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# Decreased incidence of preterm birth during coronavirus disease 2019 pandemic



**OBJECTIVE:** Although most studies have reported an increase in preterm birth (PTB) in pregnant women with severe or critical coronavirus disease 2019 (COVID-19) infection,<sup>1</sup> population-level European reports offer conflicting data on a decrease<sup>2,3</sup> or stability<sup>4</sup> in the overall rate of PTB during the pandemic. Our objective was to evaluate the incidence of PTB at our institution, in the North-East of the United States, during the COVID-19 pandemic in 2020 compared with the similar period in 2019.

**STUDY DESIGN:** Birth data at Thomas Jefferson University Hospital were accessed by a query of the electronic medical record; 2 time periods were examined: March 1 to July 31, 2020 (during the COVID-19 pandemic), and March 1 to July 31, 2019 (before the onset of COVID-19 pandemic). The inclusion criteria were all births at  $\geq 20$  weeks' gestation, inclusive of those with intrauterine fetal death, fetal anomalies, and multiple gestations. Individual charts were accessed for women who delivered preterm to confirm the

**TABLE**  
**Demographic characteristics and outcomes**

	March to July 2020	March to July 2019	P value or aOR (95% CIs) <sup>a</sup>
Total births	1197	911	
Race/ethnic group			
Black or African American	448 (37.4)	343 (37.7)	.001 <sup>b</sup>
Hispanic	177 (14.8)	87 (9.5)	
Non-Hispanic, nonblack	572 (47.8)	481 (52.8)	
PTBs <sup>c</sup>			
PTB at <37 wk gestation overall	118 (9.9)	115 (12.6)	0.75 (0.57–0.99) <sup>b</sup>
PTB at 34–36 wk gestation	88 (7.4)	72 (7.9)	0.93 (0.67–1.28)
PTB at <34 wk gestation	30 (2.5)	43 (4.7)	0.51 (0.32–0.83) <sup>b</sup>
PTB at <28 wk gestation	7 (0.6)	14 (1.5)	0.37 (0.15–0.93) <sup>b</sup>
SPTB at <37 wk gestation overall	57 (4.8)	59 (6.6)	0.75 (0.52–1.10)
SPTB at 34–36 wk gestation	44 (3.7)	44 (4.8)	0.76 (0.49–1.16)
SPTB at <34 wk gestation	14 (1.2)	15 (1.6)	0.76 (0.36–1.60)
SPTB at <28 wk gestation	3 (0.3)	7 (0.8)	0.33 (0.09–1.30)
IPTB at <37 wk gestation overall	60 (5.0)	56 (6.1)	0.78 (0.53–1.10)
IPTB at 34–36 wk gestation	44 (3.7)	28 (3.1)	1.19 (0.73–1.93)
IPTB at <34 wk gestation	16 (1.3)	28 (3.1)	0.40 (0.21–0.75) <sup>b</sup>
IPTB at <28 wk gestation	4 (0.3)	7 (0.8)	0.42 (0.12–1.44)
COVID-19–positive preterm deliveries <sup>d</sup>	8 (3.4)	Not applicable	—
Mode of delivery			
Cesarean delivery	344 (28.7)	236 (25.9)	.15
Vaginal delivery	853 (71.3)	675 (74.1)	
Perinatal death	7 (0.6)	12 (1.3)	.08

Values are number (percentage) unless indicated otherwise.

aOR, adjusted odds ratio; CI, confidence interval; COVID-19, coronavirus disease 2019; IPTB, iatrogenic preterm birth; PCR, polymerase chain reaction; PTB, preterm birth; SARS-CoV-2, severe acute respiratory syndrome coronavirus 2; SPTB, spontaneous preterm birth.

<sup>a</sup> aOR, is odds ratio adjusted for race; <sup>b</sup> statistically significant; <sup>c</sup> Spontaneous PTB included preterm labor and preterm prelabor rupture of membranes; <sup>d</sup> Women with positive SARS-CoV-2 PCR test result within the Jefferson Health system at any point during pregnancy before delivery.

