Maternal obesity and the risk of postpartum infections according to mode of delivery

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ABSTRACT

Objective: The aim of the present study was to assess the impact of different maternal Body Mass Index (BMI) classes on the risk of postpartum endometritis, wound infection, and breast abscess after different modes of delivery. Secondly to estimate how the risk of postpartum infection varies with different maternal BMI groups after induction of labor and after obstetric anal sphincter injuries.

Methods: A population-based observational study including women who gave birth during eight years (N = 841,780). Data were collected from three Swedish Medical Health Registers, the Swedish Medical Birth Register, the Swedish National Patient Register, and the Swedish Prescribed Drug Register. Outcomes were defined by ICD-10 codes given within eight weeks postpartum. The reference population was uninfected women. Odds ratios were determined using Mantel–Haenszel technique. Year of delivery, maternal age, parity and smoking in early pregnancy were considered as confounders.

Results: There was a dose-dependent relationship between an increasing maternal BMI and a higher risk for postpartum infections. Women in obesity class II and III had an increased risk for endometritis after normal vaginal delivery aOR 1.45 (95% CI: 1.29–1.63) and for wound infections after cesarean section aOR 3.83 (95% CI: 3.39–4.32). There was no difference in how maternal BMI affected the association between cesarean section and wound infection, regardless of whether it was planned or emergent. Women in obesity class II and III had a lower risk of breast abscess compared with normal-weight women, aOR 0.47 (95% CI: 0.38–0.58). The risk of endometritis after labor induction decreased with increasing maternal BMI. The risk of wound infection among women with an obstetrical sphincter injury decreased with increasing BMI.

Conclusion: This study provides new knowledge about the impact of maternal BMI on the risk of postpartum infections after different modes of delivery. There was no difference in how BMI affected the association between cesarean section and wound infections, regardless of whether it was a planned cesarean section or an emergency cesarean section.

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KEYWORDS
Body mass index; postpartum endometritis; wound infection; breast abscess; mode of delivery

Introduction

The rate of overweight and obesity is increasing in nearly every country in the world. In Sweden, 27.4% of pregnant women are now overweight and 16.3% are obese [1]. Before the pandemic, almost 40% of US women aged 20 to 39 were obese [2]. Obesity has emerged as one of the major challenges in obstetrics, as obese women and their offspring are subject to a higher risk of morbidity and mortality than normal-weight women [3]. Postpartum infections are a major cause of morbidity after childbirth and still pose a significant risk of mortality in many parts of the world. Postpartum infections are among the most common causes of prolonged hospital stays and readmissions after childbirth [4–8]. In addition, postpartum infections entail substantial costs for society [6].

Endometritis, wound infections (WI), and infectious mastitis are among the most common postpartum infections [4,9]. Studies on obesity as a risk factor for postpartum infection have predominantly focused on postcesarean infections and mostly on WI. These
studies showed that obesity was an independent risk factor for postcesarean wound infection and surgical site infection [10,11]. Endometritis after cesarean section (CS) also seemed to be more common among obese women than normal-weight women. Studies have also suggested that the risk of WI increases with a higher Body Mass Index (BMI) [9,11,12]. In a relatively large study, morbidly obese women were found to have a 1.4 times higher risk of endometritis and a 4.2 times higher risk of WI postpartum, than normal-weight women [9].

The mode of delivery (CS, instrumental delivery, or vaginal, noninstrumental delivery) seems to be associated with different risks of postpartum infection. One study found that women delivered with CS or who had an instrumental vaginal delivery had a 17 and 7 times, respectively, higher risk of wound infections, compared to women with a vaginal noninstrumental delivery [9]. The risks of endometritis were also higher after CS and instrumental delivery [9]. Among patients without medical indication for planned cesarean section, the risks of endometritis, WI, urinary tract infection, and mastitis were higher with planned cesarean section than with planned vaginal delivery [13]. If the mode of delivery affects, not only the risk of mastitis, but also the risk of developing a postpartum breast abscess (BA) is more sparsely described. Furthermore, the impact of maternal body composition on the potential risk of BA related to the mode of delivery is to the best of our knowledge not earlier described.

The aim of this study was to assess the impact of different maternal BMI classes on the risk of postpartum endometritis, WI, and BA after different modes of delivery. Secondly, to assess the impact of maternal BMI on the risk of postpartum infections in women with induced labor and/or after obstetric anal sphincter injury (OASIS).

