Letters

RESEARCH LETTER

Changes in Preterm Birth Phenotypes and Stillbirth at 2 Philadelphia Hospitals During the SARS-CoV-2 Pandemic, March-June 2020

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic has had far-reaching implications, including changes in societal stressors and health care delivery, which may alter preterm birth risk. Previous studies in the US regarding SARS-CoV-2 in pregnancy focused on associations of SARS-CoV-2 infection with cesarean delivery, neonatal transmission, preterm birth, and stillbirth.[1] In a relatively homogeneous Danish population, Hedermann et al[2] reported a decrease in preterm birth during the pandemic among uninfected patients. Given differences in preterm birth across populations,[3] we examined a diverse urban cohort in the US to determine if preterm birth, spontaneous preterm birth, medically indicated preterm birth, and stillbirth rates have changed during the SARS-CoV-2 pandemic.

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Methods | GeoBirth is a curated pregnancy cohort of all births in 2 Penn Medicine hospitals in Philadelphia ongoing since 2008 (approximately 9000 births per year), in which each preterm birth (<37 weeks' gestation) is manually classified by 2 independent blinded reviewers, with further adjudication by a third reviewer when there is nonconcordance. Preterm birth phenotypes are categorized as spontaneous preterm birth (eg, preterm labor, spontaneous rupture of membranes) or medically indicated preterm birth (eg, clinician-initiated due to a maternal or fetal health condition, such as preeclampsia or intrauterine growth restriction). Stillbirth is defined as intrauterine fetal demise at 20 weeks' gestation or greater. We compared preterm birth, spontaneous preterm birth, medically indicated preterm birth, and stillbirth rates among singleton pregnancies during the pandemic period (March-June 2020) with the same months in 2018 and 2019 (prepandemic) to account for seasonality using a 2-tailed Fisher exact test with a significance threshold of $P < .05$ using R, version 4.0.2. We used marginal effects models to calculate absolute risk differences between the 2 epochs adjusting for birth month, age, parity, body mass index, race/ethnicity, marital status, smoking, and insurance status. We also performed analyses stratified by race/ethnicity because of persistent preterm birth disparities.[3] This study was approved by the University of Pennsylvania Institutional Review Board with a waiver of informed consent.

Results | There were a total of 8867 singleton, liveborn deliveries in March through June of 2018, 2019, and 2020 (42% non-Hispanic Black, 37% non-Hispanic White, and 21% other race/ethnicity); 2992 deliveries occurred during the pandemic period, including 283 preterm births (135 spontaneous and 148 medically indicated) and 15 stillbirths. Prepandemic and pandemic birth outcomes were as follows: 10.5% vs 9.5% of deliveries were preterm births (adjusted difference, −1.1% [95% CI, −2.4% to 0.2%]), 5.7% vs 4.7% were spontaneous preterm births (adjusted difference, −0.8% [95% CI, −1.8% to 0.2%]), 5.4% vs 5.2% were medically indicated preterm births (adjusted difference, −0.3% [95% CI, −1.4% to 0.6%]), and 5.4 per 1000 births vs 5.0 per 1000 births were stillbirths (adjusted difference, −0.03 per

Table. Birth Outcomes by Race/Ethnicity Before (March-June 2018 and 2019) and During (March-June 2020) the Severe Acute Respiratory Syndrome Coronavirus 2 Pandemic in 2 Philadelphia Hospitals[a]

Birth outcome	No. (%) Prepandemic epoch (n = 5907)	No. (%) Pandemic epoch (n = 3007)	Unadjusted *P* value[b]	Adjusted absolute risk difference (95% CI), %[c]
Preterm birth[d]	617 (10.5)	283 (9.5)	.12	−1.1 (−2.4 to 0.2)
Non-Hispanic Black	323 (13.1)	157 (12.4)	.57	−0.7 (−3.0 to 1.5)
Non-Hispanic White	177 (7.9)	73 (6.8)	.26	−1.0 (−2.8 to 0.9)
Other race/ethnicity	117 (9.9)	53 (8.2)	.24	−1.7 (−4.4 to 1.0)
Spontaneous preterm birth[e]	315 (5.7)	135 (4.7)	.09	−0.8 (−1.8 to 0.2)
Non-Hispanic Black	150 (6.6)	77 (6.5)	.99	0.1 (−1.6 to 1.9)
Non-Hispanic White	96 (4.5)	30 (2.9)	.04	−1.4 (−2.8 to −0.1)
Other race/ethnicity	69 (6.1)	28 (4.5)	.16	−1.6 (−3.7 to 0.6)
Medically indicated preterm birth[f]	302 (5.4)	148 (5.2)	.65	−0.3 (−1.4 to 0.6)
Non-Hispanic Black	173 (7.5)	80 (6.7)	.45	−1.0 (−2.7 to 0.8)
Non-Hispanic White	81 (3.8)	43 (4.1)	.70	0.4 (−1.1 to 1.9)
Other race/ethnicity	48 (4.3)	25 (4.0)	.80	−0.3 (−2.3 to 1.7)
Stillbirth (per 1000 births)	32 (0.54)	15 (0.50)	.88	−0.03 (−0.34 to 0.29)
Non-Hispanic Black	25 (1.01)	9 (0.71)	.47	−0.29 (−0.90 to 0.31)
Non-Hispanic White[g]	4 (0.18)	2 (0.19)	.99	
Other race/ethnicity[g]	3 (0.25)	4 (0.61)	.26	

[a] Race/ethnicity was based on patient self-identification during patient registration.

[b] Calculated using a 2-tailed Fisher exact test.

[c] Adjusted for month of birth, age, parity, body mass index, race/ethnicity (except in stratified models), marital status, smoking, and insurance status, calculated using marginal effects models. Presented as percentages for all birth outcomes except for stillbirth.

[d] Preterm birth calculations exclude stillbirths.

[e] Spontaneous preterm birth calculations exclude medically indicated preterm births and stillbirths.

[f] Medically indicated preterm birth calculations exclude spontaneous preterm births and stillbirths.

[g] Adjusted models did not converge due to small numbers of events.

1000 births [95% CI, −0.34 to 0.29]) (**Table**). Spontaneous preterm birth among non-Hispanic White patients declined during the pandemic (4.5% vs 2.9%; adjusted difference, −1.4% [95% CI, −2.8% to −0.1%]); no other racial/ethnic groups had significant changes in outcomes. However, no significant interaction was detected between race/ethnicity and epoch with spontaneous preterm birth (P = .09 for interaction).

In the 2 hospitals, universal SARS-CoV-2 testing began on April 1, 2020, and April 13, 2020. Among 86 patients with test results positive for SARS-CoV-2, the preterm birth rate was 11.6% (n = 10; 6 spontaneous and 4 medically indicated preterm births) and there was 1 stillbirth.

Discussion | This study did not detect significant changes in preterm or stillbirth rates during the SARS-CoV-2 pandemic in a racially diverse urban cohort from 2 Philadelphia hospitals. Although these data allow for disaggregation of spontaneous and medically indicated preterm births, no differences in overall rates of these phenotypes were detected.

These findings differ from a Danish report of decreasing preterm birth rates[2] and higher stillbirth rates in a UK hospital[4] during the pandemic. The differences between studies may be due to differences in enforcement of lockdown orders, population heterogeneity, access to health care, or societal stressors.

Study limitations include examination of a single health system, short epochs, limited representation of other races/ethnicities, few stillbirths, and potential for change in delivery hospital choice during the pandemic.

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