cohort. It will be important to continue to monitor pregnancy outcomes in the future.

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Concept and design: Stowe, Andrews, Ladhani.

Acquisition, analysis, or interpretation of data: All authors.

Drafting of the manuscript: Stowe, Smith, Thurland.

Critical revision of the manuscript for important intellectual content: Stowe, Ramsay, Andrews, Ladhani.

Statistical analysis: Stowe, Smith, Thurland, Andrews.

Administrative, technical, or material support: Stowe.

Supervision: Ramsay.

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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 infection with cesarean delivery, neonatal transmission, preterm birth, and stillbirth.1 In a relatively homogeneous Danish population, Hedermann et al2 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.

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 pre-eclampsia 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 \( P < 0.05 \) 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. 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, live-born 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. Prepregnancy and pandemic birth outcomes were as follows: 10.5% vs 9.5% of deliveries were preterm births (adjacent difference, −1.1% [95% CI, −2.4% to 0.2%]), 5.7% vs 4.7% were spontaneous preterm births (adjacent difference, −0.8% [95% CI, −1.8% to 0.2%]), 5.4% vs 5.2% were medically indicated preterm births (adjacent difference, −0.3% [95% CI, −1.4% to 0.6%]), and 5.4% per 1000 births vs 5.0 per 1000 births were stillbirths (adjacent difference, −0.03 per 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 (\( P = 0.09 \) 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 and higher stillbirth rates in a UK hospital 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.

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

* Race/ethnicity was based on patient self-identification during patient registration.

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COMMENT & RESPONSE

Postexercise Ankle-Brachial Index Testing to Diagnose Peripheral Artery Disease

To the Editor Dr Mehta and colleagues presented the advantages and drawbacks of postexercise ankle-brachial index (ABI) testing based on a clinical case.1 However, several concerns about the postexercise criteria were not mentioned in the article. Postexercise ABI criteria to diagnose peripheral artery disease (PAD) are debated.

In 2012, Aboyans et al2 proposed using either a postexercise decline of more than 20% or a postexercise ankle pressure decrease of more than 30 mm Hg to establish the diagnosis of PAD. In 2015, among 7995 consecutive patients with claudication and ABI greater than 0.90, 19% of patients presented with a mismatch between the criteria.3 In 2018, to detect arterial stenosis greater than 50% in patients with a resting ABI of 0.90 or greater, Aday et al4 found that the sensitivity and specificity of a decrease in the postexercise ankle pressure greater than 30 mm Hg were 3% and 94%, respectively, whereas the sensitivity and specificity of a postexercise decline of more than 20% were 52% and 56%, respectively. A postexercise ABI less than 0.90 exhibited the best sensitivity (70%) and specificity (38%).4 In 2019, the best postexercise criteria to detect an arterial stenosis greater than 50% using computed tomographic angiography as a gold standard5 was a postexercise ABI decrease of 18.5% or greater, with sensitivity and specificity of 71% and 64%, respectively, whereas the sensitivity and specificity of a postexercise ABI less than 0.90 were 71% and 62%.5 In our study, the cutoff value for postexercise ankle pressure was a decrease of 20 mm Hg or greater, but the sensitivity (52%) and specificity (72%) remained poor.4 Therefore, based on the literature since 2012, use of a postexercise ankle pressure decrease of more than 30 mm Hg to diagnose PAD should not be proposed.

Exercise transcutaneous oxygen pressure (TcPO2) measurement could be useful to diagnose PAD when ankle pressures do not suggest PAD, even if this test is more complicated to perform routinely.6 Exercise TcPO2 had a sensitivity of 48% and a specificity of 85%.

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Conflict of Interest Disclosures: None reported.


In Reply Dr Mahé and colleagues are concerned about the sensitivity and specificity of the thresholds used for diagnosing PAD in patients with normal (1.00-1.40) or borderline (0.91-0.99) resting ABI and exertional non–joint-related leg pain.1,2 The diagnostic threshold of either a postexercise ABI decrease of more than 20% or a postexercise ankle systolic pressure decrease of more than 30 mm Hg were suggested by Aboyans et al3 as a reasonable diagnostic criterion for PAD (recommendation class IIa; level of evidence A) in the 2012 American Heart Association scientific statement on measurement and interpretation of the ABI.