Appendix 1. Study Sites and Personnel

The members of the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development Maternal-Fetal Medicine Units Network that participated in this study are as follows:

Clinical Centers:

Main centers are listed below. Personnel at subsites have the subsite listed in brackets.

University of Pittsburgh, Pittsburgh, PA – H. Simhan, M. Bickus, F. Facco

University of Alabama at Birmingham, Birmingham, AL – A. Tita, J. Grant, A. Leath, S. Longo [Ochsner Health], M. Hendricks [Ochsner Health], K. Arias [Ochsner Health]

The Ohio State University, Columbus, OH – M. Costantine, A. Bartholomew, M. Landon, K. Rood, P. Schneider, H. Frey, D. McKenna [Miami Valley Hospital], S. Wiegand [Miami Valley Hospital], E. K. Snow [Miami Valley Hospital], K. Fennig [Miami Valley Hospital], M. Habli [Good Samaritan Hospital], D. Lambers [Good Samaritan Hospital], M. McClellan [Good Samaritan Hospital]

University of Utah Health Sciences Center, Salt Lake City, UT – T. Metz, A. Sowles, A. Nelsen [Utah Valley], M. Varner, M.S. Esplin [Intermountain Medical Center]

Brown University, Providence, RI – D. Rouse, D. Allard, C. Pettker [Yale], J. Leventhal [Yale], J. Rousseau, J. Milano, L. Early

Columbia University, New York, NY – C. Gyamfi-Bannerman, S. Bousleiman, R. Wapner, D. Sutton, H. Manchon, M. Hoffman [Christiana Care], C. Kitto [Christiana Care], K. Palomares [St. Peter's U. Hosp], I. Beche [St. Peter's U. Hosp.], D. Skupski [NY Presbyterian Queens], R. Chan-Akeley [NY Presbyterian Queens]

University of Texas Medical Branch, Galveston, TX – G. Saade, A. Salazar, L. Pacheco, S. Clark, H. Harirah, S. Jain, G. Olson, A. Saad, M. McDonnold [St. David's Women's Center of Texas], C. Brown [St. David's Women's Center of Texas], L. Allen, G. Carrington, J. Cornwell, J. DeVolder, L. Thibodeaux, E. Welch

MetroHealth Medical Center-Case Western Reserve University, Cleveland, OH – J. Bailit, W. Dalton, A. Tyhulski, A. Mayle [University Hospitals]

University of Texas Health Science Center at Houston-Children's Memorial Hermann Hospital, Houston, TX – S. Chauhan, H. Mendez-Figueroa, F. Ortiz

University of North Carolina at Chapel Hill, Chapel Hill, NC – J. Thorp, T. Manuck, K. Clark, B. Hughes [Duke], S. Timlin, L. Fried, H. Byers, C. Beamon, MD [WakeMed Health & Hospitals], J. Ferrara [Duke], A. Williams, K. Eichelberger [Greenville], A. Moore [Greenville]

Metz TD, Clifton RG, Hughes BL, Sandoval GJ, Grobman WA, Saade GR, et al. Association between giving birth during the early coronavirus disease 2019 (COVID-19) pandemic and serious maternal morbidity. Obstet Gynecol 2022;140.
The authors provided this information as a supplement to their article.

Northwestern University, Chicago, IL – W. Grobman, G. Mallett, M. Ramos-Brinson, B. Plunkett [NorthShore University Evanston Hospital], K. Kearns [NorthShore University Evanston Hospital], A. Palatnik [Froedhert Hospital/ Medical College of Wisconsin], S. Northey [Froedert Hospital/Medical College of Wisconsin]

University of Pennsylvania, Philadelphia, PA – S. Parry, H. Sehdev, M. McCabe, C. Fazio, A. Filipczak, J. Craig, L. Muzzarelli

Data Coordinating Center:

The George Washington University Biostatistics Center, Washington, DC – R. Clifton, G. Sandoval, E. Thom, C. Nwachuku, V. L. Flowers-Fanomezantsoa

NIH:

***Eunice Kennedy Shriver* National Institute of Child Health and Human Development**, Bethesda, MD – M. Longo, M. Miodovnik, S. Archer

MFMU Network Steering Committee Chair: George A. Macones

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Appendix 2.

Modifications at the hospital, healthcare system, and community level were recorded for each participating site. Start and end date of each modification was also recorded.

