted		Adjusted for other factors in same domain		Fully adjusted	
Base outcome = received antenatal care but did not attend classes		RRR (95% CI)	P-value	RRR (95% CI)	P-value	RRR (95% CI)	P-value
<b>Socio-demographic factors</b>							
<b>Age at cohort member birth</b>	<b>19 or younger</b>	2.01 (1.13-3.59)	<0.05	1.63 (0.87-3.05)	0.13	1.11 (0.47-2.59)	0.81
	<b>20-24</b>	1.57 (1.12-2.19)	<0.05	1.30 (0.93-1.81)	0.13	1.37 (0.93-2.04)	0.12
	<b>25-29</b>	1.00		1.00		1.00	
	<b>30-34</b>	0.57 (0.42-0.78)	<0.001	0.75 (0.53-1.06)	0.11	0.68 (0.45-1.03)	0.07
	<b>35 and older</b>	0.48 (0.32-0.72)	<0.001	0.75 (0.50-1.13)	0.17	0.55 (0.35-0.87)	<0.05
<b>Age at first birth</b>	<b>19 or younger</b>	2.54 (1.74-3.70)	<0.001	1.86 (1.22-2.84)	<0.05	0.93 (0.55-1.56)	0.77
	<b>20-24</b>	1.90 (1.36-2.65)	<0.001	1.62 (1.11-2.36)	<0.05	0.88 (0.55-1.40)	0.60
	<b>25-29</b>	1.00		1.00		1.00	
	<b>30-34</b>	0.53 (0.29-0.98)	<0.05	0.58 (0.32-1.05)	0.07	0.90 (0.48-1.70)	0.75
	<b>35 and older</b>	0.73 (0.19-2.78)	0.65	0.80 (0.22-2.94)	0.73	1.34 (0.35-5.16)	0.67
<b>Ethnicity, language and migration</b>							
<b>Ethnicity</b>	<b>White</b>	1.00		1.00		1.00	
	<b>Mixed</b>	4.00 (1.94-8.27)	<0.001	5.59 (2.62-11.94)	<0.001	4.92 (2.18-11.07)	<0.001
	<b>Indian</b>	3.06 (1.70-5.54)	<0.001	2.10 (0.89-4.96)	0.09	2.05 (0.79-5.33)	0.14

Table A9.6: The characteristics of *multiparous* women who did not receive antenatal care: multinomial logistic regression analyses

	<b>Pakistani and Bangladeshi Black</b>	5.26 (3.32-8.34)	<0.001	3.34 (1.79-6.22)	<0.001	1.94 (1.08-3.48)	<0.05
		1.89 (1.01-3.55)	<0.05	1.29 (0.64-2.62)	0.48	0.95 (0.42-2.12)	0.90
<b>First language at home</b>	<b>English</b>	1.00		1.00			
	<b>Other language</b>	3.91 (2.30-6.64)	<0.001	1.25 (0.59-2.67)	0.56		
<b>How long lived in the UK</b>	<b>Since birth</b>	1.00		1.00		1.00	
	<b>More than 5 years</b>	4.16 (2.91-5.93)	<0.001	2.12 (1.24-3.61)	<0.05	2.47 (1.30-4.71)	<0.05
	<b>Less than 5 years</b>	5.32 (3.07-9.22)	<0.001	2.28 (1.22-4.26)	<0.05	1.59 (0.75-3.40)	0.23
<b>Socio-economic factors</b>							
<b>Educational level</b>	<b>NVQ level 4 &amp; 5</b>	1.00		1.00		1.00	
	<b>NVQ level 3</b>	1.21 (0.66-2.24)	0.53	0.89 (0.48-1.66)	0.72	1.70 (0.35-3.40)	0.31
	<b>NVQ level 2</b>	1.70 (1.08-2.68)	<0.05	1.12 (0.73-1.72)	0.61	1.01 (0.61-1.68)	0.97
	<b>NVQ level 1</b>	2.69 (1.53-4.73)	<0.05	1.47 (0.83-2.59)	0.19	1.05 (0.53-2.10)	0.89
	<b>None</b>	6.45 (4.21-9.90)	<0.001	2.85 (1.77-4.60)	<0.001	2.09 (1.12-3.88)	<0.05
	<b>Overseas qualification</b>	5.77 (2.97-11.23)	<0.001	3.18 (1.48-6.82)	<0.05	2.06 (0.81-5.23)	0.13

Table A9.6: The characteristics of multiparous women who did not receive antenatal care: multinomial logistic regression analyses

<b>Highest NS SEC in household</b>	<b>Higher man and prof</b>	1.00		1.00		1.00	
	<b>Lower man and prof</b>	1.92 (0.94-3.93)	0.07	1.82 (0.90-3.67)	0.10	1.57 (0.74-3.30)	0.24
	<b>Intermediate</b>	2.86 (1.28-6.38)	<0.05	2.56 (1.20-5.45)	<0.05	2.29 (1.06-4.92)	<0.05
	<b>Small emp and self-emp</b>	3.41 (1.34-8.68)	<0.05	2.46 (0.93-6.47)	0.07	1.67 (0.65-4.27)	0.29
	<b>Lower sup and tech</b>	4.03 (1.89-8.59)	<0.001	2.88 (1.36-6.09)	<0.05	2.15 (1.00-4.63)	0.05
	<b>Semi-routine</b>	6.48 (3.06-13.74)	<0.001	4.21 (1.95-9.09)	<0.001	2.91 (1.34-6.32)	<0.05
	<b>Routine</b>	7.68 (3.57-16.55)	<0.001	4.36 (1.93-9.84)	<0.001	2.75 (1.25-6.05)	<0.05
	<b>Unclassified</b>	15.46 (7.13-33.52)	<0.001	7.67 (3.58-16.46)	<0.001	4.07 (1.93-8.56)	<0.001
<b>Psychosocial factors</b>							
<b>Feelings about pregnancy</b>	<b>Happy</b>	1.00				1.00	
	<b>Unhappy or not bothered</b>	1.45 (1.00-2.09)	<0.05			1.14 (0.69-1.90)	0.60
<b>Pregnancy factors</b>							
<b>Planned pregnancy</b>	<b>Planned</b>	1.00		1.00		1.00	
	<b>Surprise</b>	1.87 (1.47-2.39)	<0.001	1.74 (1.38-2.18)	<0.001	1.03 (0.75-1.43)	0.84
<b>Smoking in pregnancy</b>	<b>Never</b>	1.00		1.00		1.00	
	<b>Quit</b>	0.85 (0.49-1.46)	0.55	0.77 (0.44-1.35)	0.36	0.89 (0.47-1.67)	0.71
	<b>Light</b>	1.15 (0.70-1.89)	0.59	1.04 (0.63-1.70)	0.89	1.17 (0.65-2.10)	0.60
	<b>Heavy</b>	2.01 (1.38-2.93)	<0.001	1.75 (1.21-2.51)	<0.05	1.55 (0.98-2.43)	0.06

Table A9.6: The characteristics of multiparous women who did not receive antenatal care: multinomial logistic regression analyses



<b>Complications during pregnancy: CS risk factor</b>	<b>No</b> <b>Yes</b>	1.00 0.65 (0.39-1.09)	0.10				
<b>Complications during pregnancy: Other</b>	<b>No</b> <b>Yes</b>	1.00 0.44 (0.31-0.62)	<0.001	1.00 0.43 (0.30-0.62)	<0.001	1.00 0.43 (0.28-0.67)	<0.001

Table A9.7: The characteristics of *multiparous* women who received care and attended classes: relative risk ratios and confidence intervals from multinomial logistic regression analyses

Characteristics of women		Unadjusted		Adjusted for other factors in same domain		Fully adjusted	
Base outcome = received antenatal care but did not attend classes		RRR (95% CI)	P-value	RRR (95% CI)	P-value	RRR (95% CI)	P-value
<b>Socio-demographic factors</b>							
<b>Age at cohort member birth</b>	<b>19 or younger</b>	0.99 (0.58-1.68)	0.96	1.10 (0.63-1.94)	0.74	0.99 (0.50-1.95)	0.98
	<b>20-24</b>	0.72 (0.57-0.91)	<0.05	0.77 (0.60-0.98)	<0.05	0.73 (0.54-0.98)	<0.05
	<b>25-29</b>	1.00		1.00		1.00	
	<b>30-34</b>	1.22 (1.02-1.46)	<0.05	1.15 (0.96-1.36)	0.12	1.19 (0.98-1.46)	0.09
	<b>35 and older</b>	1.53 (1.26-1.86)	<0.001	1.37 (1.12-1.66)	<0.05	1.55 (1.23-1.95)	<0.001
<b>Age at first birth</b>	<b>19 or younger</b>	0.71 (0.57-0.88)	<0.05	0.84 (0.65-1.09)	0.19	1.21 (0.88-1.66)	0.24
	<b>20-24</b>	0.84 (0.69-1.02)	0.07	0.92 (0.76-1.13)	0.43	1.13 (0.89-1.44)	0.32
	<b>25-29</b>	1.00		1.00		1.00	
	<b>30-34</b>	1.22 (1.01-1.49)	<0.05	1.10 (0.90-1.35)	0.33	1.04 (0.84-1.28)	0.74
	<b>35 and older</b>	1.34 (0.92-1.97)	0.13	1.13 (0.75-1.69)	0.56	0.76 (0.48-1.21)	0.25
<b>Ethnicity, language and migration</b>							
<b>Ethnicity</b>	<b>White</b>	1.00		1.00		1.00	
	<b>Mixed</b>	0.78 (0.36-1.68)	0.53	1.09 (0.45-2.63)	0.84	1.07 (0.45-2.54)	0.88
	<b>Indian</b>	0.78 (0.48-1.26)	0.31	0.81 (0.47-1.39)	0.44	0.79 (0.46-1.36)	0.40

Table A9.7: The characteristics of *multiparous* women who received care and attended classes: multinomial logistic regression analyses

	<b>Pakistani and Bangladeshi Black</b>	0.65 (0.47-0.90)	<0.05	0.52 (0.33-0.85)	<0.05	0.66 (0.41-1.07)	0.09
		1.21 (0.87-1.68)	0.26	1.18 (0.77-1.82)	0.44	1.16 (0.75-1.79)	0.50
<b>First language at home</b>	<b>English</b>	1.00		1.00			
	<b>Other language</b>	0.61 (0.40-0.93)	<0.05	0.90 (0.52-1.59)	0.72		
<b>How long lived in the UK</b>	<b>Since birth</b>	1.00		1.00		1.00	
	<b>More than 5 years</b>	1.01 (0.76-1.35)	0.94	1.21 (0.87-1.69)	0.26	1.13 (0.81-1.58)	0.47
	<b>Less than 5 years</b>	0.72 (0.43-1.23)	0.23	0.84 (0.48-1.48)	0.55	1.05 (0.58-1.91)	0.86
<b>Socio-economic factors</b>							
<b>Educational level</b>	<b>NVQ level 4 &amp; 5</b>	1.00		1.00		1.00	
	<b>NVQ level 3</b>	0.96 (0.80-1.16)	0.68	0.98 (0.81-1.19)	0.87	1.08 (0.87-1.34)	0.47
	<b>NVQ level 2</b>	0.69 (0.57-0.83)	<0.001	0.72 (0.60-0.86)	<0.001	0.75 (0.61-0.91)	<0.05
	<b>NVQ level 1</b>	0.65 (0.49-0.86)	<0.05	0.69 (0.53-0.91)	<0.05	0.75 (0.55-1.02)	0.06
	<b>None</b>	0.45 (0.35-0.59)	<0.001	0.50 (0.38-0.65)	<0.001	0.51 (0.36-0.72)	<0.001
	<b>Overseas qualification</b>	0.46 (0.30-0.71)	<0.05	0.50 (0.32-0.77)	<0.05	0.45 (0.25-0.82)	<0.05

Table A9.7: The characteristics of multiparous women who received care and attended classes: multinomial logistic regression analyses