Materials and methods

This study was based on data from three different Swedish medical health registers with 99 percent coverage of births during the study period. The Swedish Medical Birth Register (MBR) contains prospectively collected information about maternal characteristics, pregnancy, and delivery, as well as diagnoses that are given at the referral for delivery up to seven days postpartum [14]. The Swedish National Patient Register (PR) contains diagnoses from inpatient care and outpatient specialist care. Diagnoses from primary health care are not registered in the PR [15].

The Swedish Prescribed Drug Register (PDR) provides data on dispensed prescriptions of drugs and the date of dispensation on an individual level [16]. Drugs are classified and presented according to the Anatomical Therapeutic Chemical classification system (ATC).

Persons in the registers are identified by their unique personal identification number (PIN), which is assigned to every Swedish resident.

The MBR was used to identify all registered women who gave birth during the study period 2005 to 2012 (n = 841,780). The MBR, the PR and the PDR were then further linked using the women’s PIN numbers. An official at the National Board of Health and Social welfare replaced the PINs with unidentifiable but unique numbers, which were subsequently used to link information in the registers.

Registered infection diagnoses for all women were then extracted from the MBR and the PR. Information about drug dispensations was collected from the PDR. In this study, data were restricted to 0–8 weeks postpartum.

The primary outcomes were endometritis, WI, and BA. Endometritis was defined as the presence of ICD-10 (Swedish version) code O85.9, WI (perineal or CS wound) as code O86.0, and BA as code O91.1, in either the MBR or the PR. Women with any of these diagnoses who also had a clinical diagnosis of chorioamnionitis (ICD-10 code O41.1) were excluded.

The main exposure was maternal BMI, calculated using data on information about maternal weight and height, measured and collected around gestational weeks 10 to 12, when the first visit to antenatal care usually occurred. BMI classes used were underweight < 18.5 kg/m², normal weight 18.5–24.9 kg/m², overweight 25-29.9 kg/m², obesity class I 30–34.9 kg/m², and obesity class II and III ≥35 kg/m².

Other maternal characteristics extracted were age, parity, and smoking habits.

The modes of delivery evaluated were vaginal, noninstrumental delivery, instrumental vaginal delivery (vacuum or forceps), and CS. CS was further divided into elective or emergency CS.

Data on maternal characteristics (including BMI) and mode of delivery were extracted from the MBR.

The reference population was considered as noninfected. Deliveries, where the woman had been given the following ICD-10 (Swedish version) diagnosis code(s), were identified and excluded from the reference population:

- A00-A39 and A42-B99; certain infectious and parasitic diseases
- O41.1; infection of amniotic sac and membranes

The reference population was considered as noninfected. Deliveries, where the woman had been given the following ICD-10 (Swedish version) diagnosis code(s), were identified and excluded from the reference population:
- O75.3; other infection during labor
- O86.4; pyrexia of unknown origin following delivery
- O86.8; other specified puerperal infections
- O91.2; non-purulent mastitis.

The PDR was used to identify women who had a dispensed prescription of antibiotics (ATC code J01) from the first eight weeks postpartum. These women were also excluded from the reference population.

Women with recorded diagnoses of endometritis, WI, and BA were compared with the reference group with regard to maternal BMI.

Secondly, the risk of endometritis, WI, and BA was evaluated in the five different BMI classes according to each mode of delivery (vaginal, noninstrumental, instrumental, any CS, planned CS, emergency CS).

Adjustments were made for maternal age, parity, and smoking in early pregnancy. BMI was included as a covariate when calculating the risk of postpartum infecion related to maternal age, parity, and smoking. For the estimate of adjusted Odds Ratios (OR) the Mantel-Haenszel technique was used, and a 95% confidence interval (CI) was determined using a test-based method based on the Mantel–Haenszel chi-squared test [17].

The Regional Ethical Review Board in Linköping, Sweden approved the study (Dnr 2014/319-32). All methods were performed in accordance with the relevant guidelines and regulations.

