**Tables**

**Table S1. Trimester at diagnosis per cancer type for all patients (n=204).**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Cancer type** | **Trimester at diagnosis, n (%)** | | | | | **Total** |
| **Before pregnancy** | **First trimester** | **Second trimester** | **Third trimester** | **Unknown** |
| Cervical cancer  Thyroid cancer  Ovarian cancer  Breast cancer  Other cancer types | 11 (21.57)  45 (93.75)  6 (19.35)  8 (29.63)  18 (38.30) | 13 (25.49)  2 (4.17)  1 (3.23)  1 (3.70)  3 (6.38) | 16 (0.31)  0 (0)  7 (0.23)  7 (0.26)  10 (0.21) | 10 (0.20)  1 (0.02)  10 (0.32)  11 (0.41)  13 (0.28) | 1 (0.02)  0 (0)  7 (0.23)  0 (0)  3 (0.06) | 51  48  31  27  47 |
| All | 88 (43.14) | 20 (9.80) | 40 (0.20) | 45 (0.22) | 11 (0.05) | 204 |

**Table S2. Reported congenital anomalies: in 144 neonates and 19 abortion cases the presence or absence of malformations was reported.**

|  |  |  |  |
| --- | --- | --- | --- |
| Cancer type | Treatment before delivery | | Maternal obstetric complications |
| Thyroid cancer | Surgery | Congenital hydronephrosis (n=1) | Anemia  Hyperlipidemia |
| Single umbilical artery (n=1) | Gestational anemia GBS infection Ovarian cyst |
| Congenital cyst of liver (n=1) | bronchial asthma Oligohydramnios Hypothyroidism Preeclampsia Hysteromyoma |
| Colon cancer | Chemotherapy (unknown) | Atrial septal defect (n=1) | Hyperthyroidism Heart disease Liver disease |
| gastric cancer | Surgery | Cleft palate with cleft lip (n=1) | - |
| Breast cancer | Chemotherapy (unknown) + Surgery | Reduction defects of lower limb (n=1) | - |

GBS, group B streptococcus.

**Table S3. Obstetric complications and outcomes per cancer type.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **All pregnant patients diagnosed with cancera** | | | | | **All pregnant womenb** |
|  | **Cervical cancer** | **Thyroid cancer** | **Ovarian cancer** | **Breast cancer** | **Other cancer types** |
| All | 51 | 48 | 31 | 27 | 47 | 1046081 |
| Missing data for obstetric complications | 2 | 1 | 0 | 0 | 0 | 0 |
| Any obstetric complications, n (%) | 24 (48.98) | 32 (68.09) | 17 (54.84) | 20 (74.07) | 27 (57.45) | 0 |
| Hypertensive disorders, n (%) | 4 (8.16) | 8 (17.02) | 0 (0) | 1 (3.7) | 3 (6.38) | 7505 (0.72) |
| Gestational diabetes, n (%) | 4 (8.16) | 5 (10.64) | 5 (16.13) | 1 (3.7) | 3 (6.38) | 15271 (1.46) |
| Gestational anemia, n (%) | 3 (6.12) | 5 (10.64) | 1 (3.23) | 4 (14.81) | 3 (6.38) | 11639 (1.11) |
| Maternal cardiac disease (%) | 2 (4.08) | 0 (0) | 1 (3.23) | 0 (0) | 3 (6.38) | 143 (0.01) |
| Intestinal obstruction (%) | 0 (0) | 0 (0) | 1 (3.23) | 0 (0) | 2 (4.26) | 29 (0) |
| Liver disease, n (%) | 0 (0) | 1 (2.13) | 1 (3.23) | 1 (3.7) | 2 (4.26) | 1220 (0.12) |
| Maternal infection, n (%) | 8 (16.33) | 7 (14.89) | 0 (0) | 2 (7.41) | 1 (2.13) | 4248 (0.41) |
| PPROM, n (%) | 2 (4.08) | 10 (21.28) | 4 (12.9) | 0 (0) | 2 (4.26) | 32399 (3.1) |
| Fetal distress, n (%) | 1 (2.04) | 5 (10.64) | 0 (0) | 0 (0) | 0 (0) | 19974 (1.91) |
| FGR, n (%) | 1 (2.04) | 1 (2.13) | 1 (3.23) | 4 (14.81) | 0 (0) | 415 (0.04) |
| Oligohydramnios, n (%) | 1 (2.04) | 3 (6.38) | 1 (3.23) | 1 (3.7) | 0 (0) | 5776 (0.55) |

PPROM, preterm prelabour rupture of membranes. FGR, fetal growth restriction.