<b>Highest NS SEC in household</b>	<b>Higher man and prof</b>	1.00		1.00		1.00	
	<b>Lower man and prof</b>	0.90 (0.74-1.11)	0.34	0.95 (0.77-1.16)	0.61	0.93 (0.74-1.16)	0.50
	<b>Intermediate</b>	0.86 (0.66-1.13)	0.29	0.99 (0.76-1.29)	0.93	1.05 (0.79-1.40)	0.74
	<b>Small emp and self-emp</b>	0.68 (0.50-0.92)	<0.05	0.84 (0.62-1.15)	0.28	0.95 (0.67-1.34)	0.76
	<b>Lower sup and tech</b>	0.73 (0.56-0.97)	<0.05	0.93 (0.71-1.22)	0.61	1.11 (0.82-1.50)	0.49
	<b>Semi-routine</b>	0.69 (0.53-0.89)	<0.05	0.91 (0.71-1.18)	0.48	1.13 (0.84-1.50)	0.43
	<b>Routine</b>	0.54 (0.39-0.75)	<0.001	0.76 (0.55-1.06)	0.11	0.93 (0.64-1.35)	0.70
	<b>Unclassified</b>	0.58 (0.37-0.90)	<0.05	0.84 (0.53-1.32)	0.44	1.17 (0.69-1.96)	0.56
<b>Psychosocial factors</b>							
<b>Feelings about pregnancy</b>	<b>Happy</b>	1.00				1.00	
	<b>Unhappy or not bothered</b>	0.68 (0.54-0.86)	<0.05			0.80 (0.60-1.07)	0.14
<b>Pregnancy factors</b>							
<b>Planned pregnancy</b>	<b>Planned</b>	1.00		1.00		1.00	
	<b>Surprise</b>	0.72 (0.62-0.83)	<0.001	0.78 (0.67-0.90)	<0.05	0.81 (0.68-0.98)	<0.05
<b>Smoking in pregnancy</b>	<b>Never</b>	1.00		1.00		1.00	
	<b>Quit</b>	0.84 (0.67-1.05)	0.13	0.86 (0.69-1.08)	0.20	0.92 (0.71-1.20)	0.54
	<b>Light</b>	0.64 (0.52-0.79)	<0.001	0.68 (0.56-0.84)	<0.001	0.84 (0.65-1.08)	0.17
	<b>Heavy</b>	0.53 (0.42-0.67)	<0.001	0.57 (0.45-0.71)	<0.001	0.62 (0.47-0.81)	<0.05

Table A9.7: The characteristics of multiparous women who received care and attended classes: multinomial logistic regression analyses

<b>Complications during pregnancy: CS risk factor</b>	<b>No</b> <b>Yes</b>	1.00 1.01 (0.83-1.22)	0.93				
<b>Complications during pregnancy: Other</b>	<b>No</b> <b>Yes</b>	1.00 1.12 (0.98-1.29)	0.09	1.00 1.13 (0.99-1.30)	0.07	1.00 1.15 (0.99-1.35)	0.07

Table A9.8: Unadjusted infant outcomes for women who received different levels of antenatal care, stratified by parity: frequencies and weighted percentages

Infant factors Frequencies (weighted percentages)	Primiparous				Multiparous			
	Received care and attended classes	Received care, no classes	Did not receive antenatal care	p-value	Received care and attended classes	Received care, no classes	Did not receive antenatal care	p-value
<b>Birth weight (kg)</b>								
<b>LBW (&lt;2.49)</b>	207 (4.4)	291 (12.0)	40 (12.7)		72 (4.2)	504 (5.2)	34 (8.6)	
<b>Normal (2.50-3.99)</b>	3,854 (84.1)	2,108 (80.3)	206 (81.8)		1,209 (82.1)	6,917 (79.8)	328 (79.0)	
<b>High BW (&gt;4.00)</b>	506 (11.5)	203 (7.7)	11 (5.4)	<0.001	210 (13.6)	1,221 (15.0)	45 (12.5)	<0.05
<b>Gestational age (weeks)</b>								
<33	25 (0.5)	69 (3.0)	13 (4.5)		12 (0.5)	112 (1.2)	11 (2.4)	
33-36.9	249 (5.5)	187 (8.0)	19 (8.6)		81 (5.7)	476 (5.3)	17 (4.7)	
37-41.9 (Normal)	4,079 (89.1)	2,206 (84.0)	212 (84.8)		1,333 (89.8)	7,625 (89.3)	333 (84.8)	
>42	204 (4.8)	122 (5.0)	7 (2.1)	<0.001	57 (4.0)	346 (4.2)	27 (8.2)	<0.05

p-values from  $\chi^2$  tests

Table A9.9: Unadjusted labour outcomes for women who received different levels of antenatal care, stratified by parity: frequencies and weighted percentages

Labour factors Frequencies (weighted percentages)			Primiparous				Multiparous				
			Received care and attended classes	Received care, no classes	Did not receive antenatal care	p-value	Received care and attended classes	Received care, no classes	Did not receive antenatal care	p-value	
<b>Labour induced</b>											
	<b>No</b>		2,898 (64.7)	1,640 (63.3)	176 (69.8)	0.21	1,089 (74.0)	6,282 (74.4)	329 (80.7)	1.0	
	<b>Yes</b>		1,667 (35.3)	960 (36.7)	81 (30.2)		401 (26.0)	2,369 (25.6)	81 (19.3)		
<b>Complications during labour</b>											
	<b>No complication</b>	<b>No</b>	2,059 (47.4)	886 (36.3)	74 (35.0)	<0.001	375 (27.0)	1,903 (23.8)	69 (18.6)	<0.05	
		<b>Yes</b>	2,433 (52.6)	1,661 (63.7)	177 (65.0)		1,078 (73.0)	6,540 (76.3)	335 (81.4)		
	<b>Malpres.</b>	<b>No</b>	4,055 (90.1)	2,347 (91.3)	236 (93.2)	0.17	1,388 (94.8)	8,093 (95.4)	392 (95.4)	0.67	
		<b>Yes</b>	437 (9.9)	200 (8.7)	15 (6.8)		65 (5.2)	350 (4.6)	12 (4.6)		
	<b>Fetal distress</b>	<b>No</b>	3,282 (71.7)	2,061 (80.1)	210 (79.8)	<0.001	1,215 (83.2)	7,419 (87.3)	378 (93.6)	<0.001	
		<b>Yes</b>	1,210 (28.4)	486 (19.9)	41 (20.2)		238 (16.8)	1,024 (12.7)	26 (6.4)		
	<b>Other</b>	<b>No</b>	3,592 (79.2)	2,167 (85.2)	224 (88.9)	<0.001	1,323 (91.1)	7,668 (90.4)	367 (90.0)	0.89	
		<b>Yes</b>	900 (20.8)	380 (14.8)	27 (11.1)		130 (9.2)	775 (9.6)	37 (10.0)		
<b>Length of labour</b>											
Mean hours (95% CIs)			13.9 (13.5-14.3)	12.0 (11.4-12.6)	10.44 (9.0-11.9)		6.4 (5.9-6.9)	6.3 (6.0-6.5)	6.1 (5.3-6.8)		

p-values from  $\chi^2$  tests

Table A9.9: Unadjusted labour outcomes for women who received different levels of antenatal care, stratified by parity

Table A9.10: Mode of birth according to antenatal care: relative risk ratios and confidence intervals from multinomial logistic regression analyses

Parity	Mode of birth  (Base outcome = unassisted vaginal birth)		Model 1 (Unadjusted)		Model 2 (Adjusted for maternal factors)		Model 3 (Adjusted for maternal and infant factors)		Model 4 (Adjusted for maternal, infant and labour factors)	
			RRR 95% CI	p-value	RRR 95% CI	p-value	RRR 95% CI	p-value	RRR 95% CI	p-value
Primiparous <sup>a</sup>	Instrumental vaginal birth	Care and classes	1.00		1.00		1.00		1.00	
		Care, no classes	0.53 (0.44-0.63)	<0.001	0.53 (0.25-1.15)	0.11	0.56 (0.26-1.22)	0.15	0.59 (0.26-1.33)	0.20
		No care	0.36 (0.22-0.61)	<0.001	2.14 (0.18-25.32)	0.55	2.33 (0.20-27.08)	0.50	2.16 (0.17-27.81)	0.55
	Planned CS	Care and classes	1.00		1.00		1.00		1.00	
		Care, no classes	1.03 (0.76-1.39)	0.86	2.03 (0.57-7.21)	0.27	1.82 (0.50-6.67)	0.36	1.35 (0.33-5.49)	0.68
		No care	0.25 (0.10-0.64)	<0.05	0.15 (0.01-3.47)	0.23	0.09 (0.01-2.00)	0.13	0.45 (0.01-24.32)	0.69
	Emergency CS	Care and classes	1.00		1.00		1.00		1.00	
		Care, no classes	0.73 (0.62-0.87)	<0.001	1.52 (0.70-3.27)	0.29	1.54 (0.69-3.42)	0.29	1.51 (0.62-3.66)	0.36
		No care	0.39 (0.25-0.61)	<0.001	0.93 (0.18-4.84)	0.93	0.77 (0.15-3.92)	0.76	0.65 (0.09-4.60)	0.67

Table A9.10: Mode of birth according to antenatal care: relative risk ratios and confidence intervals from multinomial logistic regression analyses



<b>Multiparous<sup>b</sup></b>	<b>Instrumental vaginal birth</b>	<b>Care and classes</b>	1.26 (0.86-1.84)	0.24	1.16 (0.77-1.74)	0.48	1.16 (0.77-1.75)	0.48	1.05 (0.68-1.61)	0.83
		<b>Care, no classes</b>	1.00		1.00		1.00		1.00	
		<b>No care</b>	0.71 (0.31-1.60)	0.41	0.86 (0.33-2.28)	0.77	0.74 (0.25-2.20)	0.58	1.01 (0.34-3.02)	0.99
	<b>Planned CS</b>	<b>Care and classes</b>	1.13 (0.92-1.38)	0.23	0.97 (0.78-1.22)	0.81	1.00 (0.79-1.26)	0.99	1.07 (0.85-1.34)	0.57
		<b>Care, no classes</b>	1.00		1.00		1.00		1.00	
		<b>No care</b>	0.48 (0.30-0.77)	<0.05	0.48 (0.26-0.88)	<0.05	0.47 (0.25-0.88)	<0.05	0.43 (0.23-0.81)	<0.05
	<b>Emergency CS</b>	<b>Care and classes</b>	1.39 (1.11-1.75)	<0.05	1.39 (1.07-1.81)	<0.05	1.46 (1.11-1.91)	<0.05	1.39 (1.06-1.82)	<0.05
		<b>Care, no classes</b>	1.00		1.00		1.00		1.00	
		<b>No care</b>	1.04 (0.58-1.85)	0.91	1.09 (0.52-2.28)	0.82	1.11 (0.51-2.39)	0.79	1.50 (0.68-3.33)	0.32

<sup>a</sup>Adjusted for: *Model 1*: week of entry to care, *Model 2*: Model 1 + age at birth, ethnicity, antenatal care\*ethnicity (non-White vs. White), migration status, educational level, social class, antenatal care\*social class (working class vs. not), planned pregnancy, smoking during pregnancy, *Model 3*: Model 2 + birth weight and gestational age, *Model 4*: Model 3 + length of labour, fetal distress and other complications in labour. <sup>b</sup>Adjusted for: *Model 1*: week of entry to care, *Model 2*: Model 1 + age at birth, ethnicity, migration status, educational level, social class, smoking during pregnancy, *Model 3*: Model 2 + birth weight and gestational age, *Model 4*: Model 3 + fetal distress.

