

Appendix A Benefits and risks of vaginal and caesarean birth

Where has this data come from?

The information used to generate the tables below comes from published studies. These studies were conducted in a variety of countries (not just the United Kingdom) and published between 1996 and 2019. [Evidence review A includes full information on each primary study](#) but overall the committee agreed that the evidence was broadly applicable to the current UK context. The populations reported in the studies were recorded as women so that is the population used in this appendix.

How was risk difference in the table calculated?

In order to estimate risk differences in these tables, the adjusted relative effects of caesarean birth compared to vaginal birth were used to calculate these values for each outcome. As the relative effects were derived from models that adjusted for confounding factors, this means the difference in risk is not always the same as the mathematical difference between the risk with vaginal birth and the risk with caesarean birth.

Does this mean that caesarean birth causes these outcomes?

As the evidence in these tables is all derived from non-randomised studies, it is not possible to conclude that the mode of birth definitively causes any outcomes. Each study has adjusted for some potential confounding factors, which makes it more likely that the difference in risk is related to the mode of birth, but it is impossible to say this for certain without large randomised studies which are unlikely ever to be conducted.

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Is this evidence about planned or unplanned caesarean births?

Ideally all evidence to inform these tables would be from “intention to treat” (ITT) type analyses (category A below) where studies would take all women planning to have a caesarean birth and compare them with women planning to have a vaginal birth. They would then analyse the women’s outcomes after birth in those groups, regardless of what mode of birth a woman ended up having. That is because there are a variety of reasons a woman may end up having a different mode of birth from her original plan and this type of analysis conveys exactly what the impact of her plan has been on her outcomes. Unfortunately, this type of evidence is rarely available and so the committee took a hierarchical approach to the evidence in their analyses preferentially including ITT type analysis, but if none was available they then included analyses done by the actual mode of birth (comparing a group of women who had had a vaginal birth with those who had had a caesarean birth). In this second category (category B below), ideally studies would exclude unplanned (or emergency) caesarean births from the caesarean group as a substantial proportion of these are likely to represent women who originally planned for a vaginal birth but actually had an unplanned or emergency caesarean birth and they are likely to have worse outcomes than planned caesarean births. However, again there was not always evidence available of this type and so for some outcomes the committee accepted evidence from a third category (category C below) where emergency caesarean births were included in the caesarean birth arm. For clarity, even these category C studies are not directly comparing only emergency caesarean births with vaginal birth, they just include a mix of emergency and non-emergency caesarean births in the caesarean birth group. All of the information below has been chosen to try and inform the decision around planning one mode of birth or other, however from outcome to outcome there were differing categories of evidence available and this is specified in the far right-hand column.

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Why are the urinary and faecal incontinence outcomes a comparison between caesarean birth and assisted and unassisted vaginal birth?

As with the discussion on planned or unplanned comparisons, the ideal evidence would compare the whole cohort of women planning to have a caesarean birth with those planning to have a vaginal birth regardless of their final mode of birth. As a consequence, where possible evidence including both assisted and unassisted vaginal births in a single group was prioritised. Women rarely get to choose whether their vaginal birth will be unassisted or assisted, the latter is typically a result of opting for a vaginal birth and some complication or delay arising. For the outcomes of faecal incontinence and urinary incontinence the available evidence was reported separately for caesarean birth compared to assisted and unassisted vaginal birth groups. The evidence showed that there was no difference in the risk of faecal incontinence between caesarean birth and unassisted vaginal birth but that there was a lower risk of faecal incontinence with caesarean birth compared to assisted vaginal births. The risk of urinary incontinence is increased for both assisted and unassisted vaginal birth compared to caesarean birth.

Table 1 Outcomes for women that may be more likely with caesarean birth

Outcomes	Risk with vaginal birth¹	Risk with caesarean birth¹	Risk difference² This is the difference in risk between vaginal birth and caesarean birth, taking into account the relative effect adjusted for confounding factors. This means the difference in risk is not always the mathematical difference between the risk with vaginal birth (column 2) and the risk with caesarean birth (column 3).	Category of evidence
Peripartum hysterectomy	About 100 women per 100,000 would be expected to have a peripartum hysterectomy (so 99,900 would not)	About 200 women per 100,000 would be expected to have a peripartum hysterectomy (so 99,800 would not)	About 65 more women per 100,000 who had a caesarean birth would be expected to have a peripartum hysterectomy; so for about 99,935 women per 100,000 the outcome was the same irrespective of the method of birth.	A - Planned mode of birth
Maternal death	About 4 women per 100,000 would be expected to die (so 99,996 would not)	About 25 women per 100,000 would be expected to die (so 99,975 would not)	About 20 more women per 100,000 who had a caesarean birth would be expected to die; so for about 99,980 women per 100,000 the outcome was the same irrespective of the method of birth.	A - Planned mode of birth
Length of hospital stay	About 2 and a half days on average	About 4 days on average	About 1 to 2 days longer on average with caesarean birth. [2011]	A - Planned mode of birth
Placenta accreta in any future pregnancy	About 30 women per 100,000 would be expected to have a placenta accreta in a	About 100 women per 100,000 would be expected to have a placenta accrete in a	About 42 more women per 100,000 who had a caesarean birth would be expected to have a placenta accreta in a future pregnancy; so for about 99,958 women per 100,000 the	C - Actual mode of birth (including planned and

