# SUPPLEMENTARY MATERIAL

**Risk of stillbirth after a previous caesarean delivery: A Swedish nationwide cohort study**

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# Supplementary methods

In a sensitivity analysis, six models were generated to assess whether these factors affect the association between CD and subsequent stillbirth. In these models, we excluded records with: (1) birth defects, (2) preeclampsia, (3) gestational diabetes, (4) preterm births (<37 weeks' gestation), (5) SGA, and finally we excluded birth records with any condition in models (1–5) (Tables S6-7). Moreover, as the definition of stillbirth changed from fetal deaths at 28 completed weeks or later to fetal deaths after 22 completed weeks from July 2008 onwards, we restricted the data to the time period from July 2008 to December 2012 to evaluate whether this had any impact on the association between mode of delivery and subsequent stillbirth.

The population attributable fraction (AF) of stillbirth is an estimate of the fraction of the total number of cases of stillbirth in the population that can be attributed to a prior CD. The estimation was calculated using the following formula23:

Where is the exposure prevalence among cases and RR is the rate ratio, the aOR of stillbirth in relation to prior CD was used.

# Supplementary results

The results from the sensitivity analysis did not differ from the presented results, although the magnitude of the ORs was stronger when excluding the risk factor in almost all models (Tables S6-S7). For example, In model-6, when excluding cases with birth defects, preeclampsia, gestational diabetes, SGA, and preterm birth, a 4-fold increased odds of subsequent intrapartum stillbirth (aOR:4.22 [95% CI, 1.95–9.15]) was observed in pre-labour CD compared to those with a previous VB (Table S7).

Lastly, when analysis was restricted to later time period (July 2008 to December 2012), all CD were associated with an increased odds of antepartum stillbirth (OR:1.48 [95% CI, 1.33–1.65]), intrapartum stillbirth (OR:1.86 [95% CI, 1.24–2.79]), and any stillbirth (OR:1.56 [95% CI, 1.36–1.67]). When we repeated the analysis by types of CD, both were associated with subsequent antepartum stillbirth. However, similar to our main findings, only pre-labour CD was associated with subsequent intrapartum stillbirth (OR:4.22 [95% CI, 1.95–9.15]), but that did not reach conventional statistical significance for in-labour (OR:1.49 [95% CI, 0.85–2.62]).

The proportion of women who had CD in the first pregnancy among subsequent stillbirth was 0.18, and the aOR was 1.37; therefore, the population AF associated with prior CD was 0.049. Thus, in our study, CD in the first pregnancy accounted for approximately 5% of all subsequent stillbirths in the studied population

**Table S1. STROBE Statement—checklist of items that should be included in reports of observational studies**

|  |  |  |  |  |
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| Item No | | | Recommendation | Location |
| **Title and abstract** | | 1 | (*a*) Indicate the study’s design with a commonly used term in the title or the abstract | Title & Abstract |
| (*b*) Provide in the abstract an informative and balanced summary of what was done and what was found | Abstract (Methods and findings) |
| Introduction | | | |  |
| Background/rationale | | 2 | Explain the scientific background and rationale for the investigation being reported | Background (Paragraphs 1-2) |
| Objectives | | 3 | State specific objectives, including any prespecified hypotheses | Background (Paragraph 3) |
| Methods | | | |  |
| Study design | | 4 | Present key elements of study design early in the paper | Methods (Study design and data sources) |
| Setting | | 5 | Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection | Methods (Study design and data sources, Study population, exposure and outcome sections) |
| Participants | | 6 | (*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up | Methods (Study population section) |
| (*b*)*Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed | NA |
| Variables | | 7 | Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable | Outcomes: Methods (Outcome variable- stillbirth)  Exposures: Methods (Exposure variable- Mode of delivery)  Potential confounders: Statistical analysis section, second paragraph)  Effect modifiers: Methods (under outcome last paragraph, Statistical analysis section paragraph) |
| Data sources/ measurement | | 8\* | For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group | Outcomes: Methods (Outcome variable - stillbirth & exposure variable – mode of delivery) |
| Bias | | 9 | Describe any efforts to address potential sources of bias | Methods (Study population, statistical analysis section) |
| Study size | | 10 | Explain how the study size was arrived at | Methods (Study population section) & Figure S1 |
| Quantitative variables | | 11 | Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why | Methods (Exposure variable section & Outcome variable section & statistical analysis section) |
| Statistical methods | | 12 | (*a*) Describe all statistical methods, including those used to control for confounding | Methods (Statistical analysis section) |
| (*b*) Describe any methods used to examine subgroups and interactions | Methods (Statistical analysis section, second and third paragraphs) |
| (*c*) Explain how missing data were addressed | Methods (Statistical analysis section, third paragraph) |
| (*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed  *Case-control study*—If applicable, explain how matching of cases and controls was addressed  *Cross-sectional study*—If applicable, describe analytical methods taking account of sampling strategy | NA |
| (*e*) Describe any sensitivity analyses | Methods (Statistical analysis section, third paragraph) |
| Results | | | |  |
| Participants | 13\* | (a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed | | Results, first paragraph & Figure S1 |
| (b) Give reasons for non-participation at each stage | | Methods (Study population section & Figure S1 |
| (c) Consider use of a flow diagram | | Figure S1 |
| Descriptive data | 14\* | (a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders | | Results (Paragraphs 1-3) & Table 1 & Tables S3-S5 |
| (b) Indicate number of participants with missing data for each variable of interest | | Results, Paragraphs 1-3 & Table 1 & Tables S3-S5 |
| (c) *Cohort study*—Summarise follow-up time (eg, average and total amount) | | Results (Paragraphs 1-3) |
| Outcome data | 15\* | *Cohort study*—Report numbers of outcome events or summary measures over time | | Results (Paragraph 1 2) |
| *Case-control study—*Report numbers in each exposure category, or summary measures of exposure | | NA |
| *Cross-sectional study—*Report numbers of outcome events or summary measures | | NA |
| Main results | 16 | (*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included | | Methods (Statistical analysis section)  Results (paragraphs 4-8, Tables 3-5, Tables S6-S9) |
| (*b*) Report category boundaries when continuous variables were categorized | | Results (Table 1, Tables S3-S5) |
| (*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period | | Supplementary results & last paragraph in Results section |
| Other analyses | 17 | Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses | | Results (paragraphs 6 & 8), Supplementary results and Tables S6-S9 |
| Discussion | | | |  |
| Key results | 18 | Summarise key results with reference to study objectives | | Discussion (Paragraphs 1-3) |
| Limitations | 19 | Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias | | Discussion (Strengths & Limitations section) |
| Interpretation | 20 | Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence | | Discussion (Compared with previous studies and Clinical and research Implications sections) |
| Generalisability | 21 | Discuss the generalisability (external validity) of the study results | | Discussion (Strengths & Limitations section) |
| Other information | | | |  |
| Funding | 22 | Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based | | Financial disclosure section |