**a**All pregnant patients diagnosed with cancer before delivery or Termination of pregnancy participated in this research (n=204). **b**All pregnancy cases in Obstetrics & Gynecology Hospital of Fudan University between 2003/1/1 and 2020/12/30.

**Table S4. Neonatal complications per cancer type.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **All pregnant patients diagnosed with cancera** | | | | | **All pregnant womenb** |
|  | **Cervical cancer** | **Thyroid cancer** | **Ovarian cancer** | **Breast cancer** | **Other cancer types** |
| **Neonatal complications** | | | | | | |
| NICU admission | 6 (20.69) | 4 (11.11) | 1 (4.17) | 3 (15) | 3 (8.82) | 19830 (1.9) |
| Neonatal acidosis | 5 (17.24) | 1 (2.78) | 2 (8.33) | 2 (10) | 0 (0) | 3585 (0.34) |
| Congenital malformations | 0 (0) | 3 (7.14) | 0 (0) | 1 (4.35) | 2 (5.13) | 1599 (0.15) |
| Neonatal respiratory distress syndrome | 13 (44.83) | 4 (11.11) | 3 (12.5) | 3 (15) | 3 (8.82) | 2687 (0.26) |
| Neonatal infection | 4 (13.79) | 0 (0) | 2 (8.33) | 1 (5) | 0 (0) | 4466 (0.43) |
| Neonatal hyperbilirubinemia | 8 (27.59) | 3 (8.33) | 8 (33.33) | 5 (25) | 2 (5.88) | 19973 (1.91) |

NICU, neonatal intensive care unit.

**a**All pregnant patients diagnosed with cancer before delivery or Termination of pregnancy participated in this research (n=204). **b**All pregnancy cases in Obstetrics & Gynecology Hospital of Fudan University between 2003/1/1 and 2020/12/30.

**Table S5. Chi-square test (one-tailed) of neonatal outcomes and the most common obstetric and neonatal complications.**

|  |  |  |
| --- | --- | --- |
| **All pregnant women with cancera/All pregnant womenb** | | |
|  | **OR (95% CI)** | **P** |
| **Obstetric complications** | | |
| Hypertensive disorders | 2.18 (1.37–3.46) | 0.003 |
| Gestational diabetes | 1.34 (0.89–2.01) | 0.168 |
| Gestational anemia | 1.23 (0.75–2.02) | 0.250 |
| Maternal cardiac disease | 35.72 (14.87–85.81) | 0.000 |
| Intestinal obstruction | 105.68 (32.56–342.99) | 0.000 |
| Liver disease | 4.19 (1.77–9.92) | 0.002 |
| Maternal infection | 1.92 (0.98–3.77) | 0.058 |
| PPROM | 0.57 (0.37–0.87) | 0.003 |
| Fetal distress | 0.31 (0.14–0.67) | 0.000 |
| Fetal growth restriction | 17.23 (8.31–35.71) | 0.000 |
| Oligohydramnios | 1.06 (0.48–2.32) | 0.500 |
| **Neonatal outcomes** | | |
| Cesarean delivery | 4.54 (4.02–5.12) | 0.000 |
| Preterm birth | 8.28 (6.75–10.18) | 0.000 |
| Low birth weight | 6.39 (4.98–8.19) | 0.000 |
| Macrosomia | 5.2 (2.54–10.64) | 0.000 |
| **Neonatal complications** | | |
| NICU admission | 0.86 (0.56–1.32) | 0.283 |
| Neonatal acidosis | 2.85 (1.57–5.18) | 0.003 |
| Respiratory acidosis | 4.34 (2.21–8.52) | 0.001 |
| Congenital malformations | 3.83 (1.75–8.4) | 0.005 |
| Neonatal respiratory distress syndrome | 10.26 (7.29–14.45) | 0.000 |
| Neonatal infection | 1.6 (0.78–3.3) | 0.150 |
| Neonatal hyperbilirubinemia | 1.43 (1.03–2) | 0.031 |
| Neonatal hypoglycemia | 3.81 (1.45–10.04) | 0.022 |
| Neonatal hyperglycemia | 18.83 (7.1–49.94) | 0.000 |

aAll pregnant patients diagnosed with cancer before delivery or termination of pregnancy who participated in this research (n = 204).

bAll pregnant women who received care in the Obstetrics & Gynecology Hospital of Fudan University between 1st January 2003 and 2nd February 2021 served as the reference group.

