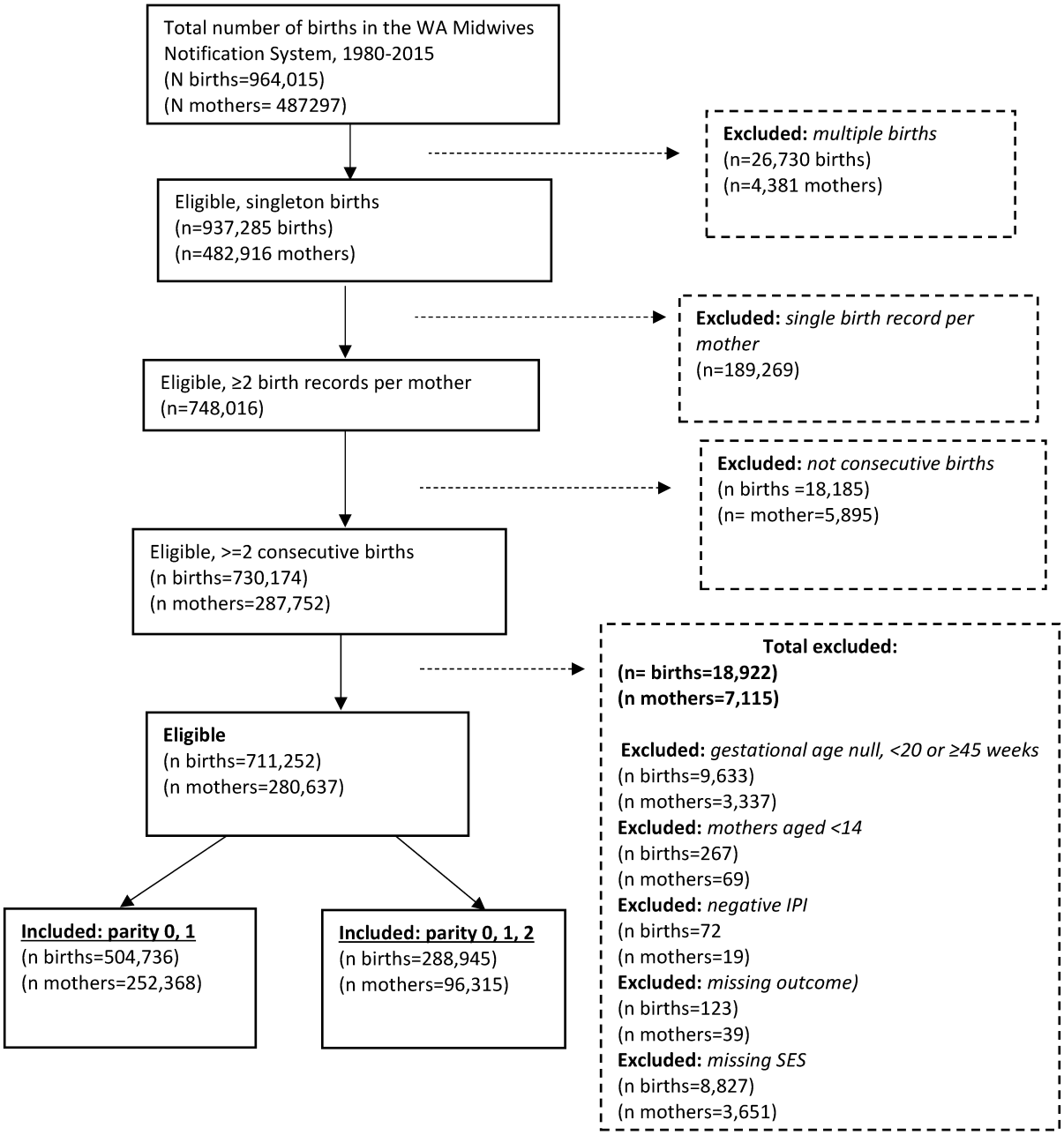
