**Supplemental Information**

Laverty M Crowcroft N, Bolotin S, Hawken S, Wilson K, Amirthalingam G, Biringer A, Cook J, Dubey V, Fakhraei R, Halperin SA, Jamieson F, Kwong JC, Sadarangani M, Sucha E, Walker MC, Fell DB. Health outcomes in young children following pertussis vaccination during pregnancy: a propensity-score matched cohort study.

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**Supplemental Fig 2. Study Design and Cohort Structurea**

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a Adaptedfrom Schneeweiss et al., 2019.1

b For the purposes of illustrating the temporal relationship between maternal and infant study variables, the date of the last menstrual period is shown as day -280 (i.e., 40 completed weeks of gestation). In the study, the length of this interval depends on the actual length of gestation.

c For the primary analyses, women had to be continuously eligible to receive health care in Ontario during their pregnancy (i.e., from -280 days to Day 0). In sensitivity analyses involving look-back periods of 6 months and 2 years prior to pregnancy, women had to be continuously eligible to receive health care in Ontario for at least 6 months and at least 2 years before their current pregnancy, respectively.

d Earliest occurrence of: outcome of interest, death, disenrollment or end of follow-up. Cohort for asthma outcome was restricted to children with a minimum of 3 years of follow-up.

# **Supplemental Table 3. ICD-10-CA Diagnostic Codes for Pre-existing Maternal Medical Conditions and Obstetrical Complications**

|  |  |
| --- | --- |
| **Condition or complication** | **ICD-10-CA diagnostic codes** |
| **Pre-existing condition** |
| Maternal asthma | J45-46a |
| Chronic hypertension | I10, I15, O10.0 |
| Diabetes | O24.0, O24.1 O24.3, O24.5, O24.6, O24.7, E10, E11, E13, E14 |
| Heart disease | O10.1, I05-I09, I34-I39, I150.0, I20, I25, Q20-26, O99.4 |
|  |
| **Obstetrical complication** |
| Pre-eclampsia | O11, O14 |
| Eclampsia | O15 |
| Gestational diabetes | O24.4, O24.8 |
| Placenta previa | O44 |
| Placental abruption | O45 |
| Pregnancy-induced hypertension | O13, O16 |

a Asthma diagnoses were obtained from the ICES-derived Ontario Asthma Dataset, which utilizes the J45 and J46 codes in a validated algorithm to identify asthma cases from health administrative databases.2,3

# **Supplemental Table 4. ICD-10-CA Diagnostic Codes for Study Outcomes**

|  |  |
| --- | --- |
| **Study outcome** | **ICD-10-CA diagnostic codes** |
| **Infectious diseases** |
| Upper respiratory infections | A36.0, A36.1, A36.2, A36.8, A36.9, J01-06, J35-37  |
| Lower respiratory infections | A37, A42.0, A48.1, A70, J09-18, J20-22, J85-86 |
| Gastrointestinal infections | A00, A01, A02.0, A02.2-A02.9, A03-09, A42.1 |
| Otitis media | H65-67 |
|  |
| **Atopic disease** |
| Pediatric asthma | J45-46a |
|  |
| **Non-immune related specific morbidity outcomes** |
| Neoplasm |  Identified using Ontario Cancer Registryb |
| Sensory loss |  |
|  Vision loss | H47, H48.8, H53-54 |
|  Hearing loss | H90-91 |
|  |
| **Negative control outcome** |
| All cause injuries |  S00-S99 and T00-T75 |

a Asthma diagnoses were obtained from the ICES-derived Ontario Asthma dataset, which utilizes the J45 and J46 codes in a validated algorithm to identify asthma cases from health administrative databases.2,3

b Cancer diagnoses were obtained from the Ontario Cancer Registry, Cancer Care Ontario. This clinical registry contains information on all Ontario residents who have been newly-diagnosed with cancer or who have died of cancer.