**Results**

A total of 841,780 singleton deliveries were recorded in the MBR during the study period (2005–2012). Of these, 22,095 (2.6%) had an ICD-10 code suggestive of postpartum infection during the first eight puerperal weeks. The numbers for the different infections were endometritis 12,559 (1.5%), WI 4123 (0.5%), and BA 5859 (0.7%). Another 77,911 deliveries (9.3%) were associated with either another infection diagnosis or a dispensed prescription for a drug with ATC code J01, suggestive of infection, leaving 741,774 cases as a noninfected reference population. The prevalence in the study population of obesity (BMI ≥30) and obesity class II and III (BMI ≥35) was 11% and 3.3%, respectively.

Maternal characteristics and risk of postpartum infection are presented in Table 1.

Postpartum infections were associated with higher maternal age, nulliparity, and smoking ≥10 cigarettes a day when compared to the noninfected population.

### Table 1. Maternal characteristics and risk of postpartum infection.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>All women N = 841,780</th>
<th>Women with no infectiona N = 741,774</th>
<th>Women with postpartum infectionb N = 22,095</th>
<th>Risk of postpartum infection compared with all women aOR (95%CI)c</th>
<th>Risk of postpartum infection compared with women with no infection aOR (95%CI)d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal age, y n (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;20</td>
<td>13,444 (1.6)</td>
<td>11,840 (1.6)</td>
<td>370 (1.7</td>
<td>0.95 (0.85–1.06)</td>
<td>0.95 (0.84–1.06)</td>
</tr>
<tr>
<td>20–24</td>
<td>107,994 (12.8)</td>
<td>95,336 (12.9)</td>
<td>2972 (13.5)</td>
<td>1.02 (0.97–1.06)</td>
<td>1.01 (0.97–1.06)</td>
</tr>
<tr>
<td>25–29</td>
<td>242,078 (28.8)</td>
<td>214,082 (28.9)</td>
<td>6202 (28.1)</td>
<td>reference</td>
<td>reference</td>
</tr>
<tr>
<td>30–34</td>
<td>294,558 (35.0)</td>
<td>259,672 (35.0)</td>
<td>7631 (34.5)</td>
<td>1.09 (1.06–1.13)</td>
<td>1.10 (1.06–1.14)</td>
</tr>
<tr>
<td>35–39</td>
<td>151,629 (18.0)</td>
<td>133,064 (17.9)</td>
<td>4005 (18.1)</td>
<td>1.15 (1.11–1.20)</td>
<td>1.16 (1.12–1.22)</td>
</tr>
<tr>
<td>40–44</td>
<td>30,574 (3.6)</td>
<td>26,508 (3.6)</td>
<td>859 (3.9)</td>
<td>1.23 (1.14–1.33)</td>
<td>1.26 (1.17–1.36)</td>
</tr>
<tr>
<td>≥45</td>
<td>1503 (0.2)</td>
<td>1272 (0.2)</td>
<td>56 (0.3)</td>
<td>1.56 (1.19–2.05)</td>
<td>1.60 (1.22–2.10)</td>
</tr>
<tr>
<td>Parity n (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>376,162 (44.7)</td>
<td>326,981 (44.1)</td>
<td>11,936 (54.0)</td>
<td>reference</td>
<td>reference</td>
</tr>
<tr>
<td>2</td>
<td>308,706 (36.7)</td>
<td>275,123 (37.1)</td>
<td>6778 (30.7)</td>
<td>0.66 (0.64–0.68)</td>
<td>0.65 (0.63–0.67)</td>
</tr>
<tr>
<td>3</td>
<td>110,104 (13.1)</td>
<td>98,191 (13.2)</td>
<td>2398 (10.9)</td>
<td>0.63 (0.60–0.66)</td>
<td>0.61 (0.59–0.64)</td>
</tr>
<tr>
<td>≥4</td>
<td>46,808 (5.6)</td>
<td>41,479 (5.6)</td>
<td>983 (4.4)</td>
<td>0.56 (0.62–0.60)</td>
<td>0.55 (0.51–0.59)</td>
</tr>
<tr>
<td>Smoking n (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>41,077 (4.9)</td>
<td>36,004 (4.9)</td>
<td>1158 (5.2)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Day</td>
<td>745,552 (88.6)</td>
<td>657,343 (88.6)</td>
<td>19,520 (88.3)</td>
<td>reference</td>
<td>reference</td>
</tr>
<tr>
<td>≥10/day</td>
<td>42,388 (5.0)</td>
<td>37,369 (5.0)</td>
<td>1044 (4.7)</td>
<td>0.95 (0.89–1.01)</td>
<td>0.95 (0.89–1.01)</td>
</tr>
<tr>
<td>Maternal Body Mass Index, kg/m² n (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mising</td>
<td>12,763 (1.5)</td>
<td>11,058 (1.5)</td>
<td>373 (1.7)</td>
<td>1.18 (1.06–1.31)</td>
<td>1.19 (1.07–1.33)</td>
</tr>
<tr>
<td>&lt;18.5</td>
<td>70,509 (8.4)</td>
<td>61,634 (8.3)</td>
<td>1959 (8.9)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>18.5–24.9</td>
<td>18,622 (2.2)</td>
<td>16,485 (2.2)</td>
<td>482 (2.2)</td>
<td>1.03 (0.94–1.13)</td>
<td>1.03 (0.94–1.13)</td>
</tr>
<tr>
<td>25–29</td>
<td>466,606 (55.4)</td>
<td>414,031 (55.8)</td>
<td>11,564 (52.3)</td>
<td>(reference)</td>
<td>(reference)</td>
</tr>
<tr>
<td>29.5–34.9</td>
<td>192,833 (22.9)</td>
<td>169,244 (22.8)</td>
<td>5197 (23.5)</td>
<td>1.13 (1.09–1.16)</td>
<td>1.14 (1.10–1.17)</td>
</tr>
<tr>
<td>≥35</td>
<td>65,261 (7.8)</td>
<td>56,744 (7.6)</td>
<td>1915 (8.7)</td>
<td>1.25 (1.11–1.31)</td>
<td>1.27 (1.21–1.33)</td>
</tr>
</tbody>
</table>

