Objective To investigate the risk of stillbirth or neonatal death before 45 post-menstrual weeks in relation to gestational duration, stratified by body mass index (BMI) and parity.

Design Retrospective study.

Setting Data from the Swedish Medical Birth Register.

Population Singleton, cephalic births at between 39\(+\)0 and 42\(+\)2 weeks of gestation, 2005–2016 (n = 892 339).

Methods Relative risk ratios for mortality in relation to gestational duration were stratified by parity and BMI, and were adjusted for maternal age, smoking, country of birth and educational level.

Main outcome measures Primary outcome: stillbirth or neonatal death before 45 post-menstrual weeks. Secondary outcome: stillbirth.

Results Among children of primiparous women, children born at 41\(+\)3 weeks of gestation, or later, were at increased risk of stillbirth or neonatal death before 45 post-menstrual weeks compared with children born between 39\(+\)0 and 40\(+\)2 weeks of gestation (aRR 1.29, 95% CI 1.10–1.52). For primiparous women with BMIs of <25, 25–29.9 and ≥30 kg/m², the corresponding aRRs were: 1.04 (95% CI 0.81–1.34), 1.25 (95% CI 0.94–1.66) and 1.52 (95% CI 1.10–2.10), respectively. No significant increase in risk with gestational age was detected for multiparous women, regardless of BMI class. Among primipara, the risk of stillbirth increased with gestational duration in all BMI classes, with the highest risk increase for BMI ≥30 kg/m², from 0.8/1000 at 40\(+\)3–40\(+\)6 weeks of gestation to 4.0/1000 at 42\(+\)0–42\(+\)2 weeks of gestation.

Conclusions At 41\(+\)3–42\(+\)2 weeks of gestation, pregnancy duration was associated with an increased risk for stillbirth or neonatal death before 45 post-menstrual weeks among primiparous women, especially among women who were obese. For multiparous women, no significant association between gestational duration and mortality was found.

Keywords BMI, gestational age, parity, stillbirth.

Tweetable abstract In term pregnancies the risk for stillbirth and neonatal death is affected by gestational age, parity and BMI.
trial also reported an increased risk for stillbirth in pregnancies exceeding 41 weeks of gestation.10 Rosenstein et al. reported improved overall mortality rates with induction from 39 weeks of gestation.11 Other known risk factors for stillbirth in term pregnancies are primiparity, country of birth (low-income countries), low level of education, overweight/obesity, smoking and advanced maternal age.5,6,12–17 Yao et al. showed that one out of four stillbirths in term pregnancies was caused by obesity.18 A significant interaction between primiparity and gestational duration in term pregnancies in relation to stillbirth and perinatal death has been reported.19–21 No national guidelines on management in late term to post-term pregnancies exists in Sweden, but an increasing awareness of risks involved with late or post-term pregnancies has led to increased induction rates in pregnancies of ≥39 weeks of gestation: from 10.8% in 2005 to 15.9% in 2016.

The aim of this study was to investigate the impact of advancing gestational age beyond 39 weeks of gestation, and the interaction with body mass index (BMI) and parity, on the mortality rate measured as stillbirth or neonatal death before 45 post-menstrual weeks (primary aim) or measured as stillbirth rate (secondary aim).

Methods

Data source

Data were collected from the Swedish Medical Birth Register (MBR), containing 98% of all births and neonatal diagnosis in Sweden.22 Delivery units in Sweden are by law obligated to report information from standardised medical records used in antenatal clinics, maternity units and paediatric care units. Maternal data including mode of delivery, parity, BMI, smoking and maternal obstetrical codes were collected. At the first antenatal appointment, height and first-trimester weight are recorded, and each pregnant woman is interviewed regarding their health and smoking habits. All pregnant women are offered a free-of-charge first- or second-trimester routine ultrasound screening to detect multiple births and fetal abnormalities, and to estimate the fetal gestational age.

