Supplemental Material

Manuscript Title: Maternal-Newborn Health System Changes and Outcomes in Ontario Canada during Wave 1 of the COVID-19 Pandemic – A Retrospective Study

Authors: Nicole F. ROBERTS, MSc1; Ann E. SPRAGUE, RN, PhD1,2; Monica TALJAARD, PhD3,4; Deshayne B. FELL, PhD2,4; Joel G. RAY, MD, MSc5; Modupe TUNDE-BYASS, MD6,7; Anne BIRINGER, MD, CCFP8; Jon F.R. BARRETT, MBBch, MD, MRCOG9; Faiza KHURSHID, MBBS, MD10; Sanober DIAZ, MSc11; Kara BELLAI-DUSSAULT, MSc1,2; Dana-Marie RADKE, RN1; Lise M. BISNAIRE, PhD1,2; Christine M. ARMOUR, MD, MSc1,2,12; Ian C. JOINER, MPA1; Mark C. WALKER, MD, MSc1,3,13,14,15

Affiliations:
1Better Outcomes Registry & Network (BORN) Ontario, Ottawa, Ontario, Canada
2Children’s Hospital of Eastern Ontario (CHEO) Research Institute, Ottawa, Ontario, Canada
3Ottawa Hospital Research Institute, Clinical Epidemiology Program, Ottawa, Ontario, Canada
4School of Epidemiology and Public Health, University of Ottawa, Ottawa, Ontario, Canada
5Department of Obstetrics and Gynecology, St. Michael’s Hospital, University of Toronto, Toronto, Ontario, Canada
6Temerty Faculty of Medicine, University of Toronto, Toronto, Ontario, Canada
7Department of Obstetrics and Gynaecology, North York General Hospital, Toronto, Ontario, Canada
8Ray D Wolfe Department of Family Medicine, Sinai Health System, University of Toronto, Toronto, Ontario, Canada
9Department of Obstetrics and Gynecology, McMaster University, Hamilton, Ontario, Canada
10Queen’s University, Kingston, Ontario, Canada
11Provincial Council for Maternal and Child Health, Toronto, Ontario, Canada
12Department of Pediatrics, University of Ottawa, Ottawa, Ontario, Canada
13International and Global Health, Faculty of Medicine, University of Ottawa, Ottawa, Ontario, Canada
14Champlain Maternal Newborn Regional Program, Ottawa, Ontario, Canada
15The Ottawa Hospital, Ottawa, Ontario, Canada
Table S2. Results from segmented logistic regression analyses