*aNon-infected women were defined as the absence of ICD-10 code A00-A39, A42-B99, O41.1, O75.3, O86.4, O86.8, O91.2 at delivery and/or a dispensed prescription of antibiotics (ATC code J01) the first eight weeks postpartum.

*bEndometritis, wound infection and breast abscess.

*cAdjustments were made for year of birth and all other variables in the table.
in the adjusted analysis. There was an increased risk of postpartum infections the higher the woman’s BMI, with obesity class II and III women having a more than 50% higher risk than normal-weight women. These results did not differ when the whole population was used as a reference.

The percentage of women with type-1 diabetes were among women with endometritis 74/12,559 (0.6%), WI 81/4123 (2.0%), and BA 13/5859 (0.2%). The corresponding ORs and 95% CIs were for endometritis 1.06 (0.84–1.34), WI 3.04 (2.46–3.76), and BA 0.44 (0.26–0.75). The percentage of women with registered gestational diabetes were among women with endometritis 183/12,559 (1.5%), WI 110/4123 (2.7%), and BA 39/5859 (0.6%). The corresponding ORs and 95% CIs were for endometritis 1.33 (1.14–1.54), WI 1.79 (1.47–2.17), and BA 0.73 (0.53–1.00).

**Endometritis**

Endometritis was increasingly associated with maternal overweight, obesity class I, and obesity class II and III (Table 2).

The risk of endometritis increased with higher BMI after vaginal, non-instrumental delivery, but not after instrumental delivery (Figure 1) or after CS (Figure 2).

**Wound infections**

WI was likewise increasingly associated with maternal overweight, obesity class I, and obesity class II and III (Table 2). The association between WI and vaginal non-instrumental delivery and instrumental delivery was constant over different BMI strata. For WI, the association with CS was stronger the higher the BMI (Figure 3). This association was the same, regardless of whether it was an elective or emergency CS (Figure 4).

Women with OASIS had a higher risk of WI, the lower the BMI. For underweight, normal weight, overweight, obesity class I, and obesity class II and III the aORs and 95% CIs were respectively: 5.19 (2.97–8.44), 3.70 (3.22–4.24), 2.44 (1.92–3.11), 1.70 (1.13–2.57), 0.73 (0.33–1.63).

**Discussion**

**Findings and interpretations**

In this study, overweight, obesity class I, and obesity class II and III were associated with an increased risk of endometritis after vaginal, noninstrumental delivery.

There was also an association between overweight and obesity and WI after CS. This association between maternal BMI and WI was equal, regardless of whether the CS was planned or emergent. On the other hand, women with high BMI had a lower risk of wound infection after vaginal, noninstrumental delivery, and instrumental vaginal delivery.