Term inclusion criteria

The study included all singleton births in 2005–2016, born between 39<sup>0</sup> and 42<sup>6</sup> weeks of gestation and with information available on first-trimester BMI (n = 892 339). The births were divided by parity (primiparity, no previous birth; multiparity, at least one previous birth before the studied birth) and BMI class (<25, 25–29.9 and ≥30 kg/m<sup>2</sup>). For the main analyses the gestational duration was classified as 39<sup>0</sup>–40<sup>2</sup>, 40<sup>3</sup>–40<sup>6</sup>, 41<sup>0</sup>–41<sup>2</sup> and 41<sup>3</sup>–42<sup>2</sup> weeks of gestation. For the stillbirth analyses, gestational age was divided into intervals of 3 or 4 days (39<sup>0</sup>–39<sup>2</sup>, 39<sup>3</sup>–39<sup>6</sup>, 40<sup>0</sup>–40<sup>2</sup>, 40<sup>3</sup>–40<sup>6</sup>, 41<sup>0</sup>–41<sup>2</sup>, 41<sup>3</sup>–41<sup>6</sup> and 42<sup>0</sup>–42<sup>2</sup> weeks of gestation).

Outcome measures

To avoid systematic bias from gestational duration-dependent follow-up lengths, a composite mortality outcome measure was used consisting of stillbirths at 39<sup>0</sup>–42<sup>2</sup> weeks of gestation, or neonatal deaths occurring at 39<sup>0</sup>–44<sup>6</sup> weeks after the last menstrual period (ultrasound adjusted). The secondary outcome measure was stillbirth during the period of gestational duration studied (39<sup>0</sup>–42<sup>2</sup> weeks of gestation). Stillbirth is a core outcome set.23

There was no patient involvement in the design or analysis of this retrospective registry study.

Statistical methods

Parity- and BMI class-specific risk ratios (RRs) for stillbirth or neonatal death before 45 weeks after the last menstrual period (ultrasound adjusted) in relation to gestational age class were obtained using modified Poisson regression analyses, recommended for use for discrete outcome variables such as incidence and mortality rates in cohort analyses.24 Adjustments were made for year of delivery (continuous), maternal age (continuous), smoking (ordinal: 1 = no smoking; 2 = smoking between one and nine cigarettes per day; 3 = smoking ten or more cigarettes per day), country of birth (classes: 1 = Nordic countries; 2 = Europe, USA, Canada, Australia or New Zealand; 3 = other) and highest achieved educational level (ordinal: 9, 10–12, 13–14 or ≥15 years). Unknown values for maternal smoking and educational level were replaced by the overall mean. When comparing the independent adjusted RRs (aRRs) for mortality among infants of primiparous and multiparous women, a two-tailed Z-test was carried out under the assumption of a normal distribution for log(aRR). To detect possible linear trends in aRR along BMI classes, weighted linear regression analyses of log(aRR) were carried out, where each aRR was weighted according to precision: 1/var[log (aRR)].

To estimate the rate of stillbirth for each certain gestational duration class, the number of stillbirths occurring during that certain period was divided by the total number of continuing pregnancies. The number of continuing pregnancies in a particular gestational age class was calculated from the sum of all births occurring at a more advanced duration class plus half of the births occurring during the particular period.
Results

Maternal characteristics
Table 1 shows maternal characteristics by survival. Women who gave birth to fetuses who died in utero or died neonatally before 45 post-menstrual weeks were older, were more often primiparous, smoked in early pregnancy, were born outside Europe, USA, Canada, Australia and New Zealand, and had a lower educational level. They were more often delivered by emergency caesarean section (CS) and less often with elective CS, compared with women with surviving neonates. Maternal characteristics by parity are displayed in Table S1.