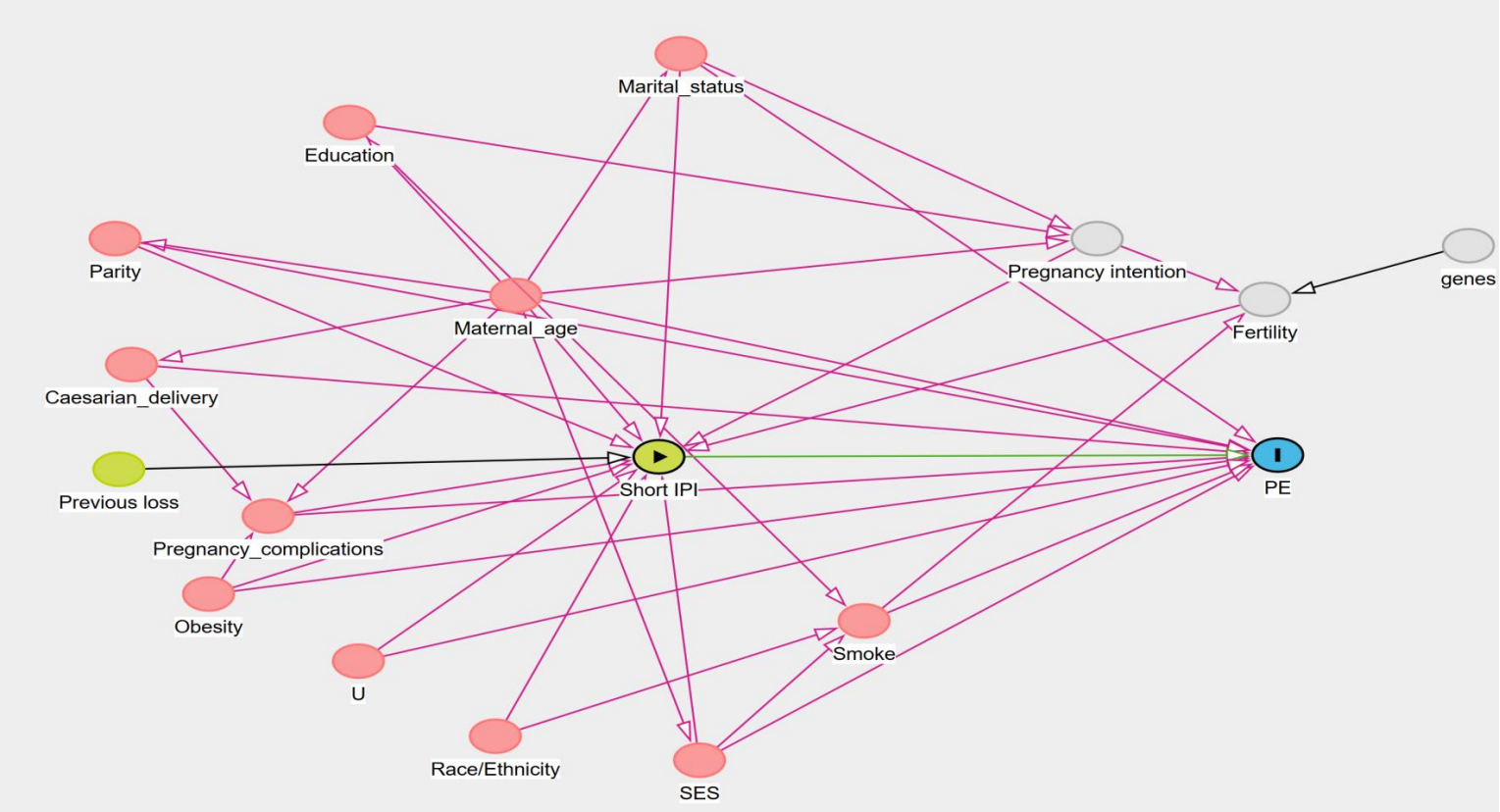
SUPPLEMENTARY

