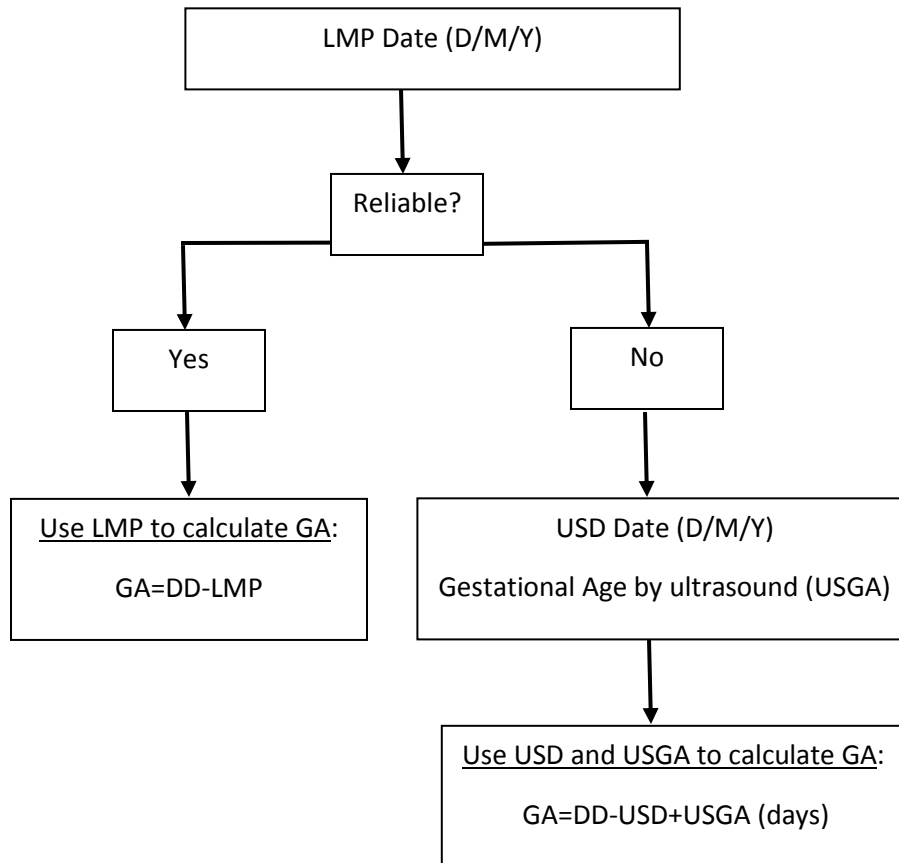


Supplementary Material A1. Gestational age calculation algorithm



Legend

LMP: Last Menstrual Period

GA: Gestational Age

DD: Delivery Date

USD: Ultrasound Date

USGA: Gestational Age by ultrasound (weeks)

Supplementary Material A2. Selected characteristics of participant pregnant women (n=3,395), post-partum interview, July–December 2014, Managua, Nicaragua

	All n=3,395 n(%)	Vaccinated in first trimester n=140 n(%)	Vaccinated in second trimester n=1,143 n(%)	Vaccinated in third trimester n=581 n(%)	Unvaccinated n=1,531 n(%)
Demographics					
Age					
<18 years	436 (13)	13 (9)	142 (12)	88 (15)	193 (13)
18–34 years	2,717 (80)	121 (86)	919 (80)	452 (78)	1,225 (80)
≥35 years	242 (7)	6 (4)	82 (7)	41 (7)	113 (7)
Number of persons in household					
2 to 4	931 (27)	53 (38)†	350 (31) †	146 (25)	382 (25)
5 to 6	1,122 (33)	44 (31) †	380 (33) †	188 (32)	510 (33)
7 to 8	722 (21)	25 (18) †	227 (20) †	138 (24)	332 (22)
>8	620 (18)	18 (13) †	186 (16) †	109 (19)	307 (20)
Delivered at Reference Obstetric Hospital	1,791 (53)	99 (71) †	690 (60) †	339 (58) †	663 (43)
Antenatal Care					
Received at least one dose of tetanus vaccine	3,097 (91)	139 (99) †	1,123 (98) †	570 (98) †	1,265 (83)
At least one antenatal visit	3,296 (97)	139 (99) †	1,143 (100) †	579 (100) †	1,435 (94)
Four or more antenatal visits	2,649 (78)	132 (94) †	1,015 (89) †	466 (80) †	1,036 (68)
Consumption of iron and folic acid	1,551 (46)	63 (45)	481 (42) †	299 (51) †	708 (46)
Consumption of albendazol	739 (22)	39 (28) †	292 (26) †	174 (30) †	234 (15)
Consumption of calcium	1,299 (38)	57 (41)	437 (38)	263 (45) †	542 (35)
Consumption of aspirin	981 (29)	51 (36) †	370 (32) †	210 (36) †	350 (23)
Risk factors					
Ever consumed alcohol	455 (13)	11 (8) †	138 (12)	76 (13)	230 (15)
Chronic conditions					
Renal Disease	1,314 (39)	60 (43)	478 (42) †	230 (40)	546 (36)
Blood Disease	762 (22)	27 (19)	287 (25) †	140 (24)	308 (20)
At least one chronic condition	1,922 (57)	83 (59)	688 (60) †	342 (59) †	809 (53)
Obstetric characteristics					
Number of parturitions					
1	1,581 (47)	70 (50) †	571 (50) †	274 (47)	666 (44)
2 to 3	1,495 (44)	64 (46) †	474 (41) †	258 (44)	699 (46)
>3	319 (9)	6 (4) †	98 (9) †	49 (8)	166 (11)
Baby characteristics					
Female	1,641 (48)	55 (39) †	508 (44) †	272 (47) †	806 (53)
Prematurity	184 (5)	17 (12) †	59 (5)	22 (4)	86 (6)
Small for gestational age	298 (9)	13 (9)	95 (8)	61 (10)	129 (8)
Low birth weight	205 (6)	13 (9)	60 (5)	30 (5)	102 (7)

