

Table 1 Demographic and clinical characteristics in ART vs unassisted pregnancies before and after PSM.

| Characteristics                | Before matching |                      |          | After matching  |                      |          |
|--------------------------------|-----------------|----------------------|----------|-----------------|----------------------|----------|
|                                | ART<br>(n=4310) | non-ART<br>(n=73712) | <i>p</i> | ART<br>(n=4218) | non-ART<br>(n=15003) | <i>p</i> |
| <b>Maternal age (y)</b>        | 33.2±3.9        | 30.4±4.0             | <0.01    | 33.2±3.9        | 33.0±4.4             | 0.61     |
| ≤25                            | 62(1.4)         | 6478(8.8)            |          | 62(1.5)         | 589(3.9)             |          |
| 26-34                          | 2693(62.5)      | 55617(75.5)          |          | 2675(63.4)      | 8609(57.4)           |          |
| 35-39                          | 1279(29.7)      | 9908(13.4)           |          | 1219(28.9)      | 4709(31.4)           |          |
| ≥40                            | 276(6.4)        | 1709(2.3)            |          | 262(6.2)        | 1096(7.3)            |          |
| <b>Gravidity</b>               |                 |                      | <0.01    |                 |                      | <0.01    |
| 1                              | 1735(53.0)      | 35984(50.0)          |          | 2284(54.1)      | 7375(49.2)           |          |
| 2                              | 851(26.0)       | 19772(27.5)          |          | 1096(26.0)      | 3960(26.3)           |          |
| ≥3                             | 686(21.0)       | 16237(22.5)          |          | 838(19.9)       | 3668(24.5)           |          |
| Unknown                        | 9(0.2)          | 126(0.2)             |          |                 |                      |          |
| <b>Parity</b>                  |                 |                      | 0.04     |                 |                      | 0.69     |
| 1                              | 2976(69.0)      | 52417(71.1)          |          | 2962(70.2)      | 10493(69.9)          |          |
| 2                              | 1227(28.5)      | 19713(26.7)          |          | 1159(27.5)      | 4145(27.6)           |          |
| 3                              | 99(2.3)         | 1445(2.0)            |          | 97(2.3)         | 365(2.4)             |          |
| Unknown                        | 8(0.2)          | 137(0.2)             |          |                 |                      |          |
| <b>Gestational age (wk)</b>    | 38.0±2.1        | 38.7±1.6             | <0.01    | 38.0±2.0        | 38.5±1.7             | <0.01    |
| <b>Previous abortions, (n)</b> |                 |                      | <0.01    |                 |                      | 0.02     |
| 0                              | 2461(57.1)      | 45425(61.6)          |          | 2418(57.3)      | 8228(54.8)           |          |
| 1-2                            | 1600(37.1)      | 24814(33.7)          |          | 1566(37.1)      | 5866(39.1)           |          |
| ≥3                             | 238(5.5)        | 3292(4.5)            |          | 234 (5.5)       | 909 (6.1)            |          |
| Unknown                        | 11(0.3)         | 181(0.2)             |          |                 |                      |          |
| <b>BMI</b>                     |                 |                      | 0.04     |                 |                      | <0.01    |
| <18.5                          | 5(0.1)          | 51(0.1)              |          | 5(0.1)          | 44(0.3)              |          |
| 18.5-27.9                      | 1374(31.9)      | 20106(27.3)          |          | 1160(27.5)      | 3335(22.2)           |          |