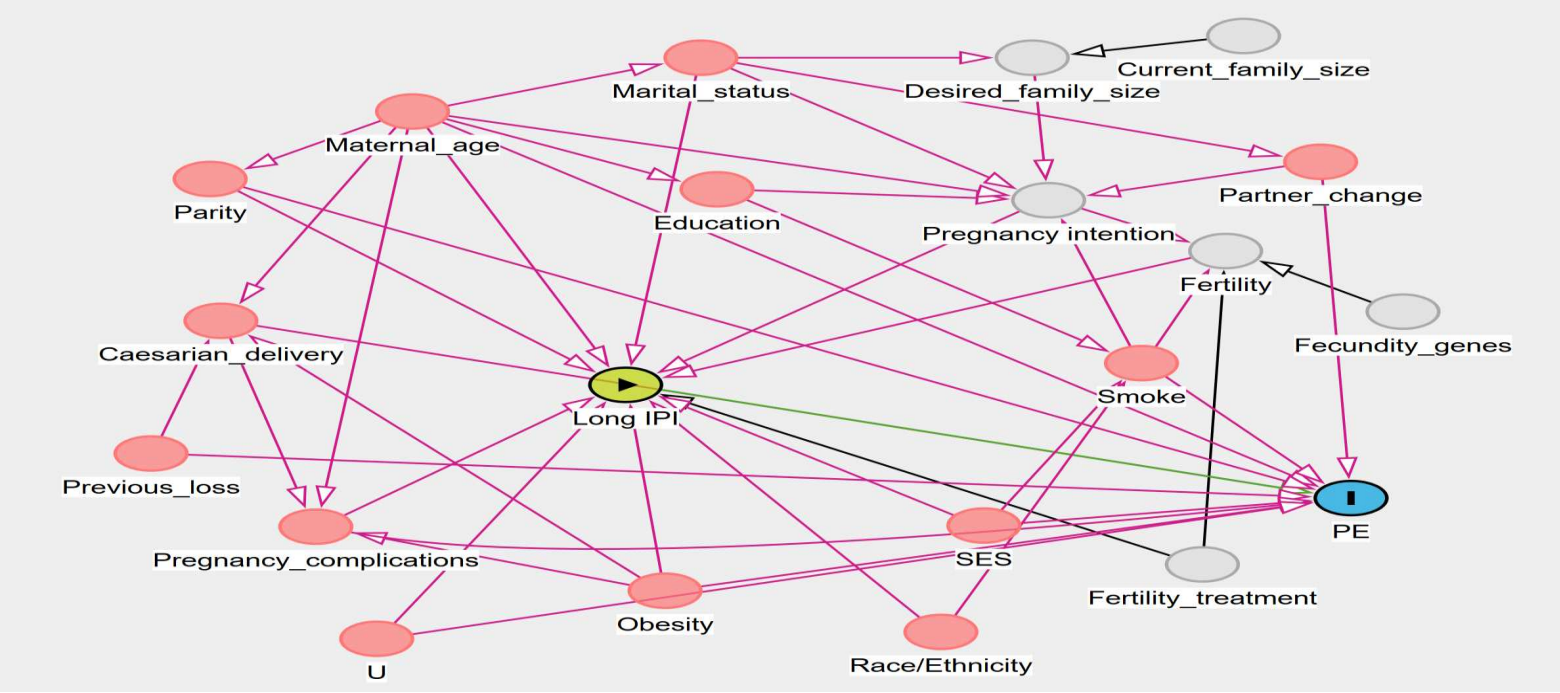


Supplementary Figure 1. Inclusion and exclusion of study cohorts



Supplementary Figure 2. **Directed acyclic graph representing the association between short interpregnancy interval and preeclampsia**

IPI: interpregnancy interval; PE: Preeclampsia); Outcome, exposure, measured covariates and unmeasured covariates are represented by blue, green, red and grey colours, respectively; U-unmeasured and unknown confounders; The minimal set of adjustment sets for estimating the total effect of short IPI on PE are: Marital status, maternal age, obesity, parity, pregnancy complications, SES, smoking and U. In this study, control for pregnancy complications is represented by stratification.



