

Appendix A

Appendix Table 1: Data sources

Data source	Full name	Description
BORN BIS	Better Outcomes Registry and Network Information System	A provincial perinatal registry established in 2012 to collect data about every birth in Ontario, as well as data about pregnancy and the early childhood period.
CIHI-DAD	Canadian Institute for Health Information Discharge Abstract Database	A national hospital discharge database that captures administrative, demographic, and clinical data on all hospitalizations.
RPDB	Registered Persons Database	An ICES derived dataset containing demographic information about anyone who has ever had an Ontario health insurance plan number. Based on data from the Ministry of Health and enhanced with other ICES data holdings.
INST	Institution Information System	A set of linkable datasets containing information about Ontario health care institutions funded by the Ministry of Health.
MOMBABY	MOMBABY	An ICES derived cohort based on linked DAD inpatient admission records of mothers (people giving birth) and their newborns.
HYPER	Ontario Hypertension Database	An ICES derived cohort containing all Ontario hypertension patients identified since 1991. Based on hospital admission and same day surgery diagnosis codes and physician billing codes.
ODD	Ontario Diabetes Database	An ICES derived cohort containing all individuals in Ontario with non-gestational diabetes identified since 1991. Based on hospital admission codes and physician billing codes.



Appendix Table 2: Data used to define low risk birth (LRB) cohort entry, exclusions, baseline characteristics and outcomes

Assessment	Disease or procedure or condition	BORN BIS	ICD-10-CA or CCI codes in CIHI-DAD, or in MOMBABY
Inclusion criteria	All deliveries in Ontario between April 1, 2012, and March 31, 2018	All records with a birthdate (B_BDATE) between 01APR2012 and 31MAR2018	All records with a birthdate (B_BDATE) between 01APR2012 and 31MAR2018 (see MOMBABY)
Exclusion criteria applied to all included records	Out of hospital births	BIRTH_LOCATION_TYPE_ID = 1012730 (hospital)	N/A
	Invalid healthcare number	M_VALIKN not 'V'	M_VALIKN not 'V'
	Invalid sex	SEX in RPDB not Female	SEX in RPDB not Female
	Non-Ontario residents	Province code in RPDB not Ontario	Province code in RPDB not Ontario
	Gestational age < 20 weeks	GA_AT_BIRTH_WEEKS < 20	B_GESTWKS_DEL < 20 (if missing use M_GESTWKS_DEL)
	Overlapping/duplicate deliveries	Same M_IKN and B_BDATE but different PREGNANCY_ID_ENC, or a delivery < 20 weeks following the previous delivery	Same M_IKN and B_BDATE but different M_KEY, or a delivery < 20 weeks following the previous delivery