|                              |            |             |       |            |             |       |
|------------------------------|------------|-------------|-------|------------|-------------|-------|
| ≥28                          | 75(1.7)    | 810(1.1)    |       | 67(1.6)    | 72(0.5)     |       |
| Unknown                      | 2689(62.4) | 48768(66.2) |       | 2986(70.8) | 11552(77.0) |       |
| <b>Delivery mode</b>         |            |             | <0.01 |            |             | <0.01 |
| Vaginal                      | 1284(29.8) | 45662(62.0) |       | 1275(30.2) | 8051(53.7)  |       |
| Caesarean                    | 3026(70.2) | 28050(38.1) |       | 2943(69.8) | 6952(46.3)  |       |
| <b>Number of neonates</b>    |            |             | <0.01 |            |             | <0.01 |
| Singleton                    | 3291(76.4) | 72444(98.3) |       | 3274(77.6) | 14159(94.4) |       |
| Multiple                     | 1019(23.6) | 1268(1.7)   |       | 944(22.3)  | 844(5.6)    |       |
| <b>Leiomyoma</b>             | 465(10.8)  | 4571(6.2)   | 0.41  | 449(10.6)  | 1387(9.2)   | 0.82  |
| <b>Uterine malformations</b> | 46(1.1)    | 751(1.0)    | 0.36  | 46(1.1)    | 147(1.0)    | 0.49  |
| <b>Uterus scarring</b>       | 274(6.4)   | 5388(7.3)   | 0.54  | 267(6.3)   | 1226(8.2)   | 0.92  |
| <b>PCOS</b>                  | 88(2.0)    | 508(0.7)    | <0.01 | 86(2.0)    | 106(0.7)    | <0.01 |
| <b>PGDM</b>                  | 46(1.1)    | 593(0.8)    | 0.87  | 44(1.0)    | 148(1.0)    | 0.74  |
| <b>Chronic hypertension</b>  | 11(0.3)    | 93(0.1)     | 0.33  | 11(0.3)    | 24(0.2)     | 0.18  |

Data are presented as mean ± SD and n (%)

ART: assisted reproductive technology; PSM: propensity score-matched; PCOS: polycystic ovary syndrome; PGDM: previous gestational diabetes; BMI: body mass index (kg/m<sup>2</sup>); SD: Standard deviation.

Table 2 Risk of maternal complications associated with ART.

| Outcomes                                                 | Before matching |                      |                     |                     |          | After matching  |                      |                     |          |
|----------------------------------------------------------|-----------------|----------------------|---------------------|---------------------|----------|-----------------|----------------------|---------------------|----------|
|                                                          | ART<br>(n=4310) | non-ART<br>(n=73712) | RR<br>(95% CI)      | aRR*<br>(95% CI)    | <i>p</i> | ART<br>(n=4218) | non-ART<br>(n=15003) | RR<br>(95% CI)      | <i>p</i> |
| <b>PIH</b>                                               | 709(16.5)       | 5916(8.0)            | 1.50<br>(1.44-1.57) | 1.18<br>(1.12-1.24) | <0.01    | 683(16.2)       | 1515(10.1)           | 1.33<br>(1.26-1.40) | <0.01    |
| <b>Gestational hypertension</b>                          | 247(5.7)        | 2614(3.5)            | 1.65<br>(1.45-1.89) | 1.30<br>(1.12-1.51) | <0.01    | 240(5.7)        | 655(4.4)             | 1.32<br>(1.14-1.54) | <0.01    |
| <b>Preeclampsia</b>                                      | 462(10.7)       | 3294(4.5)            | 1.87<br>(1.74-2.01) | 1.24<br>(1.13-1.35) | <0.01    | 443(10.5)       | 858(5.7)             | 1.57<br>(1.44-1.71) | <0.01    |
| Preeclampsia without severe features                     | 330(7.7)        | 2377(3.2)            | 2.49<br>(2.21-2.80) | 1.48<br>(1.29-1.71) | <0.01    | 316(7.5)        | 615(4.1)             | 1.90<br>(1.65-2.18) | <0.01    |
| Preeclampsia with severe features                        | 132(3.1)        | 917(1.2)             | 2.51<br>(2.08-3.02) | 1.29<br>(1.03-1.61) | 0.03     | 127(3.0)        | 243(1.6)             | 1.89<br>(1.52-2.34) | <0.01    |
| <b>Eclampsia</b>                                         | 0(0.0)          | 8(0.0)               | /                   | /                   | /        | 0(0.0)          | 2(0.0)               | /                   | /        |
| <b>Preeclampsia superimposed on chronic hypertension</b> | 16(0.4)         | 118(0.2)             | 2.18<br>(1.25-3.81) | 1.12<br>(0.60-2.11) | 0.73     | 15(0.4)         | 42(0.3)              | 1.27<br>(0.70-2.30) | 0.43     |
| <b>GDM</b>                                               | 803(18.6)       | 9391(12.7)           | 1.35<br>(1.27-1.43) | 1.15<br>(1.05-1.25) | 0.02     | 824(19.5)       | 2406(16.0)           | 1.27<br>(1.16-1.38) | <0.01    |
| GDM(A1)                                                  | 776(18.0)       | 9146(12.4)           |                     |                     |          | 754(17.9)       | 2194(14.6)           |                     |          |
| GDM(A2)                                                  | 27(0.6)         | 245(0.3)             |                     |                     |          | 26(0.6)         | 64(0.4)              |                     |          |
| <b>Hypothyroidism in pregnancy</b>                       | 182(4.2)        | 2130(2.9)            | 1.22<br>(1.13-1.32) | 1.09<br>(1.00-1.19) | 0.05     | 178(4.2)        | 523(3.5)             | 1.10<br>(1.01-1.21) | 0.03     |
| <b>PROM</b>                                              | 1029(23.9)      | 14522(19.7)          | 1.28<br>(1.19-1.37) | 1.12<br>(1.04-1.22) | <0.01    | 1007(23.9)      | 3182(21.2)           | 1.17<br>(1.08-1.26) | <0.01    |