# **Supplemental Table 5. Baseline Characteristics Included in Propensity Score Model**

|  |
| --- |
| **Variables included** |
| Maternal age (continuous variable) |
| Parity |
| Year of delivery |
| Rural residence |
| Neighborhood income quintile |
| Geographic region (public health unit region of residence) |
| Pre-existing maternal medical conditions (asthma, chronic hypertension, diabetes, heart disease) |
| Obstetrical complications (pre-eclampsia, eclampsia, gestational diabetes, placenta previa, placental abruption, pregnancy-induced hypertension) |
| Multiple birth |
| Infant sex |
| Adequacy of prenatal care using Revised Graduated Adequacy of Prenatal Care Index (R-GINDEX; 6 categories of prenatal care: inadequate, intermediate, adequate, intensive, no care, and missing) |
| Total number of outpatient visits in the 6 months before index pregnancy |

# **Supplemental Table 6. Baseline Characteristics of the Propensity-Score Matched Cohort for the Asthma Outcome, Ontario, Canada**

|  |  |
| --- | --- |
| **Characteristic** | **Asthma propensity-score matched cohorta** |
| **No (%) of births to Tdap-vaccinated women*****n*=4,256** | **No (%) of births to Tdap-unvaccinated women*****n*=21,280** | **Std Diffb** |
| **Fiscal year of birth** |  |  |  |
|  2012-13 | 581 (13.7) | 2871 (13.5) | 0.00 |
|  2013-14 | 1608 (37.8) | 8139 (38.2) | 0.01 |
|  2014-15 | 2607 (48.6) | 10 343 (48.3) | 0.01 |
|  2015-16 | 0 (0.0) | 0 (0.0) | 0.00 |
|  2016-17 | 0 (0.0) | 0 (0.0) | 0.00 |
| **Maternal age (years)** |  |  |  |
|  <20 | 83 (2.0) | 389 (1.8) | 0.01 |
|  20-24 | 294 (6.9) | 1510 (7.1) | 0.01 |
|  25-29 | 1239 (29.1) | 6201 (29.1) | 0.00 |
|  30-34 | 1646 (38.7) | 8245 (38.7) | 0.00 |
|  ≥35 | 994 (23.4) | 4935 (23.2) | 0.00 |
| **Parity** |  |  |  |
|  0 (nulliparous) | 2184 (51.3) | 10 904 (51.2) | 0.00 |
|  ≥1 (multiparous) | 2072 (48.7) | 10 376 (48.8) | 0.00 |
| **Pre-existing maternal medical conditionsc** |  |  |  |
|  No | 4200 (98.7) | 21 053 (98.9) | 0.02 |
|  Yes | 56 (1.3) | 227 (1.1) | 0.02 |
| **Type of pre-existing maternal medical condition** |  |  |  |
|  Asthma | 654 (15.4) | 3108 (14.6) | 0.02 |
|  Chronic hypertension | 17 (0.4) | 60 (0.3) | 0.02 |
|  Diabetes | 14 (0.3) | 54 (0.3) | 0.01 |
|  Heart diseased | 16 (0.4) | 55 (0.3) | 0.02 |
| **Obstetrical complicationse** |  |  |  |
|  No | 3796 (89.2) | 19 351 (90.9)) | 0.06 |
|  Yes | 460 (10.8) | 1929 (9.1) | 0.06 |
| **Delivery by cesarean** |  |  |  |
|  No | 3099 (72.8) | 15 229 (71.6) | 0.03 |
|  Yes | 1157 (27.2) | 6051 (28.4) | 0.03 |

Abbreviations: Tdap, tetanus, diphtheria, and acellular pertussis; Std Diff, standardized difference

a Cohort for asthma outcome was restricted to children with a minimum of 3 years of follow-up.

b Standardized differences >0.10 indicate imbalance between Tdap-vaccinated and unvaccinated subjects.