	Non-birth outcome	AGG_PREGNANCY_OUTCOME_ID is not live birth (1021030) or stillbirth (1021060, 1021070, 1021080, 1021090)	N/A
Link BIS & CIHI-DAD deliveries	Deliveries from 01APR2012 to 31MAR2018	M_IKN in MOMBABY = M_IKN in BIS B_BDATE in MOMBABY +/- 7 days of B_BDATE in BIS	M_IKN in MOMBABY = M_IKN in BIS B_BDATE in MOMBABY +/- 7 days of B_BDATE in BIS
Exclusions applied to linked BIS + CIHI-DAD delivery records:			
<i>Recorded at delivery, or during pregnancy (BMI)</i>	Stillbirth	AGG_PREGNANCY_OUTCOME_ID includes 1021060, 1021070, 1021080, or 1021090	M_STILLBIRTH in MOMBABY = 'T'
<i>Same as above</i>	<10 or >35 years of age	MATAGEATSTILLORLIVEBIRTHYEARS < 10 or > 35	AGE in RPDB < 10 or > 35
<i>Same as above</i>	Pre-pregnancy BMI >= 40.0 kg/m ²	MATERNAL_BMI >= 40.0 (if BMI is missing, then include in dataset)	E66.(Obesity). Any DXTYPE.
<i>Same as above</i>	Multiparous	PARITY is not 0	The sum of PREVTERM (Number of previous term deliveries) and PREVPRETERM (Number of previous pre-term deliveries) > 0
<i>Same as above</i>	Multifetal gestation	NUMBER_OF_FETUSES is not 1	O30 (same as M_MULTIBIRTH = 'T' in MOMBABY)
<i>Same as above</i>	Non-Cephalic presentation	PRESENTATION_TYPE_ID is not 1021150 (Cephalic), 3000088 (Cephalic \ Cephalic type unknown), 1021190 (Cephalic \ Vertex)	5MD56^^ (Breech delivery) OR O32.^^ (malpresentation) OR O64.^^ (obstructed labour)
<i>Same as above</i>	Gestation < 37 weeks	GA_AT_BIRTH_WEEKS < 37	B_GESTWKS_DEL in MOMBABY < 37 (if missing use M_GESTWKS_DEL in MOMBABY)
<i>Same as above</i>	Non-Spontaneous labour	LABOUR_TYPE_ID is not 1014640 (Spontaneous)	5.AC.24 or 5.AC.30 (inductions)
<i>Same as above</i>	No labour C-section	BIRTH_TYPE_ID = 1012900 (No Labour - Cesarean Section) OR (BIRTH_TYPE_ID = 1012890 [Induced or Spontaneous Labour Cesarean Section] and LABOUR_TYPE_ID = 1014645 [No Labour])	5.MD.60.^^ AND Intervention Status Attribute code: N2 (Elective primary c/s with indications), N3 (Elective primary c/s without indication – e.g. mother's request), or N4 (Elective repeat c/s), PA (Primary, Indicated, Planned), PC (Primary, Not-Indicated, Planned), RA (Repeat, Indicated, Planned), or RC (Repeated, Not-Indicated, Planned)
<i>BIS: Pre-existing or diagnosed / active during the index pregnancy; CIHI-DAD: Diagnosed ≤ 2 y pre-conception & before delivery discharge</i>	Maternal autoimmune condition	MAT_PRE_EXIST_HEALTH_COND_ID IN (1016530, 1016540, 1016560, 1016550)	L93, M32, A18.4, M05, M06, M45, M35.9