Multivariable analyses revealed that maternal age (aRR for an increase of 1 year = 1.05, 95% CI = 1.04–1.06), primparity (aRR versus multiparity = 2.50, 95% CI = 2.25–2.79), maternal BMI (aRR for one unit increase in BMI=1.08, 95% CI = 1.07–1.09), maternal smoking (aRR versus non-smoking = 1.35, 95% CI = 1.18–1.54) and maternal country of birth (aRR non-Europe, USA, Canada, Australia and New Zealand, were older, were more often primiparous, smoked in early pregnancy, were born outside Europe, USA, Canada, Australia and New Zealand, and had a lower educational level. They were more often delivered by emergency caesarean section (CS) and less often with elective CS, compared with women with surviving neonates. Maternal characteristics by parity are displayed in Table S1.)

Table 1. Maternal characteristics and delivery mode by survival

| Maternal characteristic                        | Stillbirths or neonatal deaths before 45 post-menstrual weeks* | Children surviving 45 post-menstrual weeks* | P     |
|------------------------------------------------|---------------------------------------------------------------|---------------------------------------------|-------|
| Maternal age, years                            |                                                               |                                             |       |
| <20                                            | 20 (1.3)                                                      | 12 587 (1.4)                                | <0.001|
| 20–24                                          | 193 (12.4)                                                    | 115 487 (13.0)                              |       |
| 25–29                                          | 422 (27.1)                                                    | 269 651 (30.3)                              |       |
| 30–34                                          | 520 (33.4)                                                    | 308 180 (34.6)                              |       |
| 35–39                                          | 316 (20.3)                                                    | 153 285 (17.2)                              |       |
| 40+                                            | 86 (5.5)                                                      | 31 592 (3.5)                                |       |
| Parity                                         |                                                               |                                             |       |
| Primiparous                                    | 945 (60.7)                                                    | 394 466 (44.3)                              | <0.001|
| Multiparous                                    | 612 (39.3)                                                    | 496 316 (55.7)                              |       |
| Maternal BMI, kg/m²                             |                                                               |                                             |       |
| <25                                            | 683 (43.9)                                                    | 559 028 (62.8)                              | <0.001|
| 25–29.9                                        | 498 (32.0)                                                    | 224 275 (25.2)                              |       |
| 30+                                            | 376 (24.1)                                                    | 107 479 (12.1)                              |       |
| Maternal smoking                               |                                                               |                                             |       |
| Smoking                                        | 132 (8.5)                                                     | 51 324 (5.8)                                | <0.001|
| Non-smoking                                    | 1409 (90.5)                                                   | 831 315 (93.3)                              |       |
| Smoking not known                              | 16 (1.0)                                                      | 8143 (0.9)                                  |       |
| Maternal country of birth                      |                                                               |                                             |       |
| Nordic countries                               | 1249 (80.2)                                                   | 763 490 (85.7)                              | <0.001|
| Europe, USA, Canada, Australia or New Zealand  | 19 (1.2)                                                      | 13 836 (1.6)                                |       |
| Other                                          | 289 (18.6)                                                    | 113 456 (12.7)                              |       |
| Maternal educational level                     |                                                               |                                             |       |
| 9 years                                        | 197 (12.7)                                                    | 75 123 (8.4)                                | <0.001|
| 10–12 years                                    | 562 (36.1)                                                    | 301 576 (33.9)                              |       |
| 13–14 years                                    | 184 (11.8)                                                    | 112 229 (12.6)                              |       |
| ≥15 years                                      | 529 (34.0)                                                    | 358 500 (40.2)                              |       |
| Education not known                            | 85 (5.5)                                                      | 43 354 (4.9)                                |       |
| Delivery mode                                  |                                                               |                                             |       |
| Vaginal non-instrumental                       | 1192 (76.6)                                                   | 717 542 (80.6)                              | <0.001|
| Elective caesarean section                     | 25 (1.6)                                                      | 35 860 (4.0)                                |       |
| Emergency caesarean section                    | 245 (15.7)                                                    | 69 592 (7.8)                                |       |
| Forceps/Vacuum extraction                      | 90 (5.8)                                                      | 66 553 (7.5)                                |       |

Singletons in cephalic presentation in pregnancies with durations 39+0–42+6 weeks of gestation in Sweden, 2005–2016. *Stillbirths or neonatal deaths before 45 post-menstrual weeks.
Australia or New Zealand versus Nordic countries = 1.67, 95% CI = 1.47–1.90) were all significant risk factors for stillbirth or neonatal death before 45 post-menstrual weeks. These variables were included in the final multivariable models evaluating the impact of gestational age at birth on mortality before 45 post-menstrual weeks (analyses not shown).

