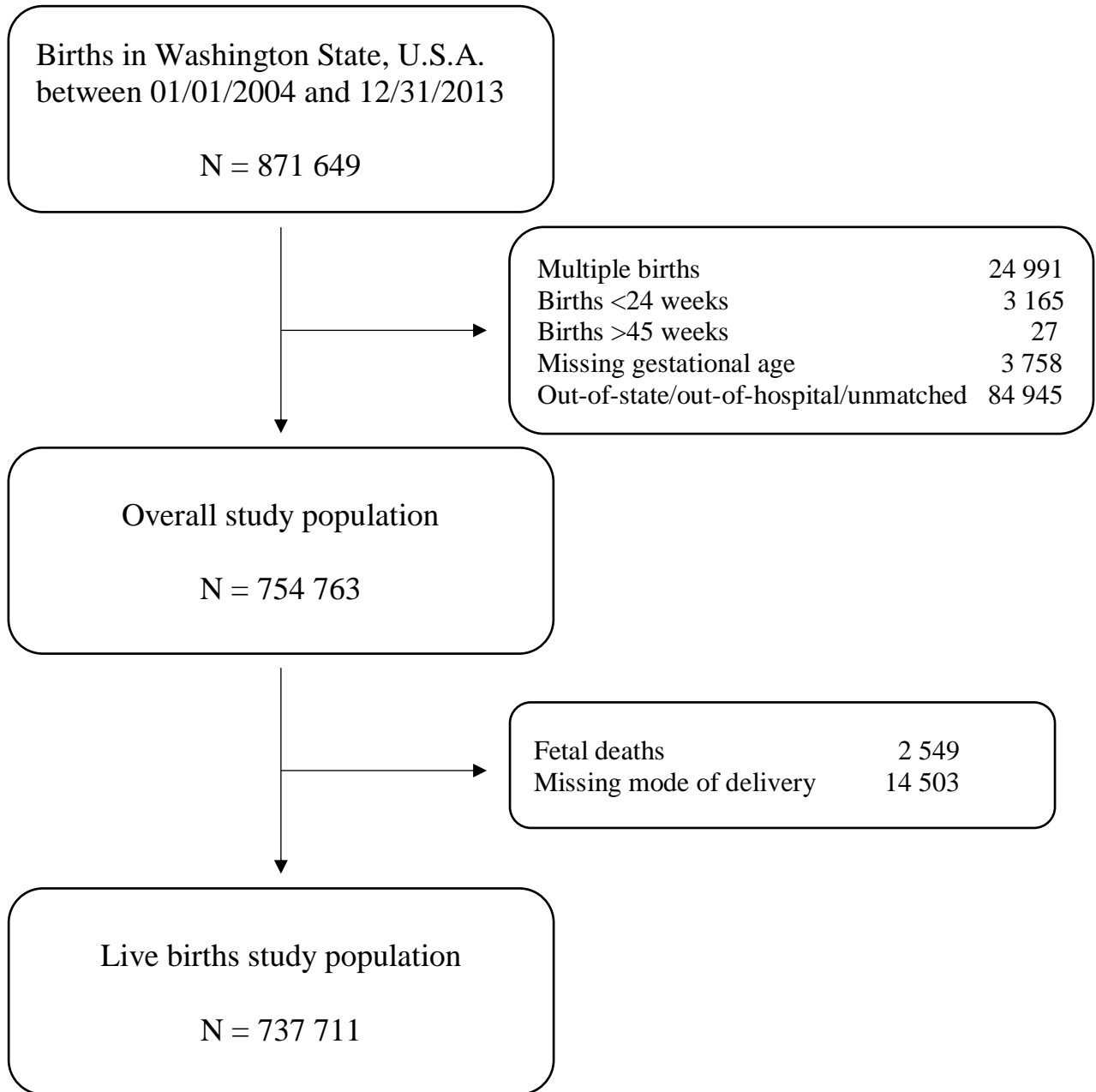


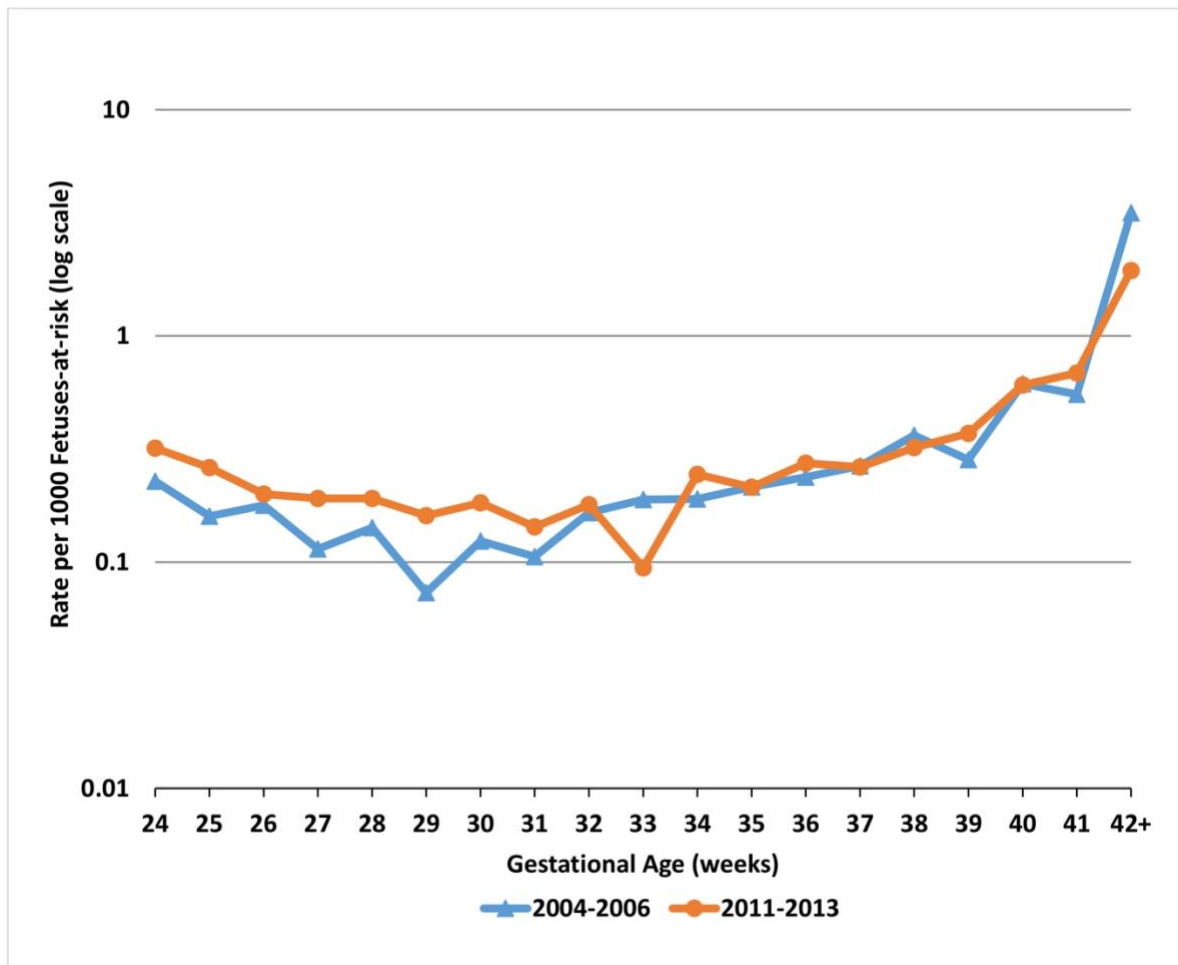
Appendix Table 1. Severe neonatal morbidity components and ICD-9-CM codes.

Neonatal morbidity	ICD-9-CM code
Bronchopulmonary dysplasia	770.7
Intraventricular hemorrhage	
Grade III – bleeding with enlargement of ventricle	772.13
Grade IV – bleeding into cerebral cortex	772.14
Periventricular leukomalacia	779.7
Retinopathy of prematurity	362.2
Necrotizing enterocolitis	777.5
Sepsis	
Septicemia of newborn	771.81
Convulsions	
Fits in newborn; seizures in newborn	779.0
Severe birth trauma	
Subdural and cerebral hemorrhage (whether described as due to birth trauma or to intrapartum anoxia or hypoxia; subdural hematoma (localized); tentorial tear	767.0
Epicranial subaponeurotic hemorrhage (massive); subgaleal hemorrhage	767.11
Injury to spine and spinal cord including:	767.4
Dislocation of spine or spinal cord due to birth trauma	
Fracture of spine or spinal cord due to birth trauma	
Laceration of spine or spinal cord due to birth trauma	
Rupture of spine or spinal cord due to birth trauma	

Appendix Figure 1. Study population flow chart, Washington State, U.S.A., 2004-2013.



Appendix Figure 2. Gestational age-specific rates of stillbirths calculated using the fetuses-at-risk (FAR) approach, Washington State, U.S.A., 2004-2013.



Appendix Table 2. Preterm live births by gestational age categories and clinical subtype, Washington State, U.S.A., 2004-2013.