|                                              |           |           |                     |                     |       |           |           |                     |       |
|----------------------------------------------|-----------|-----------|---------------------|---------------------|-------|-----------|-----------|---------------------|-------|
| <b>PTB</b>                                   | 684(15.9) | 4761(6.5) | 2.73<br>(2.50-2.98) | 2.68<br>(2.45-2.93) | <0.01 | 650(15.4) | 1382(9.2) | 1.80<br>(1.62-1.99) | <0.01 |
| Unknown                                      | 6(0.1)    | 145(0.2)  |                     |                     |       |           |           |                     |       |
| <b>PPH</b>                                   | 247(5.7)  | 1880(2.6) | 2.32<br>(2.03-2.66) | 1.91<br>(1.63-2.23) | <0.01 | 245(5.8)  | 426(2.8)  | 2.11<br>(1.80-2.48) | <0.01 |
| <b>Chorioamnionitis</b>                      | 32(0.7)   | 419(0.6)  | 1.31<br>(0.91-1.88) | 1.17<br>(0.80-1.73) | 0.42  | 32(0.8)   | 94(0.6)   | 1.35<br>(0.81-1.81) | 0.96  |
| <b>PAS</b>                                   | 291(6.8)  | 1828(2.5) | 2.17<br>(1.96-2.41) | 1.72<br>(1.52-1.95) | <0.01 | 287(6.8)  | 443(3.0)  | 1.95<br>(1.72-2.22) | <0.01 |
| Placenta accreta                             | 255(5.9)  | 1561(2.1) | 2.91<br>(2.54-3.33) | 2.21<br>(1.89-2.59) | <0.01 | 251(6.0)  | 377(2.5)  | 2.46<br>(2.08-2.89) | <0.01 |
| Placenta increta                             | 36(0.8)   | 267(0.4)  | 2.32<br>(1.63-3.29) | 1.42<br>(0.93-2.15) | 0.10  | 36(0.9)   | 66(0.4)   | 1.95<br>(1.30-2.93) | 0.01  |
| <b>Placenta previa</b>                       | 116(2.7)  | 1039(1.4) | 1.94<br>(1.59-2.35) | 1.45<br>(1.16-1.81) | 0.01  | 114(2.7)  | 270(1.8)  | 1.52<br>(1.21-1.89) | <0.01 |
| <b>Abnormal<br/>placental<br/>morphology</b> | 353(8.2)  | 3343(4.5) | 1.30<br>(1.23-1.38) | 1.19<br>(1.12-1.27) | <0.01 | 354(8.4)  | 820(5.5)  | 1.22<br>(1.14-1.30) | <0.01 |
| Velamentous cord<br>insertion                | 96(2.2)   | 645(0.9)  | 2.58<br>(2.08-3.21) | 1.56<br>(1.20-2.02) | 0.01  | 93(2.2)   | 165(1.1)  | 2.03<br>(1.57-2.62) | <0.01 |
| Marginal cord<br>insertion                   | 208(4.8)  | 2231(3.0) | 1.63<br>(1.41-1.88) | 1.29<br>(1.10-1.52) | <0.01 | 204(4.8)  | 533(3.6)  | 1.38<br>(1.17-1.63) | <0.01 |
| Accessory<br>placental lobes                 | 48(1.1)   | 529(0.7)  | 1.89<br>(1.44-2.48) | 1.79<br>(1.33-2.42) | <0.01 | 57(1.4)   | 122(0.8)  | 1.67<br>(1.22-2.29) | 0.01  |
| <b>Placenta<br/>abruption</b>                | 54(1.3)   | 593(0.8)  | 1.56<br>(1.18-2.07) | 1.50<br>(1.09-2.05) | 0.01  | 52(1.2)   | 117(0.8)  | 1.59<br>(1.14-2.21) | 0.01  |

Data are presented as n (%).