Continued

Appendix Table 2: Continued

Assessment	Disease or procedure or condition	BORN BIS	ICD-10-CA or CCI codes in CIHI-DAD, or in MOMBABY
Same as above	Maternal cancer	MAT_PRE_EXIST_HEALTH_COND_ID IN (1016570, 1016580, 1016590) or EXPOSURE_MEDICATION_ID = 1020640	C00-C97, Z51.1, Z54.2, Z92.6
Same as above	Maternal cardiovascular condition	MAT_PRE_EXIST_HEALTH_COND_ID IN (1016600, 1016610, 1016620, 1016630, 1016640, 1016650, 1016680, 1016660, 1016670)	O10.1, O10.3, I51.6, Q20, Q21, Q22, Q23, Q24, O10.4, O10.9, I10, I11, I13, O10.2, I12, O26.8, N00-N07; N13.0-N13.5; N13.7-N13.9; N17-N19
Same as above	Maternal diabetes	MAT_PRE_EXIST_HEALTH_COND_ID IN (1016730, 1016740, 1016750, 1016760, 1016770, 1016780, 3000004) or DIABETES_AND_PREGNANCY_ID IN (1013400, 1013410, 1013420, 1013430, 1013440, 1013450, 1013460, 1013465, 1013470, 1013480, 1013490, 1013500, 1013510, 1013520, 1013530, 1013540, 1013545, 1013550, 1013560, 1013570, 3000001, 3000002)	O24, E10, E11, E13, E14
Same as above	Maternal gastrointestinal condition	MAT_PRE_EXIST_HEALTH_COND_ID IN (1016900, 1016910, 1016920, 1016930, 1016905, 1017383)	O26.2, K80.0, K80.1, K80.2, K80.4, K81, K51, K52, K50, O98.4, B15-B19
Same as above	Maternal genitourinary condition	MAT_PRE_EXIST_HEALTH_COND_ID IN (1016960, 1016970, 1016980, 1017010, 1016990, 1017000)	O99.2, O11, O12.1, N17, N18, N19, O34.0, O34.1, O34.29, N99
Same as above	Maternal haematologic disorder	MAT_PRE_EXIST_HEALTH_COND_ID IN (1017020, 1017030, 1017035, 1017040, 1017050, 1017090, 1017060, 1017070, 1017080)	O28.0, O99.1, D65-D89, D66, D67, D68.0, D69, D57, D56, D68.5
Same as above	Maternal musculoskeletal condition	MAT_PRE_EXIST_HEALTH_COND_ID IN (1017100, 1017150, 1017110, 1017120, 3000186, 1017130, 1017140, 1017160, 1017165)	Q77.4, G71.0, G71.2, G71.1, Q78.0, G71.8, G71.9
Same as above	Maternal neurologic condition	MAT_PRE_EXIST_HEALTH_COND_ID IN (1017170, 1017180, 1017190, 1017189, 1017200, 1017210, 1017230, 1017220)	G80, G35, G70.0, Q05, G90-G99
Same as above	Maternal pulmonary condition	MAT_PRE_EXIST_HEALTH_COND_ID IN (1017320, 1017192, 1017330, 1017340, 1017370, 1017350, 1017360)	O28.5, E84, I27.0, I27.1, I27.2, I28
During index pregnancy or delivery hospitalization	Maternal hypertensive disorder of pregnancy	PREG_HYPERTENSION_DISORDER_ID IN (1020800, 1020810, 1020820, 1020850, 1020854, 1020840)	O11, O13, O14, O15, O16
Same as above	Maternal placental disorder in the index pregnancy	COMPLICATION_ID IN (1020245, 1020365, 1020310, 1020320, 1020330, 1020340, 1020300)	O43.2, O44, O45, O43.0, O43.1, O43.80, O43.81, O43.88, O43.9
Same as above	Fetal complication in the index pregnancy	COMPLICATION_ID IN (1020190, 1020195, 1020200, 1020210, 1020215, 1020220, 1020235, 1020230)	O35, O36.0, O36.1, O36.5, O41.01, O41.02, O41.03, O41.09, O36.7, O36.8, O36.9
Additional comparisons in full linked cohort	Maternal pre-existing diabetes	MAT_PRE_EXIST_HEALTH_COND_ID IN (1016730, 1016740, 1016750, 1016760, 1016770, 1016780, 3000004) OR DIABETES_AND_PREGNANCY_ID IN (1013500, 1013510, 1013520, 1013530, 1013545, 1013540, 1013550, 1013560, 1013570)	ODD: ICES-derived cohort created using algorithms applied to DAD, SDS & OHIP physician claims databases. Definition: 2 OHIP records with ICD-9 250, or 1 DAD / SDS record with ICD-9 [ICD-10] 250 [E10, E11, E13, E14] in 2-y. Excludes claims & admissions with diabetes Dx in 120-d before or 180-d after a gestational hospitalization record
	Maternal pre-existing hypertension	MAT_PRE_EXIST_HEALTH_COND_ID IN (1016660, 1016620)	HYPER: ICES-derived cohort created using algorithms applied to DAD, SDS & OHIP physician claims databases. Definition: 2 OHIP claims with ICD-9 401-405, or 1 DAD/SDS with ICD-9 [ICD-10] 401-405 [I10-I13, I15]. Excludes claims & admissions with hypertension Dx in 120-d before or 180-d after a gestational hospitalization record