\*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

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| **Table S2.** ICD codes | | | |
|  | **ICD-8 codes**  **(1973-1986)** | **ICD-9 codes**  **(1987-1996)** | **ICD-10 codes**  **(1997-2013)** | |
| **Fetus related condition** |  |  |  | |
| Congenital anomaly | 740-759 | 740-759 | Q00-Q99 | |
| Non-immune hydrops | - | 773D, 778A | O36.0 | |
| Isoimmunisation | 774-775 | 656B, 656C, 773A, 773B | O36.1, O36.2, P56.0 | |
| Fetomaternal haemorrhage | - | 656A, 772A | P50.4 | |
| Other fetal abnormality/damage |  | 655 | O35 | |
| **Umbilical cord related condition** |  |  |  | |
| Prolapse | 771.10 | 663A, 762E | P02.4, O69.0 | |
| Constricting loop or knot | - | 663B, 762F | P02.5, O69.0–2 | |
| Umbilical cord - other | 771.00, 771.98 | 663C,D,E,G,W,X,762F,G,W,X | P02.6, P02.8, P02.9, O69.3, O69.5, O69.8, O69.9 | |
| **Placenta related conditions** |  |  |  | |
| Placental abruption | 770,10 | 641C | O45.0, O45.8, O45.9 | |
| Praevia | 770,00 | 762A, 641A, 641B | P02.0 O44.0, O44.1 | |
| Vasa praevia |  | 663F | O69.4 | |
| Other Placental complications | 770.20, 770.80  770.99, 634.30 | 762B,C,D, 656H, 656W,X | O43.0-O43.9  P02.1, P02.2 | |
| **Amniotic fluid related condition** |  |  |  | |
| Chorioamnionitis | - | 762H, 658E | P02.7, O41.1 | |
| Oligohydramnios |  | 658A | O41.0 | |
| Polyhydramnios | 634.40 | 657 | O40 | |
| Other | 769.10 | 658B,C,D,W,X | O41.2–9 | |
| **Uterus related condition** |  |  |  | |
| Rupture | 634.10 , 659.90, 659 | 665A, 665B | O71.0, O71.1 | |
| Uterine anomalies | 752.50 | 752C, 752D | O34.0, O34.1, O34.5 | |
| **Mother related condition** |  |  |  | |
| Diabetes/ gestational diabetes | 250 | 250, 648A | E10-E14, O24.4 | |
| Thyroid diseases | 242-246 | 648B, 243, 244, 246 | E00-E07 | |
| Chronic hypertension | 401-404 | 401-405, 642A-C | I10-I15, O10 | |
| Hypertensive disorders during pregnancy | 637 | 642E, 642F, 642G | O11, O13, O14 | |
| Lupus or antiphospholipid syndrome | 734.10 | 710A, 286F\* | M32, D68.6A | |
| **Intrapartum related condition** |  |  |  | |
| Intrapartum asphyxia | 768.40 | 799A/768A, 768B | P21.0, P20.0-1,P20.9 | |
| Birth trauma | 772 | 767 | P10.0-P15.9 | |
| Other Trauma | 660 | 664,665C-F, W, X | O70.0-9, O71.2-9 | |