c Asthma, chronic hypertension, diabetes, or heart disease

d Cardiac valvular disease, congenital heart disease, chronic congestive heart failure, hypertensive heart disease, or chronic ischemic heart disease

e Eclampsia, gestational diabetes, placenta previa, placental abruption, pre-eclampsia, or pregnancy-induced hypertension
f Adequacy of prenatal care characterized using the Revised-Graduated Prenatal Care Utilization Index (see Supplemental Information 1 for description)

**Supplemental Table 6. Baseline Characteristics of the Propensity-Score Matched Cohort for the Asthma Outcome, Ontario, Canada (continued)**

|  |  |
| --- | --- |
| **Characteristic** | **Asthma propensity-score matched cohorta** |
| **No (%) of births to Tdap-vaccinated women*****n*=4,256** | **No (%) of births to Tdap-unvaccinated women*****n*=21,280** | **Std Diffb** |
| **Multiple birth** |  |  |  |
|  No | 4164 (97.8) | 20 843 (97.9) | 0.01 |
|  Yes | 92 (2.2) | 437 (2.1) | 0.01 |
| **Prenatal care indexf** |  |  |  |
|  Adequate | 2254 (53.0) | 11 481 (54.0) | 0.02 |
|  Inadequate | 261 (6.1) | 1251 (5.9) | 0.01 |
|  Intensive | 310 (7.3) | 1338 (6.3) | 0.04 |
|  Intermediate | 1312 (30.8) | 6610 (31.1) | 0.01 |
|  No care |  119 (2.8) |  600 (2.8) | 0.00 |
| **Neighborhood median family income quintiles** |  |  |  |
|  1 (Lowest) | 722 (17.0) | 3544 (16.7) | 0.01 |
|  2 | 852 (20.0) | 4405 (20.7) | 0.02 |
|  3 | 809 (19.0) | 4074 (19.1) | 0.00 |
|  4 | 961 (22.6) | 4777 (22.4) | 0.00 |
|  5 (Highest) | 912 (21.4) | 4480 (21.1) | 0.01 |
| **Rural residence** |  |  |  |
|  No | 3846 (90.4) | 19 407 (91.2) | 0.03 |
|  Yes | 410 (9.6) | 1873 (8.8) | 0.03 |
| **Public health unit region** |  |  |  |
|  North West | 18 (0.4) | 151 (0.7) | 0.04 |
|  North East | 64 (1.5) | 393 (1.8) | 0.03 |
|  Eastern | 474 (11.1) | 2635 (12.4) | 0.04 |
|  Central East | 1741 (40.9) | 8370 (39.3) | 0.03 |
|  Toronto | 1306 (30.7) | 6424 (30.2) | 0.01 |
|  South West | 185 (4.3) | 968 (4.5) | 0.01 |
|  Central West | 468 (11.0) | 2339 (11.0) | 0.00 |
| **Sex** |  |  |  |
|  Female | 2043 (48.0) | 10 304 (48.4) | 0.01 |
|  Male | 2213 (52.0) | 10 976 (51.6) | 0.01 |

Abbreviations: Tdap, tetanus, diphtheria, and acellular pertussis; Std Diff, standardized difference

a Cohort for asthma outcome was restricted to children with a minimum of 3 years of follow-up.

b Standardized differences >0.10 indicate imbalance between Tdap-vaccinated and unvaccinated subjects.

c Asthma, chronic hypertension, diabetes, or heart disease

d Cardiac valvular disease, congenital heart disease, chronic congestive heart failure, hypertensive heart disease, or chronic ischemic heart disease

e Eclampsia, gestational diabetes, placenta previa, placental abruption, pre-eclampsia, or pregnancy-induced hypertension
f Adequacy of prenatal care characterized using the Revised-Graduated Prenatal Care Utilization Index (see Supplemental Information 1 for description)