**Risk of stillbirth or neonatal death before 45 post-menstrual weeks**

Table 2 shows the risk of stillbirth or neonatal death before 45 post-menstrual weeks for all BMI classes increased from 2.2 to 2.9 per 1000 births between 39+0–40+2 and 41+3–42+2 weeks of gestation, respectively. Compared with children born at 39+0–40+2 weeks of gestation, children born at 41+3–42+2 weeks of gestation were at increased risk of stillbirth or neonatal death before 45 post-menstrual weeks (aRR 1.29, 95% CI 1.10–1.52). For primiparous women with BMIs of <25, 25–29.9 and ≥30 the aRRs for stillbirth or neonatal death before 45 post-menstrual weeks were: 1.04, 1.25 and 1.52, respectively. A linear association between aRR and BMI was indicated, albeit not statistically significant (P = 0.066).

Table 3 shows the risk of stillbirth or neonatal death before 45 post-menstrual weeks in relation to gestational duration among children of multiparous women. The mortality risk increased with maternal BMI, but within each BMI class, no association was indicated between increasing gestational duration and stillbirth or neonatal mortality before 45 post-menstrual weeks: the aRR for children born at 41+3–42+2 versus 39+0–40+2 weeks of gestation for stillbirth or neonatal death before 45 post-menstrual weeks was 0.93 (95% CI 0.75–1.16). The corresponding BMI class-specific aRR estimates were all close to unity.

**Risk of stillbirth**

Figure 1 shows the rate of stillbirth in relation to gestational duration, parity and maternal BMI (also see Table

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Table 2. Risk of stillbirth or neonatal death before 45 post-menstrual weeks in relation to gestational duration

| Gestational duration | Total births | Stillbirths or neonatal deaths at <45 post-menstrual weeks | Risk ratio | Crude | Adjusted* |
|----------------------|-------------|----------------------------------------------------------|------------|-------|-----------|
|                      | N           | n            | per 1000          | RR  95% CI | aRR  95% CI |
| All BMI classes      |             |              |                   |            |            |
| 39+0–40+2            | 177 502     | 396          | (2.2)             | 1.00       | Reference  |
| 40+3–40+6            | 81 649      | 177          | (2.2)             | 0.97       | 0.81–1.16  |
| 41+0–41+2            | 52 863      | 128          | (2.4)             | 1.08       | 0.89–1.32  |
| 41+3–42+2            | 83 397      | 244          | (2.9)             | 1.31       | 1.12–1.54  |
| BMI < 25 kg/m²       |             |              |                   |            |            |
| 39+0–40+2            | 122 915     | 201          | (1.6)             | 1.00       | Reference  |
| 40+3–40+6            | 55 188      | 89           | (1.6)             | 0.99       | 0.77–1.26  |
| 41+0–41+2            | 34 952      | 61           | (1.7)             | 1.07       | 0.80–1.42  |
| 41+3–42+2            | 52 595      | 91           | (1.7)             | 1.06       | 0.83–1.36  |
| BMI = 25–29.9 kg/m²  |             |              |                   |            |            |
| 39+0–40+2            | 38 538      | 119          | (3.1)             | 1.00       | Reference  |
| 40+3–40+6            | 18 567      | 50           | (2.7)             | 0.87       | 0.63–1.21  |
| 41+0–41+2            | 12 342      | 35           | (2.8)             | 0.92       | 0.63–1.34  |
| 41+3–42+2            | 20 738      | 81           | (3.9)             | 1.26       | 0.95–1.68  |
| BMI ≥ 30 kg/m²       |             |              |                   |            |            |
| 39+0–40+2            | 16 049      | 76           | (4.7)             | 1.00       | Reference  |
| 40+3–40+6            | 7894        | 38           | (4.8)             | 1.02       | 0.69–1.15  |
| 41+0–41+2            | 5569        | 32           | (5.7)             | 1.21       | 0.80–1.83  |
| 41+3–42+2            | 10 064      | 72           | (7.2)             | 1.51       | 1.10–2.08  |