4,073,947 births (1973-2012)

**Excluded:**

* Records with first pregnancy before 1982 (n=1,208,556)
* Records with first pregnancy resulted in multiple gestations (n=76,817), stillbirth (n=5,249) and their subsequent pregnancies (n=8,123)
* Records with only one pregnancy (n=447,707)
* No data on delivery method in the first pregnancy (n=164,080)
* Remove subsequent pregnancies after 2 births (n=391,715)

2,061,909 women

1,771,700 births

885,850 women

**Figure S1.** Study flowchart

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| **Table S3.** Maternal characteristics and infant characteristics in the first pregnancy | | |
|  | **Vaginal birth**  **(n=** **768,736)** | **Caesarean delivery**  **(n=** **117,114)** |
| **Age (years), mean (SD)** | 26.2 (4.5) | 27.7 (4.7) |
| **Age (years), (n, %)** |  |  |
| <20 | 43,933 (5.7) | 3,773 (3.2) |
| 20-29 | 548,028 (71.2) | 71,152 (60.7) |
| 30-39 | 175,364 (22.8) | 41,486 (35.4) |
| ≥40 | 1,411 (0.2) | 703 (0.6) |
| **Smoking, (n, %)** |  |  |
| Non-smokers | 598,507 (77.8) | 93,630 (79.9) |
| 1-9 cigarettes/day | 79,426 (10.3) | 10,724 (9.2) |
| ≥ 10 cigarettes/day | 35,421 (4.6) | 4,749 (4.1) |
| Missing | 55,382 (7.2) | 8,011 (6.8) |
| **Body mass index kg/m2, (n, %)** |  |  |
| Underweight: <18.5 | 27,976 (3.6) | 2,943 (2.51) |
| Normal: ≥18.5 to <25 | 414,743 (53.9) | 57,448 (49.0) |
| Overweight: ≥25 to <30 | 98,049 (12.7) | 20,520 (17.5) |
| Obese: ≥30 | 29,163 (3.8) | 8,934 (7.6) |
| Missing | 198,805 (25.8) | 27,269 (23.2) |
| **Country of origin, (n, %)** |  |  |
| Sweden | 655,494 (85.3) | 98,660 (84.2) |
| Other Scandinavian | 19,201 (2.5) | 2,850 (2.4) |
| Non-Scandinavian | 88,826 (11.5) | 15,098 (12.8) |
| Missing | 5,215 (0.7) | 506 (0.4) |
| **Diabetes, (n, %)** | 2,462 (0.3) | 1,808 (1.5) |
| **Cardiovascular disease, (n, %)** | 420 (0.1) | 208 (0.2) |
| **Chronic hypertension, (n,%)** | 2,252 (0.3) | 849 (0.7) |
| **Hypertensive disorders of pregnancy, (n, %)** | 29,224 (3.8) | 11,606 (9.9) |
| **Gestational diabetes, (n, %)** | 2,485 (0.3) | 1,130 (1.0) |
| **Types of delivery, (n,%)** |  |  |
| Spontaneous VB | 684,733 (89.0) | - |
| Vacuum/forceps | 84,003 (10.9) | - |
| Pre-labour CD | - | 33,833 (28.8) |
| In-labour CD | - | 72,439 (61.8) |
| Unspecified CD | - | 10,842 (9.3) |
| **Year of first birth, (n, %)** |  |  |
| 1982-1989 | 216,300 (28.1) | 23,292 (19.8) |
| 1990-1999 | 286,232 (37.2) | 38,772 (33.1) |
| 2000-2012 | 266,204 (34.6) | 55,050 (47.0) |
| **Gestational age at birth in weeks, mean (SD)** | 39.4 (1.73) | 38.8 (2.81) |
| **Birthweight in grams, mean (SD)** | 3469.1 (497.5) | 3359.3 (781.9) |
| **Sex, (n, %)** |  |  |
| Female | 377,320 (49.0) | 53,752 (45.9) |