**Supplemental Table 6. Baseline Characteristics of the Propensity-Score Matched Cohort for the Asthma Outcome, Ontario, Canada (continued)**

|  |  |
| --- | --- |
| **Characteristic** | **Asthma propensity-score matched cohorta** |
| **No (%) of births to Tdap-vaccinated women*****n*=4,256** | **No (%) of births to Tdap-unvaccinated women*****n*=21,280** | **Std Diffb** |
| **Birth weight (grams)** |  |  |  |
|  <1500  | 19 (0.4) | 146 (0.7) | 0.03 |
|  1500-2499  | 184 (4.3) | 989 (4.6) | 0.02 |
|  2500-3499  | 2335 (54.9) | 11 811 (55.5) | 0.01 |
|  ≥3500  | 1718 (40.4) | 8334 (39.2) | 0.02 |
| **Gestational age at birth in weeks** |  |  |  |
|  <31 | 22 (0.5) | 169 (0.8) | 0.04 |
|  32-33 | 24 (0.6) | 147 (0.7) | 0.02 |
|  34 | 39 (0.9) | 198 (0.9) | 0.00 |
|  35 | 61 (1.4) | 291 (1.4) | 0.01 |
|  36 | 121 (2.8) | 664 (3.1) | 0.02 |
|  ≥37 (Term) | 3990 (93.8) | 19 811 (93.1) | 0.03 |
| **Median follow-up time in person-years (range)** | 4.0 (3.0-6.0) | 4.0 (3.0-6.0) | - |

Abbreviations: Tdap, tetanus, diphtheria, and acellular pertussis; Std Diff, standardized difference

a Cohort for asthma outcome was restricted to children with a minimum of 3 years of follow-up.

b Standardized differences >0.10 indicate imbalance between Tdap-vaccinated and unvaccinated subjects.

c Asthma, chronic hypertension, diabetes, or heart disease

d Cardiac valvular disease, congenital heart disease, chronic congestive heart failure, hypertensive heart disease, or chronic ischemic heart disease

e Eclampsia, gestational diabetes, placenta previa, placental abruption, pre-eclampsia, or pregnancy-induced hypertension
f Adequacy of prenatal care characterized using the Revised-Graduated Prenatal Care Utilization Index (see Supplemental Information 1 for description)

# **Supplemental Table 7. Sensitivity Analysis for Association Between Tdap Vaccination During Pregnancy and Pediatric Health Outcomes, Ontario, Canada**

|  |  |  |
| --- | --- | --- |
| **Outcome** |  **Results from primary analysisa** | **Sensitivity analysis (expanded exposure definition)b** |
| **Estimate from propensity score-matched sample (95% CI)** | **Estimate from propensity score-matched sample (95% CI)** |
| **Atopic disease** |
|  Asthmac,d | 0.93 (0.82-1.04) | 0.94 (0.86-1.02) |
| **Infectious disease** |
|  Upper respiratory infectionse | 0.94 (0.90-0.99) | 0.94 (0.90-0.99) |
|  Lower respiratory infectionse | 0.94 (0.88-1.00) | 0.93 (0.87-1.00) |
|  Gastrointestinal infectionse | 0.85 (0.79-0.91) | 0.89 (0.82-0.95) |
|  Otitis mediae | 0.97 (0.91-1.04) | 0.97 (0.91-1.04) |
| **Non-immune related morbidity outcomes** |
|  Neoplasmd | 1.36 (0.76-2.44) | 1.35 (0.76-2.40) |
|  Sensory disordersd | 0.72 (0.34-1.52) | 0.86 (0.41-1.81) |
| **Non-specific morbidity outcome** |
|  Rates of urgent and in-patient  health service utilizatione | 0.93 (0.91-0.96) | 0.93 (0.91-0.96) |
| **Negative-control outcome** |  |  |
|  All-cause injuriesd | 0.99 (0.94-1.03) | 0.99 (0.95-1.03) |

Abbreviations: Tdap, tetanus, diphtheria, and acellular pertussis; CI, confidence interval

a Exposure to Tdap vaccination defined as pertussis-specific fee code during pregnancy (fee code G847).

b Exposure to Tdap vaccination defined as pertussis-specific (fee code G847) or generic vaccine fee code (G538, G53; only if it occurred outside of influenza season) during pregnancy.

c Cohort for asthma outcome was restricted to children with a minimum of 3 years of follow-up.

d Point estimates are hazard ratios generated from a Cox proportional hazards model.

e Point estimates are incidence rate ratios generated from a Poisson regression model.