**CHAPTER 10:**  
The Millennium Cohort Study: Fully adjusted models

Table A10.2: The characteristics of *primiparous* women who had an instrumental birth: relative risk ratios and confidence intervals from multinomial logistic regression analyses

Characteristics of women		Unadjusted		Adjusted for other factors in same domain		Fully adjusted	
Base outcome = unassisted vaginal birth		RRR (95% CI)	P-value	RRR (95% CI)	P-value	RRR (95% CI)	P-value
<b>Socio-demographic factors</b>							
<b>Age at cohort member birth</b>	<b>19 or younger</b>	0.44 (0.35-0.55)	<0.001	N/A		0.53 (0.39-0.72)	<0.001
	<b>20-24</b>	0.58 (0.47-0.71)	<0.001			0.64 (0.49-0.82)	<0.05
	<b>25-29</b>	1.00				1.00	
	<b>30-34</b>	1.26 (1.03-1.55)	<0.05			1.26 (0.99-1.60)	0.05
	<b>35 and older</b>	1.85 (1.42-2.40)	<0.001			2.07 (1.52-2.82)	<0.001
<b>Ethnicity, language and migration</b>							
<b>Ethnicity</b>	<b>White</b>	1.00		1.00		1.00	
	<b>Mixed</b>	0.68 (0.32-1.42)	0.30	0.68 (0.33-1.43)	0.31	0.86 (0.44-1.62)	0.66
	<b>Indian</b>	0.80 (0.45-1.40)	0.43	0.81 (0.46-1.44)	0.47	1.15 (0.62-2.12)	0.66
	<b>Pakistani/Bangladeshi</b>	0.44 (0.29-0.66)	<0.001	0.46 (0.30-0.69)	<0.001	0.86 (0.55-1.34)	0.50
	<b>Black</b>	0.30 (0.16-0.56)	<0.001	0.30 (0.16-0.56)	<0.001	0.36 (0.18-0.70)	<0.05
<b>First language at home</b>	<b>English</b>	1.00		1.00			
	<b>Other language</b>	0.48 (0.31-0.76)	<0.05	0.81 (0.49-1.35)	0.41		

Table A10.2: The characteristics of *primiparous* women who had an instrumental birth: multinomial logistic regression analyses

<b>How long lived in the UK</b>	<b>Since birth</b>	1.00					
	<b>More than 5 years</b>	0.92 (0.66-1.28)	0.60				
	<b>Less than 5 years</b>	0.70 (0.45-1.09)	0.12				
<b>Socio-economic factors</b>							
<b>Educational level</b>	<b>NVQ level 4/5</b>	1.00		1.00		1.00	
	<b>NVQ level 3</b>	0.72 (0.58-0.89)	<0.05	0.80 (0.64-0.99)	<0.05	0.92 (0.71-1.18)	0.49
	<b>NVQ level 2</b>	0.72 (0.59-0.89)	<0.05	0.84 (0.68-1.05)	0.14	1.00 (0.77-1.29)	1.00
	<b>NVQ level 1</b>	0.61 (0.47-0.80)	<0.001	0.80 (0.59-1.07)	0.14	1.07 (0.77-1.49)	0.68
	<b>None</b>	0.39 (0.29-0.54)	<0.001	0.55 (0.39-0.77)	<0.05	0.81 (0.55-1.22)	0.32
	<b>Overseas qualification</b>	0.59 (0.33-1.04)	0.07	0.71 (0.40-1.26)	0.24	0.93 (0.39-2.25)	0.88
<b>Highest NS SEC in household</b>	<b>Higher man and prof</b>	1.00		1.00		1.00	
	<b>Lower man and prof</b>	0.97 (0.77-1.21)	0.77	1.01 (0.81-1.25)	0.96	1.12 (0.85-1.46)	0.43
	<b>Intermediate</b>	0.75 (0.59-0.97)	<0.05	0.84 (0.65-1.09)	0.19	1.33 (0.98-1.81)	0.07
	<b>Small emp and self-emp</b>	0.77 (0.55-1.10)	0.15	0.88 (0.62-1.25)	0.48	1.44 (0.96-2.17)	0.08
	<b>Lower sup and tech</b>	0.70 (0.51-0.96)	<0.05	0.81 (0.59-1.12)	0.20	1.39 (0.96-2.00)	0.08
	<b>Semi-routine</b>	0.53 (0.40-0.69)	<0.001	0.63 (0.48-0.83)	<0.05	1.36 (0.99-1.86)	0.06
	<b>Routine</b>	0.47 (0.35-0.65)	<0.001	0.59 (0.43-0.81)	<0.05	1.22 (0.84-1.76)	0.29
	<b>Unclassified</b>	0.46 (0.32-0.67)	<0.001	0.60 (0.41-0.88)	<0.05	1.50 (0.94-2.38)	0.09

Table A10.2: The characteristics of primiparous women who had an instrumental birth: multinomial logistic regression analyses

<b>Maternal height</b>							
<b>Height (cm)</b>							
	<b>&lt;154</b>	0.92 (0.66-1.29)	0.64	N/A		1.32 (0.90-1.93)	0.15
	<b>154-159</b>	1.02 (0.84-1.23)	0.86			1.06 (0.84-1.33)	0.63
	<b>160-165</b>	1.00				1.00	
	<b>166-171</b>	0.89 (0.73-1.07)	0.22			0.78 (0.63-0.97)	<0.05
	<b>&gt;172</b>	1.07 (0.86-1.33)	0.55			0.99 (0.77-1.27)	0.94
<b>Interpersonal factors</b>							
<b>Left home before 17</b>							
	<b>No</b>	1.00		1.00		1.00	
	<b>Yes</b>	0.71 (0.56-0.90)	<0.05	0.73 (0.58-0.93)	<0.05	0.90 (0.69-1.19)	0.47
<b>Parents ever separated</b>							
	<b>No</b>	1.00		1.00		1.00	
	<b>Yes</b>	0.94 (0.82-1.09)	0.40	1.02 (0.88-1.18)	0.78	1.01 (0.86-1.19)	0.89
<b>Feelings about pregnancy</b>							
	<b>Happy</b>	1.00		1.00		1.00	
	<b>Unhappy or not bothered</b>	0.57 (0.47-0.69)	<0.001	0.58 (0.48-0.70)	<0.001	0.78 (0.61-1.00)	0.05
<b>Pregnancy factors</b>							
<b>Planned pregnancy</b>							
	<b>Planned</b>	1.00		1.00		1.00	
	<b>Surprise</b>	0.57 (0.49-0.67)	<0.001	0.66 (0.56-0.76)	<0.001	0.89 (0.73-1.08)	0.23
<b>Fertility treatment</b>							
	<b>No</b>	1.00		1.00		1.00	
	<b>Yes</b>	1.33 (0.93-1.89)	0.11	1.04 (0.73-1.48)	0.83	0.88 (0.59-1.31)	0.53

Table A10.2: The characteristics of primiparous women who had an instrumental birth: multinomial logistic regression analyses

<b>Antenatal care</b>	<b>Care and classes</b>	1.00		1.00		1.00	
	<b>Care, no classes</b>	0.53 (0.44-0.63)	<0.001	0.59 (0.50-0.70)	<0.001	0.83 (0.67-1.03)	0.10
	<b>No care</b>	0.36 (0.22-0.61)	<0.001	0.53 (0.33-0.87)	<0.05	0.99 (0.59-1.66)	0.97
<b>Health factors</b>							
<b>Pre-pregnancy BMI</b>	<b>Underweight</b>	0.66 (0.59-0.90)	<0.05	0.66 (0.48-0.90)	<0.05	0.99 (0.71-1.39)	0.96
	<b>Ideal</b>	1.00		1.00		1.00	
	<b>Overweight</b>	1.03 (0.86-1.23)	0.77	1.02 (0.85-1.23)	0.80	0.85 (0.68-1.06)	0.14
	<b>Obese</b>	0.93 (0.66-1.31)	0.69	0.93 (0.66-1.30)	0.66	0.74 (0.50-1.09)	0.13
	<b>Severely obese</b>	1.18 (0.68-2.07)	0.56	1.16 (0.66-2.04)	0.61	1.07 (0.59-1.94)	0.82
<b>Complications during pregnancy: CS risk factor</b>	<b>No</b>	1.00		1.00		1.00	
	<b>Yes</b>	1.09 (0.88-1.36)	0.42	1.07 (0.86-1.34)	0.53	1.02 (0.80-1.31)	0.86
<b>Complications during pregnancy: Other</b>	<b>No</b>	1.00		1.00		1.00	
	<b>Yes</b>	1.13 (0.97-1.31)	0.12	1.12 (0.96-1.30)	0.16	0.94 (0.79-1.11)	0.45
<b>Labour factors</b>							
<b>Labour induced</b>	<b>No</b>	1.00		1.00		1.00	
	<b>Yes</b>	1.53 (1.33-1.75)	<0.001	1.44 (1.24-1.67)	<0.001	1.45 (1.23-1.72)	<0.001
<b>Companion during labour</b>	<b>Yes</b>	1.00		1.00		1.00	
	<b>No</b>	0.47 (0.20-1.10)	0.08	0.56 (0.23-1.32)	0.18	0.76 (0.32-1.81)	0.53
<b>Complications during labour and birth: Malpresentation</b>	<b>No</b>	1.00		1.00		1.00	
	<b>Yes</b>	5.03 (3.76-6.74)	<0.001	6.66 (4.92-9.03)	<0.001	7.19 (5.29-9.77)	<0.001

Table A10.2: The characteristics of primiparous women who had an instrumental birth: multinomial logistic regression analyses

<b>Complications during labour and birth:</b>	<b>No</b>	1.00		1.00		1.00	
<b>Fetal distress</b>	<b>Yes</b>	4.43 (3.74-5.25)	<0.001	4.68 (3.92-5.58)	<0.001	4.65 (3.80-5.68)	<0.001
<b>Complications during labour and birth:</b>	<b>No</b>	1.00		1.00		1.00	
<b>Other</b>	<b>Yes</b>	3.62 (3.03-4.32)	<0.001	3.59 (2.94-4.38)	<0.001	3.46 (2.81-4.26)	<0.001
<b>Infant factors</b>							
<b>Birth weight (kg)</b>	<b>Low (&lt;2.50)</b>	0.55 (0.38-0.81)	<0.05	0.55 (0.37-0.84)	<0.05	0.64 (0.38-1.08)	0.10
	<b>Normal (2.50-3.99)</b>	1.00		1.00		1.00	
	<b>High (&gt;4.00)</b>	1.46 (1.13-1.89)	<0.05	1.43 (1.11-1.85)	<0.05	1.40 (1.01-1.93)	<0.05
<b>Gestational age (weeks)</b>	<b>Preterm (&lt;37)</b>	0.82 (0.58-1.17)	0.27	1.08 (0.73-1.58)	0.71	1.30 (0.84-2.01)	0.23
	<b>Normal (37-41.9)</b>	1.00		1.00		1.00	
	<b>Post-term (&gt;42)</b>	1.78 (1.25-2.54)	<0.05	1.70 (1.19-2.44)	<0.05	1.58 (1.09-2.29)	<0.05
<b>Interactions</b>							
	<b>Short height*low birth weight</b>					0.81 (0.35-1.89)	0.63
	<b>Short height*high birth weight</b>					2.59 (1.06-6.31)	<0.05

Table A10.3: The characteristics of *primiparous* women who had an emergency caesarean section: relative risk ratios and confidence intervals from multinomial logistic regression analyses

Characteristics of women		Unadjusted		Adjusted for other factors in same domain		Fully adjusted	
Base outcome = unassisted vaginal birth		RRR (95% CI)	P-value	RRR (95% CI)	P-value	RRR (95% CI)	P-value
<b>Socio-demographic factors</b>							
<b>Age at cohort member birth</b>	<b>19 or younger</b>	0.38 (0.30-0.48)	<0.001	N/A		0.39 (0.27-0.55)	<0.001
	<b>20-24</b>	0.67 (0.54-0.82)	<0.001			0.70 (0.52-0.93)	<0.05
	<b>25-29</b>	1.00				1.00	
	<b>30-34</b>	1.62 (1.33-1.96)	<0.001			1.64 (1.27-2.11)	<0.001
	<b>35 and older</b>	2.62 (2.05-3.34)	<0.001			2.81 (2.05-3.86)	<0.001
<b>Ethnicity, language and migration</b>							
<b>Ethnicity</b>	<b>White</b>	1.00		1.00		1.00	
	<b>Mixed</b>	0.39 (0.17-0.92)	<0.05	0.39 (0.17-0.91)	<0.05	0.43 (0.15-1.23)	0.12
	<b>Indian</b>	1.12 (0.65-1.94)	0.68	1.12 (0.64-1.95)	0.70	1.32 (0.77-2.24)	0.31
	<b>Pakistani/Bangladeshi</b>	0.55 (0.36-0.86)	<0.05	0.55 (0.35-0.85)	<0.05	0.73 (0.43-1.24)	0.24
	<b>Black</b>	1.52 (1.02-2.27)	<0.05	1.51 (1.01-2.28)	<0.05	1.74 (1.02-2.95)	<0.05
<b>First language at home</b>	<b>English</b>	1.00		1.00			
	<b>Other language</b>	1.06 (0.69-1.63)	0.81	1.05 (0.65-1.72)	0.83		
<b>How long lived in the UK</b>	<b>Since birth</b>	1.00					
	<b>More than 5 years</b>	0.97 (0.72-1.31)	0.86				
	<b>Less than 5 years</b>	1.01 (0.69-1.47)	0.96				

Table A10.3: The characteristics of *primiparous* women who had an emergency caesarean section: multinomial logistic regression analyses



