

Have Coronavirus Disease 2019 (COVID-19) Community Lockdowns Reduced Preterm Birth Rates?



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See related articles on pages 403 and 405.

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Conditions associated with preterm birth are responsible for more than half of childhood mortality before 5 years of age and a significant portion of long-term developmental disabilities.¹ Despite many attempts, few interventions have substantially reduced the rate of neonates born preterm.² Bedrest, antibiotics, progesterins, pessaries, and numerous other strategies have not consistently reduced preterm birth. Despite some fluctuations, the preterm birth rate does not appear to have changed substantially over the past half century.¹

One challenge in analyzing the effect of various interventions on preterm birth is that the rates have not been measured consistently either over time or across locations. Combinations of last menstrual period, fundal height, quickening, and, in recent decades, ultrasonography, have been used to determine gestational age. This variation in methodology contributes to challenges in evaluating changes in gestational age over time and in comparing preterm birth rates among various groups, especially outside of randomized trials.³ Therefore, any study assessing preterm birth should describe the methodology used to determine gestational age. Given the limitations of gestational age ascertainment, birth weight should be used to confirm study findings. In addition, other confirmatory data should be reported when possible, such as the percentage of neonatal intensive care unit admissions.

Preterm births have many apparent risk factors and etiologies but often are divided into two major categories: 1) *spontaneous preterm births*, usually defined as those occurring after spontaneous onset of labor or membrane rupture; and 2) *medically indicated preterm births*, usually defined as those occurring after a prelabor cesarean birth or induction of labor.^{1,4} Studies claiming a reduction in preterm birth should describe the proportion of the reduction attributed to each group. Preterm births also are frequently classified by gestational age, ranging from extremely preterm (less than 28 weeks of gestation) to late preterm (34–37 weeks). Studies claiming a reduction in preterm birth should be able to determine the gestational age groups in which reductions occurred. Finally, because stillbirth is a competing outcome, the effect of the intervention on stillbirth rates should be presented as well.

The observation of a potential reduction in preterm birth in some locations during the coronavirus disease 2019 (COVID-19) pandemic has aroused interest, likely in part due to previous failures to reduce preterm birth rates. In most reports, this potential reduction is attributed to indirect effects of a lockdown rather than to the infection itself. Early in the pandemic, multiple reports showed an increase in preterm birth associated with maternal COVID-19 infection, which, in retrospect, appeared to be related to an increase in medically indicated prelabor cesarean births.^{5,6} More recently, while the effect of maternal COVID-19 infection on preterm birth



Table 1. Summary of Studies Evaluating Preterm Birth Before and After the Coronavirus Disease 2019 (COVID-19) Lockdown

Study	Sample Size (n)	Study Dates	Preterm Birth (wk) (%)			Birth Weight (%)	Stillbirth (/1,000)	NICU Admission (%)	Comments	
			Less than 37	Less than 34	Less than 28					
Boston, MA ⁷ ; 4 hospitals	4,644	April–July 2019	7.4	1.8	0.3	NA	NA	NA	No change in PTB, including medically indicated PTB	
	4,712	April–July 2020	7.9*	2.1*	0.4*					
Australia ⁸ ; 3 hospitals	2,514	July–September 2019	10.1	3.6	0.8	<10% 10.5	<3% 1.9	1.5	17.5	Significant decrease in PTB, greater in medically indicated than spontaneous PTB groups
	2,448	July–September 2020	8.3 [†]	2.6 [†]	0.4 [†]	10.2*	2.5*	0.8 [†]	16.1 [†]	
Italy ⁹ ; 1 hospital	9,053	March–May 2019	5.9	NA	0.55	NA		1.07	NA	Significant PTB reduction only at 32–37 wk of gestation; increase in stillbirth
	7,775	March–May 2020	4.6 [†] (32–37 wk)		0.79* (<32 wk)			3.23 [†]		
Denmark ¹⁰ ; 46 NICUs in 17 countries	—	2019 (3 mo)	NA	NA	NA	NA	NA	NA	N=457	PTB not evaluated but no change in NICU admissions (no denominator included)
	—	2020 (3 mo)							N=428*	
Denmark ¹¹ ; national registry	31,180	March–April 2015–2019	4.3	0.56	0.22	NA		NA	NA	No change in PTB rates, except significant reduction in less than 28 wk of gestation subgroup
	5,162	March–April 2020	4.2* (32–37 wk)	0.62* (28–32 wk)	0.02 [†]					
Ireland ¹² ; 1 hospital		March–June 2016–2019	NA	NA	NA	<1,500 g 9.8	<1,000 g 3.6	5.2	NA	PTB rates not presented; only present reduction in LBW; increase in stillbirth
		March–June 2020				2.3 [†]	0.8 [†]	6.0 [†]		
Netherlands ¹³ ; national registry	1,599,547	October 2010–July 2020	RR 0.84 (0.73–0.97) [§]	RR 0.91 (0.58–1.42) [§]	RR=0.99 (0.38–2.55) [§]	NA	NA	NA	NA	PTB reductions overall, primarily in high-socioeconomic-status groups
United Kingdom ¹⁴ ; 1 hospital	1,681	October 2019–January 2020	6.8	2.5	NA	NA		2.38	6.1	No change in PTB rates or in medically indicated PTB; stillbirth increased
	1,718	February–June 2020	7.6*	3.7*				9.31 [†]	6.2*	
Nepal ¹⁵ ; 9 hospitals	13,189	January–March 2020	16.7	NA	NA	NA		14	NA	PTB and stillbirth increased; however, overall births in hospital decreased during lockdown
	7,165	April–May 2020	20.0 [†]					21 [†]		
Wuhan, China ¹⁶ ; 1 hospital	7,159	January 2019–January 2020	8.6	NA	NA	NA	NA	NA	NA	No difference in PTB; neonates born during lockdown were heavier
	3,432	January–March 2020	8.2*							
Philadelphia, PA ¹⁷ ; 2 hospitals	5,907	March–June 2018	10.5	NA	NA	NA	5.4	NA	NA	No difference in spontaneous or medically indicated PTB
	3,007	March–June 2020	9.5*				5.0*			