Continued

Appendix Table 2: Continued

Assessment	Disease or procedure or condition	BORN BIS	ICD-10-CA or CCI codes in CIHI-DAD, or in MOMBABY
Baseline characteristics of LRB cohort	Extreme preterm birth (<32 weeks gestational age)	GA_AT_BIRTH_WEEKS < 32	B_GESTWKS_DEL < 32 (if missing use M_GESTWKS_DEL)
	Gestational age	GA_AT_BIRTH_WEEKS	B_GESTWKS_DEL (if missing use M_GESTWKS_DEL) in MOMBABY
	Birthweight	BIRTH_WEIGHT_GRAMS (link to AGG_INFANT on PREGNANCY_ID_ENC)	B_WEIGHT in MOMBABY
	Small-for-gestational-age ¹	BIRTH_WEIGHT_GRAMS, GA_AT_BIRTH_WEEKS, B_SEX (link to AGG_INFANT on PREGNANCY_ID_ENC)	B_SEX in MOMBABY, Gestational age (defined above), Birthweight (defined above)
	Large-for-gestational-age ¹	BIRTH_WEIGHT_GRAMS, GA_AT_BIRTH_WEEKS, B_SEX (link to AGG_INFANT on PREGNANCY_ID_ENC)	B_SEX in MOMBABY, Gestational age (defined above), Birthweight (defined above)
	Parity	PARITY	Sum of PREVTERM (Number of previous term deliveries) and PREVPRETERM (Number of previous pre-term deliveries)
	Maternal age	MATAGEATSTILLORLIVEBIRTHYEARS	AGE in RPDB
	Gestational age	GA_AT_BIRTH_WEEKS	B_GESTWKS_DEL (if missing use M_GESTWKS_DEL)
	LHIN of hospital	INDEX_HOSPITAL_LHIN_CODE_NUM	INSTLHIN from the LHIN file
	Hospital type	MATERNAL_INDEX_HOSPITAL_ID	INST from the institution file provided by the Ministry of Health
Outcomes compared between BIS LRB cohort and CIHI-DAD LRB cohort	Rural residence	Postal code in RPDB outside the commuting zone of centres with population 10,000+ (Statistics Canada, PCCF+)	Postal code in RPDB outside the commuting zone of centres with population 10,000+ (Statistics Canada, PCCF+)
	Neighbourhood income quintile	Postal code in RPDB linked with Census area data on median household income (Statistics Canada, PCCF+)	Postal code in RPDB linked with Census area data on median household income (Statistics Canada, PCCF+)
	Cesarean section	BIRTH_TYPE_ID = '1012890' (Induced or Spontaneous Labour Cesarean Section) or '1012900' (No Labour - Cesarean Section)	5.MD.60. AND Intervention Status Attribute code NOT 'A' (Abandoned)
	Maternal ICU admission	MATERNAL_OUTCOME_ID = '1016500' (Transfer to ICU/CCU) at labour/birth encounter (LBM) or post-partum (PPM) or AGG_PREGNANCY (link on PREGNANCY_ID_ENC)	DAD (SCU1-SCU6) 10 (Medical) 20 (Surgical) 25 (Trauma) 30 (Combined Medical-Surgical) 35 (Burn) 40 (Cardiac) 45 (Coronary) 60 (Neurosurgery) 80 (Respirology)
	Neonatal ICU admission	NICU_ADMISSION_FLAG (link to AGG_INFANT on PREGNANCY_ID_ENC)	DAD (SCU1-SCU6) 50, 51, 52, 53

BIS: Better Outcomes Registry & Network (BORN) Information System; CCI: Canadian Classification of Health Interventions; CIHI: Canadian Institute for Health Information; DAD: Discharge Abstract Database; HYPER: Ontario Hypertension Database; ICD-9: International Classification of Diseases, 9th Revision; ICD-10-CA: International Classification of Diseases, 10th Revision, Canada; LHIN: Local Health Integration Network; ODD: Ontario Diabetes Dataset; OHIP: Ontario Health Insurance Plan; PCCF+: Statistics Canada's Postal Code^{OM} Conversion File Plus; RPDB: Registered Persons Database; SDS: Same Day Surgery Database.

¹Defined according to Kramer *et al*'s population-based Canadian reference for birth weight for gestational age: Kramer MS, Platt RW, Wen SW, Joseph KS, Allen A, Abrahamowicz M, Blondel B, Bréart G, Fetal/Infant Health Study Group of the Canadian Perinatal Surveillance System. A new and improved population-based Canadian reference for birth weight for gestational age. *Pediatrics*. 2001 Aug;108(2):E35. <https://doi.org/10.1542/peds.108.2.e35>. PMID: 11483845.