For BA, there was an inverse association, regardless of the mode of delivery.

Endometritis was more common after vaginal, noninstrumental delivery the higher the woman’s BMI. To our knowledge, there are no earlier studies that have evaluated this risk with regard to different BMI classes.

CS has earlier been reported to be an independent risk factor for endometritis, although without a strong association with BMI. These results are in accordance

<table>
<thead>
<tr>
<th>Maternal Body Mass Index, kg/m²</th>
<th>No infection</th>
<th>Endometritis</th>
<th>Wound infections</th>
<th>Breast abscess</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>n</td>
<td>aOR (95%CI)</td>
<td>n</td>
</tr>
<tr>
<td>&lt;18.5</td>
<td>16,485</td>
<td>278</td>
<td>1.03 (0.92–1.17)</td>
<td>81</td>
</tr>
<tr>
<td>18.5-24.9</td>
<td>414,031</td>
<td>6468</td>
<td>reference</td>
<td>1758</td>
</tr>
<tr>
<td>25-29.9</td>
<td>169,244</td>
<td>3052</td>
<td>1.17 (1.12–1.22)</td>
<td>978</td>
</tr>
<tr>
<td>30-34.9</td>
<td>56,744</td>
<td>1111</td>
<td>1.27 (1.19–1.35)</td>
<td>526</td>
</tr>
<tr>
<td>≥35</td>
<td>23,636</td>
<td>516</td>
<td>1.42 (1.30–1.56)</td>
<td>398</td>
</tr>
<tr>
<td>Missing</td>
<td>61,634</td>
<td>1134</td>
<td>reference</td>
<td>382</td>
</tr>
</tbody>
</table>

*Noninfected women were defined as the absence of ICD-10 code A00–A39, A42–B99, O41.1, O75.3, O86.4, O86.8, O91.2 at delivery and/or a dispensed prescription of antibiotics (ATC code J01) the first eight weeks postpartum.

*Adjustments were made for year of birth, maternal age, parity and smoking in early pregnancy.
Figure 1. The risk of endometritis after vaginal delivery in different Body Mass Index (BMI) groups. Normal weight women were set as reference. Adjusted Odds Ratios (aOR) was estimated using the Mantel–Haenszel technique and a 95% Confidence Interval (CI) was based on the Mantel–Haenszel chi-squared test. Adjustments were made for year of birth, maternal age, parity, and smoking in early pregnancy.

Figure 2. The risk of endometritis after emergency and planned cesarean section in different Body Mass Index (BMI) groups. Normal weight women were set as reference. Adjusted Odds Ratios (aOR) was estimated using the Mantel–Haenszel technique and a 95% confidence interval (CI) was based on the Mantel–Haenszel chi-squared test. Adjustments were made for year of birth, maternal age, parity, and smoking in early pregnancy.
with the findings in the present study, where the risk of endometritis after CS was slightly increased in overweight and obese women.

The results for postcesarean WI show an obvious dose–response curve, where the risk of infection rises with increasing BMI. This has previously been

Figure 3. The risk of wound infections after vaginal delivery and cesarean section in different Body Mass Index (BMI) groups. Normal weight women were set as reference. Adjusted Odds Ratios (aOR) was estimated using the Mantel–Haenszel technique and a 95% confidence interval (CI) was based on the Mantel–Haenszel chi-squared test. Adjustments were made for year of birth, maternal age, parity, and smoking in early pregnancy.

Figure 4. The risk of wound infections after emergency and planned cesarean section in different Body Mass Index (BMI) groups. Normal weight women were set as reference. Adjusted Odds Ratios (aOR) was estimated using the Mantel–Haenszel technique and a 95% confidence interval (CI) was based on the Mantel–Haenszel chi-squared test. Adjustments were made for year of birth, maternal age, parity, and smoking in early pregnancy.
described by Wloch et al. who found similar ORs for the BMI classes [11]. In their study, all CSs were assessed in one group. Sebire et al. found that postpartum wound infection was more common among overweight and obese women (BMI >30 kg/m²), ORs 1.27 (95% CI: 1.09–1.48) and 2.24 (95% CI 1.91–2.64), respectively [18]. Their study population consisted of both vaginal deliveries and CS. The results are similar to the ones after CS in the present study.