Supplementary Figure 3. Directed acyclic graph representing the association between long interpregnancy interval and preeclampsia

IPI: interpregnancy interval; PE: Preeclampsia); Outcome, exposure, measured covariates and unmeasured covariates are represented by blue, green, red and grey colours, respectively; U-unmeasured and unknown confounders; The minimal set of adjustment sets for estimating the total effect of long IPI on PE are: Maternal age, obesity, parity, pregnancy complications, partner change, SES, smoking and U. In this study, control for pregnancy complications is represented by stratification

Supplementary Table 1. Adjusted Relative Risk (RRs) and predicted absolute risks (ARs) of pregnancy complications at their last birth according to IPI stratified by pregnancy complications at any previous pregnancy (n=280,637 mothers)

	Interpregnancy interval (months): RR, AR and RD (95% CI)							
Outcome	**3**	**6**	**12**	**18**	**24**	**36**	**48**	**60**
Preeclampsia								
Any previous PE (n=28,431 mothers)								
AR (95% CI)	1.08 (0.93-1.25)	1.00 (0.91-1.11)	1.03 (0.94-1.14)	1.00 (Reference)	0.99 (0.92-1.07)	1.05 (0.97-1.13)	1.06 (0.98-1.14)	1.05 (0.97-1.13)
AR % (95% CI)	12.8 (12.1, 16.6)	11.8 (11.7, 14.8)	12.5 (12.3, 15.1)	12.2 (11.9, 14.6)	12.2 (11.9, 14.4)	12.7 (12.6, 15.1)	12.5 (12.7, 15.4)	12.6 (12.6, 15.3)
RD % (95% CI)	0.6 (-1.4, 2.6)	-0.3 (-1.7, 1.0)	0.33 (-0.9, 1.6)	Reference	-0.03 (-1.0, 1.0)	0.5 (-0.0, 1.6)	0.3 (-0.8, 1.3)	0.4 (-0.8, 1.6)
No any previous PE (n=252,206 mothers)								
RR (95% CI)	1.09 (0.93-1.29)	1.01 (0.91-1.13)	0.94 (0.85-1.05)	1.00 (Reference)	1.03 (0.95-1.11)	1.29 (1.18-1.40)	1.42 (1.31-1.54)	1.49 (1.37-1.61)
AR % (95% CI)	1.1 (1.0, 1.4)	1.0 (0.9, 1.3)	0.9 (0.9, 1.1)	1.0 (0.99, 1.2)	1.0 (1.0, 1.2)	1.3 (1.3, 1.5)	1.4 (1.4, 1.7)	1.5 (1.5, 1.8)
RD % (95% CI)	0.1 (-0.1, 0.3)	0.02 (-0.10, 0.1)	-0.06 (-0.16, 0.05)	Reference	0.04 (-0.05, 0.1)	0.3 (0.2, 0.4)	0.5 (0.3, 0.6)	0.5 (0.4, 0.7)
Gestational diabetes								
Any previous GDM (n=10,001 mothers)								
RR (95% CI)	1.02 (0.90-1.15)	0.91 (0.83-1.00)	0.94 (0.86-1.02)	1.00 (Reference)	0.98 (0.92-1.05)	1.08 (1.00-1.16)	1.13 (1.05-1.21)	1.14 (1.06-1.23)
AR % (95% CI)	38.2 (30.3, 46.0)	33.8 (27.4, 40.2)	34.9 (27.5, 42.3)	37.7 (31.4, 44.0)	37.0 (30.4, 43.5)	40.9 (35.4, 46.5)	42.8 (38.0, 47.7)	43.6 (38.6, 48.7)
RD % (95% CI)	0.4 (-4.7, 5.6)	-3.9 (-7.4, -0.4)	-2.81 (-6.5, 0.8)	Reference	-0.8 (-3.6, 2.1)	3.2 (-0.03, 6.4)	5.08 (1.4, 8.8)	5.9 (2.3, 9.5)
No any previous GDM (n=270,636 mothers)								
RR (95% CI)	0.89 (0.77-1.03)	0.86 (0.78-0.95)	0.95 (0.87-1.04)	1.00 (Reference)	1.18 (1.11-1.26)	1.72 (1.61-1.85)	2.12 (1.98-2.27)	2.50 (2.34-2.68)
AR % (95% CI)	2.6 (2.3, 3.0)	2.5 (2.2, 2.7)	2.7 (2.5, 2.9)	2.8 (2.6, 3.0)	3.4 (3.1, 3.6)	5.0 (4.7, 5.3)	6.3 (5.9, 6.7)	7.6 (7.1, 8.1)
RD % (95% CI)	-0.1 (-0.6, 0.3)	-0.3 (-0.6, -0.1)	-0.1 (-0.4, 0.2)	Reference	0.6 (0.4, 0.8)	2.2 (1.9, 2.5)	3.5 (3.1, 3.9)	4.8 (4.4, 5.3)