| Outcome                        | Relative Risk (95% CI) | p-value | Risk Difference (95% CI) | p-value |
|--------------------------------|------------------------|---------|--------------------------|---------|
| **System Outcomes**            |                        |         |                          |         |
| **Length of stay: vaginal birth** |                        |         |                          |         |
| Pre-intervention trend (per week) | -0.006 (-0.007 to -0.005) | <.0001  |                          |         |
| Change in level                | -1.45 (-1.85 to -1.06) | <.0001  |                          |         |
| Change in slope                | 0.031 (0.012 to 0.050)  | 0.0015  |                          |         |
| **Length of stay: cesarean birth** |                        |         |                          |         |
| Pre-intervention trend (per week) | -0.010 (-0.011 to -0.001) | <.0001  |                          |         |
| Change in level                | -3.66 (-4.09 to -3.24)  | <.0001  |                          |         |
| Change in slope                | 0.043 (0.023 to 0.064)  | <.0001  |                          |         |
| **Maternal Outcomes**          |                        |         |                          |         |
| Regional anesthesia for cesarean birth |                     |         |                          |         |
| Pre-intervention trend (per week) | 1.000 (1.000 to 1.000)  | 0.0617  | 0.001 (-0.00003 to 0.003) | 0.0619  |
| Change in level                | 1.01 (1.01 to 1.02)    | <.0001  | 1.05 (0.55 to 1.56)      | <.0001  |
| Change in slope                | 1.000 (1.000 to 1.000)  | 0.1241  | -0.020 (-0.045 to 0.005) | 0.1234  |
| **Newborn Outcomes**           |                        |         |                          |         |
| Preterm birth: <24 weeks       |                        |         |                          |         |
| Pre-intervention trend (per week) | 1.000 (1.000 to 1.000)  | 0.3160  | -0.0001 (-0.0003 to 0.0001) | 0.3300  |
| Change in level                | 1.02 (0.74 to 1.40)    | 0.9123  | 0.007 (-0.083 to 0.096)  | 0.8820  |
| Change in slope                | 0.99 (0.98 to 1.01)    | 0.3816  | -0.002 (-0.006 to 0.002) | 0.3938  |
| Preterm birth: 24-27+6 weeks   |                        |         |                          |         |
| Pre-intervention trend (per week) | 1.000 (1.000 to 1.001)  | 0.2446  | 0.0002 (-0.0001 to 0.0004) | 0.1945  |
| Change in level                | 1.10 (0.82 to 1.47)    | 0.5174  | 0.028 (-0.085 to 0.14)   | 0.6320  |
| Change in slope                | 0.99 (0.97 to 1.00)    | 0.0644  | -0.005 (-0.010 to 0.0003) | 0.0698  |
| Preterm birth: 28-31+6 weeks   |                        |         |                          |         |
| Pre-intervention trend (per week) | 1.000 (1.000 to 1.000)  | 0.9794  | 0.00001 (-0.0003 to 0.0003) | 0.9527  |
| Change in level                | 1.04 (0.87 to 1.24)    | 0.6523  | 0.024 (-0.10 to 0.15)    | 0.7138  |
| Change in slope                | 1.00 (0.99 to 1.01)    | 0.3886  | -0.002 (-0.008 to 0.004) | 0.4358  |
| Preterm birth: 32-33+6 weeks   |                        |         |                          |         |
| Pre-intervention trend (per week) | 1.000 (1.000 to 1.000)  | 0.2680  | -0.0002 (-0.0006 to 0.0002) | 0.2895  |
| Change in level                | 1.04 (0.86 to 1.24)    | 0.7022  | 0.032 (-0.13 to 0.19)    | 0.6997  |
| Change in slope                | 1.00 (0.99 to 1.01)    | 0.4237  | -0.003 (-0.011 to 0.005) | 0.4322  |
| Preterm birth: 34-36+6 weeks |
|-------------------------------|
| Pre-intervention trend (per week) | 1.000 (1.000 to 1.000) | 0.0018 | 0.002 (0.0006 to 0.003) | 0.0021 |
| Change in level | 0.97 (0.90 to 1.04) | 0.4285 | -0.17 (-0.62 to 0.27) | 0.4411 |
| Change in slope | 1.000 (1.000 to 1.004) | 0.9167 | 0.001 (-0.021 to 0.023) | 0.9137 |

| Medically-induced preterm birth |
|-------------------------------|
| Pre-intervention trend (per week) | 1.000 (1.000 to 1.000) | 0.0447 | 0.006 (0.00003 to 0.013) | 0.0488 |
| Change in level | 0.95 (0.88 to 1.02) | 0.1366 | -2.14 (-4.90 to 0.62) | 0.1299 |
| Change in slope | 1.003 (1.000 to 1.007) | 0.0654 | 0.13 (-0.007 to 0.28) | 0.0631 |

| Spontaneous preterm birth |
|----------------------------|
| Pre-intervention trend (per week) | 1.000 (1.000 to 1.000) | 0.0043 | -0.01 (-0.017 to -0.003) | 0.0038 |
| Change in level | 0.94 (0.87 to 1.01) | 0.0948 | -2.53 (-5.49 to 0.44) | 0.0961 |
| Change in slope | 1.002 (0.998 to 1.006) | 0.3671 | 0.07 (-0.08 to 0.22) | 0.3587 |

Results from segmented regression models, March 1 2015 – October 31 2020. Models included terms for continuous time (week interval), a binary indicator for whether the time interval was before or after the start of the COVID-19 pandemic on March 1, 2020, continuous time post onset of COVID-19 Wave 1 and seasonality (month). Intercept and seasonality parameter estimates not shown. All models accounted for first-order autocorrelation.

Length of stay is a median difference (hours), all other outcomes are shown as relative risks and risk differences (%).
P-values <.05 for immediate effects (change in level after onset of COVID-19 Wave 1) and gradual effects (change in slope after onset of COVID-19 Wave 1) are bolded.

*Models for length of stay have the first three time points in the pandemic period set to missing.