# **Supplemental Table 8. Sensitivity Analyses for Association Between Tdap Vaccination During Pregnancy and Pediatric Health Outcomes, Ontario, Canada**

|  |  |  |  |
| --- | --- | --- | --- |
| **Outcome** | **Results from primary analysis** |  **6-month lookbacka** | **2-year lookbackb** |
| **Estimate from propensity score-matched sample (95% CI)** | **Estimate from propensity score-matched sample (95% CI)** | **Estimate from propensity score-matched sample (95% CI), adjusted for health care visitsc** | **Estimate from propensity score-matched sample (95% CI)** | **Estimate from propensity score-matched sample (95% CI), adjusted for health care visitsd** |
| **Atopic disease** |
|  Asthmae,f | 0.93 (0.82-1.04) | 0.89 (0.80-0.98) | 0.90 (0.81-1.00) | 0.88 (0.80-0.98) | 0.88 (0.80-0.98) |
| **Infectious disease** |
|  Upper respiratory  Infectionsg | 0.94 (0.90-0.99) | 0.94 (0.90-0.98) | 0.94 (0.90-0.99) | 0.95 (0.90-0.99) | 0.95 (0.90-0.99) |
|  Lower respiratory  Infectionsg | 0.94 (0.88-1.00) | 0.92 (0.86-0.98) | 0.93 (0.87-0.99) | 0.94 (0.88-1.00) | 0.94 (0.88-1.01) |
|  Gastrointestinal infectionsg | 0.85 (0.79-0.91) | 0.84 (0.78-0.90) | 0.85 (0.79-0.92) | 0.85 (0.79-0.92) | 0.85 (0.79-0.92) |
|  Otitis mediag | 0.97 (0.91-1.04) | 0.98 (0.91-1.04) | 0.98 (0.92-1.05) | 1.00 (0.93-1.07) | 1.00 (0.93-1.07) |
| **Non-immune related morbidity outcomes** |
|  Neoplasmf | 1.36 (0.76-2.44) | 1.10 (0.61-2.00) | 1.08 (0.60-1.96) | 1.22 (0.67-2.23) | 1.22 (0.67-2.23) |
|  Sensory disordersf | 0.72 (0.34-1.52) | 1.03 (0.48-2.23) | 1.05 (0.49-2.26) | 0.66 (0.40-1.79) | 0.84 (0.40-1.79) |
| **Non-specific morbidity outcome** |
|  Rates of urgent and in- patient health service  utilizationg | 0.93 (0.91-0.96) | 0.93 (0.91-0.96) | 0.94 (0.91-0.97) | 0.94 (0.91-0.97) | 0.94 (0.91-0.97) |
| **Negative-control outcome** |
|  All-cause injuriesf | 0.99 (0.94-1.03) | 1.00 (0.96-1.04) | 1.00 (0.96-1.05) | 0.99 (0.95-1.04) | 0.99 (0.95-1.04) |

Abbreviations: Tdap, tetanus, diphtheria, and acellular pertussis; CI, confidence interval

a Analysis limited to mothers continuously eligible for provincial healthcare in the 6 months before pregnancy

b Analysis limited to mothers continuously eligible for provincial healthcare in the 2 years before pregnancy

c Additionally adjusted for maternal propensity to use health care (# of outpatient visits in the 6 months before pregnancy).

d Additionally adjusted for maternal propensity to use health care (# of non-obstetric related hospitalizations in the 2 years before pregnancy).

e Cohort for asthma outcome was restricted to children with a minimum of 3 years of follow-up.

f Point estimates are hazard ratios generated from a Cox proportional hazards model.

g Point estimates are incidence rate ratios generated from a Poisson regression model.