Interpregnancy interval (IPI) was modelled using restricted cubic splines with knots placed at 3, 6, 12, 18, 24, 36, 48 months of interpregnancy interval. Models were adjusted for maternal age, parity, SES, birth year, ethnicity, marital status at birth prior to IPI and partner change at recent birth with 18-month of IPI as reference. Maternal age was modelled using restricted cubic splines with 4 knots at the 5th, 35th, 65th, and 95th percentiles (ages 18, 24, 29, and 35); Predicted absolute risks are reported at representative values of covariates: Caucasian, married, average SES, average maternal age (25.1) and birth year in 2010 at birth prior to the IPI; *PE, preeclampsia; GDM, gestational diabetes; RR:Relative risk; AR: Absolute risk; RD:Risk difference*

Supplementary Table 2. Adjusted Relative Risk (RRs) and predicted absolute risks (ARs) of pregnancy complications at parity 1 according to IPI stratified by pregnancy complication at parity 0 for a cohort of mothers with their first two consecutive births at the end of the study period (1997 onwards) (n=119,902 mothers)

	Interpregnancy interval (months): RR, AR and RD (95% CI)							
Outcome	**3**	**6**	**12**	**18**	**24**	**36**	**48**	**60**
Preeclampsia								
Previous PE								
RR (95% CI)	1.23 (0.94-1.61)	0.88 (0.73-1.07)	0.94 (0.79-1.12)	1.00 (Reference)	0.9 (0.78-1.04)	0.96 (0.83-1.13)	0.98 (0.84-1.14)	0.95 (0.81-1.11)
AR % (95% CI)	17.7 (12.7, 22.7)	12.7 (9.5, 15.9)	13.60 (10.2, 17.1)	14.5 (11.2, 17.8)	13.0 (9.7, 16.4)	13.9 (11.2, 16.6)	14.1 (11.2, 17.1)	13.7 (10.6, 16.7)
RD % (95% CI)	3.2 (-1.7, 8.1)	-1.8 (-4.5, 0.9)	-0.9 (-3.4, 1.7)	Reference	-1.5 (-3.5, 0.6)	-0.60 (-3.0, 1.8)	-0.4 (-2.8, 2.0)	-0.8 (-3.2, 1.5)
No previous PE								
RR (95% CI)	1.31 (1.00-1.71)	0.94 (0.77-1.15)	0.99 (0.82-1.19)	1.00 (Reference)	0.99 (0.86-1.15)	1.26 (1.07-1.48)	1.38 (1.17-1.63)	1.43 (1.21-1.69)
AR % (95% CI)	1.5 (1.1, 1.90)	0.9 (0.7, 1.1)	0.8 (0.7, 1.0)	0.8 (0.7, 1.0)	0.9 (0.7, 1.0)	1.2 (1.0, 1.4)	1.5 (1.2, 1.8)	1.6 (1.3, 1.9)
RD % (95% CI)	0.7 (0.2, 1.1)	0.1 (-0.1, 0.2)	0.01 (-0.2, 0.2)	Reference	0.02 (-0.1, 0.2)	0.4 (0.2, 0.6)	0.7 (0.4, 0.9)	0.8 (0.5, 1.1)
Gestational diabetes								
Previous GDM								
RR (95% CI)	1.10 (0.94-1.29)	0.85 (0.76-0.96)	0.93 (0.83-1.04)	1.00 (Reference)	0.93 (0.85-1.02)	1.05 (0.95-1.16)	1.12 (1.02-1.24)	1.15 (1.04-1.28)
AR % (95% CI)	38.8 (26.3, 51.2)	28.9 (20.1, 37.8)	31.4 (20.0, 42.7)	34.9 (24.9, 44.9)	31.6 (20.5, 42.6)	37.2 (27.1, 47.3)	40.0 (30.2, 49.9)	42.5 (35.9, 49.2)
RD % (95% CI)	3.9 (-3.8, 11.6)	-5.9 (-10.4, -1.5)	-3.5 (-8.0, 1.0)	Reference	-3.3 (-7.1, 0.5)	2.4 (-1.9, 6.6)	5.2 (0.7, 9.6)	7.7 (0.7, 14.6)
No previous GDM								
RR (95% CI)	1.03 (0.85-1.23)	0.89 (0.78-1.00)	0.96 (0.85-1.07)	1.00 (Reference)	1.22 (1.12-1.34)	1.73 (1.57-1.90)	2.10 (1.91-2.31)	2.49 (2.26-2.73)
AR % (95% CI)	2.8 (2.2, 3.3)	2.2 (1.9, 2.5)	2.3 (2.0, 2.6)	2.4 (2.1, 2.7)	3.0 (2.6, 3.3)	4.4 (3.9, 4.8)	5.6 (5.0, 6.2)	6.7 (6.0, 7.4)
RD % (95% CI)	0.4 (-0.2, 0.9)	-0.2 (-0.5, 0.1)	-0.09 (-0.4, 0.2)	Reference	0.6 (0.3, 0.8)	2.0 (1.6, 2.4)	3.2 (2.7, 3.7)	4.3 (3.7, 5.0)