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| **Table S4.** Maternal and infant characteristics in the first pregnancy according to types of delivery | | | | | | |
|  | **Spontaneous VB**  **(n= 684,733)** | **Vacuum/forceps**  **(n=84,003)** | **Pre-labour CD**  **(n=72,439)** | **In-labour CD**  **(n=33,833)** | **Unspecified CD**  **(n=10,842)** | | |
| **Age (years), mean (SD)** | 25.9 (4.4) | 27.7 (4.4) | 27.8 (4.8) | 27.8 (4.7) | | 27.3 (4.7) | |
| **Age (years), (n, %)** |  |  |  |  | |  | |
| <20 | 41,735 (6.1) | 2,198 (2.6) | 1,152 (3.4) | 2,246 (3.1) | | 375 (3.5) | |
| 20-29 | 495,670 (72.3) | 52,358 (62.3) | 20,269 (59.9) | 43,914 (60.6) | | 6,969 (64.2) | |
| 30-39 | 146,210 (21.3) | 29,154 (34.7) | 12,163 (35.9) | 25,883 (35.7) | | 3,440 (31.7) | |
| ≥40 | 1,118 (0.2) | 293 (0.4) | 249 (0.7) | 396 (0.6) | | 58 (0.5) | |
| **Smoking, (n, %)** |  |  |  |  | |  | |
| Non-smokers | 527,311 (77.0) | 71,196 (84.7) | 26,769 (79.1) | 58,139 (80.2) | | 8,722 (80.4) | |
| 1-9 cigarettes/day | 73,191 (10.9) | 6,235 (7.4) | 3,157 (9.3) | 6,567 (9.1) | | 1,000 (9.2) | |
| ≥ 10 cigarettes/day | 33,366 (4.9) | 2,055 (2.5) | 1,464 (4.3) | 2,801 (3.9) | | 484 (4.5) | |
| Missing | 50,865 (7.4) | 4,517 (5.4) | 2,443 (7.2) | 4,932 (6.8) | | 636 (5.9) | |
| **Body mass index kg/m2, (n, %)** |  |  |  |  | |  | |
| Underweight: <18.5 | 26,080 (3.81) | 1,896 (2.3) | 1,129 (3.3) | 1,683 (2.3) | | 131 (1.2) | |
| Normal: ≥18.5 to <25 | 369,970 (54.0) | 44,773 (53.3) | 17,587 (51.9) | 36,022 (49.7) | | 3,839 (35.4) | |
| Overweight: ≥25 to <30 | 83,966 (12.2) | 14,083 (16.7) | 4,942 (14.6) | 13,693 (18.9) | | 1,885 (17.3) | |
| Obese: ≥30 | 24,737 (3.61) | 4,426 (5.3) | 1,997 (5.9) | 5,951 (8.2) | | 986 (9.09) | |
| Missing | 179,980 (26.2) | 18,825 (22.4) | 8,178 (24.1) | 15,090 (20.8) | | 4,001 (36.9) | |
| **Country of origin, (n, %)** |  |  |  |  | |  | |
| Sweden | 583,922 (85.2) | 71,572 (85.2) | 28,778 (85.0) | 60,677 (83.7) | | 9,205 (84.9) | |
| Other Scandinavian | 17,722 (2.6) | 1,479 (1.8) | 871 (2.57) | 1,710 (2.4) | | 269 (2.48) | |
| Non-Scandinavian | 78,168 (11.4) | 10,658 (12.6) | 4,040 (11.9) | 9,778 (13.5) | | 1,280 (11.8) | |
| Missing | 4,921 (0.7) | 294 (0.4) | 144 (0.4) | 274 (0.4) | | 88 (0.8) | |
| **Diabetes, (n, %)** | 1,911 (0.3) | 551 (0.7) | 576 (1.7) | 987 (1.4) | | 245 (2.3) | |
| **Cardiovascular disease, (n, %)** | 357 (0.1) | 63 (0.1) | 108 (0.3) | 86 (0.1) | | 14 (0.1) | |
| **Chronic hypertension, (n,%)** | 1,928 (0.3) | 324 (0.4) | 265 (0.9) | 465 (0.6) | | 119 (1.1) | |
| **Hypertensive disorders of pregnancy, (n, %)** | 25,350 (3.7) | 3,874 (4.6) | 2,849 (8.4) | 6,958 (9.6) | | 1,799 (16.5) | |
| **Gestational diabetes, (n, %)** | 1,969 (0.3) | 516 (0.6) | 342 (1.0) | 604 (0.8) | | 184 (1.7) | |
| **Gestational age at birth in weeks, mean (SD)** | 39.4 (1.7) | 39.9 (1.5) | 37.8 (2.3) | 39.1 (2.9) | | 39.3 (3.1) | |
| **Birthweight in grams, mean (SD)** | 3455.0 (495.6) | 3583.8 (497.6) | 3197.4 (732.9) | 3425.6 (783.5) | | 3421. (843.2) | |
| **Sex, (n, %)** |  |  |  |  | |  | |
| Female | 341,229 (49.8) | 36,091 (42.9) | 16,903 (49.9) | 32,144 (44.3) | | 4,705 (43.4) | |