ART: assisted reproductive technology; PIH: pregnancy-induced hypertension; GDM: gestational diabetes mellitus; PROM: premature rupture of membranes; PTB: preterm birth; PPH: postpartum hemorrhage; PAS: placenta accreta spectrum; RR: relative risk; aRR: adjusted relative risk.

\* Adjusted for confounding factors.

Table 3 Risk of neonatal complications associated with ART in singletons.

| Outcomes                   | Before matching |                      |                     |                                  |          | After matching  |                      |                     |          |
|----------------------------|-----------------|----------------------|---------------------|----------------------------------|----------|-----------------|----------------------|---------------------|----------|
|                            | ART<br>(n=3291) | non-ART<br>(n=72444) | RR<br>(95% CI)      | aRR <sup>&amp;</sup><br>(95% CI) | <i>p</i> | ART<br>(n=3274) | non-ART<br>(n=14159) | RR<br>(95% CI)      | <i>p</i> |
| <b>Neonatal weight (g)</b> | 3370.7±502.5    | 3326.1±471.6         |                     |                                  | <0.01    | 3370.6±502.2    | 3314.3±470.4         |                     | <0.01    |
| Unknown                    | /               | 6(0.0)               |                     |                                  |          | /               | /                    |                     |          |
| <b>SGA</b>                 | 141(4.3)        | 3933(5.4)            | 0.84<br>(0.73-0.95) | 0.78<br>(0.70-0.87)              | <0.01    | 140(4.2)        | 760(5.4)             | 0.84<br>(0.73-0.97) | 0.02     |
| 3%-10%                     | 107(3.3)        | 2999(4.1)            |                     |                                  |          | 106(3.2)        | 577(4.1)             |                     |          |
| <3%                        | 34(1.0)         | 934(1.3)             |                     |                                  |          | 34(1.0)         | 183(1.3)             |                     |          |
| Unknown                    | 5(0.2)          | 136(0.2)             |                     |                                  |          | /               | /                    |                     |          |
| <b>LGA</b>                 | 452(13.7)       | 7419(10.2)           | 1.40<br>(1.26-1.55) | 1.28<br>(1.17-1.40)              | <0.01    | 449(13.7)       | 1444(10.2)           | 1.40<br>(1.25-1.57) | <0.01    |
| Unknown                    | 5(0.2)          | 136(0.2)             |                     |                                  |          | /               | /                    |                     |          |
| <b>LBW</b>                 | 146(4.4)        | 2661(3.7)            | 1.12<br>(0.97-1.29) | 0.98<br>(0.87-1.11)              | 0.77     | 145(4.4)        | 551(3.9)             | 1.08<br>(0.92-1.27) | 0.349    |
| 1500-2500g                 | 132(4.0)        | 2259(3.1)            |                     |                                  |          | 131(4.0)        | 475(3.4)             |                     |          |
| <1500g                     | 14(0.4)         | 402(0.6)             |                     |                                  |          | 14(0.4)         | 76(0.5)              |                     |          |
| Unknown                    | 5(0.2)          | 136(0.2)             |                     |                                  |          | /               | /                    |                     |          |
| <b>Macrosomia</b>          | 303(9.2)        | 4631(6.4)            | 1.48<br>(1.31-1.68) | 1.40<br>(1.26-1.55)              | <0.01    | 301(9.2)        | 886(6.3)             | 1.52<br>(1.32-1.74) | <0.01    |
| Unknown                    | 5(0.2)          | 136(0.2)             |                     |                                  |          | /               | /                    |                     |          |
| <b>PTB</b>                 | 229(7.0)        | 3985(5.5)            | 1.29<br>(1.12-1.48) | 1.02<br>(0.91-1.15)              | 0.69     | 229(7.0)        | 886(6.3)             | 1.13<br>(0.97-1.31) | 0.12     |
| Unknown                    | 6(0.2)          | 140(0.2)             |                     |                                  |          | /               | /                    |                     |          |