# **Supplemental Table 9. Sensitivity Analysis for Association Between Tdap Vaccination During Pregnancy and Pediatric Health Outcomes, Ontario, Canada**

|  |  |  |
| --- | --- | --- |
| **Outcome** |  **Results from primary analysis** | **Sensitivity analysisa**  |
| **Estimate from propensity score-matched sample (95% CI)** | **Estimate from propensity score-matched sample (95% CI)** |
| **Atopic disease** |
|  Asthma2b,c | 0.93 (0.82-1.04) | 0.85 (0.77-0.94) |
| **Infectious disease** |
|  Upper respiratory infectionsd | 0.94 (0.90-0.99) | 0.94 (0.90-0.98) |
|  Lower respiratory infectionsd | 0.94 (0.88-1.00) | 0.94 (0.88-1.00) |
|  Gastrointestinal infectionsd | 0.85 (0.79-0.91) | 0.86 (0.80-0.92) |
|  Otitis mediad | 0.97 (0.91-1.04) | 0.98 (0.92-1.05) |
| **Non-immune related morbidity outcomes** |
|  Neoplasmc | 1.36 (0.76-2.44) | 1.47 (0.80-2.71) |
|  Sensory disordersc | 0.72 (0.34-1.52) | 0.78 (0.37-1.66) |
| **Non-specific morbidity outcome** |
|  Rates of urgent and in-patient  health service utilizationc | 0.93 (0.91-0.96) | 0.93 (0.91-0.96) |
| **Negative-control outcome** |  |  |
|  All-cause injuriesc | 0.99 (0.94-1.03) | 0.99 (0.95-1.03) |

Abbreviations: Tdap, tetanus, diphtheria, and acellular pertussis; CI, confidence interval

a Analysis limited to children with at least 2 well-baby and/or routine pediatric immunization visits in the first year (n=70,470).

b Cohort for asthma outcome was restricted to children with a minimum of 3 years of follow-up.

c Point estimates are hazard ratios generated from a Cox proportional hazards model.

d Point estimates are incidence rate ratios generated from a Poisson regression model.

# **Supplemental Information 1. Methodology Used to Assign Adequacy of Prenatal Care Received**

The Revised Graduated Prenatal Care Index (R-GINDEX) is based on work from Alexander and Kotelchuck (1996).4 It is derived from a combination of gestational age of the infant at birth (**GEST**), trimester when prenatal care began (**TCPB**), and total number of prenatal care visits (**PCV**) and categorizes adequacy of prenatal care into 6 groups: inadequate, intermediate, adequate, intensive, no care, and missing.

**Table. OHIP Fee Codes Associated with a Prenatal Care Visita**

|  |  |
| --- | --- |
| **OHIP fee code** | **Description** |
| A920 | Medical management of early pregnancy, initial visit |
| A921 | Medical management of early pregnancy, subsequent visit |
| A005 | Consultation  |
| A006 | Re-consultation |
| A665 | Prenatal consult |
| Q606 | Prenatal care - gen. Assess - major prenatal visit  |
| Q607 | Prenatal care - min. Assess - subsequent prenatal visit  |
| P002 | High risk prenatal assessment |
| P003 | Obs.-prenatal care-general assess - major prenatal visit |
| P004 | Obs.-prenatal care-minor prenatal assess - subsequent prenatal visit |
| P005 | Antenatal health screen |
| A205 | Consult |
| A206 | Repeat consult |
| A204 | Partial assessment |

a Prenatal visits were defined by limiting to one record per person per type of doctor per day. Only visits with an associated OHIP fee code related to prenatal care were included in this definition.