Hospital-Level Modifications

Any modifications made at the hospital-level due to COVID-19?

Changes to trainees:

1. Removal of medical students from the OB service?
2. Removal of residents from the OB service?
3. Addition of residents from other services to the OB service?
4. Removal of maternal-fetal medicine (MFM) fellows from the OB service?
5. Addition of non-MFM fellows to the OB service?

Changes to staffing of labor and delivery:

1. Need for changes in labor and delivery staffing as a result of a large number of staff requiring quarantine?
2. Utilization of nursing staff on labor and delivery who were not previously employed as labor and delivery nurses (eg. nursing staff from other departments/hospital wards)?

Changes to attending or primary physician (in community settings) covering labor and delivery:

1. Utilization of obstetrician-gynecologists who were not previously doing obstetrics (before pandemic) for staffing of labor and delivery?

Healthcare System Modifications

Any modifications made at the healthcare system-level due to COVID-19?

Changes to in-person visit frequency:

1. Use of telemedicine visits/virtual care?

Changes to frequency of ultrasounds or antenatal surveillance:

1. Policy implemented to change frequency of ultrasounds for a variety of conditions (maternal hypertension, diabetes, congenital heart disease, fetal congenital anomalies, etc)?
2. Policy implemented to change frequency of antenatal surveillance (non-stress tests or biophysical profiles)?

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Changes to criteria for blood product administration:

1. Implementation of a policy to conserve blood products?

Changes to visitor policies:

1. Implementation of a policy to limit visitors on L&D?

Community SARS-CoV-2 Mitigation Strategies

Any modifications made at the community-level due to COVID-19?

School, restaurant or business closures:

1. Local school closures (within the county of the hospital)?
2. Local restaurant and other business closures (within the county of the hospital)?

Shelter in place orders:

1. Shelter in place government orders (within the county of the hospital)?
2. Full state shelter in place orders?

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Appendix 3. Sensitivity Analysis, Primary Outcome and Secondary Maternal and Neonatal Adverse Outcomes for Individuals Who Gave Birth During the Pandemic Compared With Those Who Gave Birth Before the Pandemic With Imputation for Missing Body Mass Index (BMI)

	During Pandemic (n=12133)	Before Pandemic (n=9709)	RR (95% CI)	aRR (95% CI)
Primary Composite of Maternal Death or Serious Morbidity from Common Obstetric Complications	1125 (9.3)	865 (8.9)	1.05 (0.97 - 1.14)	1.02 (0.94 - 1.11)
Death	0	0		
Hypertensive disorders of pregnancy	797 (6.6)	641 (6.6)	1.00 (0.91 - 1.11)	0.97 (0.87 - 1.07)
Postpartum hemorrhage	292 (2.4)	215 (2.2)	1.10 (0.93 - 1.29)	1.09 (0.92 - 1.28)
Infection	109 (0.9)	83 (0.9)	1.02 (0.78 - 1.33)	1.02 (0.78 - 1.33)
Secondary Maternal Outcomes				
Cesarean birth	3930 (32.4)	3041 (31.3)	1.04 (0.99 - 1.08)	1.01 (0.97 - 1.06)
ACOG and SMFM definition severe morbidity	174 (1.4)	188 (1.9)	0.71 (0.59 - 0.87)	0.70 (0.57 - 0.85)
ICU admission	150 (1.2)	169 (1.7)	0.68 (0.55 - 0.83)	0.68 (0.55 - 0.84)
Number of ICU days	2.0 (1.0 - 3.0)	2.0 (1.0 - 3.0)	-0.1 (-0.2 - 0.1)*	-0.10 (-0.25 - 0.04)*
Venous thromboembolism (DVT/PE)	9 (0.1)	13 (0.1)	0.58 (0.26 - 1.32)	
Superficial or deep incisional surgical site infection	30 (0.8)	18 (0.6)	1.36 (0.79 - 2.36)	1.35 (0.77 - 2.35)
Number of in-patient hospitalization days	2.0 (2.0 - 3.0)	3.0 (2.0 - 3.0)	-0.1 (-0.1 - -0.1)*	-0.10 (-0.11 - -0.08)*
Length of stay (days)	2.0 (2.0 - 3.0)	3.0 (2.0 - 3.0)	-0.1 (-0.1 - -0.1)*	-0.09 (-0.11 - -0.08)*