<b>Socio-economic factors</b>							
<b>Educational level</b>	<b>NVQ level 4/5</b>	1.00		1.00		1.00	
	<b>NVQ level 3</b>	0.67 (0.55-0.83)	<0.001	0.78 (0.63-0.96)	<0.05	0.92 (0.70-1.21)	0.56
	<b>NVQ level 2</b>	0.65 (0.54-0.78)	<0.001	0.80 (0.66-0.98)	<0.05	0.89 (0.68-1.17)	0.40
	<b>NVQ level 1</b>	0.54 (0.40-0.72)	<0.001	0.76 (0.55-1.04)	0.09	1.00 (0.66-1.52)	0.99
	<b>None</b>	0.51 (0.40-0.65)	<0.001	0.79 (0.59-1.06)	0.11	1.45 (0.98-2.14)	0.06
	<b>Overseas qualification</b>	0.93 (0.54-1.62)	0.80	1.19 (0.68-2.10)	0.54	1.67 (0.79-3.52)	0.18
<b>Highest NS SEC in household</b>	<b>Higher man and prof</b>	1.00		1.00		1.00	
	<b>Lower man and prof</b>	0.88 (0.72-1.08)	0.22	0.92 (0.75-1.12)	0.40	0.86 (0.66-1.12)	0.25
	<b>Intermediate</b>	0.66 (0.52-0.84)	<0.05	0.74 (0.58-0.95)	<0.05	1.08 (0.80-1.47)	0.60
	<b>Small emp and self-emp</b>	0.73 (0.51-1.05)	0.09	0.74 (0.58-0.95)	0.26	1.02 (0.61-1.72)	0.93
	<b>Lower sup and tech</b>	0.50 (0.36-0.70)	<0.001	0.57 (0.55-1.17)	<0.05	0.76 (0.50-1.17)	0.21
	<b>Semi-routine</b>	0.47 (0.37-0.60)	<0.001	0.54 (0.42-0.70)	<0.001	0.87 (0.60-1.26)	0.46
	<b>Routine</b>	0.48 (0.36-0.63)	<0.001	0.55 (0.40-0.76)	<0.001	1.05 (0.68-1.63)	0.82
	<b>Unclassified</b>	0.38 (0.26-0.56)	<0.001	0.44 (0.29-0.67)	<0.001	0.99 (0.58-1.68)	0.97
<b>Anthropometric factors</b>							
<b>Height (cm)</b>	<b>&lt;154</b>	1.88 (1.43-2.48)	<0.001			2.64 (1.74-4.02)	<0.001
	<b>154-159</b>	1.39 (1.15-1.69)	<0.05	N/A		1.54 (1.18-2.02)	<0.05
	<b>160-165</b>	1.00				1.00	
	<b>166-171</b>	0.83 (0.69-1.01)	0.06			0.71 (0.55-0.93)	<0.05
	<b>&gt;172</b>	0.72 (0.58-0.90)	<0.05			0.57 (0.43-0.75)	<0.001

Table A10.3: The characteristics of primiparous women who had an emergency caesarean section: multinomial logistic regression analyses

<b>Interpersonal factors</b>							
<b>Left home before 17</b>	<b>No</b>	1.00		1.00		1.00	
	<b>Yes</b>	0.74 (0.60-0.92)	<0.05	0.83 (0.66-1.05)	0.11	0.84 (0.61-1.15)	0.28
<b>Parents ever separated</b>	<b>No</b>	1.00		1.00		1.00	
	<b>Yes</b>	0.78 (0.67-0.90)	<0.05	0.83 (0.71-0.98)	<0.05	0.83 (0.67-1.02)	0.08
<b>Feelings about pregnancy</b>	<b>Happy</b>	1.00		1.00		1.00	
	<b>Unhappy or not bothered</b>	0.52 (0.42-0.64)	<0.001	0.53 (0.43-0.67)	<0.001	0.62 (0.44-0.86)	<0.05
<b>Pregnancy factors</b>							
<b>Planned pregnancy</b>	<b>Planned</b>	1.00		1.00		1.00	
	<b>Surprise</b>	0.63 (0.55-0.72)	<0.001	0.70 (0.60-0.81)	<0.001	1.13 (0.90-1.43)	0.29
<b>Fertility treatment</b>	<b>No</b>	1.00		1.00		1.00	
	<b>Yes</b>	2.20 (1.63-2.97)	<0.001	1.82 (1.34-2.47)	<0.001	1.32 (0.85-2.05)	0.21
<b>Antenatal care</b>	<b>Care and classes</b>	1.00		1.00		1.00	
	<b>Care, no classes</b>	0.73 (0.62-0.87)	<0.001	0.82 (0.69-0.98)	<0.05	1.14 (0.89-1.47)	0.29
	<b>No care</b>	0.39 (0.25-0.61)	<0.001	0.57 (0.37-0.88)	<0.05	0.90 (0.50-1.62)	0.72
<b>Health factors</b>							
<b>Pre-pregnancy BMI</b>	<b>Underweight</b>	0.70 (0.53-0.92)	<0.05	0.71 (0.54-0.94)	<0.05	0.98 (0.68-1.41)	0.91
	<b>Ideal</b>	1.00		1.00		1.00	
	<b>Overweight</b>	1.65 (1.40-1.94)	<0.001	1.62 (1.37-1.91)	<0.001	1.18 (0.95-1.46)	0.14

Table A10.3: The characteristics of primiparous women who had an emergency caesarean section: multinomial logistic regression analyses

	<b>Obese</b>	2.45 (1.84-3.24)	<0.001	2.33 (1.75-3.10)	<0.001	1.72 (1.20-2.47)	<0.05
	<b>Severely obese</b>	3.18 (2.11-4.79)	<0.001	2.83 (1.86-4.31)	<0.001	2.49 (1.51-4.11)	<0.001
<b>Complications during pregnancy: CS risk factor</b>	<b>No</b>	1.00		1.00		1.00	
	<b>Yes</b>	1.88 (1.57-2.26)	<0.001	1.71 (1.40-2.08)	<0.001	1.46 (1.10-1.93)	<0.05
<b>Complications during pregnancy: Other</b>	<b>No</b>	1.00		1.00		1.00	
	<b>Yes</b>	1.14 (1.00-1.30)	<0.05	1.04 (0.90-1.19)	0.62	0.73 (0.61-0.89)	<0.05
<b>Labour factors</b>							
<b>Labour induced</b>	<b>No</b>	1.00		1.00		1.00	
	<b>Yes</b>	2.32 (2.00-2.68)	<0.001	2.28 (1.92-2.70)	<0.001	2.03 (1.66-2.48)	<0.001
<b>Companion during labour</b>	<b>Yes</b>	1.00		1.00		1.00	
	<b>No</b>	4.35 (3.01-6.30)	<0.001	5.45 (3.55-8.36)	<0.001	6.00 (3.54-10.16)	<0.001
<b>Complications during labour and birth: Malpresentation</b>	<b>No</b>	1.00		1.00		1.00	
	<b>Yes</b>	9.51 (7.23-12.50)	<0.001	14.67 (10.69-20.14)	<0.001	17.25 (12.28-24.23)	<0.001
<b>Complications during labour and birth: Fetal distress</b>	<b>No</b>	1.00		1.00		1.00	
	<b>Yes</b>	5.92 (4.99-7.02)	<0.001	6.43 (5.35-7.73)	<0.001	6.92 (5.58-8.59)	<0.001
<b>Complications during labour and birth: Other</b>	<b>No</b>	1.00		1.00		1.00	
	<b>Yes</b>	4.76 (3.96-5.72)	<0.001	4.85 (3.95-5.95)	<0.001	5.24 (4.13-6.65)	<0.001
<b>Infant factors</b>							
<b>Birth weight (kg)</b>	<b>Low (&lt;2.50)</b>	2.30 (1.79-2.95)	<0.001	1.62 (1.21-2.16)	<0.05	1.85 (1.13-3.04)	<0.05
	<b>Normal (2.50-3.99)</b>	1.00		1.00		1.00	

Table A10.3: The characteristics of primiparous women who had an emergency caesarean section: multinomial logistic regression analyses

	<b>High (&gt;4.00)</b>	2.76 (2.24-3.39)	<0.001	2.76 (2.25-3.40)	<0.001	3.31 (2.38-4.59)	<0.001
<b>Gestational age (weeks)</b>	<b>Preterm (&lt;37)</b>	2.32 (1.83-2.95)	<0.001	2.03 (1.54-2.69)	<0.001	2.26 (1.56-3.27)	<0.001
	<b>Normal (37-41.9)</b>	1.00		1.00		1.00	
	<b>Post-term (&gt;42)</b>	2.08 (1.54-2.81)	<0.001	1.92 (1.40-2.63)	<0.001	1.53 (1.03-2.27)	<0.05
<b>Interactions</b>							
<b>Short height*low birth weight</b>						0.49 (0.24-1.00)	0.05
<b>Short height*high birth weight</b>						1.98 (0.81-4.85)	0.13

*Table A10.3: The characteristics of primiparous women who had an emergency caesarean section: multinomial logistic regression analyses*

Table A10.4: The characteristics of *primiparous* women who had a planned caesarean section: relative risk ratios and confidence intervals from multinomial logistic regression analyses

Characteristics of women		Unadjusted		Adjusted for other factors in same domain		Fully adjusted	
Base outcome = unassisted vaginal birth		RRR (95% CI)	P-value	RRR (95% CI)	P-value	RRR (95% CI)	P-value
<b>Socio-demographic factors</b>							
<b>Age at cohort member birth</b>	<b>19 or younger</b>	0.27 (0.16-0.45)	<0.001	N/A		0.22 (0.12-0.40)	<0.001
	<b>20-24</b>	0.67 (0.47-0.95)	<0.05			0.46 (0.29-0.72)	<0.05
	<b>25-29</b>	1.00				1.00	
	<b>30-34</b>	1.33 (0.98-1.80)	0.07			1.66 (1.15-2.38)	<0.05
	<b>35 and older</b>	2.82 (1.96-4.07)	<0.001			3.26 (2.13-4.99)	<0.001
<b>Ethnicity, language and migration</b>							
<b>Ethnicity</b>	<b>White</b>	1.00		1.00		1.00	
	<b>Mixed</b>	0.57 (0.18-1.81)	0.34	0.54 (0.17-1.71)	0.30	0.90 (0.18-4.43)	0.90
	<b>Indian</b>	0.64 (0.24-1.68)	0.36	0.58 (0.22-1.57)	0.29	0.59 (0.20-1.73)	0.34
	<b>Pakistani/Bangladeshi</b>	1.19 (0.78-1.82)	0.42	1.00 (0.61-1.65)	0.99	1.42 (0.70-2.86)	0.33
	<b>Black</b>	0.71 (0.33-1.51)	0.37	0.67 (0.32-1.40)	0.28	0.46 (0.20-1.04)	0.06
<b>First language at home</b>	<b>English</b>	1.00		1.00			
	<b>Other language</b>	1.67 (0.88-3.19)	0.12	2.00 (0.91-4.38)	0.09		
<b>How long lived in the UK</b>	<b>Since birth</b>	1.00					
	<b>More than 5 years</b>	1.04 (0.65-1.68)	0.86				
	<b>Less than 5 years</b>	0.98 (0.52-1.84)	0.95				

Table A10.4: The characteristics of *primiparous* women who had a planned caesarean section: multinomial logistic regression analyses