PPROM, preterm pre-labor rupture of membranes; NICU, neonatal intensive care unit; OR, odds ratio; CI, confidence interval

**Table S6. Overview of different treatment modalities by cancer type**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Cancer type** | **Total** | **No treatment** | **Any surgery** | **Chemotherapy** | **Radiotherapy** | **Targeted & hormonal therapy** |
| Cervical cancer | 51 | 30 (59%) | 19 (37%) | 10 (20%) | 0 (0%) | 0 (0%) |
| Thyroid cancer | 48 | 3 (6%) | 45 (94%) | 0 (0%) | 3 (6%) | 0 (0%) |
| Ovarian cancer | 31 | 17 (55%) | 14 (45%) | 2 (6%) | 0 (0%) | 0 (0%) |
| Breast cancer | 27 | 7 (26%) | 14 (52%) | 11 (41%) | 1 (4%) | 3 (11%) |
| Other cancer types | 47 | 26 (55%) | 20 (43%) | 5 (11%) | 0 (0%) | 4 (9%) |

**Table S7. Obstetric outcomes stratified by cancer type**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Cancer type** | **Termination of pregnancy** | **Miscarriage** | **Live birth <37 weeks** | **Live birth ≥37 weeks** | **Stillbirth** |
| Cervical cancer | 16/51 (31%) | 1/32 (3%) | 20/29 (69%) | 9/29 (31%) | 2/32 (6%) |
| Thyroid cancer | 6/48 (13%) | 4/40 (10%) | 4/36 (11%) | 32/36 (89%) | 0/40 (0%) |
| Ovarian cancer | 5/31 (16%) | 0/25 (0%) | 5/24 (21%) | 19/24 (79%) | 0/25 (0%) |
| Breast cancer | 4/27 (15%) | 2/22 (9%) | 12/20 (60%) | 8/20 (40%) | 0/22 (0%) |
| Other cancer types | 5/47 (11%) | 3/37 (8%) | 15/34 (44%) | 19/34 (56%) | 0/37 (0%) |

**Table S8. Chi-square test (one tailed) of neonatal outcomes and the most common obstetric and neonatal complications. Cases of pregnancy complicated with cervical cancer were taken as control group.**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Thyroid cancer | | Ovarian cancer | | Breast cancer | | Other cancer types | |
|  | OR (95% CI) | P | OR (95% CI) | P | OR (95% CI) | P | OR (95% CI) | P |
| **Obstetric complications** | | |  |  |  |  |  |  |
| Cesarean section delivery | 0.36 (0.22-0.57) | 0.000 | 0.7 (0.5-0.98) | 0.017 | 0.85 (0.678-1.07) | 0.140 | 0.73 (0.56-0.94) | 0.013 |
| Hypertensive disorders | 2.09 (0.67-6.46) | 0.158 | 0.45 (0.05-3.86) | 0.413 | - | 0.134 | 0.78 (0.18-3.31) | 0.524 |
| Gestational diabetes | 1.56 (0.78-3.13) | 0.146 | 1.27 (0.55-2.95) | 0.390 | 0.95 (0.38-2.35) | 0.573 | 1.56 (0.78-3.13) | 0.146 |
| Gestational anemia | 1.3 (0.37-4.56) | 0.473 | 0.45 (0.05-3.86) | 0.413 | 1.98 (0.57-6.8) | 0.229 | 0.78 (0.18-3.31) | 0.524 |
| Maternal cardiac disease | 1.74 (0.44-6.87) | 0.334 | 2.42 (0.58-10.02) | 0.198 | 0.53 (0.06-4.84) | 0.495 | 1.04 (0.22-4.91) | 0.641 |
| PPROM | 0.91 (0.36-2.32) | 0.535 | 0.45 (0.1-1.99) | 0.233 | - | 0.016 | 0.13 (0.02-1) | 0.018 |
| Fetal growth restriction | 5.21 (1.21-22.55) | 0.011 | - | 0.413 | 3.16 (0.62-16.24) | 0.153 | 1.04 (0.15-7.1) | 0.676 |
| **Neonatal outcomes** | | |  |  |  |  |  |  |
| Fetal preservation | 1.28 (1.03-1.58) | 0.021 | 1.24 (0.97-1.58) | 0.091 | 1.22 (0.96-1.56) | 0.100 | 1.3 (1.06-1.61) | 0.011 |
| Preterm birth | 0.16 (0.06-0.42) | 0.000 | 0.87 (0.56-1.34) | 0.364 | 0.3 (0.13-0.68) | 0.001 | 0.64 (0.41-1) | 0.042 |
| Small for gestational age | 3.22 (0.38-27.28) | 0.252 | 5.8 (0.7-48.13) | 0.082 | 3.63 (0.4-32.64) | 0.237 | 4.26 (0.53-34.45) | 0.139 |
| Infant low birth weight | 0.11 (0.03-0.43) | 0.000 | 0.88 (0.51-1.51) | 0.770 | 0.3 (0.12-0.78) | 0.004 | 0.57 (0.32-1.01) | 0.044 |
| NICU admission | 0.54 (0.17-1.72) | 0.236 | 0.73 (0.2-2.56) | 0.455 | 0.2 (0.03-1.56) | 0.084 | 0.43 (0.12-1.56) | 0.164 |
| **Neonatal complication** | | |  |  |  |  |  |  |
| Neonatal acidosis | 0.16 (0.02-1.3) | 0.058 | 0.58 (0.12-2.7) | 0.391 | 0.48 (0.1-2.27) | 0.297 | - | 0.017 |
| Neonatal respiratory distress syndrome | 0.25 (0.09-0.68) | 0.002 | 0.33 (0.11-1.02) | 0.028 | 0.28 (0.09-0.87) | 0.011 | 0.2 (0.06-0.62) | 0.001 |
| Neonatal hyperbilirubinemia | 0.21 (0.06-0.69) | 0.005 | 0.73 (0.29-1.8) | 0.350 | 0.97 (0.45-2.06) | 0.582 | 0.17 (0.04-0.72) | 0.005 |