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Neonatal Outcomes	During Pandemic (n=12407)	Before Pandemic (n=9938)	RR (95% CI)	aRR (95% CI)
Stillbirth at 20 weeks' gestation or later	91 (0.7)	62 (0.6)	1.12 (0.84 - 1.51)	1.16 (0.86 - 1.58)
Neonatal death	70 (0.6)	69 (0.7)	0.84 (0.61 - 1.14)	0.82 (0.59 - 1.13)
Live births or stillbirth 20 weeks or later	12339	9895		
Perinatal preterm composite	257 (2.1)	211 (2.1)	0.98 (0.83 - 1.16)	1.01 (0.85 - 1.20)
Perinatal term composite	727 (5.9)	618 (6.2)	0.94 (0.85 - 1.04)	0.94 (0.85 - 1.04)
Live births	12248	9833		
NICU admission	2183 (17.8)	1901 (19.3)	0.93 (0.88 - 0.98)	0.92 (0.87 - 0.98)
Number of days in NICU	7.0 (3.0 - 21.0)	7.0 (3.0 - 20.0)	0.01 (-0.07 - 0.09)*	0.01 (-0.07 - 0.09)*

RR, relative risk; aRR, adjusted relative risk; CI, confidence interval.
Data are n (%) or median (IQR), unless otherwise specified.
* difference in means of the natural-log transform.
Model for primary composite of maternal death or serious morbidity adjusted for MFMU site, maternal age, body mass index, any co-morbidity (asthma/COPD, pregestational diabetes, chronic hypertension), and obstetric history (no prior pregnancy, prior pregnancy without PTB/preeclampsia, or prior pregnancy with PTB/preeclampsia).
Model for cesarean birth adjusted for MFMU site, maternal age, body mass index, any co-morbidity (asthma/COPD, pregestational diabetes, chronic hypertension), and prior delivery route (no prior pregnancy, vaginal only, or cesarean).
All other models adjusted for MFMU site, maternal age, body mass index, and any co-morbidity (asthma/COPD, pregestational diabetes, chronic hypertension).

Appendix 4. Sensitivity Analysis, Primary Outcome, and Secondary Maternal and Neonatal Adverse Outcomes for Individuals Who Gave Birth During the Pandemic Compared With Those Who Gave Birth Before the Pandemic, Excluding Those With No SARS-CoV-2 Test

	During Pandemic (n=11752)	Before Pandemic (n=9709)	RR (95% CI)	aRR (95% CI)
Primary Composite of Maternal Death or Serious Morbidity from Common Obstetric Complications	1076 (9.2)	865 (8.9)	1.04 (0.95 - 1.13)	1.00 (0.92 - 1.10)
Death	0	0		
Hypertensive disorders of pregnancy	761 (6.5)	641 (6.6)	0.99 (0.90 - 1.09)	0.93 (0.84 - 1.04)
Postpartum hemorrhage	282 (2.4)	215 (2.2)	1.09 (0.93 - 1.29)	1.11 (0.93 - 1.33)
Infection	103 (0.9)	83 (0.9)	0.99 (0.76 - 1.30)	1.03 (0.77 - 1.37)
Secondary Maternal Outcomes				
Cesarean birth	3811 (32.4)	3041 (31.3)	1.04 (0.99 - 1.09)	1.02 (0.97 - 1.07)
ACOG and SMFM definition severe morbidity	163 (1.4)	188 (1.9)	0.69 (0.57 - 0.84)	0.66 (0.54 - 0.82)
ICU admission	139 (1.2)	169 (1.7)	0.65 (0.53 - 0.80)	0.64 (0.51 - 0.80)
Number of ICU days	2.0 (1.0 - 3.0)	2.0 (1.0 - 3.0)	-0.1 (-0.3 - 0.0)*	-0.16 (-0.31 - -0.01)*
Venous thromboembolism (DVT/PE)	9 (0.1)	13 (0.1)	0.60 (0.27 - 1.36)	
Superficial or deep incisional surgical site infection	28 (0.7)	18 (0.6)	1.31 (0.75 - 2.29)	1.19 (0.66 - 2.14)
Number of in-patient hospitalization days	2.0 (2.0 - 3.0)	3.0 (2.0 - 3.0)	-0.1 (-0.1 - -0.1)*	-0.10 (-0.11 - -0.08)*
Length of stay (days)	2.0 (2.0 - 3.0)	3.0 (2.0 - 3.0)	-0.1 (-0.1 - -0.1)*	-0.09 (-0.10 - -0.08)*