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indication for delivery. The primary outcome was the incidence of PTB between the 2 groups, before and during the COVID-19 pandemic. Secondary outcomes included the incidences of late PTB (34 0/7 to 36 6/7 weeks' gestation), early PTB (<34 weeks' gestation) and very early PTB (<28 weeks' gestation), and perinatal death (fetal and neonatal death) between periods. Analyses by subgroups of spontaneous and iatrogenic PTB were also performed. Chi-square analysis using odds ratios (ORs) and 95% confidence intervals (CIs) was used for categorical variables and adjusted OR (aOR) for demographic differences using multivariable logistic regression analysis.  $P<.05$  was considered statistically significant.

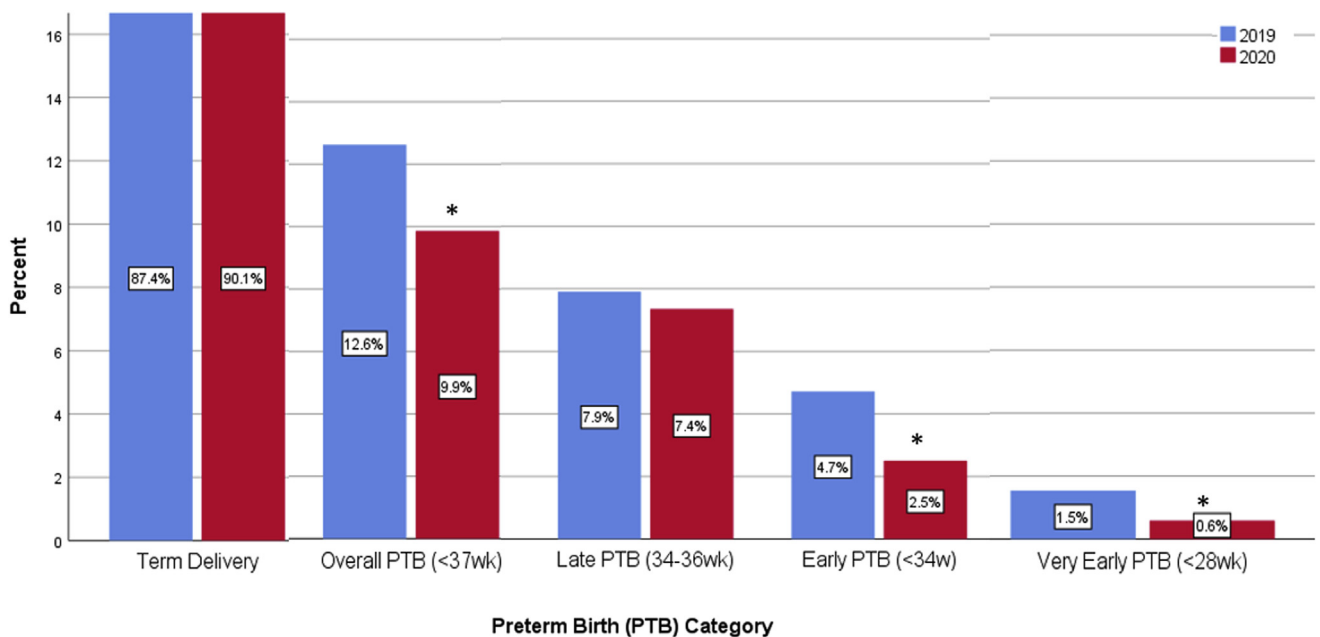
**RESULTS:** There was a significantly decreased incidence of PTB in 2020 during the COVID-19 pandemic compared with the 2019 period (9.9% vs 12.6%; OR, 0.76; 95% CI, 0.58–0.99) (Table). After adjusting for race/ethnicity, the 2020 period remained associated with a significantly decreased incidence of PTB (aOR, 0.75; 95% CI, 0.57–0.99) compared with the 2019 pre–COVID-19 period. There were also significant decreases in PTB at <34 weeks' gestation (2.5% vs 4.7%; aOR, 0.51; 95% CI, 0.31–0.82) and PTB at <28 weeks' gestation (0.6% vs 1.5%; aOR, 0.37; 95% CI, 0.15–0.93) in 2020 compared