† X² test of the distribution of the vaccinated group, respective of trimester of vaccination, compared to the unvaccinated group.

Supplementary Material A3. Evaluation of the association of influenza vaccination and birth outcomes among pregnant women by trimester of vaccination (n=3,688), post-partum interview, July–December 2014, Managua Province, Nicaragua.

Birth Outcomes	Influenza vaccine 2014 season Multiple Logistic Regression (MLR)		Influenza vaccine 2014 season Propensity score Model (PSM) [†] + MLR [‡] n=1,600 x1,000 simulations [¥]	
	aOR (95% CI)		aOR (95% CI)	
Small for gestational age (SGAi)	0.97*	(0.77; 1.23)	1.01	(0.80; 1.27)
Prematurity (PR)	0.97**	(0.71; 1.34)	0.98	(0.73; 1.32)
Low birth weight (LBW)	0.89***	(0.67; 1.19)	0.89	(0.67; 1.18)

aOR= Adjusted Odds Ratio.

*Model adjusted for race, education level, reporting receiving at least one tetanus vaccine, albendazol, iron, and folic acid consumption during pregnancy, alcohol consumption before pregnancy, number of parturitions, body mass index (BMI) at first antenatal visit. **Model adjusted for age, race, reporting at least one chronic condition (obesity, diabetes, asthma, renal disease, liver disease, blood disease, neurologic disease), hospitalization during pregnancy, delivery hospital, body mass index (BMI) at first antenatal visit, alcohol consumption before pregnancy, number of antenatal visits, , reporting receiving at least one tetanus vaccine, iron, and folic acid consumption during pregnancy, influenza circulation and sex of the baby. *** Model adjusted for education level, alcohol consumption before pregnancy, hospitalization during pregnancy, body mass index (BMI) at first antenatal visit, and sex of the baby.

[†] Propensity Score Models adjusted for age, race, education level, type of fuel used for cooking, number of people in the household, reporting receiving at least one tetanus vaccine, number of antenatal visits, Fe and vitamin B12 consumption during pregnancy, albendazol consumption during pregnancy, calcium consumption during pregnancy, aspirin consumption during pregnancy, alcohol consumption before pregnancy, body mass index (BMI) at first antenatal visit, number of parturitions, and reporting at least one chronic condition (obesity, diabetes, asthma, renal disease, liver disease, blood disease, neurologic disease).

[‡] Models adjusted for delivery hospital, hospitalization during pregnancy, reporting at least one episode of influenza-like illness during pregnancy (ILI), alcohol consumption before pregnancy, number of parturitions, sex of the baby, and influenza circulation.

[¥] Based on 1000 simulations; point estimate and lower and upper confidence interval represent 50th, 25th and 97.5th percentiles of point estimates (n=1,000), respectively.

Supplementary Material A4. Evaluation of the association of influenza vaccination and birth outcomes among pregnant women by trimester of vaccination (n=3,688) with multiple logistic regression (MLR) method, post-partum interview, July–December 2014, Managua, Nicaragua.

Birth Outcomes	Influenza vaccine 2014 season								
	Vaccinated in first trimester (n=155)		Vaccinated in second trimester (n=1,293)		Vaccinated in third trimester (n=775)				
	aOR (95% CI)	p-value	aOR (95% CI)	p-value	aOR (95% CI)	p-value			
Small for gestational age* (SGAi)	1.22	(0.71; 2.12)	0.47	1.01	(0.78; 1.31)	0.44	0.89	(0.65; 1.23)	0.49
Prematurity** (PR)	2.29	(1.23; 4.26)	0.01	1.04	(0.72; 1.48)	0.85	0.72	(0.45; 1.14)	0.16
Low birth weight (LBW) ***	1.41	(0.75; 2.66)	0.30	0.90	(0.65; 1.24)	0.51	0.81	(0.54; 1.21)	0.29

aOR= Adjusted Odds Ratio.