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| **Table S5.** Maternal and infant characteristics in the second pregnancy according to types of delivery | | | | |
|  | **CD-CD**  **(n=59,843)** | **VBAC**  **(n=****51,755)** | **VB-CD**  **(n=39,635)** | **VB-VB (n=699,587)** |
| **Age (years), mean (SD)** | 31.7 (4.8) | 31.0 (4.8) | 30.3 (4.6) | 29.3 (4.6) |
| **Age (years), (n, %)** |  |  |  |  |
| <20 | 108 (0.2) | 113 (0.2) | 163 (0.3) | 3,534 (0.5) |
| 20-29 | 19,635 (32.8) | 15,015 (37.9) | 22,278 (43.1) | 367,526 (52.5) |
| 30-39 | 36,871 (61.6) | 22,934 (57.9) | 28,240 (54.5) | 317,281 (45.4) |
| ≥40 | 3,229 (5.4) | 1,573 (4.0) | 1,074 (2.1) | 11,246 (1.6) |
| **Smoking, (n, %)** |  |  |  |  |
| Non-smokers | 50,291 (84.0) | 32,208 (81.3) | 43,453 (84.0) | 573,901 (82.0) |
| 1-9 cigarettes/day | 4,176 (7.0) | 3,264 (8.2) | 3,771 (7.3) | 58,985 (8.4) |
| ≥ 10 cigarettes/day | 1,902 (3.2) | 1,641 (4.1) | 1,865 (3.6) | 29,668 (4.2) |
| Missing | 3,474 (5.8) | 2,522 (6.4) | 2,666 (5.1) | 37,033 (5.3) |
| **Body mass index kg/m2, (n, %)** |  |  |  |  |
| Underweight: <18.5 | 986 (1.6) | 812 (2.1) | 1,069 (2.1) | 19,088 (2.7) |
| Normal: ≥18.5 to <25 | 25,653 (42.9) | 18,686 (47.2) | 25,508 (49.3) | 359,347 (51.3) |
| Overweight: ≥25 to <30 | 13,942 (23.3) | 8,399 (21.1) | 10,797 (20.9) | 119,314 (17.1) |
| Obese: ≥30 | 8,498 (14.2) | 4,062 (10.2) | 4,655 (9.0) | 44,579 (6.4) |
| Missing | 10,764 (18.0) | 7,676 (19.4) | 9,726 (18.7) | 157,259 (22.5) |
| **Country of origin, (n, %)** |  |  |  |  |
| Sweden | 49,354 (82.5) | 33,461 (84.4) | 44,700 (86.4) | 597,861 (85.5) |
| Other Scandinavian | 1,450 (2.4) | 929 (2.3) | 1,213 (2.3) | 17,492 (2.5) |
| Non-Scandinavian | 8,990 (15.0) | 5,198 (13.1) | 5,796 (11.2) | 83,313 (11.9) |
| Missing | 49 (0.1) | 47 (0.1) | 46 (0.1) | 921 (0.1) |
| **Diabetes, (n, %)** | 1,680 (2.8) | 492 (1.2) | 458 (0.9) | 3,110 (0.4) |
| **Cardiovascular disease, (n, %)** | 211 (0.4) | 136 (0.3) | 88 (0.2) | 595 (0.1) |
| **Chronic hypertension, (n,%)** | 856 (1.4) | 345 (0.9) | 421 (0.8) | 2,756 (0.4) |
| **Hypertensive disorders of pregnancy, (n, %)** | 3,054 (5.1) | 1,825 (4.6) | 1,778 (3.4) | 11,725 (1.7) |
| **Gestational diabetes, (n, %)** | 1,095 (1.8) | 440 (1.1) | 436 (0.8) | 3,241 (0.5) |
| **Gestational age at birth in weeks, mean (SD)** | 38.4 (1.9) | 37.9 (2.8) | 39.5 (1.7) | 39.1 (1.5) |
| **Birthweight in grams, mean (SD)** | 3539.7 (657.7) | 3346.3 (812.1) | 3573.6 (532.8) | 3638.9 (507.7) |
| **Sex, (n, %)** |  |  |  |  |
| Female | 28,326 (47.3) | 18,678 (47.1) | 25,875 (50.0) | 340,447 (48.7) |
| Abbreviations: CD, caesarean delivery; VBAC, vaginal birth after caesarean delivery; VB, vaginal birth | | | | |

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| **TableS6.** ORs with 95% CIs for the risk of stillbirth in mothers who had a vaginal birth after caesarean delivery | | | |
| **Mode of delivery**  **1st - 2nd birth** | **Stillbirth in the 2nd birth** |  |  | |
|  | **Antepartum stillbirth, (n, %)** | **Crude OR (95% CI)** | **Adjusted OR (95% CI)\*** | |
| CD-CD | 93 (0.16) | Reference | Reference | |
| VBAC | 309 (0.60) | 3.86 (3.06–4.87) | 4.49 (3.55–5.67) | |
| VB-CD | 143 (0.36) | 2.33 (1.79–3.02) | 2.50 (1.92–3.25) | |
| VB-VB | 1,622 (0.23) | 1.49 (1.21–1.84) | 1.82 (1.47–2.26) | |
|  | **Intrapartum stillbirth, (n, %)** |  |  | |
| CD-CD | 17 (0.03) | Reference | Reference | |
| VBAC | 13 (0.03) | 0.89 (0.43–1.83) | 0.99 (0.48–2.06) | |
| VB-CD | 32 (0.08) | 2.85 (1.58–5.13) | 3.01 (1.67–5.43) | |
| VB-VB | 64 (0.01) | 0.32 (0.19–0.55) | 0.37 (0.22–0.65) | |
|  | **Stillbirth (total)†, (n, %)** |  |  | |
| CD-CD | 110 (0.18) | Reference | Reference | |
| VBAC | 322 (0.62) | 3.40 (2.74–4.22) | 3.94 (3.17–4.90) | |
| VB-CD | 175 (0.44) | 2.41 (1.90–3.06) | 2.58 (2.03–3.28) | |
| VB-VB | 1,686 (0.24) | 1.31 (1.08–1.59) | 1.60 (1.31–1.94) | |
| Abbreviations: CD, caesarean delivery; VBAC, vaginal birth after caesarean delivery; VB, vaginal birth  \*Adjusted for maternal age, body mass index, smoking, education, country of origin, year of delivery, and comorbidities (cardiovascular disease, diabetes, gestational diabetes, hypertensive disorders during pregnancy). †Includes both antepartum and intrapartum stillbirth. Records with missing data on the second delivery were excluded from this analysis (n=35,030). | | | |