Significant findings are indicated in bold.
Children of primiparous women.
*Adjusted for year of birth, maternal age, smoking, educational level and country of birth.
For each gestational age group, the risk of stillbirth was calculated using all continuing pregnancies in the denominator. Among children of primiparous women, with all weight classes together, the risk of stillbirth increased from 0.20 per thousand continuing pregnancies at 39+0 – 39+2 weeks of gestation to 1.45 per thousand at 42+0 – 42+2 weeks of gestation (Table S2). The corresponding stillbirth risks for children of multiparous women were

| Gestational duration | Total births | Stillbirths or neonatal deaths at <45 post-menstrual weeks | Risk ratio |
|----------------------|-------------|------------------------------------------------------------|------------|
|                      | N           | n               | per 1000     | Crude | Adjusted* |
|                      | RR 95% CI   | aRR 95% CI      |              |        |           |
| All BMI classes      |             |                 |              |        |           |
| 39+0–40+2            | 251 812     | 347             | (1.4)        | 1.00  | Reference |
| 40+3–40+6            | 103 847     | 87              | (0.8)        | 0.61  | 0.48–0.77 |
| 41+0–41+2            | 61 026      | 73              | (1.2)        | 0.87  | 0.68–1.12 |
| 41+3–42+2            | 80 243      | 105             | (1.3)        | 0.95  | 0.76–1.18 |
| BMI < 25 kg/m²       |             |                 |              |        |           |
| 39+0–40+2            | 152 492     | 145             | (1.0)        | 1.00  | Reference |
| 40+3–40+6            | 61 972      | 39              | (0.6)        | 0.66  | 0.46–0.94 |
| 41+0–41+2            | 35 358      | 23              | (0.7)        | 0.68  | 0.44–1.06 |
| 41+3–42+2            | 44 239      | 34              | (0.8)        | 0.81  | 0.56–1.17 |
| BMI = 25–29.9 kg/m²  |             |                 |              |        |           |
| 39+0–40+2            | 66 309      | 123             | (1.9)        | 1.00  | Reference |
| 40+3–40+6            | 28 029      | 25              | (0.9)        | 0.48  | 0.31–0.74 |
| 41+0–41+2            | 16 949      | 26              | (1.5)        | 0.83  | 0.54–1.26 |
| 41+3–42+2            | 23 301      | 39              | (1.7)        | 0.90  | 0.63–1.29 |
| BMI ≥ 30             |             |                 |              |        |           |
| 39+0–40+2            | 33 011      | 79              | (2.4)        | 1.00  | Reference |
| 40+3–40+6            | 13 846      | 23              | (1.7)        | 0.69  | 0.44–1.10 |
| 41+0–41+2            | 8719        | 24              | (2.8)        | 1.15  | 0.73–1.81 |
| 41+3–42+2            | 12 703      | 32              | (2.5)        | 1.05  | 0.70–1.59 |

Children of multiparous women.

*Adjusted for year of birth, maternal age, smoking, educational level and country of birth.