OR, odds ratio. PPROM, preterm prelabour rupture of membranes. FGR, fetal growth restriction. NICU, neonatal intensive care unit.

**Table S9. Model coefficients and standard errors for the multiple logistic regression models.**

|  |  |  |
| --- | --- | --- |
|  | **Premature delivery** | **Small for gestational age** |
|  | **Coefficient (SE)** | **Coefficient (SE)** |
| Age of admission (per 8 years) | 0.19 (0.66) | 0.17 (0.69) |
| Period of diagnosis |  |  |
| Before pregnancy | Reference | Reference |
| First trimester | 17.51 (40192.97) | 19.74 (40192.97) |
| Second trimester | -3.03 (1.33) | -0.32 (1.78) |
| Third trimester | -2.56 (1.40) | -1.32 (1.43) |
| Unknow | 15.78 (19363.11) | -3.54 (2.86) |
| Cancer type |  |  |
| Cervical cancer | Reference | Reference |
| Thyroid cancer | 0.56 (1.15) | -2.52 (1.85) |
| Ovarian cancer | 4.86 (1.99) | 0.78 (1.98) |
| Breast cancer | 0.82 (1.39) | 0.02 (1.57) |
| Other cancer types | 1.73 (1.18) | -1.58 (1.61) |
| Surgery before delivery | 1.44 (1.20) | 1.52 (1.13) |
| Chemotherapeutic treatment before delivery | 0.12 (1.42) | -2.47 (1.36) |
| Year of LMP |  |  |
| [2003,2008] | Reference | Reference |
| [2009,2014] | -19.31 (26255.62) | 0.74 (2.43) |
| [2015,2020] | -17.04 (26255.62) | 1.26 (2.19) |
| Reproductive system complications | -1.22 (0.80) | 0.05 (0.83) |
| Digestive system complications | 19.11 (14860.57) | -2.87 (1.41) |
| Systemic disease | -1.48 (0.81) | 2.49 (0.96) |