Interpregnancy interval (IPI) was modelled using restricted cubic splines with knots placed at 3, 6, 12, 18, 24, 36, 48 months of interpregnancy interval. Models were adjusted for maternal age, SES, birth year, ethnicity, smoking, fertility treatment, paternal age, marital status at birth prior to IPI and partner change at recent birth with 18-month of IPI as reference. Maternal age was modelled using restricted cubic splines with 4 knots at the 5th, 35th, 65th, and 95th percentiles (ages 18, 24, 29, and 35); Predicted absolute risks are reported at representative values of covariates: Caucasian, married, not smoking, no fertility treatment, average paternal age (age group; 25-34 years), average SES, average maternal age (25.1) and birth year in 2010 at birth prior to the IPI; *PE, preeclampsia; GDM, gestational diabetes; RR:Relative risk; AR: Absolute risk; RD:Risk difference*

Supplementary Table 3. Adjusted Relative Risk (RRs) and predicted absolute risks (ARs) of pregnancy complications at parity 2 according to IPI stratified by pregnancy complications at parity 0 and parity 1 (n=96,315 mothers)

	Interpregnancy interval (months): RR, AR and RD (95% CI)							
Outcome	**3**	**6**	**12**	**18**	**24**	**36**	**48**	**60**
Preeclampsia								
No PE No PE								
RR (95% CI)	0.68 (0.48-0.96)	0.84 (0.68-1.05)	0.92 (0.75-1.13)	1.00 (Reference)	0.88 (0.75-1.04)	1.27 (1.08-1.51)	1.53 (1.31-1.80)	1.63 (1.39-1.93)
AR % (95% CI)	0.7 (0.4, 0.9)	0.8 (0.6, 1.0)	0.9 (0.8, 1.1)	1.0 (0.8, 1.2)	0.9 (0.8, 1.1)	1.4 (1.1, 1.6)	1.6 (1.4, 1.9)	1.8 (1.5, 2.1)
RD % (95% CI)	-0.4 (-0.7, -0.1)	-0.2 (-0.4, 0.02)	-0.1 (-0.3, 0.1)	Reference	-0.1 (-0.3, 0.05)	0.3 (0.1, 0.5)	0.6 (0.4, 0.8)	0.7 (0.5, 1.0)
No PE PE								
RR (95% CI)	0.77 (0.45-1.32)	0.84 (0.59-1.19)	1.25 (0.90-1.75)	1.00 (Reference)	1.05 (0.80-1.37)	1.04 (0.77-1.40)	1.02 (0.76-1.35)	1.02 (0.76-1.36)
AR % (95% CI)	15.3 (6.4, 24.3)	16.3 (8.7, 23.8)	24.0 (16.3, 31.6)	19.2 (12.3, 26.2)	19.5 (13.5, 25.6)	19.8 (14.0, 25.5)	18.4 (12.7, 24.2)	17.7 (11.9, 23.5)