Figure 1. Risk of stillbirth per 10 000 continuing pregnancies in relation to gestational length, by parity and maternal BMI.
0.20 and 0.53, respectively. Figure 1 shows that at $39^{+0.2}$ weeks of gestation, there was no apparent impact of BMI or parity on stillbirth risk. At more advanced gestations, there were distinctly increased risks of stillbirth among children of primiparous women, especially in children of women who were overweight or obese. Among children of primiparous women with BMIs of $\geq 30$ kg/m$^2$, the risk of stillbirth increased from 0.3 per thousand continuing pregnancies at $39^{+0.2}$ weeks of gestation to 3.9 per thousand continuing pregnancies at $42^{+0.2}$ weeks of gestation. The corresponding stillbirth risk for children of primiparous women with BMIs of $25.0 – 29.9$ kg/m$^2$ was 0.34–1.83 per thousand continuing pregnancies, and for BMIs of $<25$ the risk was 0.14–0.78 per thousand continuing pregnancies. Among children of multiparous women with BMIs of $\geq 30$ kg/m$^2$, the stillbirth rate increased with advancing gestational duration (from 0.23 per thousand continuing pregnancies at $39^{+0.2}$ weeks of gestation to 1.44 per thousand continuing pregnancies at $42^{+0.2}$ weeks of gestation), but for multiparous women with BMIs of $<30$ kg/m$^2$, no distinct association between stillbirth and advancing gestational age was noted.

Discussion

Main findings

In our study, including almost 900 000 births, we showed that children born to primiparous women at $\geq 41^{+3}$ weeks of gestation were at significantly increased risk of stillbirth or neonatal death before 45 post-menstrual weeks, compared with infants born at $39^{+0.2}$ weeks of gestation. Being overweight or obese amplified this increase in risk. Among the children of multiparous women, no increased risk of mortality with increasing gestational duration beyond $40^{+2}$ post-menstrual weeks was indicated. Adjustments for maternal smoking and age had a minor impact on the risk estimates. The risk for stillbirth (our secondary outcome) in pregnancies at $39^{+0.2}$ weeks of gestation and beyond was more than doubled among primiparous compared with multiparous women. The increasing risk with advancing gestational duration was evident among primiparous women with BMIs of $\geq 25$ kg/m$^2$, and was most pronounced among women with BMIs of $\geq 30$ kg/m$^2$. Among primiparous women with normal BMIs, and among multiparous women, an increase in the risk of stillbirth with advancing gestational duration of low to moderate magnitude was indicated.

Strengths and limitations

With the large study population it was possible to obtain results stratified on parity and maternal BMI with high precision, adjusting for maternal age, country of birth and smoking. In the analyses of stillbirth rates (secondary outcome), we used all continuing pregnancies in the denominator. When considering stillbirth rates alone, the mortality among neonates is disregarded, introducing a systematic bias as children who are born in early term gestation have a shorter time ‘at risk’ of death compared with children born later. With the primary outcome chosen in the current study (stillbirth or neonatal death before 45 post-menstrual weeks), we eliminated this confounding factor.

Although we included term singletons only, we may have included fetuses and children with lethal conditions for whom obstetrical management had no impact on fetal/neonatal survival. Furthermore, the presence of maternal or fetal conditions associated with an increased risk of mortality, known or suspected before delivery, could be expected to have resulted in more active obstetric management. Thus, risk factors and conditions not accounted for in our analyses might be expected to be present less often in pregnancies continuing to $\geq 41$ weeks of gestation than at 39 weeks of gestation. It is therefore possible that the increases in risk according to gestational age may have been underestimated. However, such a bias would be unlikely to have affected the associations between BMI or parity and mortality.