NICU, neonatal intensive care unit; NA, not assessed; PTB, preterm birth; LBW, low birth weight; RR, relative risk.

* Results not statistically different.

[†] Statistically significant decrease in lockdown vs prelockdown period.

[‡] Statistically significant increase in lockdown vs prelockdown period.

[§] Data are RR (95% CI) comparing postlockdown period with prelockdown period.



has become less clear, no evidence suggests that maternal infection with COVID-19 reduces preterm birth.⁵

In this month's issue of *Obstetrics & Gynecology*, two Research Letters (see pages 403 and 405) present preterm birth rates associated with COVID-19 lockdown compared with an earlier period.^{7,8} We are aware of 11 studies,⁷⁻¹⁷ mostly originating from high-income countries, including the two in this issue,^{7,8} that explore the association of lockdowns implemented in response to the COVID-19 pandemic and rates of preterm birth or low birth weight. We have summarized these studies (Table 1), focusing not only on their results but also on their adherence to some of the quality metrics. As with this issue's two studies, when all are considered, there is essentially an even split between those suggesting that lockdown was associated with reduced rates of preterm birth or low birth weight and those that conclude it was not. We suspect that investigators who did not see a reduction in preterm birth would be less likely to publish their results. Thus, negative findings may be underrepresented in publications.

In terms of quality, none of the studies describe methods to determine gestational age; for those estimating a reduction in preterm birth, only one found a similar reduction in birth weight. The study from Australia,⁸ which demonstrated a reduction in preterm birth during the lockdown, did not show a corresponding decrease in birth weight during the same time-period. In this study, the reduction in preterm birth appeared to be greater among medically indicated deliveries. Several studies found that the reduction in preterm birth rate was confined to extremely low-birth-weight or very-low-birth-weight preterm neonates; on the other hand, one study showed a significant reduction only in near-term births. Although many addressed overall cesarean birth rates, few^{7,8,14,17} addressed whether the preterm births averted were spontaneous or medically indicated. Of the studies that provided data on medically indicated preterm birth, the three that showed no changes also observed no change in the overall preterm birth rates.^{7,14,17} The most recently published study, from Philadelphia, Pennsylvania, which included data on medically indicated preterm births, found no change in preterm birth or stillbirths associated with the lockdown.¹⁷

Although unavoidable because of the range of governmental actions, different study dates, and lengths of time defined the lockdown periods, but of concern, many studies used different lengths of time for the historic control sample. In addition, the numbers were often small, especially in the studies that evaluated subgroups of extremely preterm neonates. Because

many potential pregnancy outcomes could have been reported in these studies (eg, various gestational age and birth weight ranges, neonatal intensive care unit admission), it is unsurprising that a few of these, by chance, would be positive. Importantly, among the six publications that presented data on stillbirth in the lockdown period, four of them reported significant increases.

With the methodologic issues noted, the discrepancies in results, and the likelihood of time-period selection and publication bias, we believe that there is not sufficient evidence to conclude that there was a consistent reduction in preterm birth associated with COVID-19 lockdowns. Thus, although the two articles presented in this issue add to the overall body of literature, there remain concerns that make the direction of the findings difficult to interpret. Certainly, it is far too early to consider potential mechanisms for a reduction in preterm birth associated with COVID-19 lockdowns.

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