<b>Socio-economic factors</b>							
<b>Educational level</b>	<b>NVQ level 4/5</b>	1.00		1.00		1.00	
	<b>NVQ level 3</b>	0.63 (0.43-0.92)	<0.05	0.64 (0.42-0.96)	<0.05	0.75 (0.45-1.23)	0.25
	<b>NVQ level 2</b>	0.65 (0.47-0.91)	<0.05	0.67 (0.47-0.97)	<0.05	0.87 (0.59-1.29)	0.48
	<b>NVQ level 1</b>	0.53 (0.32-0.88)	<0.05	0.59 (0.35-0.99)	<0.05	0.80 (0.43-1.48)	0.47
	<b>None</b>	0.47 (0.31-0.72)	<0.05	0.55 (0.34-0.89)	<0.05	0.56 (0.29-1.09)	0.09
	<b>Overseas qualification</b>	0.79 (0.36-1.74)	0.56	0.80 (0.37-1.74)	0.57	0.82 (0.34-1.95)	0.65
<b>Highest NS SEC in household</b>	<b>Higher man and prof</b>	1.00		1.00		1.00	
	<b>Lower man and prof</b>	0.80 (0.53-1.19)	0.27	0.86 (0.57-1.30)	0.48	0.97 (0.62-1.51)	0.90
	<b>Intermediate</b>	0.80 (0.52-1.24)	0.32	1.00 (0.62-1.62)	0.98	1.46 (0.87-2.45)	0.16
	<b>Small emp and self-emp</b>	1.24 (0.72-2.12)	0.44	1.53 (0.86-2.72)	0.15	1.81 (0.95-3.46)	0.07
	<b>Lower sup and tech</b>	0.85 (0.51-1.42)	0.54	1.10 (0.63-1.91)	0.74	2.52 (1.33-4.79)	<0.05
	<b>Semi-routine</b>	0.50 (0.33-0.76)	<0.05	0.67 (0.43-1.07)	0.09	1.78 (1.03-3.07)	<0.05
	<b>Routine</b>	0.54 (0.31-0.93)	<0.05	0.75 (0.42-1.34)	0.33	2.07 (1.04-4.11)	<0.05
	<b>Unclassified</b>	0.47 (0.24-0.89)	<0.05	0.65 (0.31-1.35)	0.25	1.70 (0.75-3.82)	0.20
<b>Maternal height</b>							
<b>Height (cm)</b>	<b>&lt;154</b>	1.57 (0.95-2.58)	0.08			1.55 (0.75-3.20)	0.23
	<b>154-159</b>	1.30 (0.91-1.87)	0.15	N/A		1.07 (0.68-1.67)	0.77
	<b>160-165</b>	1.00				1.00	
	<b>166-171</b>	0.88 (0.64-1.23)	0.46			0.81 (0.55-1.19)	0.28
	<b>&gt;172</b>	0.92 (0.65-1.31)	0.65			0.82 (0.54-1.25)	0.35

Table A10.4: The characteristics of primiparous women who had a planned caesarean section: multinomial logistic regression analyses

<b>Interpersonal factors</b>							
<b>Left home before 17</b>	<b>No</b>	1.00		1.00		1.00	
	<b>Yes</b>	0.83 (0.58-1.17)	0.28	0.96 (0.66-1.38)	0.81	1.17 (0.72-1.90)	0.52
<b>Parents ever separated</b>	<b>No</b>	1.00		1.00		1.00	
	<b>Yes</b>	0.76 (0.58-1.01)	p=0.06	0.81 (0.60-1.08)	0.15	0.91 (0.65-1.26)	0.57
<b>Feelings about pregnancy</b>	<b>Happy</b>	1.00		1.00		1.00	
	<b>Unhappy or not bothered</b>	0.36 (0.23-0.55)	<0.001	0.35 (0.22-0.55)	<0.001	0.49 (0.28-0.84)	<0.05
<b>Pregnancy factors</b>							
<b>Planned pregnancy</b>	<b>Planned</b>	1.00		1.00		1.00	
	<b>Surprise</b>	0.56 (0.43-0.72)	<0.001	0.59 (0.45-0.77)	<0.001	1.03 (0.74-1.43)	0.87
<b>Fertility treatment</b>	<b>No</b>	1.00		1.00		1.00	
	<b>Yes</b>	2.98 (1.81-4.89)	<0.001	2.41 (1.46-3.98)	<0.05	1.44 (0.76-2.74)	0.27
<b>Antenatal care</b>	<b>Care and classes</b>	1.00		1.00		1.00	
	<b>Care, no classes</b>	1.03 (0.76-1.39)	0.86	1.20 (0.88-1.63)	0.26	1.44 (0.99-2.10)	0.06
	<b>No care</b>	0.25 (0.10-0.64)	<0.05	0.57 (0.23-1.39)	0.22	0.88 (0.32-2.41)	0.80
<b>Health factors</b>							
<b>Pre-pregnancy BMI</b>	<b>Underweight</b>	0.82 (0.47-1.43)	0.49	0.82 (0.47-1.43)	0.49	1.39 (0.80-2.40)	0.24
	<b>Ideal</b>	1.00		1.00		1.00	
	<b>Overweight</b>	1.17 (0.86-1.59)	0.33	1.14 (0.84-1.56)	0.40	0.95 (0.67-1.33)	0.75

Table A10.4: The characteristics of primiparous women who had a planned caesarean section: multinomial logistic regression analyses

	<b>Obese</b>	1.56 (0.90-2.71)	0.12	1.41 (0.81-2.46)	0.22	1.31 (0.68-2.53)	0.42
	<b>Severely obese</b>	2.11 (1.00-4.44)	0.05	1.86 (0.87-3.99)	0.11	2.54 (0.97-6.66)	0.06
<b>Complications during pregnancy: CS risk factor</b>	<b>No</b>	1.00		1.00		1.00	
	<b>Yes</b>	1.74 (1.28-2.35)	<0.001	1.60 (1.17-2.19)	<0.05	1.65 (1.10-2.46)	<0.05
<b>Complications during pregnancy: Other</b>	<b>No</b>	1.00		1.00		1.00	
	<b>Yes</b>	1.50 (1.19-1.90)	<0.05	1.44 (1.13-1.83)	<0.05	1.48 (1.12-1.96)	<0.05
<b>Labour factors</b>							
<b>Labour induced</b>	<b>No</b>	1.00		1.00		1.00	
	<b>Yes</b>	0.44 (0.32-0.60)	<0.001	0.54 (0.39-0.74)	<0.001	0.47 (0.33-0.67)	<0.001
<b>Companion during labour</b>	<b>Yes</b>	1.00		1.00		1.00	
	<b>No</b>	4.78 (2.90-7.87)	<0.001	5.35 (3.09-9.26)	<0.001	6.47 (3.48-12.05)	<0.001
<b>Complications during labour and birth: Malpresentation</b>	<b>No</b>	1.00		1.00		1.00	
	<b>Yes</b>	23.12 (16.71-31.98)	<0.001	20.85 (15.10-28.78)	<0.001	22.72 (15.49-33.33)	<0.001
<b>Complications during labour and birth: Fetal distress</b>	<b>No</b>	1.00		1.00		1.00	
	<b>Yes</b>	0.20 (0.11-0.38)	<0.001	0.28 (0.15-0.51)	<0.001	0.19 (0.09-0.38)	<0.001
<b>Complications during labour and birth: Other</b>	<b>No</b>	1.00		1.00		1.00	
	<b>Yes</b>	0.63 (0.39-1.02)	0.06	0.74 (0.45-1.21)	0.23	0.67 (0.40-1.13)	0.13

Table A10.4: The characteristics of primiparous women who had a planned caesarean section: multinomial logistic regression analyses



<b>Infant factors</b>							
<b>Birth weight (kg)</b>	<b>Low (&lt;2.50)</b>	1.47 (0.88-2.47)	0.14	1.41 (0.79-2.51)	0.25	0.80 (0.34-1.88)	0.61
	<b>Normal (2.50-3.99)</b>	1.00		1.00		1.00	
	<b>High (&gt;4.00)</b>	1.28 (0.86-1.91)	0.23	1.31 (0.88-1.96)	0.18	1.60 (0.92-2.77)	0.10
<b>Gestational age (weeks)</b>	<b>Preterm (&lt;37)</b>	1.24 (0.77-2.00)	0.37	1.07 (0.63-1.81)	0.80	0.79 (0.43-1.46)	0.46
	<b>Normal (37-41.9)</b>	1.00		1.00		1.00	
	<b>Post-term (&gt;42)</b>	0.37 (0.17-0.84)	<0.05	0.37 (0.17-0.83)	<0.05	0.68 (0.30-1.55)	0.36
<b>Interactions</b>							
<b>Short height*low birth weight</b>						3.12 (1.08-9.00)	<0.05
<b>Short height*high birth weight</b>						5.31 (1.70-16.60)	<0.05

Table A10.4: The characteristics of primiparous women who had a planned caesarean section: multinomial logistic regression analyses

Table A10.5: The characteristics of *multiparous* women who had an instrumental birth: relative risk ratios and confidence intervals from multinomial logistic regression analyses

Characteristics of women		Unadjusted		Adjusted for other factors in same domain		Fully adjusted	
Base outcome = unassisted vaginal birth		RRR (95% CI)	P-value	RRR (95% CI)	P-value	RRR (95% CI)	P-value
<b>Socio-demographic factors</b>							
<b>Age at cohort member birth</b>	<b>19 or younger</b>	0.45 (0.16-1.27)	0.13	0.56 (0.19-1.62)	0.28	0.97 (0.21-4.58)	0.97
	<b>20-24</b>	0.59 (0.37-0.95)	<0.05	0.72 (0.44-1.18)	0.19	0.79 (0.39-1.60)	0.51
	<b>25-29</b>	1.00		1.00		1.00	
	<b>30-34</b>	1.08 (0.78-1.50)	0.63	0.93 (0.66-1.31)	0.69	1.00 (0.64-1.55)	0.99
	<b>35 and older</b>	1.45 (1.06-1.98)	<0.05	1.37 (0.96-1.96)	0.09	1.32 (0.82-2.14)	0.25
<b>Age at first birth</b>	<b>19 or younger</b>	0.46 (0.31-0.68)	<0.001	0.55 (0.36-0.85)	<0.001	0.28 (0.14-0.54)	<0.001
	<b>20-24</b>	0.53 (0.37-0.75)	<0.001	0.56 (0.39-0.79)	<0.05	0.43 (0.27-0.67)	<0.05
	<b>25-29</b>	1.00		1.00		1.00	
	<b>30-34</b>	0.76 (0.54-1.08)	0.13	0.67 (0.47-0.95)	<0.05	0.70 (0.47-1.07)	0.10
	<b>35 and older</b>	0.89 (0.48-1.64)	0.71	0.67 (0.34-1.31)	0.71	0.88 (0.40-1.92)	0.74
<b>Ethnicity, language and migration</b>							
<b>Ethnicity</b>	<b>White</b>	1.00		1.00		1.00	
	<b>Mixed</b>	1.64 (0.52-5.25)	0.40	1.87 (0.53-6.67)	0.33	2.92 (0.85-9.98)	0.09
	<b>Indian</b>	1.55 (0.73-3.28)	0.25	1.76 (0.67-4.60)	0.25	2.15 (0.82-5.65)	0.12
	<b>Pakistani/Bangladeshi</b>	0.53 (0.31-0.93)	<0.05	0.57 (0.27-1.18)	0.13	0.86 (0.34-2.18)	0.75
	<b>Black</b>	0.47 (0.16-1.40)	0.18	0.33 (0.07-1.55)	0.16	0.36 (0.05-2.60)	0.31

Table A10.5: The characteristics of *multiparous* women who had an instrumental birth: multinomial logistic regression analyses

<b>First language at home</b>	<b>English</b>	1.00					
	<b>Other language</b>	1.28 (0.67-2.45)	0.45				
<b>How long lived in the UK</b>	<b>Since birth</b>	1.00		1.00		1.00	
	<b>More than 5 years</b>	0.93 (0.57-1.52)	0.77	0.93 (0.47-1.84)	0.83	1.00 (0.48-2.09)	0.99
	<b>Less than 5 years</b>	1.29 (0.60-2.79)	0.51	1.81 (0.75-4.35)	0.18	3.72 (1.49-9.27)	<0.05
<b>Socio-economic factors</b>							
<b>Educational level</b>	<b>NVQ level 4/5</b>	1.00		1.00		1.00	
	<b>NVQ level 3</b>	0.81 (0.56-1.17)	0.27	0.88 (0.62-1.25)	0.48	0.85 (0.54-1.34)	0.47
	<b>NVQ level 2</b>	0.93 (0.65-1.32)	0.68	1.04 (0.74-1.47)	0.80	1.30 (0.88-1.91)	0.19
	<b>NVQ level 1</b>	0.66 (0.39-1.12)	0.12	0.79 (0.48-1.29)	0.34	1.09 (0.57-1.98)	0.78
	<b>None</b>	0.65 (0.44-0.95)	<0.05	0.82 (0.54-1.26)	0.37	0.97 (0.52-1.83)	0.94
	<b>Overseas qualification</b>	1.06 (0.56-2.02)	0.86	1.25 (0.66-2.37)	0.50	2.79 (1.29-6.03)	<0.05
<b>Highest NS SEC in household</b>	<b>Higher man and prof</b>	1.00		1.00		1.00	
	<b>Lower man and prof</b>	1.07 (0.73-1.56)	0.73	1.08 (0.74-1.59)	0.69	1.19 (0.75-1.90)	0.46
	<b>Intermediate</b>	0.86 (0.49-1.50)	0.59	0.88 (0.51-1.51)	0.64	0.88 (0.42-1.82)	0.73
	<b>Small emp and self-emp</b>	0.83 (0.49-1.40)	0.48	0.85 (0.50-1.46)	0.56	1.01 (0.47-2.18)	0.97
	<b>Lower sup and tech</b>	0.78 (0.45-1.36)	0.39	0.81 (0.45-1.46)	0.49	1.12 (0.54-2.33)	0.77
	<b>Semi-routine</b>	0.65 (0.40-1.05)	0.08	0.69 (0.42-1.13)	0.15	1.31 (0.73-2.33)	0.36
	<b>Routine</b>	0.77 (0.44-1.37)	0.38	0.83 (0.46-1.51)	0.55	1.46 (0.65-3.28)	0.36
	<b>Unclassified</b>	0.55 (0.28-1.09)	0.09	0.63 (0.30-1.30)	0.21	1.32 (0.46-3.81)	0.61