with 2019. The rate of late PTB at 34–36 weeks' gestation was similar between groups (Table) (Figure). Subgroup analyses of just spontaneous or just iatrogenic PTB did not reveal significant differences, except for a 60% decrease in iatrogenic PTB at <34 weeks' gestation in 2020 compared with 2019 (Table). The incidences of mode of delivery and perinatal death were similar between time periods (Table). Notably, 8 of the 118 PTB (6.8%) in the 2020 period occurred in COVID-19–positive women. The incidence of PTB in COVID-19–positive women (most diagnosed during pregnancy because of symptoms) was 14.5% (8 of 55) and did not differ significantly compared with the rest of the women in the 2020 group (110 of 1142; 9.6%; OR, 1.60; 95% CI, 0.74–3.47). The incidence of severe acute respiratory syndrome coronavirus 2 positivity on the labor and delivery universal screening between April 13, 2020 (when we started), and July 31, 2020, was 4.5% (40 of 878).

**CONCLUSION:** This United States study reported a significant (25%) decrease in the odds of PTB during the COVID-19 pandemic compared with a similar prepandemic period in the peer-reviewed literature. In particular, we identified a significant decrease in early PTB (49% decrease for <34 weeks' gestation and 63% decrease for <28 weeks' gestation), which have the highest risk of neonatal morbidity

#### FIGURE

#### PTB by gestational age at delivery comparing 2019 pre–COVID-19 and 2020 COVID-19 periods



Rate of term and preterm delivery comparing March to July 2019 (blue) with March to July 2020 (red). \*Indicates a statistically significant difference between periods at  $P<.05$ .

COVID-19, coronavirus disease 2019; PTB, preterm birth.

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**BOX****Possible reasons for the decrease in the incidence of PTB during COVID-19 pandemic**

- Less stress and anxiety: work from home
- Other work changes: no shift work, no long hours, and less physical work
- Better support systems: partner and family
- Better nutrition
- More exercise
- Better hygiene and fewer social interactions: fewer infections
- Less smoking owing to being indoor and fewer chances of drug use because of the lockdown
- Less car driving: less stress and fewer accidents
- Less air pollution
- Government financial assistance
- Fewer medical interventions

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and mortality (Table). When analyzing the subgroup of spontaneous PTB, data pointed to a decrease in spontaneous PTB at different cutoffs, but none was significant, probably owing to a type II error. When analyzing the subgroup of iatrogenic PTB, most—but not all—data also pointed to a decrease in iatrogenic PTB at different cutoffs and by race/ethnicity, with iatrogenic PTB at <34 weeks' gestation significantly decreased by 60% (Table). The incidences of cesarean delivery and perinatal death were not different. The major limitation of this study is only accounting for race/ethnicity and no other sociodemographic data as possible confounders. The decrease in PTB, in particular in early (<34 weeks' gestation) and very early (<28 weeks' gestation) PTBs, is consistent with 2 previous reports from Denmark<sup>2</sup> and Ireland,<sup>3</sup> but differs from a United Kingdom report that did not report changes in the incidence of PTB.<sup>4</sup>

The reasons for a decrease in PTB during the COVID-19 pandemic are unclear, and it is notable that the decrease seemed to be both in spontaneous and indicated PTBs, but these subgroup analyses were small and probably underpowered. Several hypotheses can be postulated (Box). In particular, reduced work hours, reduced physical and/or emotional stress of work, being home with support from family, being able to have time to exercise, and reduced exposure to environmental pollutants from reduced air pollution could all be plausible explanations, among others, but require further study. In particular, the decrease in iatrogenic PTB could be related to reduced antepartum surveillance that would prompt a delivery. The examination of PTB rate should be evaluated in conjunction with fetal demise/neonatal morbidity and mortality rates as reduced access to care can certainly result in a rise in both.<sup>5</sup> Further research is needed on the potential differential benefit among

racial/ethnic groups (current analysis being limited by sample sizes and potential for type II error) and on how practice changes during the pandemic affect population-level outcomes. If replicated in larger populations, this decrease in PTB opens a whole new avenue for investigation, because no single intervention has been shown to have such a major effect on the incidence of PTB in the general population.

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