Another possible shortcoming was that, even though the study was large, the numbers in some of the BMI subgroups were limited, thereby reducing the power. Despite the lower numbers in some classes, BMI was entered as a class variable to the models as the indicated U-shaped association between gestational duration and mortality made a linear model inappropriate. We found indications that the risk for deaths before 45 post-menstrual weeks increased with BMI among women who were obese (data not shown), but the proportion of women in Sweden who had a BMI above $35$ kg/m$^2$ during the study period was too low to calculate any risk estimates for this BMI group with adequate precision. Another potential source of bias is a possible systematic underestimation of gestational duration among women with high BMI,

Interpretation

Most studies investigating the impact of advanced gestational duration on survival report an increased risk of stillbirth with advancing gestation at term, but the number of studies that report the gestational duration specific mortality risk stratified by parity is limited. Two randomised trials of induction versus expectant management in pregnancies beyond term investigate parity-specific mortality. These studies were not dimensioned to study parity-specific effects of intervention, and no significant interaction between parity and obstetric management was detected. Noticeably, in the study by Wennerholm et al. all six deaths
that occurred in the expectant group were among fetuses/children born to primiparous women.\textsuperscript{10} In the study conducted by Keulen et al. three stillbirths occurred, two of which were to multiparous women.\textsuperscript{26} An individual participant data meta-analysis of these two studies showed reduced perinatal mortality with induction at 41 weeks of gestation in primiparous women (none in 1219 pregnancies), as compared with expectant management until 42 weeks of gestation (seven in 1264 pregnancies; \( P = 0.01 \)), but no difference among multiparous women.\textsuperscript{27}

Body mass index (BMI) is a well-known risk factor for fetal and neonatal death,\textsuperscript{16–18} and high BMI is also known to be a major risk factor for post-term birth.\textsuperscript{28} To our knowledge, no other study has been published that report fetal and neonatal deaths by BMI discretely for primiparous and multiparous women.

**Clinical implications**

The evidence from the current literature suggests that risks of fetal or neonatal death increase as gestation continues beyond 40 weeks of gestation. According to a recent Cochrane Review,\textsuperscript{29} a policy of labour induction in term pregnancies has a positive impact on survival as compared with expectant management. To decide the optimal timing of when to offer induction of labour is a challenge. Such efforts will inevitably be complicated because of the uncertainty in the determination of gestational duration. In Sweden the estimates of pregnancy duration are considered to be relatively accurate, as over 97% of all pregnancies are dated by ultrasound. Systematic bias in ultrasound-based gestational duration estimations, linked to fetal sex, intrauterine growth restriction and maternal BMI, have been reported.\textsuperscript{25,30} Thus, it is of utmost importance that maternity staff are aware of individual differences to avoid adverse outcomes resulting from undetected late or post-term pregnancies. Furthermore, based on the results of the current study, it is feasible that this timing should depend not only on parity but also on maternal BMI. Pregnancies lasting more than 42 completed weeks of gestation are not in line with the state of knowledge, regardless of BMI and parity.

**Conclusion**

Our study indicates that primiparity is a risk factor for perinatal death independent of maternal BMI. With increasing BMI class, the risk for stillbirth or perinatal death before 45 post-menstrual weeks is enhanced. According to our results both parity and BMI should be considered when creating guidelines and when counselling women to make an informed choice between induction and expectant management in term pregnancies. There appears to be little justification to use the same induction guidelines for primiparous and multiparous women in pregnancies lasting \( \geq 39 \) weeks of gestation.

**Disclosure of interests**

None declared. Completed disclosure of interests form available to view online as supporting information.

**Contribution to authorship**

Conception: LL, AS, AH and KK. Planning: LL, AS, AH and KK. Conducting study: LL, AS and KK. Analysing results: LL and KK. Writing: LL, AS, AH and KK.

**Details of ethics approval**

The study was approved by the Research Ethics Committee of Lund University, Sweden (2015/397 2015-06-25).

**Funding**

The Gorthon Foundation for Medical Research provided funds for research time. The funder had no role in conducting the study or in the writing of the paper.

**Acknowledgements**

None.

**Data availability**

Data are available upon request, subject to third-party restrictions.

**Supporting Information**

Additional supporting information may be found online in the Supporting Information section at the end of the article.

**Table S1.** Maternal characteristics and delivery mode by parity.

**Table S2.** Risk of stillbirth by gestational age at birth, parity and maternal first-trimester BMI.

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