Table A10.5: The characteristics of multiparous women who had an instrumental birth: multinomial logistic regression analyses

<b>Maternal height</b>							
<b>Height (cm)</b>							
	<b>&lt;154</b>	1.00 (0.63-1.89)	1.00	N/A		0.86 (0.46-1.60)	0.63
	<b>154-159</b>	1.04 (0.77-1.42)	0.78			1.21 (0.77-1.89)	0.41
	<b>160-165</b>	1.00				1.00	
	<b>166-171</b>	0.80 (0.57-1.12)	0.19			0.71 (0.47-1.08)	0.11
	<b>&gt;172</b>	0.73 (0.48-1.13)	0.16			0.78 (0.48-1.29)	0.34
<b>Interpersonal factors</b>							
<b>Left home before 17</b>							
	<b>No</b>	1.00		1.00		1.00	
	<b>Yes</b>	0.63 (0.44-0.91)	<0.05	0.60 (0.42-0.88)	<0.05	0.49 (0.28-0.85)	<0.05
<b>Parents ever separated</b>							
	<b>No</b>	1.00		1.00		1.00	
	<b>Yes</b>	1.19 (0.94-1.51)	0.15	1.30 (1.02-1.66)	<0.05	1.35 (0.95-1.91)	0.09
<b>Feelings about pregnancy</b>							
	<b>Happy</b>	1.00		1.00			
	<b>Unhappy or not bothered</b>	0.75 (0.53-1.06)	0.10	0.77 (0.55-1.09)	0.14		
<b>Pregnancy factors</b>							
<b>Planned pregnancy</b>							
	<b>Planned</b>	1.00		1.00			
	<b>Surprise</b>	0.86 (0.67-1.10)	0.23	0.88 (0.69-1.13)	0.31		
<b>Fertility treatment</b>							
	<b>No</b>	1.00		1.00		1.00	
	<b>Yes</b>	1.77 (0.72-4.39)	0.22	1.63 (0.66-3.97)	0.29	1.83 (0.73-4.61)	0.20

Table A10.5: The characteristics of multiparous women who had an instrumental birth: multinomial logistic regression analyses

<b>Antenatal care</b>	<b>Care and classes</b>	1.26 (0.86-1.84)	0.24	1.22 (0.84-1.79)	0.30	1.03 (0.66-1.59)	0.91
	<b>Care, no classes</b>	1.00		1.00		1.00	
	<b>No care</b>	0.71 (0.31-1.60)	0.41	0.69 (0.34-1.40)	0.30	0.49 (0.16-1.48)	0.20
<b>Health factors</b>							
<b>Pre-pregnancy BMI</b>	<b>Underweight</b>	0.57 (0.28-1.16)	0.12	0.57 (0.28-1.16)	0.12	0.45 (0.16-1.25)	0.12
	<b>Ideal</b>	1.00		1.00		1.00	
	<b>Overweight</b>	0.86 (0.64-1.15)	0.31	0.85 (0.63-1.15)	0.29	0.91 (0.65-1.27)	0.57
	<b>Obese</b>	0.95 (0.57-1.58)	0.85	0.94 (0.57-1.56)	0.81	0.58 (0.30-1.13)	0.11
	<b>Severely obese</b>	1.18 (0.60-2.30)	0.63	1.16 (0.59-2.26)	0.66	1.29 (0.54-3.10)	0.57
<b>Complications during pregnancy: CS risk factor</b>	<b>No</b>	1.00		1.00		1.00	
	<b>Yes</b>	1.08 (0.74-1.55)	0.70	1.16 (0.80-1.68)	0.45	1.02 (0.64-1.64)	0.92
<b>Complications during pregnancy: Other</b>	<b>No</b>	1.00					
	<b>Yes</b>	0.85 (0.66-1.10)	0.23				
<b>Labour factors</b>							
<b>Labour induced</b>	<b>No</b>	1.00		1.00		1.00	
	<b>Yes</b>	1.48 (1.17-1.88)	<0.05	1.32 (1.03-1.70)	<0.05	1.19 (0.86-1.64)	0.30
<b>Companion during labour</b>	<b>Yes</b>	1.00		1.00		1.00	
	<b>No</b>	0.69 (0.36-1.33)	0.27	0.55 (0.28-1.10)	0.09	0.82 (0.36-1.87)	0.64
<b>Complications during labour and birth: Malpresentation</b>	<b>No</b>	1.00		1.00		1.00	
	<b>Yes</b>	9.40 (6.58-13.41)	<0.001	10.90 (7.52-15.79)	<0.001	12.33 (8.00-19.01)	<0.001
<b>Complications during</b>							

Table A10.5: The characteristics of multiparous women who had an instrumental birth: multinomial logistic regression analyses

<b>labour and birth:</b>	<b>No</b>	1.00		1.00		1.00	
<b>Fetal distress</b>	<b>Yes</b>	4.76 (3.68-6.17)	<0.001	4.77 (3.65-6.24)	<0.001	5.31 (3.78-7.45)	<0.001
<b>Complications during labour and birth:</b>	<b>No</b>	1.00		1.00		1.00	
<b>Other</b>	<b>Yes</b>	3.49 (2.49-4.87)	<0.001	3.27 (2.30-4.65)	<0.001	3.53 (2.41-5.17)	<0.001
<b>Infant factors</b>							
<b>Birth weight (kg)</b>	<b>Low (&lt;2.50)</b>	0.67 (0.28-1.61)	0.37	0.72 (0.33-1.60)	0.42	0.42 (0.11-1.57)	0.19
	<b>Normal (2.50-3.99)</b>	1.00		1.00		1.00	
	<b>High (&gt;4.00)</b>	1.71 (1.21-2.40)	<0.05	1.72 (1.22-2.42)	<0.05	1.38 (0.85-2.27)	0.20
<b>Gestational age (weeks)</b>	<b>Preterm (&lt;37)</b>	0.73 (0.37-1.43)	0.35	0.88 (0.49-1.57)	0.66	1.21 (0.57-2.58)	0.62
	<b>Normal (37-41.9)</b>	1.00		1.00		1.00	
	<b>Post-term (&gt;42)</b>	0.96 (0.54-1.70)	0.88	0.89 (0.50-1.59)	0.69	0.81 (0.40-1.64)	0.55
<b>Interactions</b>							
	<b>Short height*low birth weight</b>					3.32 (1.01-10.86)	<0.05
	<b>Short height*high birth weight</b>					1.44 (0.51-4.04)	0.49

Table A10.5: The characteristics of multiparous women who had an instrumental birth: multinomial logistic regression analyses

Table A10.6: The characteristics of *multiparous* women who had an emergency caesarean section: relative risk ratios and confidence intervals from multinomial logistic regression analyses

Characteristics of women		Unadjusted		Adjusted for other factors in same domain		Fully adjusted	
Base outcome = unassisted vaginal birth		RRR (95% CI)	P-value	RRR (95% CI)	P-value	RRR (95% CI)	P-value
<b>Socio-demographic factors</b>							
<b>Age at cohort member birth</b>	<b>19 or younger</b>	0.57 (0.28-1.14)	0.11	0.73 (0.34-1.54)	0.41	0.68 (0.19-2.42)	0.55
	<b>20-24</b>	0.72 (0.51-1.01)	0.06	0.83 (0.59-1.17)	0.29	0.94 (0.54-1.65)	0.83
	<b>25-29</b>	1.00		1.00		1.00	
	<b>30-34</b>	1.26 (1.00-1.58)	0.05	1.22 (0.96-1.56)	0.11	1.10 (0.81-1.50)	0.53
	<b>35 and older</b>	1.59 (1.24-2.04)	<0.001	1.58 (1.18-2.11)	<0.05	1.00 (0.68-1.48)	0.99
<b>Age at first birth</b>	<b>19 or younger</b>	0.55 (0.42-0.72)	<0.001	0.68 (0.50-0.93)	<0.05	0.44 (0.29-0.67)	<0.001
	<b>20-24</b>	0.78 (0.62-0.97)	<0.05	0.87 (0.69-1.10)	0.24	0.63 (0.46-0.85)	<0.05
	<b>25-29</b>	1.00		1.00		1.00	
	<b>30-34</b>	0.88 (0.66-1.18)	0.39	0.76 (0.56-1.03)	0.08	0.97 (0.66-1.41)	0.86
	<b>35 and older</b>	1.42 (0.90-2.26)	0.13	1.10 (0.67-1.82)	0.70	1.72 (0.90-3.28)	0.10
<b>Ethnicity, language and migration</b>							
<b>Ethnicity</b>	<b>White</b>	1.00		1.00		1.00	
	<b>Mixed</b>	1.52 (0.69-3.36)	0.30	1.87 (0.84-4.21)	0.13	1.11 (0.43-2.83)	0.83
	<b>Indian</b>	1.55 (0.97-2.48)	0.07	1.41 (0.81-2.44)	0.22	0.70 (0.33-1.50)	0.36
	<b>Pakistani/Bangladeshi</b>	0.77 (0.55-1.08)	0.14	0.60 (0.38-0.95)	<0.05	0.53 (0.29-0.96)	<0.05
	<b>Black</b>	1.94 (1.34-2.79)	<0.001	1.47 (0.90-2.39)	0.12	1.29 (0.71-2.36)	0.40

Table A10.6: The characteristics of *multiparous* women who had an emergency caesarean section: multinomial logistic regression analyses

<b>First language at home</b>	<b>English</b>	1.00					
	<b>Other language</b>	1.43 (0.94-2.16)	0.09				
<b>How long lived in the UK</b>	<b>Since birth</b>	1.00		1.00		1.00	
	<b>More than 5 years</b>	1.71 (1.28-2.30)	<0.001	1.48 (1.01-2.16)	<0.05	1.86 (1.16-2.98)	<0.05
	<b>Less than 5 years</b>	0.90 (0.53-1.53)	0.70	1.00 (0.56-1.79)	0.99	1.09 (0.51-2.33)	0.83
<b>Socio-economic factors</b>							
<b>Educational level</b>	<b>NVQ level 4/5</b>	1.00		1.00		1.00	
	<b>NVQ level 3</b>	0.80 (0.60-1.07)	0.14	0.77 (0.57-1.04)	0.09	0.74 (0.48-1.14)	0.17
	<b>NVQ level 2</b>	0.86 (0.70-1.07)	0.18	0.82 (0.65-1.03)	0.09	0.78 (0.56-1.08)	0.13
	<b>NVQ level 1</b>	0.93 (0.67-1.30)	0.68	0.88 (0.63-1.22)	0.44	1.19 (0.76-1.86)	0.45
	<b>None</b>	0.84 (0.66-1.07)	0.16	0.79 (0.59-1.06)	0.12	0.85 (0.54-1.34)	0.48
	<b>Overseas qualification</b>	0.73 (0.44-1.23)	0.24	0.68 (0.40-1.17)	0.17	0.69 (0.33-1.45)	0.33
<b>Highest NS SEC in household</b>	<b>Higher man and prof</b>	1.00		1.00		1.00	
	<b>Lower man and prof</b>	1.03 (0.78-1.34)	0.86	1.06 (0.81-1.39)	0.66	1.21 (0.84-1.75)	0.30
	<b>Intermediate</b>	0.99 (0.72-1.37)	0.97	1.09 (0.79-1.52)	0.59	1.15 (0.75-1.78)	0.52
	<b>Small emp and self-emp</b>	1.11 (0.76-1.62)	0.58	1.24 (0.84-1.83)	0.27	1.36 (0.82-2.25)	0.23
	<b>Lower sup and tech</b>	1.20 (0.85-1.68)	0.30	1.34 (0.94-1.92)	0.11	1.51 (0.89-2.56)	0.12
	<b>Semi-routine</b>	0.91 (0.67-1.24)	0.56	1.03 (0.75-1.41)	0.85	1.50 (0.94-2.39)	0.09
	<b>Routine</b>	1.06 (0.77-1.47)	0.72	1.21 (0.86-1.69)	0.28	1.07 (0.62-1.84)	0.82
	<b>Unclassified</b>	0.88 (0.60-1.28)	0.49	0.97 (0.65-1.44)	0.89	1.09 (0.55-2.16)	0.80