**Table S10. Changes in cancer treatment and obstetric outcomes over the study period**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Year of LMP, n/N (%)** | | | |  |
| **Variable** | **2003–2008** | **2009–2014** | **2015–2020** | **Total** | **RR (95% CI)** |
| Timing of diagnosis | |  |  |  |  |
| Before pregnancy | 3/15 (20) | 6/36 (17) | 79/153 (52) | 88/204 (43) | 2.24 (1.39–3.62) |
| First trimester | 6/15 (40) | 4/36 (11) | 10/153 (7) | 20/204 (10) | 0.39 (0.25–0.62) |
| Second trimester | 2/15 (13) | 12/36 (33) | 26/153 (17) | 40/204 (20) | 0.39 (0.24–0.62) |
| Third trimester | 2/15 (13) | 14/36 (39) | 29/153 (19) | 45/204 (22) | 0.83 (0.58–1.19) |
| Cancer type | |  |  |  |  |
| Cervical cancer | 5/15 (33) | 11/36 (31) | 35/153 (23) | 51/204 (25) | 0.81 (0.58–1.13) |
| Thyroid cancer | 0/15 (0) | 2/36 (6) | 46/153 (30) | 48/204 (24) | 6.13 (1.67–22.49) |
| Ovarian cancer | 3/15 (20) | 7/36 (19) | 21/153 (14) | 31/204 (15) | 0.79 (0.5–1.26) |
| Breast cancer | 3/15 (20) | 7/36 (19) | 17/153 (11) | 27/204 (13) | 0.7 (0.44–1.12) |
| Other cancer types | 4/15 (27) | 9/36 (25) | 34/153 (22) | 47/204 (23) | 0.91 (0.61–1.33) |
| Pre-delivery treatment | | |  |  |  |
| Surgery | 3/15 (20) | 12/36 (33) | 97/153 (63) | 112/202 (55) | 1.87 (1.31–2.67) |
| Chemotherapy | 2/15 (13) | 3/36 (8) | 23/153 (15) | 28/204 (14) | 1.26 (0.65–2.43) |
| Age at LMP (years) | |  |  |  |  |
| 21–28 | 4/15 (27) | 13/36 (36) | 42/153 (27) | 59/204 (29) | 0.92 (0.66–1.28) |
| 29–36 | 5/15 (33) | 17/36 (47) | 88/153 (58) | 110/204 (54) | 1.27 (0.97–1.65) |
| 37–44 | 7/15 (47) | 6/36 (17) | 23/153 (15) | 36/204 (18) | 0.65 (0.44–0.95) |
| Obstetric complications | |  |  |  |  |
| Any | 5/15 (33) | 22/36 (61) | 91/150 (61) | 118/201 (59) | 1.17 (0.94–1.46) |
| Systemic disease | 1/5 (20) | 6/22 (27) | 46/91 (51) | 53/118 (45) | 1.76 (0.99–3.12) |
| Reproductive system complications | 4/5 (80) | 12/22 (55) | 31/91 (34) | 47/118 (40) | 0.65 (0.51–0.83) |
| Systemic disease | 0/5 (0) | 2/22 (9) | 6/91 (7) | 8/118 (7) | 1.08 (0.29–3.96) |
| Neonatal outcomes | |  |  |  |  |
| Termination of pregnancy | 8/15 (53) | 8/36 (22) | 19/153 (12) | 35/204 (17) | 0.48 (0.35–0.67) |
| Abortion | 1/8 (13) | 0/22 (0) | 18/132 (14) | 19/162 (12) | 2.02 (0.57–7.15) |
| Vaginal delivery | 0/7 (0) | 18/36 (50) | 45/114 (39) | 63/157 (40) | 2.65 (1.13–6.26) |
| Cesarean delivery | 7/7 (100) | 18/36 (50) | 69/114 (61) | 94/157 (60) | - |
| Miscarriage | 0/7 (0) | 0/22 (0) | 12/126 (10) | 12/155 (8) | - |
| Iatrogenic preterm birth | 3/7 (43) | 12/22 (55) | 34/115 (30) | 49/144 (34) | 0.73 (0.54–0.98) |
| Preterm birth | 0/7 (0) | 3/22 (14) | 4/115 (3) | 7/144 (5) | 0.63 (0.23–1.76) |
| Term birth | 4/7 (57) | 7/22 (32) | 77/115 (67) | 88/144 (61) | 1.46 (1–2.13) |
| SGA | 1/7 (14) | 3/22 (14) | 13/114 (11) | 17/143 (12) | 0.88 (0.41–1.89) |
| Low birth weight | 1/7 (14) | 12/22 (55) | 30/112 (27) | 43/141 (30) | 0.82 (0.57–1.18) |
| Any neonatal complication | 1/7 (14) | 10/22 (45) | 32/112 (29) | 43/141 (30) | 0.93 (0.61–1.4) |

LMP, last menstrual period; SGA, small for gestational age; RR, relative risk; CI, confidence interval

**Table S11. Termination of pregnancy per cancer type per period of LMP. n(%).**

|  |  |  |  |
| --- | --- | --- | --- |
| **Cancer type** | **2003-2008** | **2009-2014** | **2015-2020** |
| Cervical cancer | 4/5 (80) | 5/11 (45) | 7/35 (20) |
| Thyroid cancer | 0/3 (0) | 0/2 (0) | 6/46 (13) |
| Ovarian cancer | 1/3 (33) | 1/7 (14) | 2/21 (10) |
| Breast cancer | 1/27(4) | 2/7 (29) | 1/17 (6) |
| All other cancer types | 1/4 (25) | 0/9 (0) | 4/34 (12) |