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Neonatal Outcomes	During Pandemic (n=12017)	Before Pandemic (n=9938)	RR (95% CI)	aRR (95% CI)
Stillbirth at 20 weeks' gestation or later	89 (0.7)	62 (0.6)	1.14 (0.84 - 1.53)	1.06 (0.76 - 1.47)
Neonatal death	66 (0.5)	69 (0.7)	0.81 (0.59 - 1.12)	0.86 (0.61 - 1.23)
Live births or stillbirth 20 weeks or later	11954	9895		
Perinatal preterm composite	249 (2.1)	211 (2.1)	0.98 (0.83 - 1.17)	1.05 (0.86 - 1.27)
Perinatal term composite	705 (5.9)	618 (6.2)	0.94 (0.85 - 1.04)	0.95 (0.85 - 1.06)
Live births	11865	9833		
NICU admission	2107 (17.8)	1901 (19.3)	0.92 (0.87 - 0.98)	0.92 (0.86 - 0.98)
Number of days in NICU	7.0 (3.0 - 21.0)	7.0 (3.0 - 20.0)	0.01 (-0.07 - 0.09)*	0.04 (-0.04 - 0.13)*

RR, relative risk; aRR, adjusted relative risk; CI, confidence interval.
Data are n (%) or median (IQR), unless otherwise specified.
* difference in means of the natural-log transform.
Model for primary composite of maternal death or serious morbidity adjusted for MFMU site, maternal age, body mass index, any co-morbidity (asthma/COPD, pregestational diabetes, chronic hypertension), and obstetric history (no prior pregnancy, prior pregnancy without PTB/preeclampsia, or prior pregnancy with PTB/preeclampsia).
Model for cesarean birth adjusted for MFMU site, maternal age, body mass index, any co-morbidity (asthma/COPD, pregestational diabetes, chronic hypertension), and prior delivery route (no prior pregnancy, vaginal only, or cesarean).
All other models adjusted for MFMU site, maternal age, body mass index, and any co-morbidity (asthma/COPD, pregestational diabetes, chronic hypertension).

Appendix 5. Planned Subanalysis for Primary Outcome and Prespecified Secondary Maternal Outcomes by Parity

	During Pandemic	Before Pandemic	RD (95% CI)	RR (95% CI)	aRR (95% CI)	p-value for interaction
Primary Composite of Maternal Death or Serious Morbidity from Common Obstetric Complications	1125 (9.3)	865 (8.9)				0.29
Cesarean birth	3930 (32.4)	3041 (31.3)				0.61
ACOG and SMFM definition severe morbidity						0.02
No prior pregnancy 20 weeks or longer	114 (1.6)	108 (1.9)	-0.3 (-0.7 - 0.1)	0.84 (0.65 - 1.07)	0.84 (0.64 - 1.09)	
Prior pregnancy 20 weeks or longer	57 (1.2)	79 (2.0)	-1.0 (-1.5 - -0.5)	0.53 (0.39 - 0.73)	0.51 (0.36 - 0.71)	
ICU admission						0.045
No prior pregnancy 20 weeks or longer	98 (1.4)	98 (1.7)	-0.4 (-0.8 - 0.0)	0.79 (0.60 - 1.02)	0.80 (0.60 - 1.06)	
Prior pregnancy 20 weeks or longer	49 (1.0)	70 (1.8)	-0.9 (-1.4 - -0.5)	0.52 (0.37 - 0.73)	0.50 (0.35 - 0.72)	
Number of ICU days	2.0 (1.0 - 3.0)	2.0 (1.0 - 3.0)				0.65
Number of in-patient hospitalization days	2.0 (2.0 - 3.0)	3.0 (2.0 - 3.0)				0.33
Length of stay (days)	2.0 (2.0 - 3.0)	3.0 (2.0 - 3.0)				0.16

RD, risk difference; RR, relative risk; aRR, adjusted relative risk; CI, confidence interval.
Data are n (%) or median (IQR), unless otherwise specified.
* difference in means of the natural-log transform.
Model for primary composite of maternal death or serious morbidity adjusted for MFMU site, maternal age, body mass index, any co-morbidity (asthma/COPD, pregestational diabetes, chronic hypertension), and obstetric history (no prior pregnancy, prior pregnancy without PTB/preeclampsia, or prior pregnancy with PTB/preeclampsia).
Model for cesarean birth adjusted for MFMU site, maternal age, body mass index, any co-morbidity (asthma/COPD, pregestational diabetes, chronic hypertension), and prior delivery route (no prior pregnancy, vaginal only, or cesarean).
All other models adjusted for MFMU site, maternal age, body mass index, and any co-morbidity (asthma/COPD, pregestational diabetes, chronic hypertension).