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Outcomes	Risk with vaginal birth ¹	Risk with caesarean birth ¹	Risk difference ² This is the difference in risk between vaginal birth and caesarean birth, taking into account the relative effect adjusted for confounding factors. This means the difference in risk is not always the mathematical difference between the risk with vaginal birth (column 2) and the risk with caesarean birth (column 3).	Category of evidence
	future pregnancy (so 99,970 would not)	future pregnancy (so 99,900 would not)	outcome was the same irrespective of the method of birth.	unplanned caesarean)
Uterine rupture in any future pregnancy	About 7 women per 100,000 would be expected to have a uterine rupture in a future pregnancy (so 99,993 would not)	About 200 women per 100,000 would be expected to have a uterine rupture in a future pregnancy (so 99,800 would not)	About 185 more women per 100,000 who had a caesarean birth would be expected to have a uterine rupture in a future pregnancy; so for about 99,815 women per 100,000 the outcome was the same irrespective of the method of birth.	C - Actual mode of birth (including planned and unplanned caesarean)

RR: risk ratio

¹ Risk with vaginal birth and risk with caesarean birth were based on raw data from the studies, hence there is a discrepancy with risk difference calculated in GRADE, which considers the relative effect adjusted for confounding factors in the calculation.

² Risk difference has been calculated in GRADE which takes into account the relative effect adjusted for confounding factors in the calculation (for example, Risk difference per 1,000 = 1,000 x control group risk x [1-RR]). Confounding factors are things such as age, body mass index and smoking status (see the [evidence review](#) for full details) which may affect the results for different outcomes after vaginal or caesarean birth.

Table 2 Outcomes for babies that may be more likely with caesarean birth

Outcomes	Risk with vaginal birth ¹	Risk with caesarean birth ¹	Risk difference ² This is the difference in risk between vaginal birth and caesarean birth, taking into account the relative effect adjusted for confounding factors. This means the difference in risk is not always the mathematical difference between the risk with vaginal birth (column 2) and the risk with caesarean birth (column 3).	Category of evidence
Neonatal mortality	About 30 babies per 100,000 would be expected to die (so 99,970 would not) ³	About 58 babies per 100,000 would be expected to die (so 99,942 would not) ⁴	About 28 more babies per 100,000 whose mothers had a caesarean birth would be expected to die; so for about 99,972 babies per 100,000 the outcome was the same irrespective of the method of birth.	A - Planned mode of birth
Asthma	About 1,500 per 100,000 children would be expected to have asthma (so 98,500 would not) ³	About 1,809 per 100,000 children would be expected to have asthma (so 98,191 would not) ⁴	About 309 more children per 100,000 whose mothers had a caesarean birth would be expected to have asthma; so for about 99,691 babies or children per 100,000 the outcome was the same irrespective of the method of birth.	B - Actual mode of birth (excluding unplanned caesarean)

NR: not reported; RR: risk ratio

¹ Risk with vaginal birth and risk with caesarean birth were based on raw data from the studies, hence there is a discrepancy with risk difference calculated in GRADE, which considers the relative effect adjusted for confounding factors in the calculation.

² Risk difference has been calculated in GRADE which takes into account the relative effect adjusted for confounding factors in the calculation (for example, Risk difference per 1,000 = 1,000 x control group risk x [1-RR]). Confounding factors are things such as age, body mass index and smoking status (see the [evidence review](#) for full details) which may affect the results for different outcomes after vaginal or caesarean birth.

³ Risk with vaginal birth was obtained from the literature as it was not reported by the included study (see [appendix O in evidence review A](#) for further details)

⁴ Risk with caesarean birth was calculated based on risk with vaginal birth obtained from the literature and risk difference

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Table 3 Outcomes for women that may be less likely with caesarean birth