WI was more common among underweight women compared with normal-weight women after vaginal delivery. Higher BMI also seemed to have a nonsignificant protective effect against WIs after vaginal delivery. In a previous study, OASIS was found to be a strong risk factor for WI after vaginal delivery, and since obese women have been shown to have less risk of OASIS than normal-weight women, this probably explains why the present study found fewer WIs among obese women than among normal weight and underweight women [9,19,20].

In this study, no differences in risk for WI or endometritis were found in the different BMI groups, regardless of whether the CS was planned or emergency. This is a novel finding, which could be one factor to consider for clinicians when planning an appropriate delivery route for obese women. This study also found that the higher the woman’s BMI, the lower the risk of endometritis after labor induction. From an infectious point view, there seems to be no benefit to planned CS as the route of delivery for obese women.

The higher the woman’s BMI, the lower the ORs for breast abscess, regardless of the mode of delivery. This could possibly be explained by the fact that breastfeeding rates are lower in higher BMI classes [21,22]. Unfortunately, data on breastfeeding were not available for this study. Further studies on this subject should stratify for breastfeeding. Another speculative, possible theoretical explanation could be that obese women’s breast tissue is surrounded by more loose fat, which might reduce pressure on milk ducts and consequently reduce the risk of milk congestion and mastitis.

**Strengths and limitations**

This study has certain strengths and limitations. Any register-based study depends on the data available in the register. Only available data can be corrected for, and systematic registration errors may make study results unreliable. However, the registers used in this study are validated, and missing data and errors in data are probably randomly distributed according to BMI and should thus not significantly affect the ORs.
Another strength and limitation are that the Swedish Prescribed Drug Register provides dated data on dispensed prescriptions, so we know that the women picked up their antibiotics, but whether they took them is unknown. Choosing the Mantel-Haenszel technique for estimating adjusted odds ratios, instead of logistic regression, enabled analysis of all women in the study population even if information on one of the putative confounders; year of delivery, maternal age, parity and smoking in early pregnancy was missing, which could be looked upon as an advantage evaluating rather rare outcomes. For the purpose of the present study, women with chorioamnionitis and a postpartum infection were excluded. Chorioamnionitis was classified as a mediator as it only affects the outcome and not the exposure (BMI). To include a mediator in the adjusted analysis, dilute the putative association between exposure and outcome. To include a defined mediator pathway between the exposure and the outcome without adjusting for it is of course possible but in the present study, the purpose was to evaluate the association between BMI and postpartum infections excluding this well-known mediator pathway. Another mediator, not excluded in the present study, was women with type 1 diabetes. Type 1 diabetes occurs in 0.6% of women giving birth in Sweden, despite this low prevalence, it is possible that the inclusion of these women might have affected the results.

There is a possibility that clinicians that are aware of the known higher postpartum morbidity among women with high BMI are more prone to give these women a diagnosis of infection and antibiotic treatment even with mild symptoms that would not have led to such a diagnosis for a woman with normal BMI. If that is the case, the ORs in this study may be higher than the true ones.

Another limitation is that diagnoses are studied, not the actual infections. This may affect the reliability of the ORs, since some women with an infection will never seek medical attention, while others may have infections without diagnosis or treatment.

Furthermore, data on breastfeeding were not available for the study group. This data could have made it possible to draw further conclusions on the effect of BMI on the risk of BA after childbirth.

However, the study population was large, which made it possible to sub-group the women according to BMI class in groups large enough to calculate reliable ORs, even for women in obesity class II and III, although not separated as absolute numbers of women with class III obesity in each stratum then became too low for meaningful analyses.

In this large population-based observational study there was a dose-dependent relationship between an increasing maternal BMI and a higher risk for postpartum infections. BMI was an independent risk factor for postpartum endometritis after vaginal, non-instrumental delivery and WI after CS. There was no difference in how BMI affected the association between CS and WI, regardless of whether it was a planned CS or an emergency CS.

Acknowledgments
We would like to express our sincere gratitude and heartfelt appreciation to the late Professor Bengt Källen, Lund, Sweden for his invaluable contributions to this scientific paper. Professor Källen’s profound expertise in statistical analysis and his meticulous dedication to detail significantly enhanced the quality and rigor of our research.

Disclosure statement
No potential conflict of interest was reported by the author(s).

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Data availability statement
The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request.

References