**SAS code for Revised Graduated Prenatal Care Utilization Index (R-GINDEX)**

**Key Variables:**

**GEST** = Gestational Age (18-45 weeks based on last menstrual period [LMP])

**PCV** = Number of Prenatal Care Visits (0 = None)

**TPCB** = Trimester Prenatal Care Began (0 = None, 1-3 trimesters) \*

**GINDEX** = Graduated Prenatal Care Utilization Index

**\*NOTE:** Trimester 1 = (0-13 weeks or 1-91 days)

 Trimester 2 = (14-27 weeks or 92-189 days)

 Trimester 3 = (28+ weeks or 190+ days)

**INTENSIVE PRENATAL CARE UTILIZATION;**

IF (TPCB=1) &

 (((18<=GEST<=21) & (11=<PCV)) | ((22<=GEST<=25) & (13=<PCV))

 | ((26<=GEST<=29) & (14=<PCV)) | ((30<=GEST<=31) & (15=<PCV))

 | ((32<=GEST<=36) & (16=<PCV)) | ((37<=GEST<=40) & (17<=PCV))

 | ((41<=GEST<=42) & (18=<PCV)) | ((43<=GEST<=45) & (19<=PCV)))

THEN GINDEX = 'INTENSIVE (1st Trimester)';

IF (TPCB=2) &

 (((18<=GEST<=21) & (10=<PCV)) | ((22<=GEST<=25) & (11=<PCV))

 | ((26<=GEST<=31) & (12=<PCV)) | ((32<=GEST<=35) & (13=<PCV))

 | ((36<=GEST<=37) & (14=<PCV)) | ((38<=GEST<=40) & (15=<PCV))

 | ((41<=GEST<=42) & (16=<PCV)) | ((43<=GEST<=45) & (17<=PCV)))

THEN GINDEX = 'INTENSIVE (2nd Trimester)';

IF (TPCB=3) &

 (((GEST=25) & (9=<PCV)) | ((26<=GEST<=31) & (10=<PCV))

 | ((32<=GEST<=35) & (11=<PCV)) | ((36<=GEST<=37) & (12=<PCV))

 | ((38<=GEST<=40) & (13=<PCV)) | ((41<=GEST<=42) & (14=<PCV))

 | ((43<=GEST<=45) & (15=<PCV)))

 THEN GINDEX = 'INTENSIVE (3rd Trimester)';

**ADEQUATE PRENATAL CARE UTILIZATION CRITERIA**;

IF (TPCB=1) &

 (((18<=GEST<=21) & (3=<PCV<=10)) | ((22<=GEST<=25) & (4=<PCV<=12))

 | ((26<=GEST <=29) & (5=<PCV<= 13)) | ((30<=GEST<=31) & (6=<PCV<= 14))

 | ((32<=GEST<=33) & (7=<PCV<=15)) | ((34<=GEST<=35) & (8=<PCV<=15))

 | ((GEST=36) & (9=<PCV<=15)) | ((GEST =37) & (10<=PCV<=16))

 | ((GEST=38) & (11=<PCV<=16)) | ((GEST =39) & (12<=PCV<=16))

 | ((GEST=40) & (13=<PCV<=16)) | ((GEST =41) & (14<=PCV<=17))

 | ((GEST=42) & (15=<PCV<=17)) | ((43<=GEST<=45) & (16<=PCV<=18)))

THEN GINDEX = 'ADEQUATE (1st Trimester)';

**INTERMEDIATE PRENATAL CARE UTILIZATION CRITERIA**;

IF (TPCB=1) &

 (((18<=GEST<=21) & (1<=PCV<=2)) | ((22<=GEST<=25) & (2=<PCV<=3))

 | ((26<=GEST<=29) & (2=<PCV<=4)) | ((30<=GEST<=31) & (3=<PCV<=5))

 | ((32<=GEST<=33) & (4=<PCV<=6)) | ((34<=GEST<=35) & (5=<PCV<=7))

 | ((GEST=36) & (5=<PCV<=8)) | ((GEST=37) & (6=<PCV<=9))

 | ((GEST=38) & (7=<PCV<=10)) | ((GEST=39) & (7=<PCV<=11))

 | ((GEST=40) & (8=<PCV<=12)) | ((GEST=41) & (8=<PCV<=13))

 | ((GEST=42) & (9=<PCV<=14)) | ((43<=GEST<=45) & (9=<PCV<=15)))