RD % (95% CI)	-3.9 (-12.3, 4.5)	-2.9 (-9.5, 3.6)	4.7 (-2.4, 11.8)	Reference	0.3 (-5.3, 5.9)	0.6 (-5.3, 6.4)	-0.8 (-7.9, 6.3)	-1.5 (-9.2, 6.2)
PE No PE								
RR (95% CI)	1.21 (0.86-1.69)	0.8 (0.60-1.07)	1.26 (0.96-1.65)	1.00 (Reference)	0.95 (0.77-1.18)	1.15 (0.92-1.43)	1.22 (0.99-1.51)	1.25 (1.01-1.55)
AR % (95% CI)	8.1 (4.9, 11.3)	5.2 (3.4, 7.0)	8.4 (6.0, 10.7)	6.5 (4.7, 8.3)	6.2 (4.6, 7.8)	7.4 (5.8, 9.0)	7.9 (6.0, 9.7)	8.1 (6.3, 9.9)
RD % (95% CI)	1.6 (-1.4, 4.6)	-1.3 (-3.0, 0.5)	1.9 (-0.3, 4.0)	Reference	-0.3 (-1.7, 1.1)	0.9 (-0.8, 2.5)	1.4 (-0.4, 3.2)	1.6 (-0.03, 3.2)
PE PE								
RR (95% CI)	1.36 (0.94-1.95)	1.23 (0.95-1.58)	1.23 (0.96-1.57)	1.00 (Reference)	1.06 (0.86-1.30)	1.1 (0.89-1.38)	1.12 (0.90-1.39)	1.15 (0.93-1.43)
AR % (95% CI)	44.2 (26.9, 61.5)	37.8 (26.8, 48.8)	37.6 (28.3, 46.9)	29.3 (21.5, 37.2)	31.7 (23.8, 39.6)	33.4 (25.9, 41.0)	31.90 (24.3, 39.5)	31.0 (22.7, 39.3)
RD % (95% CI)	14.8 (-1.5, 31.3)	8.5 (-0.9, 17.9)	8.3 (-0.6, 17.1)	Reference	2.4 (-4.3, 9.0)	4.1 (-3.1, 11.3)	2.6 (-5.0, 10.2)	1.7 (-7.202, 10.5)
Gestational diabetes								
No GDM No GDM								
RR (95% CI)	1.10 (0.85-1.42)	1.01 (0.84-1.23)	1.05 (0.87-1.26)	1.00 (Reference)	1.05 (0.92-1.20)	1.44 (1.24-1.66)	1.64 (1.43-1.87)	1.74 (1.52-2.00)
AR % (95% CI)	3.0 (2.2, 3.9)	2.7 (2.2, 3.3)	2.8 (2.3, 3.2)	2.6 (2.2, 3.0)	2.7 (2.4, 3.1)	3.7 (3.3, 4.1)	4.2 (3.7, 4.7)	4.5 (3.9, 5.0)
RD % (95% CI)	0.4 (-0.4, 1.3)	0.1 (-0.4, 0.7)	0.2 (-0.3, 0.7)	0.00 (0.00, 0.00)	0.12 (-0.2, 0.5)	1.1 (0.6, 1.5)	1.6 (1.1, 2.003)	1.8 (1.3, 2.3)
No GDM GDM								
RR (95% CI)	1.04 (0.77-1.41)	0.97 (0.77-1.22)	0.98 (0.78-1.24)	1.00 (Reference)	0.89 (0.74-1.08)	1.02 (0.84-1.24)	1.07 (0.89-1.28)	1.04 (0.87-1.26)
AR % (95% CI)	42.1 (29.9, 54.2)	35.0 (25.8, 44.2)	37.3 (29.5, 45.1)	39.7 (31.4, 48.0)	31.7 (24.4, 38.9)	38.2 (31.1, 45.0)	39.6 (31.4, 47.8)	36.3 (26.4, 46.2)
RD % (95% CI)	2.3 (-10.1, 14.7)	-4.7 (-14.6, 5.2)	-2.5 (-11.5, 6.5)	0.00 (0.00, 0.00)	-8.1 (-16.4, 0.2)	-1.5 (-9.8, 6.8)	-0.14 (-8.9, 8.6)	-3.4 (-14.4, 7.6)
GDM No GDM								