|                       |            |             |                     |                     |       |            |             |                     |      |
|-----------------------|------------|-------------|---------------------|---------------------|-------|------------|-------------|---------------------|------|
| <b>NICU admission</b> | 66(2.0)    | 1060(1.5)   | 1.38<br>(1.07-1.77) | 1.07<br>(0.86-1.33) | 0.53  | 65(2.0)    | 273(1.9)    | 1.03<br>(0.78-1.35) | 0.83 |
| <b>Stillbirths</b>    | 9(0.3)     | 164(0.2)    | 2.24<br>(1.37-3.66) | 4.98<br>(3.21-7.72) | <0.01 | 9(0.3)     | 17(0.1)     | 2.24<br>(1.25-4.03) | 0.01 |
| Unknown               | /          | 2(0.0)      |                     |                     |       | /          | /           |                     |      |
| <b>Apgar 1 minute</b> |            |             | 1.00<br>(0.81-1.24) | 1.13<br>(0.94-1.35) | 0.20  |            |             | 1.00<br>(0.79-1.26) | 0.10 |
| 0-3                   | 12(0.4)    | 341(0.5)    |                     |                     |       | 12(0.4)    | 63(0.4)     |                     |      |
| 4-7                   | 37(1.1)    | 688(0.9)    |                     |                     |       | 38(1.1)    | 142(1.0)    |                     |      |
| 8-10                  | 3242(98.5) | 71419(98.6) |                     |                     |       | 3224(98.5) | 13954(98.6) |                     |      |
| <b>Neonatal sex</b>   |            |             | 0.99<br>(0.92-1.06) | 0.98<br>(0.92-1.04) | 0.47  |            |             | 1.01<br>(0.94-1.09) | 0.10 |
| Male                  | 1725(52.4) | 37741(52.1) |                     |                     |       | 1714(52.4) | 7455(52.7)  |                     |      |
| Female                | 1566(47.6) | 34703(47.9) |                     |                     |       | 1560(47.6) | 6703(47.3)  |                     |      |
| Unknown               | /          | 4(0.0)      |                     |                     |       | /          | /           |                     |      |

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Data are presented as mean  $\pm$  SD and n (%)

ART: assisted reproductive technology; SGA: small for gestational age; LGA: large for gestational age; LBW: low birthweight; PTB: preterm birth; NICU: neonatal intensive care unit; RR: relative risk; aRR: adjusted relative risk; SD: Standard deviation.

<sup>&</sup>Adjusted for confounding factors

Table 4 Risk of neonatal complications associated with ART in multiple pregnancies (Including twins, triples, and quadruplets).