THEN GINDEX = 'INTERMEDIATE (1st Trimester)';

IF (TPCB=2) &

 (((18<=GEST<=21) & (1=<PCV<=9)) | ((22<=GEST<=25) & (2=<PCV<=10))

 | ((26<=GEST<=29) & (2=<PCV<=11)) | ((30<=GEST<=31) & (3=<PCV<=11))

 | ((32<=GEST<=33) & (4=<PCV<=12)) | ((34<=GEST<=35) & (5=<PCV<=12))

 | ((36<=GEST<=37) & (6=<PCV<=13)) | ((38<=GEST<=39) & (7=<PCV<=14))

 | ((GEST=40) & (8=<PCV<=14)) | ((GEST =41) & (8=<PCV<=15))

 | ((GEST=42) & (9=<PCV<=15)) | ((43<=GEST<=45) & (9=<PCV<=16)))

THEN GINDEX = 'INTERMEDIATE (2nd Trimester)';

**INADEQUATE PRENATAL CARE UTILIZATION CRITERIA**;

IF (TPCB=1) &

 (((22<=GEST<=29) & (PCV=1)) | ((30<=GEST<=31) & (1<=PCV<=2))

 | ((32<=GEST<=33) & (1<=PCV<=3)) | ((34<=GEST<=36) & (1<=PCV<=4))

 | ((GEST=37) & (1<=PCV<=5)) | ((38<=GEST<=39) & (1<=PCV<=6))

 | ((40<=GEST<=41) & (1<=PCV<=7)) | ((42<=GEST<=45) & (1<=PCV<=8)))

THEN GINDEX = 'INADEQUATE (1St Trimester)';

IF (TPCB=2) &

 (((22<=GEST<=29) & (PCV=1)) | ((30<=GEST<=31) & (1<=PCV<=2))

 | ((32<=GEST<=33) & (1<=PCV<=3)) | ((34<=GEST<=35) & (1<=PCV<=4))

 | ((36<=GEST<=37) & (1<=PCV<=5)) | ((38<=GEST<=39) & (1<=PCV<=6))

 | ((40<=GEST<=41) & (1<=PCV<=7)) | ((42<=GEST<=45) & (1<=PCV<=8)))

THEN GINDEX = 'INADEQUATE (2nd Trimester)';

IF (TPCB=3) &

 (((GEST =25) & (1<=PCV<=8)) | ((26<=GEST<=31) & (1<=PCV<=9))

 | ((32<=GEST<=35) & (1<=PCV<=10)) | ((36<=GEST<=37) & (1<=PCV<=11))

 | ((38<=GEST<=40) & (1<=PCV<=12)) | ((41<=GEST<=42) & (1<=PCV<=13))

 | ((43<=GEST<=45) & (1<=PCV<=14)))

THEN GINDEX = 'INADEQUATE (3rd Trimester)';

**MISSING PRENATAL CARE CRITERIA**;

IF (((PCV=.) & (TPCB^=0)) | ((TPCB=3) & (1<=GEST<=24))

| ((TPCB=2) & (1<=GEST<=11)) | ((GEST=.) & (PCV^=0))

| ((TPCB=.) & (PCV^=0)) | (TPCB=0 & (PCV>0)))

THEN GINDEX = 'MISSING';

**NO PRENATAL CARE UTILIZATION**;

IF (PCV=0) | (TPCB=0 & PCV=.)

THEN GINDEX = 'NOCARE';

**References**

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