Table A10.6: The characteristics of multiparous women who had an emergency caesarean section: multinomial logistic regression analyses



<b>Maternal height</b>							
<b>Height (cm)</b>							
	<b>&lt;154</b>	1.53 (1.09-2.14)	<0.05	N/A		1.51 (0.91-2.51)	0.11
	<b>154-159</b>	1.55 (1.24-1.93)	<0.001			1.83 (1.28-2.63)	<0.001
	<b>160-165</b>	1.00				1.00	
	<b>166-171</b>	0.95 (0.75-1.20)	0.66			1.01 (0.72-1.41)	0.97
	<b>&gt;172</b>	0.78 (0.57-1.05)	0.11			0.62 (0.41-0.94)	<0.05
<b>Interpersonal factors</b>							
<b>Left home before 17</b>							
	<b>No</b>	1.00		1.00		1.00	
	<b>Yes</b>	0.91 (0.74-1.14)	0.42	0.90 (0.71-1.14)	0.37	0.92 (0.62-1.36)	0.68
<b>Parents ever separated</b>							
	<b>No</b>	1.00		1.00		1.00	
	<b>Yes</b>	0.99 (0.82-1.20)	0.94	0.99 (0.82-1.22)	0.98	0.88 (0.65-1.17)	0.38
<b>Feelings about pregnancy</b>							
	<b>Happy</b>	1.00		1.00			
	<b>Unhappy or not bothered</b>	1.12 (0.91-1.37)	0.28	1.12 (0.91-1.37)	0.27		
<b>Pregnancy factors</b>							
<b>Planned pregnancy</b>							
	<b>Planned</b>	1.00		1.00			
	<b>Surprise</b>	1.08 (0.91-1.28)	0.37	1.09 (0.92-1.30)	0.29		
<b>Fertility treatment</b>							
	<b>No</b>	1.00		1.00		1.00	
	<b>Yes</b>	1.06 (0.48-2.35)	0.89	1.06 (0.48-2.36)	0.88	0.90 (0.31-2.58)	0.84

Table A10.6: The characteristics of multiparous women who had an emergency caesarean section: multinomial logistic regression analyses

<b>Antenatal care</b>	<b>Care and classes</b>	1.39 (1.11-1.75)	<0.05	1.37 (1.09-1.73)	<0.05	1.43 (1.05-1.95)	<0.05
	<b>Care, no classes</b>	1.00		1.00		1.00	
	<b>No care</b>	1.04 (0.58-1.85)	0.91	1.20 (0.74-1.94)	0.46	1.85 (0.95-3.61)	0.49
<b>Health factors</b>							
<b>Pre-pregnancy BMI</b>	<b>Underweight</b>	0.95 (0.65-1.39)	0.78	0.95 (0.65-1.39)	0.79	0.74 (0.38-1.45)	0.38
	<b>Ideal</b>	1.00		1.00		1.00	
	<b>Overweight</b>	1.33 (1.09-1.63)	<0.05	1.27 (1.04-1.55)	<0.05	1.32 (0.98-1.78)	0.07
	<b>Obese</b>	1.88 (1.33-2.65)	<0.001	1.70 (1.19-2.44)	<0.05	1.44 (0.87-2.38)	0.16
	<b>Severely obese</b>	2.77 (1.85-4.16)	<0.001	2.46 (1.64-3.69)	<0.001	2.36 (1.30-4.28)	<0.05
<b>Complications during pregnancy: CS risk factor</b>	<b>No</b>	1.00		1.00		1.00	
	<b>Yes</b>	2.62 (2.13-3.22)	<0.001	2.52 (2.03-3.14)	<0.001	1.56 (1.13-2.14)	<0.05
<b>Complications during pregnancy: Other</b>	<b>No</b>	1.00					
	<b>Yes</b>	1.06 (0.88-1.29)	0.52				
<b>Labour factors</b>							
<b>Labour induced</b>	<b>No</b>	1.00		1.00		1.00	
	<b>Yes</b>	1.01 (0.83-1.23)	0.94	0.91 (0.74-1.13)	0.41	0.99 (0.76-1.31)	0.97
<b>Companion during labour</b>	<b>Yes</b>	1.00		1.00		1.00	
	<b>No</b>	4.12 (3.19-5.32)	<0.001	4.10 (3.09-5.43)	<0.001	4.13 (3.07-6.34)	<0.001
<b>Complications during labour and birth: Malpresentation</b>	<b>No</b>	1.00		1.00		1.00	
	<b>Yes</b>	11.98 (8.69-16.52)	<0.001	14.04 (9.82-20.08)	<0.001	16.42 (10.13-26.59)	<0.001

Table A10.6: The characteristics of multiparous women who had an emergency caesarean section: multinomial logistic regression analyses

<b>Complications during labour and birth:</b>	<b>No</b>	1.00		1.00		1.00	
<b>Fetal distress</b>	<b>Yes</b>	4.14 (3.40-5.05)	<0.001	3.99 (3.20-4.96)	<0.001	4.26 (3.25-5.59)	<0.001
<b>Complications during labour and birth:</b>	<b>No</b>	1.00		1.00		1.00	
<b>Other</b>	<b>Yes</b>	4.47 (3.47-5.77)	<0.001	4.47 (3.36-5.95)	<0.001	4.64 (3.26-6.59)	<0.001
<b>Infant factors</b>							
<b>Birth weight (kg)</b>	<b>Low (&lt;2.50)</b>	8.41 (6.72-10.54)	<0.001	3.83 (2.94-5.00)	<0.001	4.30 (2.59-7.15)	<0.001
	<b>Normal (2.50-3.99)</b>	1.00		1.00		1.00	
	<b>High (&gt;4.00)</b>	1.59 (1.23-2.06)	<0.001	1.76 (1.35-2.29)	<0.001	1.76 (1.20-2.60)	<0.05
<b>Gestational age (weeks)</b>	<b>Preterm (&lt;37)</b>	7.18 (5.76-8.95)	<0.001	4.08 (3.07-5.42)	<0.001	4.64 (3.03-7.09)	<0.001
	<b>Normal (37-41.9)</b>	1.00		1.00		1.00	
	<b>Post-term (&gt;42)</b>	1.11 (0.70-1.74)	0.66	1.03 (0.66-1.62)	0.89	0.60 (0.29-1.22)	0.16
<b>Interactions</b>							
	<b>Short height*low birth weight</b>					0.69 (0.35-1.33)	0.27
	<b>Short height*high birth weight</b>					1.14 (0.50-2.61)	0.75

Table A10.6: The characteristics of multiparous women who had an emergency caesarean section: multinomial logistic regression analyses

Table A10.7: The characteristics of *multiparous* women who had a planned caesarean section: relative risk ratios and confidence intervals from multinomial logistic regression analyses

Characteristics of women		Unadjusted		Adjusted for other factors in same domain		Fully adjusted	
Base outcome = unassisted vaginal birth		RRR (95% CI)	P-value	RRR (95% CI)	P-value	RRR (95% CI)	P-value
<b>Socio-demographic factors</b>							
<b>Age at cohort member birth</b>	<b>19 or younger</b>	0.43 (0.21-0.87)	<0.05	0.66 (0.31-1.43)	0.29	0.62 (0.16-2.46)	0.50
	<b>20-24</b>	0.70 (0.54-0.91)	<0.05	0.93 (0.71-1.22)	0.60	1.27 (0.91-1.79)	0.16
	<b>25-29</b>	1.00		1.00		1.00	
	<b>30-34</b>	1.51 (1.27-1.78)	<0.001	1.20 (1.00-1.44)	<0.05	1.31 (1.04-1.66)	<0.05
	<b>35 and older</b>	1.87 (1.50-2.33)	<0.001	1.34 (1.06-1.69)	<0.05	1.36 (0.99-1.85)	0.05
<b>Age at first birth</b>	<b>19 or younger</b>	0.40 (0.32-0.51)	<0.001	0.47 (0.36-0.63)	<0.001	0.45 (0.32-0.63)	<0.001
	<b>20-24</b>	0.62 (0.52-0.73)	<0.001	0.67 (0.56-0.80)	<0.001	0.55 (0.43-0.72)	<0.001
	<b>25-29</b>	1.00		1.00		1.00	
	<b>30-34</b>	1.25 (1.02-1.54)	<0.05	1.15 (0.93-1.42)	0.19	1.17 (0.91-1.51)	0.21
	<b>35 and older</b>	1.43 (1.00-2.04)	<0.05	1.25 (0.86-1.82)	0.24	1.36 (0.87-2.12)	0.18
<b>Ethnicity, language and migration</b>							
<b>Ethnicity</b>	<b>White</b>	1.00		1.00		1.00	
	<b>Mixed</b>	1.38 (0.67-2.84)	0.39	0.79 (0.32-1.99)	0.62	0.83 (0.30-2.28)	0.72
	<b>Indian</b>	0.82 (0.51-1.33)	0.43	0.71 (0.40-1.28)	0.25	0.57 (0.29-1.15)	0.12
	<b>Pakistani/Bangladeshi</b>	0.78 (0.59-1.03)	0.08	0.71 (0.50-1.02)	0.07	0.60 (0.36-1.01)	0.06
	<b>Black</b>	1.16 (0.79-1.69)	0.46	1.25 (0.76-2.06)	0.38	0.99 (0.57-1.70)	0.96

Table A10.7: The characteristics of *multiparous* women who had a planned caesarean section: multinomial logistic regression analyses

<b>First language at home</b>	<b>English</b>	1.00					
	<b>Other language</b>	1.00 (0.73-1.38)	0.98				
<b>How long lived in the UK</b>	<b>Since birth</b>	1.00		1.00		1.00	
	<b>More than 5 years</b>	1.16 (0.89-1.51)	0.28	1.21 (0.86-1.68)	0.27	1.31 (0.86-2.02)	0.21
	<b>Less than 5 years</b>	1.06 (0.65-1.71)	0.82	1.27 (0.71-2.26)	0.41	1.36 (0.68-2.74)	0.38
<b>Socio-economic factors</b>							
<b>Educational level</b>	<b>NVQ level 4/5</b>	1.00		1.00		1.00	
	<b>NVQ level 3</b>	0.74 (0.57-0.96)	<0.05	0.75 (0.58-0.97)	<0.05	0.72 (0.52-1.01)	0.06
	<b>NVQ level 2</b>	0.87 (0.73-1.04)	0.13	0.90 (0.75-1.09)	0.28	1.06 (0.84-1.34)	0.60
	<b>NVQ level 1</b>	0.64 (0.46-0.87)	<0.05	0.70 (0.51-0.97)	<0.05	1.13 (0.76-1.70)	0.54
	<b>None</b>	0.69 (0.56-0.85)	<0.05	0.82 (0.65-1.04)	0.11	1.24 (0.89-1.71)	0.20
	<b>Overseas qualification</b>	0.74 (0.48-1.15)	0.18	0.81 (0.52-1.25)	0.34	1.13 (0.64-2.00)	0.66
<b>Highest NS SEC in household</b>	<b>Higher man and prof</b>	1.00		1.00		1.00	
	<b>Lower man and prof</b>	0.99 (0.80-1.23)	0.92	1.02 (0.83-1.26)	0.85	1.13 (0.86-1.48)	0.38
	<b>Intermediate</b>	0.97 (0.75-1.24)	0.79	1.05 (0.81-1.37)	0.70	1.20 (0.86-1.67)	0.28
	<b>Small emp and self-emp</b>	1.10 (0.83-1.47)	0.50	1.21 (0.91-1.62)	0.18	1.32 (0.91-1.91)	0.14
	<b>Lower sup and tech</b>	0.90 (0.67-1.20)	0.46	0.99 (0.76-1.31)	0.97	1.15 (0.80-1.66)	0.45
	<b>Semi-routine</b>	0.66 (0.52-0.85)	<0.05	0.75 (0.58-0.96)	<0.05	1.00 (0.73-1.38)	0.99
	<b>Routine</b>	0.74 (0.54-1.00)	<0.05	0.83 (0.60-1.16)	0.27	1.33 (0.83-2.13)	0.23
	<b>Unclassified</b>	0.49 (0.34-0.72)	<0.001	0.56 (0.37-0.84)	<0.05	0.74 (0.40-1.35)	0.32