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Outcomes	Risk with vaginal birth ¹	Risk with caesarean birth ¹	Risk difference ² This is the difference in risk between vaginal birth and caesarean birth, taking into account the relative effect adjusted for confounding factors. This means the difference in risk is not always the mathematical difference between the risk with vaginal birth (column 2) and the risk with caesarean birth (column 3).	Category of evidence
Urinary incontinence occurring more than 1 year after birth compared to unassisted vaginal birth	About 48,700 per 100,000 women would be expected to have urinary incontinence (so 51,300 would not)	About 19,600 per 100,000 women would be expected to have urinary incontinence (so 80,400 would not)	About 21,176 fewer women per 100,000 who had a caesarean birth would be expected to have urinary incontinence, so for about 78,824 women per 100,000 the outcome was the same irrespective of the method of birth.	B - Actual mode of birth (excluding unplanned caesarean)
Urinary incontinence occurring more than 1 year after birth compared to assisted vaginal birth	About 19,800 per 100,000 women would be expected to have urinary incontinence (so 80,200 would not)	About 7,300 per 100,000 women would be expected to have urinary incontinence (so 92,700 would not)	About 14,677 fewer women per 100,000 who had a caesarean birth would be expected to have urinary incontinence, so for about 85,323 women per 100,000 the outcome was the same irrespective of the method of birth.	B - Actual mode of birth (excluding unplanned caesarean)
Faecal incontinence occurring more than 1 year after birth; compared to assisted vaginal birth	About 15,100 per 100,000 women would be expected to have faecal incontinence after assisted vaginal birth (so 84,900 would not)	About 7,800 per 100,000 women would be expected to have faecal incontinence (so 92,200 would not)	About 7,680 fewer women per 100,000 who had a caesarean birth would be expected to have faecal incontinence; so for about 92,320 women per 100,000 the outcome was the same irrespective of the method of birth.	B - Actual mode of birth (excluding unplanned caesarean)

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Outcomes	Risk with vaginal birth ¹	Risk with caesarean birth ¹	Risk difference ² This is the difference in risk between vaginal birth and caesarean birth, taking into account the relative effect adjusted for confounding factors. This means the difference in risk is not always the mathematical difference between the risk with vaginal birth (column 2) and the risk with caesarean birth (column 3).	Category of evidence
Vaginal tear	About 560 per 100,000 women would be expected to have a vaginal tear (so 99,440 would not)	About 0 per 100,000 women would be expected to have a vaginal tear (so 100,000 would not)	About 560 fewer women per 100,000 who had a caesarean birth would be expected to have vaginal tear; so for about 99,440 women per 100,000 the outcome was the same irrespective of the method of birth. [2011]	A - Planned mode of birth
Perineal/abdominal pain during birth and 3 days after birth	Median pain scores of 7.3 (during birth) and 5.2 (3 days after birth), 1 is no pain, 10 is most severe pain	Median pain scores of 1.0 (during birth) and 4.5 (3 days after birth)	Reduction in pain score with caesarean birth compared to vaginal birth of 6.3 (during birth) and 0.7 (3 days after birth), 1 is no pain, 10 is most severe pain [2011]	A - Planned mode of birth

RR: risk ratio

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² Risk difference has been calculated in GRADE which takes into account the relative effect adjusted for confounding factors in the calculation (for example, Risk difference per 1,000 = 1,000 x control group risk x [1-RR]). Confounding factors are things such as age, body mass index and smoking status (see the [evidence review](#) for full details) which may affect the results for different outcomes after vaginal or caesarean birth.

More details on the differences in risk, how they were estimated and uncertainty in the evidence including confidence intervals are provided in [appendix M of evidence review A](#).

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The outcomes labelled **[2011]** in the table are outcomes which were not reviewed in the 2021 update of this guideline but that the committee agreed, at least qualitatively, were still applicable and so were carried forward into these tables. Limited information on the source of this evidence is included in [appendix P of evidence review A](#).

In addition to tables 1, 2 and 3, there were a number of outcomes where the evidence identified showed there was no difference between caesarean or vaginal birth (box 1) and an additional set of outcomes where there was insufficient evidence or conflicting evidence about the risk with caesarean or vaginal birth (box 2).

Box 1 Outcomes for women and babies that are likely to be similar for caesarean or vaginal birth

Outcomes for women:

- thromboembolic disease
- major obstetric haemorrhage
- postnatal depression
- faecal incontinence (occurring more than 1 year after birth; compared to unassisted vaginal birth)

Outcomes for babies/children:

- admission to neonatal unit
- infection
- persistent verbal delay
- infant mortality (up to 1 year)

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More details on the differences in risk, how they were estimated and uncertainty in the evidence including confidence intervals are provided in [appendix M of evidence review A](#).

Box 2 Outcomes for women and babies that have conflicting or limited evidence about the risk with caesarean or vaginal birth

Outcomes for women:

- ITU admission
- stillbirth in a subsequent pregnancy.

Outcomes for babies/children:

- respiratory morbidity
- cerebral palsy
- obesity (childhood)
- autism spectrum condition
- type 1 diabetes.

More details on the differences in risk, how they were estimated and uncertainty in the evidence including confidence intervals are provided in [appendix M of evidence review A](#).

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