Outcome	Interpregnancy interval (months): RR, AR and RD (95% CI)							
	3	**6**	**12**	**18**	**24**	**36**	**48**	**60**
RR (95% CI)	1.47 (0.85-2.52)	1.23 (0.79-1.90)	1.14 (0.74-1.77)	1.00 (Reference)	1.25 (0.89-1.76)	1.28 (0.88-1.86)	1.27 (0.88-1.83)	1.34 (0.93-1.93)
AR % (95% CI)	29.0 (15.4, 42.6)	31.5 (15.6, 47.4)	23.7 (14.2, 33.2)	13.4 (7.6, 19.2)	23.0 (15.3, 30.7)	19.0 (12.7, 25.4)	18.7 (12.1, 25.4)	12.7 (4.6, 20.8)
RD % (95% CI)	15.6 (1.6, 29.6)	18.1 (1.4, 34.8)	10.3 (-0.2, 20.7)	0.00 (0.00, 0.00)	9.6 (2.1, 17.1)	5.6 (-0.6, 11.9)	5.3 (-0.7, 11.4)	-0.7 (-7.525 6.2)
GDM GDM								
RR (95% CI)	0.97 (0.65-1.45)	1.19 (0.93-1.52)	1.21 (0.96-1.52)	1.00 (Reference)	1.15 (0.95-1.39)	1.07 (0.86-1.32)	1.04 (0.84-1.28)	1.07 (0.87-1.33)
AR % (95% CI)	58.7 (34.2, 83.2)	66.7 (52.6, 80.8)	69.9 (59.6, 80.1)	64.2 (50.0, 78.5)	68.8 (58.6, 79.0)	76.5 (60.1, 93.0)	65.4 (50.4, 80.4)	77.0 (54.2, 99.9)
RD % (95% CI)	-5.5 (-27.6, 16.6)	2.5 (-14.6, 19.6)	5.6 (-9.1, 20.4)	0.00 (0.00, 0.00)	4.6 (-7.5, 16.6)	12.3 (1.2, 23.5)	1.2 (-9.8, 12.1)	12.8 (-2.6, 28.1)

Interpregnancy interval (IPI) was modelled using restricted cubic splines with knots placed at 3, 6, 12, 18, 24, 36, 48 months of interpregnancy interval. Models were adjusted for SES, birth year, ethnicity, marital status and partner change at the time of the outcome (third birth) with 18-month of IPI as reference. We modelled maternal age using restricted cubic splines with 4 knots at the 5th, 35th, 65th, and 95th percentiles (ages 18, 24, 29, and 35); Predicted absolute risks are reported at representative values of covariates: Caucasian, married, average SES, average maternal age (31.2) and birth year in 2010 at the time of the outcome. *PE, preeclampsia; GDM, gestational diabetes; RR:Relative risk; AR: Absolute risk; RD:Risk difference*

Supplementary Table 4. Counts and percentage of pregnancy complications during first and second singleton pregnancies by interpregnancy interval for mothers with first two consecutive births during the study period

	Interpregnancy Interval, No. (%) of pregnancies						
	Total	**<6**	**6-11**	**12-17**	**18-23**	**24-59**	**≥60**
	252,368	12,104 (4.8)	42,470 (16.8)	55,218 (21.9)	42,934 (17.0)	79,950 (31.7)	19,692 (7.8)
Preeclampsia							
First birth	23,961 (9.5)	1,098 (4.6)	3,792 (15.8)	4,981 (20.8)	4,054 (16.9)	7,970 (33.3)	2,066 (8.6)
Second birth	5,387 (2.4)	271 (2.5)	748 (1.9)	1,012 (2.0)	835 (2.1)	1,813 (2.5)	708 (4.0)
First and second	4,635 (19.3)	227 (20.7)	701 (18.5)	947 (19.0)	796 (19.6)	1,547 (19.4)	417 (20.2)
Gestational diabetes							
First birth	6,604 (2.6)	324 (4.9)	1,203 (18.2)	1,481 (22.4)	1183 (17.9)	2060 (31.2)	353 (5.3)
Second birth	6,349 (2.6)	228 (1.9)	708 (1.7)	1,022 (1.9)	885 (2.1)	2,427 (3.1)	1,079 (5.6)
First and second	2,739 (41.5)	142 (43.8)	444 (36.9)	614 (41.5)	484 (40.9)	890 (43.2)	165 (46.7)