Table A10.7: The characteristics of multiparous women who had a planned caesarean section: multinomial logistic regression analyses

<b>Maternal height</b>							
<b>Height (cm)</b>	<b>&lt;154</b>	1.47 (1.15-1.89)	<0.05	N/A		1.49 (1.03-2.17)	<0.05
	<b>154-159</b>	1.13 (0.93-1.37)	0.21			1.21 (0.96-1.53)	0.21
	<b>160-165</b>	1.00				1.00	
	<b>166-171</b>	0.89 (0.74-1.09)	0.26			0.83 (0.65-1.07)	0.26
	<b>&gt;172</b>	0.76 (0.59-0.98)	<0.05			0.71 (0.49-1.01)	0.06
<b>Interpersonal factors</b>							
<b>Left home before 17</b>	<b>No</b>	1.00		1.00		1.00	
	<b>Yes</b>	0.73 (0.58-0.91)	<0.05	0.81 (0.64-1.02)	0.08	1.15 (0.83-1.59)	0.40
<b>Parents ever separated</b>	<b>No</b>	1.00		1.00		1.00	
	<b>Yes</b>	0.72 (0.61-0.85)	<0.001	0.75 (0.63-0.90)	<0.05	0.81 (0.63-1.03)	0.09
<b>Feelings about pregnancy</b>	<b>Happy</b>	1.00		1.00			
	<b>Unhappy or not bothered</b>	0.80 (0.66-0.97)	<0.05	0.85 (0.70-1.03)	0.10		
<b>Pregnancy factors</b>							
<b>Planned pregnancy</b>	<b>Planned</b>	1.00		1.00			
	<b>Surprise</b>	0.82 (0.70-0.96)	<0.05	0.86 (0.73-1.02)	0.08		
<b>Fertility treatment</b>	<b>No</b>	1.00		1.00		1.00	
	<b>Yes</b>	3.19 (2.03-5.01)	<0.001	2.95 (1.85-4.70)	<0.001	2.71 (1.60-4.58)	<0.001

Table A10.7: The characteristics of multiparous women who had a planned caesarean section: multinomial logistic regression analyses

<b>Antenatal care</b>	<b>Care and classes</b>	1.13 (0.92-1.38)	0.23	1.11 (0.91-1.36)	0.23	1.13 (0.89-1.45)	0.32
	<b>Care, no classes</b>	1.00		1.00		1.00	
	<b>No care</b>	0.48 (0.30-0.77)	<0.05	0.75 (0.47-1.19)	0.22	0.67 (0.35-1.28)	0.13
<b>Health factors</b>							
<b>Pre-pregnancy BMI</b>	<b>Underweight</b>	0.55 (0.36-0.85)	<0.05	0.55 (0.36-0.86)	<0.05	0.62 (0.34-1.13)	0.12
	<b>Ideal</b>	1.00		1.00		1.00	
	<b>Overweight</b>	1.54 (1.30-1.83)	<0.001	1.51 (1.27-1.79)	<0.001	1.74 (1.40-2.16)	<0.001
	<b>Obese</b>	2.05 (1.62-2.61)	<0.001	1.96 (1.53-2.51)	<0.001	2.54 (1.92-3.35)	<0.001
	<b>Severely obese</b>	2.14 (1.46-3.13)	<0.001	2.03 (1.38-2.97)	<0.001	2.12 (1.35-3.34)	<0.05
<b>Complications during pregnancy: CS risk factor</b>	<b>No</b>	1.00		1.00		1.00	
	<b>Yes</b>	1.83 (1.48-2.26)	<0.001	1.73 (1.39-2.14)	<0.001	2.13 (1.64-2.77)	<0.001
<b>Complications during pregnancy: Other</b>	<b>No</b>	1.00					
	<b>Yes</b>	1.12 (0.95-1.32)	0.17				
<b>Labour factors</b>							
<b>Labour induced</b>	<b>No</b>	1.00		1.00		1.00	
	<b>Yes</b>	0.36 (0.27-0.46)	<0.001	0.36 (0.28-0.48)	<0.001	0.35 (0.25-0.48)	<0.001
<b>Companion during labour</b>	<b>Yes</b>	1.00		1.00		1.00	
	<b>No</b>	1.84 (1.38-2.46)	<0.001	1.86 (1.37-2.52)	<0.001	2.43 (1.61-3.68)	<0.001

Table A10.7: The characteristics of multiparous women who had a planned caesarean section: multinomial logistic regression analyses

<b>Complications during labour and birth: Malpresentation</b>	No Yes	1.00 7.37 (5.36-10.13)	<0.001	1.00 7.22 (5.27-9.89)	<0.001	1.00 8.11 (5.64-11.66)	<0.001
<b>Complications during labour and birth: Fetal distress</b>	No Yes	1.00 0.14 (0.09-0.23)	<0.001	1.00 0.16 (0.10-0.25)	<0.001	1.00 0.11 (0.06-0.20)	<0.001
<b>Complications during labour and birth: Other</b>	No Yes	1.00 0.33 (0.21-0.52)	<0.001	1.00 0.36 (0.23-0.57)	<0.001	1.00 0.35 (0.21-0.57)	<0.001
<b>Infant factors</b>							
<b>Birth weight (kg)</b>	<b>Low (&lt;2.50)</b> <b>Normal (2.50-3.99)</b> <b>High (&gt;4.00)</b>	1.14 (0.80-1.61) 1.00 0.97 (0.78-1.20)	0.46  0.77	1.15 (0.78-1.71) 1.00 0.98 (0.79-1.21)	0.48  0.86	1.35 (0.65-2.80) 1.00 0.84 (0.62-1.15)	0.42  0.27
<b>Gestational age (weeks)</b>	<b>Preterm (&lt;37)</b> <b>Normal (37-41.9)</b> <b>Post-term (&gt;42)</b>	1.01 (0.76-1.34) 1.00 0.59 (0.38-0.92)	0.96  <0.05	0.95 (0.69-1.32) 1.00 0.57 (0.36-0.90)	0.78  <0.05	0.76 (0.49-1.16) 1.00 0.83 (0.45-1.53)	0.20  0.56
<b>Interactions</b>							
<b>Short height*low birth weight</b>						1.01 (0.41-2.51)	0.99
<b>Short height*high birth weight</b>						1.13 (0.55-2.33)	0.74



Table A11.3: Assessment of study quality for the core comparative studies

<b>Study quality</b>	<b>MCS</b> n=18,239	<b>ALSPAC</b> n=12,944	<b>NSCSA</b> n=147,087	<b>HES data</b> n=620,604
<i>Selection bias</i>				
<p><b>Are the individuals selected to participate in the study likely to be representative of the target population?</b></p> <ol style="list-style-type: none"> <li>1. Very likely</li> <li>2. Somewhat likely</li> <li>3. Not likely</li> <li>4. Can't tell</li> </ol>	<p><b>Very likely</b></p> <p>Target population: UK, 2000-2002.</p> <p>Children were eligible for inclusion in the MCS if they had eligible birth dates and lived in any of the weighted random sample of 398 electoral wards in the UK. Eligible families were contacted.</p>	<p><b>Very likely</b></p> <p>Target population: Avon, 1990-1991.</p> <p>Women were eligible for inclusion in ALSPAC if they were pregnant and residing in Avon, with a due date between April 1991 and December 1992. Women were approached about ALSPAC in multiple ways.</p>	<p><b>Very likely</b></p> <p>Target population: England and Wales, 2001.</p> <p>99% of all registered births for the period included. Data collected at hospital-level rather than from women.</p>	<p><b>Very likely</b></p> <p>Target population: English NHS trusts with more than 1000 births per annum in 2008.</p> <p>Births were included if there was information on mode of birth. Detail was taken primarily from procedure fields, and maternity tail data if not. Data collected at hospital-level rather than from women. Not clear how many records were not included, but likely to be a small minority.</p>
<p><b>What percentage of selected individuals agreed to participate?</b></p> <ol style="list-style-type: none"> <li>1. 80 - 100%</li> <li>2. 60 – 79%</li> <li>3. less than 60%</li> <li>4. Not applicable</li> <li>5. Can't tell</li> </ol>	<b>72%</b>	<b>85%</b>	<b>N/A</b>	<b>N/A</b>
<b>Rating</b>	<b>Moderate (2)</b>	<b>Strong (3)</b>	<b>Strong (3)</b>	<b>Strong (3)</b>

Table A11.3: Assessment of study quality for the core comparative studies

<i>Confounders</i>				
<b>Were there important differences between groups prior to the intervention (mode of birth)?</b> 1. Yes 2. No 3. Can't Tell	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>
<b>*Indicate the percentage of relevant confounders that were controlled (either in the design (e.g. stratification, matching) or analysis)?</b> 1. 80 – 100% (most) 2. 60 – 79% (some) 3. Less than 60% (few or none) 4. Can't Tell	<b>80-100%</b>  Adjusted for covariates in 9/10 categories.  (Obstetric history not adjusted for.)	<b>80-100%</b>  Adjusted for covariates in 8/10 categories.  (Height and interpersonal factors not adjusted for.)	<b>Less than 60%</b>  Adjusted for covariates in 5/10 categories.  (Socio-economic, height, pregnancy, health, and interpersonal factors not adjusted for.)	<b>60-79%</b>  Adjusted for covariates in 7/10 categories.  (Height, pregnancy and interpersonal factors not adjusted for.)
<b>Rating</b>	<b>Strong (3)</b>	<b>Strong (3)</b>	<b>Weak (1)</b>	<b>Moderate (2)</b>
<i>Data collection</i>				
<b>Were data collection tools (for mode of birth) shown to be valid?</b> 1. Yes 2. No 3. Can't tell	<b>Yes</b>  Although mode of birth was self-reported 9 months after the birth, a comparison with hospital records indicated 94% agreement when using 6	<b>Yes</b>  Mode of birth was determined from computerised records of the relevant hospitals. Data had been recorded by the attendant midwife.	<b>Yes</b>  Data was collected at the time of birth using standardised data collection tools designed specifically for the study, completed by someone who	<b>Can't tell</b>  Mode of birth was taken primarily from procedure fields, or from the maternity tail if not available, from HES data. According to the authors,

	groups and 98% when using 3.		was present at the birth.  Data were validated by local facilitators and by the RCOG. Checks were made to identify data inconsistencies and duplication.	no study has validated the coding of caesarean sections in HES against hospital records in the UK.
<b>Rating</b>	<b>Yes (1)</b>	<b>Yes (1)</b>	<b>Yes (1)</b>	<b>Can't tell (0)</b>
<b>Total score</b>	<b>6/7</b>	<b>7/7</b>	<b>5/7</b>	<b>5/7</b>

### SELECTION BIAS

**Strong:** The selected individuals are very likely to be representative of the target population (Q1 is 1) **and** there is greater than 80% participation (Q2 is 1).

**Moderate:** The selected individuals are at least somewhat likely to be representative of the target population (Q1 is 1 or 2); **and** there is 60 - 79% participation (Q2 is 2). 'Moderate' may also be assigned if Q1 is 1 or 2 and Q2 is 5 (can't tell).

**Weak:** The selected individuals are not likely to be representative of the target population (Q1 is 3); **or** there is less than 60% participation (Q2 is 3) **or** selection is not described (Q1 is 4); and the level of participation is not described (Q2 is 5).

### CONFOUNDERS

**Strong:** will be assigned to those articles that controlled for at least 80% of relevant confounders (Q1 is 2); **or** (Q2 is 1).

**Moderate:** will be given to those studies that controlled for 60 – 79% of relevant confounders (Q1 is 1) **and** (Q2 is 2).

**Weak:** will be assigned when less than 60% of relevant confounders were controlled (Q1 is 1) **and** (Q2 is 3) **or** control of confounders was not described (Q1 is 3) **and** (Q2 is 4).

\* Percentage of confounder groups listed in Table 11.1 (10 groups in total: socio-demographic, ethnicity, socio-economic, height, pregnancy, health, obstetric history, labour and infant).

**DATA COLLECTION METHODS (modified question)**

**Yes:** The data collection tools have been shown to be valid (Q1 is 1).

**No:** The data collection tools have not been shown to be valid (Q1 is 2) **or** validity is not described (Q1 is 3).

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