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Appendix 6. Planned Subanalysis for Primary Outcome and Prespecified Secondary Maternal Outcomes by Insurance Status

	During Pandemic	Before Pandemic	RD (95% CI)	RR (95% CI)	aRR (95% CI)	p-value for interaction
Primary Composite of Maternal Death or Serious Morbidity from Common Obstetric Complications	1125 (9.3)	865 (8.9)				0.38
Cesarean birth	3930 (32.4)	3041 (31.3)				0.40
ACOG and SMFM definition severe morbidity	174 (1.4)	188 (1.9)				0.43
ICU admission	150 (1.2)	169 (1.7)				0.32
Number of ICU days	2.0 (1.0 - 3.0)	2.0 (1.0 - 3.0)				0.34
Number of in-patient hospitalization days	2.0 (2.0 - 3.0)	3.0 (2.0 - 3.0)				0.67
Length of stay (days)	2.0 (2.0 - 3.0)	3.0 (2.0 - 3.0)				0.31

RD, risk difference; RR, relative risk; aRR, adjusted relative risk; CI, confidence interval.
Data are n (%) or median (IQR), unless otherwise specified.
* difference in means of the natural-log transform.
Model for primary composite of maternal death or serious morbidity adjusted for MFMU site, maternal age, body mass index, any co-morbidity (asthma/COPD, pregestational diabetes, chronic hypertension), and obstetric history (no prior pregnancy, prior pregnancy without PTB/preeclampsia, or prior pregnancy with PTB/preeclampsia).
Model for cesarean birth adjusted for MFMU site, maternal age, body mass index, any co-morbidity (asthma/COPD, pregestational diabetes, chronic hypertension), and prior delivery route (no prior pregnancy, vaginal only, or cesarean).
All other models adjusted for MFMU site, maternal age, body mass index, and any co-morbidity (asthma/COPD, pregestational diabetes, chronic hypertension).

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Appendix 7. Planned Subanalysis for Primary Outcome and Prespecified Secondary Maternal Outcomes by Race and Ethnicity

	During Pandemic	Before Pandemic	RD (95% CI)	RR (95% CI)	aRR (95% CI)	p-value for interaction
Primary Composite of Maternal Death or Serious Morbidity from Common Obstetric Complications	1125 (9.3)	865 (8.9)				0.51
Cesarean birth	3930 (32.4)	3041 (31.3)				0.58
ACOG and SMFM definition severe morbidity	174 (1.4)	188 (1.9)				0.19
ICU admission	150 (1.2)	169 (1.7)				0.13
Number of ICU days	2.0 (1.0 - 3.0)	2.0 (1.0 - 3.0)				0.11
Number of in-patient hospitalization days	2.0 (2.0 - 3.0)	3.0 (2.0 - 3.0)				0.08
Length of stay (days)	2.0 (2.0 - 3.0)	3.0 (2.0 - 3.0)				0.21

RD, risk difference; RR, relative risk; aRR, adjusted relative risk; CI, confidence interval.
Data are n (%) or median (IQR), unless otherwise specified.
* difference in means of the natural-log transform.
Model for primary composite of maternal death or serious morbidity adjusted for MFMU site, maternal age, body mass index, any co-morbidity (asthma/COPD, pregestational diabetes, chronic hypertension), and obstetric history (no prior pregnancy, prior pregnancy without PTB/preeclampsia, or prior pregnancy with PTB/preeclampsia).
Model for cesarean birth adjusted for MFMU site, maternal age, body mass index, any co-morbidity (asthma/COPD, pregestational diabetes, chronic hypertension), and prior delivery route (no prior pregnancy, vaginal only, or cesarean).
All other models adjusted for MFMU site, maternal age, body mass index, and any co-morbidity (asthma/COPD, pregestational diabetes, chronic hypertension).

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