# Additional analysis

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| **Table S7.** Results of subgroup analyses of the association between Caesarean delivery in the first pregnancy and the odds of subsequent stillbirth according to the elements of the ReCoDe classification system | | | | |
| **Subgroup** | **Stillbirth in 2nd pregnancy, n (%)** | | **Crude OR (95%CI)** | **Adjusted OR (95% CI)** | |
| **Lethal congenital anomalya** | |  |  |  | |
| Vaginal birth | | 62 (0.24) | Reference | Reference | |
| Caesarean delivery | | 8 (0.18) | 0.75 (0.36–1.56) | 0.81 (0.38–1.70)\* | |
| **Fetal growth restrictionb** | |  |  |  | |
| Vaginal birth | | 427 (3.08) | Reference | Reference | |
| Caesarean delivery | | 123 (3.35) | 1.09 (0.89–1.33) | 1.00 (0.81–1.23)\* | |
| **Any umbilical cord complicationsc** | |  | 16 | 0.66 | |
| Vaginal birth | | 68 (2.70) | Reference | Reference | |
| Caesarean delivery | | 15 (0.43) | 1.28 (0.73–2.27) | 1.31 (0.73–2.34)\* | |
| **Placental abruptiond** | |  | 4 | 0.16 | |
| Vaginal birth | | 118 (8.30) | Reference | Reference | |
| Caesarean delivery | | 34 (6.06) | 0.71 (0.48–1.06) | 0.70 (0.46–1.07)\* | |
| **Any placental complicationse** | |  | 504 | 20.76 | |
| Vaginal birth | | 159 (4.20) | Reference | Reference | |
| Caesarean delivery | | 54 (3.99) | 0.95 (0.69–1.30) | 0.95 (0.68–1.32)\* | |
| **Uterine rupturef** | |  | 7 | 0.29 | |
| Vaginal birth | | 5 (3.73) | Reference | Reference | |
| Caesarean delivery | | 18 (1.85) | 0.49 (0.18–1.33) | 0.35 (0.11–1.06)\* | |
| **Other maternal conditionsg** | |  | 32 | 1.32 | |
| Vaginal birth | | 113 (0.34) | Reference | Reference | |
| Caesarean delivery | | 69 (0.61) | 1.78 (1.32–2.40) | 1.78 (1.31–2.42)\*\* | |
| **Intrapartum asphyxia/birth traumah** | | | 37 | 1.52 | |
| Vaginal birth | | 157 (1.14) | Reference | Reference | |
| Caesarean delivery | | 37 (2.05) | 1.82 (1.27–2.61) | 2.04 (1.41–2.97)\* | |
| **Explained stillbirthi** | |  |  |  | |
| Vaginal birth | | 992 (0.12) | Reference | Reference | |
| Caesarean delivery | | 268 (0.23) | 1.91 (1.67–2.19) | 1.69 (1.46–1.94)\* | |
| **Unexplained stillbirthj** | |  |  |  | |
| Vaginal birth | | 1,054 (0.14) | Reference | Reference | |
| Caesarean delivery | | 184 (0.16) | 1.15 (0.98–1.34) | 1.08 (0.92–1.27)\* | |
| **Explained versus unexplained stillbirthk** | | | 30 | 1.24 | |
| Vaginal birth | |  | Reference | Reference | |
| Caesarean delivery | |  | 0.47 (0.36–0.61) | 0.54 (0.41–0.71)\* | |
| \*Adjusted for maternal age, body mass index, smoking, education, country of origin, year of delivery, and comorbidities (cardiovascular disease, diabetes, gestational diabetes, hypertensive disorders during pregnancy).  \*\* Adjusted for maternal age, body mass index, smoking, education, country of origin, and year of delivery.  **a**This analysis was restricted to birth records with a lethal congenital anomaly in the second pregnancy (N=29,723).  **b**This analysis was restricted to birth records with fetal growth restriction/small-for-gestational-age infants in the second pregnancy (N=17,525).  **c**This analysis was restricted to birth records with any cord issues in the second pregnancy (N= 2,960).  **d**This analysis was restricted to birth records with placental abruption in the second pregnancy (N=1,983).  **e**This analysis was restricted to birth records with any placental complications in the second pregnancy (N= 5,140).  **f**This analysis was restricted to birth records with uterine rupture in the second pregnancy (N= 1,106).  **g**This analysis was restricted to birth records with any maternal disease, including diabetes, hypertension, cardiovascular disease, chronic kidney disease, thyroid disorders, lupus, hypertensive disorders during pregnancy and gestational diabetes) in the second pregnancy (N=44,169)  **h**This analysis was restricted to birth records with Intrapartum asphyxia / Birth trauma in the second pregnancy (N= 15,629).  **i**In this analysis the outcome was explained stillbirth, including cases with a known cause of stillbirth (N=884,612)  **j**In this analysis the outcome was explained stillbirth, including cases with a known cause of stillbirth (N=884,660)  **k**In this analysis we assessed stillbirth with relevant condition (explained) versus no relevant condition (unexplained) N=2,428. | | | | | |