*Models adjusted for race, number of people in the household, delivery hospital, reporting receiving at least one tetanus vaccine, iron and folic acid consumption during pregnancy, number of parturitions, body mass index (BMI) at first antenatal visit, and influenza circulation for mothers vaccinated in the first trimester; race, number of parturitions, body mass index (BMI) at first antenatal visit, and number of people in the household for mothers vaccinated in the second trimester; race, reporting receiving at least one tetanus vaccine, calcium, iron and folic acid consumption during pregnancy, number of parturitions, body mass index (BMI) at first antenatal visit, reporting at least one episode of influenza-like illness during pregnancy (ILI), and influenza circulation for mothers vaccinated in the third trimester. **Models adjusted for age, race, education level, delivery hospital, reporting receiving at least one tetanus vaccine, number of antenatal visits, iron and folic acid, albendazol, aspirin and calcium consumption during pregnancy, reporting at least one episode of influenza-like illness during pregnancy (ILI), hospitalization during pregnancy, alcohol consumption before pregnancy, reporting at least one chronic condition (obesity, diabetes, asthma, renal disease, liver disease, blood disease, neurologic disease), number of parturitions, body mass index (BMI) at first antenatal visit, sex of the baby, and influenza circulation for mothers vaccinated in the first trimester; age, race, delivery hospital, reporting receiving at least one tetanus vaccine, number of antenatal visits, iron and folic acid consumption during pregnancy, hospitalization during pregnancy, alcohol consumption before pregnancy, reporting at least one chronic condition (obesity, diabetes, asthma, renal disease, liver disease, blood disease, neurologic disease), number of parturitions, body mass index (BMI) at first antenatal visit, sex of the baby, and influenza circulation for mothers vaccinated in the second trimester; race, alcohol consumption before pregnancy, BMI at first antenatal visit, number of antenatal visits, hospitalization during pregnancy, delivery hospital, reporting at least one chronic condition (obesity, diabetes, asthma, renal disease, liver disease, blood disease, neurologic disease), reporting receiving at least one tetanus vaccine, and type of fuel used for cooking for mothers vaccinated in the third trimester. *** Models adjusted for alcohol consumption before pregnancy, BMI at first antenatal visit, number of antenatal visits, hospitalization during pregnancy, delivery hospital, and sex of the baby for mothers vaccinated in the first trimester; education level, alcohol consumption before pregnancy, BMI at first antenatal visit, hospitalization during pregnancy, albendazol consumption during pregnancy, delivery hospital, sex of the baby, and ILI for mothers vaccinated in the second trimester; number of antenatal visits, hospitalization during pregnancy, alcohol consumption before pregnancy, body mass index (BMI) at first antenatal visit and sex of the baby for mothers vaccinated in the third trimester.

Supplementary Material A5. Evaluation of the association of influenza vaccination and birth outcomes among pregnant women by trimester of vaccination with propensity score matching (PSM) analysis, post-partum interview, July–December 2014, Managua, Nicaragua.

Birth Outcomes	Influenza vaccine 2014 season								
	Vaccinated in first trimester (n=310)		Vaccinated in second trimester (n=1,600)		Vaccinated in third trimester (n=1,550)				
	aOR (95% CI)	p-values	aOR (95% CI) x1,000sim***	p-values	aOR (95% CI)	p-values			
Small for gestational age** (SGA)	1.20	(0.53; 2.73)	0.66	0.97	(0.80; 1.16)	N/A	1.04	(0.72; 1.48)	0.85
Prematurity** (PR)	3.1	(0.99; 9.73)	0.05	1.14	(0.87; 1.46)	N/A	0.60	(0.36; 1.02)	0.06
Low birth weight (LBW) **	1.82	(0.59; 5.58)	0.29	0.94	(0.72; 1.17)	N/A	0.78	(0.49; 1.24)	0.29

aOR= Adjusted Odds Ratio.

*Propensity Score Models adjusted for age, race, education level, type of fuel used for cooking, number of people in the household, reporting receiving at least one tetanus vaccine, number of antenatal visits, Fe and vitamin B12 consumption during pregnancy, albendazol consumption during pregnancy, calcium consumption during pregnancy, aspirin consumption during pregnancy, alcohol consumption before pregnancy, body mass index (BMI) at first antenatal visit, number of parturitions, and reporting at least one chronic condition (obesity, diabetes, asthma, renal disease, liver disease, blood disease, neurologic disease).

**Models adjusted for delivery hospital, hospitalization during pregnancy, reporting at least one episode of influenza-like illness during pregnancy (ILI), alcohol consumption before pregnancy, number of parturitions, sex of the baby, and influenza circulation.

*** Based on 1000 simulations; point estimate and lower and upper confidence interval represent 50th, 25th and 97.5th percentiles of point estimates (n=1,000), respectively.