| Outcomes                   | Before matching |                     |                     |                              |          | After matching  |                     |                     |          |
|----------------------------|-----------------|---------------------|---------------------|------------------------------|----------|-----------------|---------------------|---------------------|----------|
|                            | ART<br>(n=2045) | non-ART<br>(n=2559) | RR<br>(95% CI)      | aRR <sup>#</sup><br>(95% CI) | <i>P</i> | ART<br>(n=1894) | non-ART<br>(n=1706) | RR<br>(95% CI)      | <i>P</i> |
| <b>Neonatal weight (g)</b> | 2510.3±472.4    | 2367.6±500.5        |                     |                              | <0.01    | 2518.3±471.2    | 2380.5±480.4        |                     | <0.01    |
| Unknown                    | /               | 21(0.8)             |                     |                              |          | /               | 1(0.0)              |                     |          |
| <b>SGA</b>                 | 281(13.7)       | 444(17.4)           | 0.86<br>(0.77-0.95) | 0.79<br>(0.70-0.89)          | <0.01    | 255(13.4)       | 305(17.8)           | 0.83<br>(0.74-0.93) | <0.01    |
| 3-10%                      | 151(7.4)        | 257(10.0)           |                     |                              |          | 137(7.2)        | 173(10.1)           |                     |          |
| <3%                        | 130(6.4)        | 187(7.3)            |                     |                              |          | 118(6.2)        | 132(7.7)            |                     |          |
| Unknown                    | /               | 21(0.8)             |                     |                              |          | /               | 1(0.0)              |                     |          |
| <b>LGA</b>                 | 28(1.4)         | 28(1.1)             | 1.24<br>(0.74-2.11) | 1.35<br>(0.75-2.43)          | 0.31     | 27(1.4)         | 18(1.1)             | 1.36<br>(0.74-2.47) | 0.29     |
| Unknown                    | /               | 21(0.8)             |                     |                              |          | /               | 1(0.0)              |                     |          |
| <b>LBW</b>                 | 885(43.3)       | 1397(54.6)          | 0.68<br>(0.62-0.75) | 0.72<br>(0.65-0.80)          | <0.01    | 805(42.5)       | 926(54.3)           | 0.69<br>(0.62-0.77) | <0.01    |
| 1500-2500g                 | 773(37.8)       | 1183(46.2)          |                     |                              |          | 707(37.3)       | 807(47.3)           |                     |          |
| <1500g                     | 112(5.5)        | 214(8.4)            |                     |                              |          | 98(5.2)         | 119(7.0)            |                     |          |
| Unknown                    | /               | 21(0.8)             |                     |                              |          | /               | 1(0.0)              |                     |          |
| <b>Macrosomia</b>          | 1(0.0)          | 0(0.0)              | /                   | /                            | /        | 1(0.1)          | 0(0.0)              | /                   | /        |
| Unknown                    | /               | 21(0.8)             |                     |                              |          | /               | 1(0.0)              |                     |          |
| <b>PTB</b>                 | 917(44.9)       | 1575(61.8)          | 0.50<br>(0.45-0.57) | 0.56<br>(0.49-0.63)          | <0.01    | 848(44.8)       | 1010(59.2)          | 0.56<br>(0.49-0.64) | <0.01    |
| Unknown                    | 2(0.0)          | 10(0.4)             |                     |                              |          | /               | /                   |                     |          |
| <b>NICU admission</b>      | 912(44.6)       | 1325(51.8)          | 0.75                | 1.02                         | 0.84     | 842(44.5)       | 868(50.9)           | 0.77                | <0.01    |

|                       |            |            |                     |                     |      |            |            |                     |      |
|-----------------------|------------|------------|---------------------|---------------------|------|------------|------------|---------------------|------|
|                       |            |            | (0.67-0.84)         | (0.87-1.19)         |      |            |            | (0.68-0.88)         |      |
| <b>Stillbirths</b>    | 2(0.1)     | 22(0.9)    | 0.37<br>(0.18-0.72) | 0.38<br>(0.19-0.79) | 0.01 | 2(0.1)     | 10(0.6)    | 0.42<br>(0.20-0.90) | 0.03 |
| <b>Apgar 1 minute</b> |            |            | 1.56<br>(1.19-2.04) | 1.29<br>(0.96-1.75) | 0.10 |            |            | 1.36<br>(1.00-1.85) | 0.05 |
| 0-3                   | 11(0.5)    | 41(1.6)    |                     |                     |      | 11(0.6)    | 21(1.2)    |                     |      |
| 4-7                   | 28(1.4)    | 42(1.6)    |                     |                     |      | 24(1.3)    | 26(1.5)    |                     |      |
| 8-10                  | 2006(98.1) | 2476(96.8) |                     |                     |      | 1859(98.2) | 1659(97.3) |                     |      |
| <b>Neonatal sex</b>   |            |            | 1.04<br>(0.93-1.17) | 1.00<br>(0.88-1.13) | 0.95 |            |            | 1.00<br>(0.88-1.15) | 0.71 |
| Male                  | 1049(51.3) | 1334(52.1) |                     |                     |      | 980(51.7)  | 883(51.8)  |                     |      |
| Female                | 996(48.7)  | 1223(47.8) |                     |                     |      | 914(48.3)  | 822(48.2)  |                     |      |
| Unknown               | /          | 2(0.0)     |                     |                     |      | /          | 1(0.0)     |                     |      |

Data are presented as mean ± SD and n (%)

ART: assisted reproductive technology; SGA: small for gestational age; LGA: large for gestational age; LBW: low birthweight; PTB: preterm birth; NICU: neonatal intensive care unit; RR: relative risk; aRR: adjusted relative risk; SD: Standard deviation.

#Adjusted for confounding factors