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| **Table S8.** Results of sensitivity analyses of the association between Caesarean delivery in the first pregnancy and the odds of subsequent stillbirth | | | | | | | | |
| **1st birth** | | **2nd birth** | **Adjusted OR (95% CI)\*** | | | | | | |
|  | **Antepartum stillbirth** | | **Model 1a** | **Model 2b** | **Model 3c** | **Model 4d** | **Model 5e** | **Model 6f** | |
| VB |  | | Reference | Reference | Reference | Reference | Reference | Reference | |
| CD |  | | 1.36 (1.22–1.52) | 1.37 (1.23–1.53) | 1.36 (1.22–1.52) | 1.35 (1.16–1.58) | 1.23 (1.08–1.40) | 1.30 (1.09–1.55) | |
|  | **Intrapartum stillbirth** | |  |  |  |  |  |  | |
| VB |  | | Reference | Reference | Reference | Reference | Reference | Reference | |
| CD |  | | 1.88 (1.22–2.90) | 1.63 (1.05–2.51) | 1.70 (1.12–2.58) | 1.86 (1.09–3.16) | 1.68 (1.04–2.70) | 2.19 (1.25–3.87) | |
|  | **Stillbirth (total)†** | |  |  |  |  |  |  | |
| VB |  | | Reference | Reference | Reference | Reference | Reference | Reference | |
| CD |  | | 1.39 (1.25–1.54) | 1.38 (1.24–1.54) | 1.38 (1.24–2.53) | 1.39 (1.19–1.61) | 1.25 (1.11–1.43) | 1.36 (1.15–1.60) | |
| Abbreviations: CD, caesarean delivery; VB, vaginal birth.  \*Adjusted for maternal age, body mass index, smoking, education, country of origin, year of delivery, and comorbidities (cardiovascular disease, diabetes, gestational diabetes, hypertensive disorders during pregnancy)  a Records with birth defects in the second pregnancy were excluded from this analysis (n=29,723 )  b Records with pre-eclampsia in the second pregnancy were excluded from this analysis (n=14,075)  c Records with gestational diabetes in the second pregnancy were excluded from this analysis (n=5,535)  d Preterm births (<37 weeks’ gestation) in the second pregnancy were excluded from this analysis (n=34,766)  e Small-for-gestational age infants in the second pregnancy were excluded from this analysis (n=6,200)  f Records with any condition in previous models (1-5) in the second pregnancy were excluded from this analysis (n=86,800)  †Includes both antepartum and intrapartum stillbirth | | | | | | | | |

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| **Table S9.** Results of sensitivity analyses of the association between Caesarean delivery subtypes in the first pregnancy and the odds of subsequent stillbirth | | | | | | | | | | | |
| **1st birth** | | | | | **2nd birth** | **Adjusted OR (95% CI)\*** | | | | | |
|  | **Antepartum stillbirth** | | | | | **Model 1a** | **Model 2b** | **Model 3c** | **Model 4d** | **Model 5e** | **Model 6f** |
| Spontaneous VB | | | |  | | Reference | Reference | Reference | Reference | Reference | Reference |
| Pre-labour CD | | |  | | | 1.24 (1.02–1.51) | 1.24 (1.02–1.52) | 1.25 (1.03–1.52) | 1.16 (0.87–1.55) | 1.09 (0.86–1.39) | 1.06 (0.76–1.48) |
| In-labour CD | | |  | | | 1.37 (1.20–1.57) | 1.38 (1.21–1.58) | 1.36 (1.19–1.56) | 1.42 (1.18–1.58) | 1.27 (1.09–1.49) | 1.43 (1.16–1.76) |
|  | | **Intrapartum stillbirth** | | | |  |  |  |  |  |  |
| Spontaneous VB | | | |  | | Reference | Reference | Reference | Reference | Reference | Reference |
| Pre-labour CD | | |  | | | 3.19 (1.75–5.81) | 2.52 (1.34–4.76) | 2.78 (1.54–5.02) | 3.96 (1.98–7.91) | 2.49 (1.23–5.03) | 4.22 (1.95–9.15) |
| In-labour CD | | |  | | | 1.43 (0.78–2.61) | 1.37 (0.76–2.48) | 1.38 (0.78–2.46) | 1.23 (0.55–2.77) | 1.39 (0.72–2.66) | 1.64 (0.72–3.73) |
|  | | | **Stillbirth (total)†** | | |  |  |  |  |  |  |
| Spontaneous VB | | | |  | | Reference | Reference | Reference | Reference | Reference | Reference |
| Pre-labour CD | | |  | | | 1.33 (1.10–1.60) | 1.31 (1.08–1.51) | 1.33 (1.10–1.60) | 1.32 (1.01–1.72) | 1.17 (0.93–1.46) | 1.23 (0.90–1.66) |
| In-labour CD | | |  | | | 1.37 (1.20–1.57) | 1.38 (1.21–1.57) | 1.36 (1.20–1.55) | 1.42 (1.18–1.70) | 1.28 (1.10–1.49) | 1.44 (1.18–1.76) |
| Abbreviations: CD, caesarean delivery; VB, vaginal birth.  \*Adjusted for maternal age, body mass index, smoking, education, country of origin, year of delivery, and comorbidities (cardiovascular disease, diabetes, gestational diabetes, hypertensive disorders during pregnancy)  a Records with birth defects in the second pregnancy were excluded from this analysis (n=29,723 )  b Records with pre-eclampsia in the second pregnancy were excluded from this analysis (n=14,075)  c Records with gestational diabetes in the second pregnancy were excluded from this analysis (n=5,535)  d Preterm births (<37 weeks’ gestation) in the second pregnancy were excluded from this analysis (n=34,766)  e Small-for-gestational age infants in the second pregnancy were excluded from this analysis (n=6,200)  f Records with any condition in previous models (1-5) in the second pregnancy were excluded from this analysis (n=86,800)  †Includes both antepartum and intrapartum stillbirth | | | | | | | | | | | |

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| **Table S10.** ORs with 95% CIs for the risk of stillbirth in mothers who had a vaginal birth after caesarean delivery | | | |
| **Mode of delivery**  **1st - 2nd birth** | **Stillbirth in the 2nd birth** |  |  | |
|  | **Antepartum stillbirth, (n, %)** | **Crude OR (95% CI)** | **Adjusted OR (95% CI)\*** | |
| CD - CD | 93 (0.16) | Reference | Reference | |
| Pre-labour CD - VB | 77 (0.51) | 3.28 (2.43–4.44) | 3.91 (2.89–5.30) | |
| In-labour CD - VB | 196 (0.61) | 3.94 (3.07–5.04) | 4.51 (3.52–5.78) | |
| VB - pre-labour CD | 36 (0.18) | 1.18 (0.81–1.74) | 1.31 (0.89–1.93) | |
| VB - in-labour CD | 96 (0.55) | 3.54 (2.66–4.71) | 3.67 (2.76–4.89) | |
| VB - VB | 1,622 (0.23) | 1.49 (1.21–1.84) | 1.81 (1.47–2.24) | |
|  | Intrapartum stillbirth, (n, %) |  |  | |
| CD - CD | 17 (0.03) | Reference | Reference | |
| Pre-labour CD - VB | 5 (0.03) | 1.17 (0.43–3.16) | 1.33 (0.49–3.63) | |
| In-labour CD - VB | 6 (0.02) | 0.66 (0.26–1.67) | 0.74 (0.29–1.88) | |
| VB - pre-labour CD | 1 (0.01) | - | - | |
| VB - in-labour CD | 28 (0.16) | 5.64 (3.08–10.3) | 5.86 (3.20–10.7) | |
| VB - VB | 64 (0.01) | 0.32 (0.19–0.55) | 0.37 (0.21–0.64) | |
|  | Stillbirth (total)†, (n, %) |  |  | |
| CD - CD | 110 (0.18) | Reference | Reference | |
| Pre-labour CD - VB | 82 (0.54) | 2.96 (2.22–3.8794) | 3.51 (2.63–4.68) | |
| In-labour CD - VB | 202 (0.63) | 3.43 (2.72–4.33) | 3.92 (3.10–4.95) | |
| VB - pre-labour CD | 37 (0.19) | 1.02 (0.71–1.49) | 1.14 (0.78–1.65) | |
| VB - in-labour CD | 124 (0.71) | 3.86 (2.99–4.99) | 4.01 (3.09–5.19) | |
| VB - VB | 1,686 (0.24) | 1.31 (1.08–1.59) | 1.59 (1.30–1.93) | |
| Abbreviations: CD, caesarean delivery; VB, vaginal birth  \*Adjusted for maternal age, body mass index, smoking, education, country of origin, year of delivery, and comorbidities (cardiovascular disease, diabetes, gestational diabetes, hypertensive disorders during pregnancy). †Includes both antepartum and intrapartum stillbirth. Records with missing data on the second delivery were excluded from this analysis (n=35,030). | | | |