Gestational age and clinical preterm birth subtype	All Years (2004-2013)	Period 1 (2004-2006)	Period 2 (2011-2013)	p-value* (Period 2 vs. Period 1)
24-27 weeks	1 833	489	598	<0.001
PPROM	509 (27.8)	181 (37.0)	130 (21.7)	
Spontaneous labor	532 (29.0)	135 (27.6)	189 (31.6)	
Iatrogenic	792 (43.2)	173 (35.4)	279 (46.7)	
28-31	4 095	1 135	1 357	<0.001
PPROM	909 (22.2)	295 (26.0)	264 (19.5)	
Spontaneous labor	1 255 (30.6)	357 (31.5)	416 (30.7)	
Iatrogenic	1 931 (47.2)	483 (42.6)	677 (49.9)	
32-33	5 664	1 469	1 848	0.006
PPROM	1 288 (22.7)	383 (26.1)	410 (22.2)	
Spontaneous labor	1 988 (35.1)	530 (36.1)	649 (35.1)	
Iatrogenic	2 388 (42.2)	556 (37.8)	789 (42.7)	
34-36	40 422	12 249	11 821	0.001
PPROM	5 809 (14.4)	1 912 (15.6)	1 673 (14.2)	
Spontaneous labor	18 973 (46.9)	5 770 (47.1)	5 530 (46.8)	
Iatrogenic	15 640 (38.7)	4 567 (37.3)	4 618 (39.1)	
All (24-36)	52 014	15 342	15 624	<0.001
PPROM	8 515 (16.4)	2 771 (18.1)	2 477 (15.9)	
Spontaneous labor	22 748 (43.7)	6 792 (44.3)	6 784 (43.4)	
Iatrogenic	20 751 (39.9)	5 779 (37.7)	6 363 (40.7)	

PPROM, preterm premature rupture of membranes

* p-value for Chi-square test comparing Period 1 and 2

Appendix Table 3 Gestational age-specific rates of adverse neonatal outcomes among singleton preterm infants, Washington State, U.S.A., 2004-2013.

Outcome and gestational age category	Rates per 100 live births		
	N (Rate)		Rate difference (95% CI)
	2004-2006	2011-2013	
Neonatal death			
24-27 weeks	76 (15.5)	85 (14.2)	-1.33 (-5.59, 2.93)
28-31	55 (4.9)	40 (3.0)	-1.90 (-3.44, -0.36)
32-33	23 (1.6)	18 (1.0)	-0.59 (-1.37, 0.19)
34-36	43 (0.4)	64 (0.5)	+0.19 (0.02, 0.36)
All (24-36)	197 (1.3)	207 (1.3)	+0.04 (-0.21, 0.29)
Neonatal death/ severe morbidity			
24-27 weeks	353 (72.2)	429 (71.7)	-0.45 (-5.82, 4.92)
28-31	383 (33.7)	496 (36.6)	+2.81 (-0.95, 6.57)
32-33	166 (11.3)	302 (16.3)	+5.04 (2.70, 7.38)
34-36	307 (2.5)	639 (5.4)	+2.90 (2.41, 3.39)
All (24-36)	1 209 (7.9)	1 866 (11.9)	+4.06 (3.40, 4.73)

CI, confidence interval; severe morbidity includes BPD, IVH grade \geq 3, PVL, ROP, NEC, neonatal sepsis, convulsions of newborn, and severe birth trauma.

Appendix Table 4. Temporal trends in gestational-specific rates of severe neonatal morbidity components, Washington State, U.S.A., 2004-2013.

Neonatal Morbidity	Rates of Outcome by Period [N (per 100 live births)]		Adjusted Odds Ratio† (95% CI)
	2004-2006	2011-2013	
All PTB (24-36 weeks)			
BPD	306 (2.0)	269 (1.7)	0.95 (0.93-0.98)
IVH (grade ≥ 3)	72 (0.5)	61 (0.4)	0.95 (0.90-1.00)
PVL	13 (0.1)	27 (0.2)	1.10 (1.00-1.22)
ROP	60 (0.4)	86 (0.6)	1.02 (0.98-1.07)
NEC	129 (0.8)	173 (1.1)	1.02 (0.99-1.06)
Sepsis	686 (4.5)	1 331 (8.5)	1.09 (1.08-1.11)
Convulsions	53 (0.4)	62 (0.4)	1.00 (0.94-1.04)
Severe birth trauma	29 (0.2)	26 (0.2)	0.96 (0.89-1.04)
Late PTB (34-36 weeks)			
BPD	6 (0.1)	4 (0.0)	0.96 (0.81-1.12)
IVH (grade ≥ 3)	3 (0.0)	3 (0.0)	0.97 (0.78-1.21)
PVL	0 (0.0)	0 (0.0)	1.05 (0.64-1.72)
ROP	0 (0.0)	2 (0.0)	1.56 (0.85-2.87)
NEC	16 (0.1)	21 (0.2)	1.04 (0.95-1.14)
Sepsis	211 (1.7)	530 (4.5)	1.12 (1.10-1.14)
Convulsions	26 (0.2)	28 (0.2)	1.01 (0.93-1.09)
Severe birth trauma	16 (0.1)	14 (0.1)	0.97 (0.87-1.08)
PTB at 28-33 weeks			
BPD	121 (4.7)	95 (3.0)	0.93 (0.89-0.97)
IVH (grade ≥ 3)	24 (0.9)	19 (0.6)	0.92 (0.84-1.01)
PVL	8 (0.3)	15 (0.5)	1.06 (0.93-1.21)
ROP	35 (1.3)	63 (2.0)	1.05 (0.99-1.11)
NEC	76 (2.9)	89 (2.8)	1.00 (0.95-1.05)
Sepsis	306 (11.8)	554 (17.3)	1.07 (1.05-1.10)
Convulsions	19 (0.7)	20 (0.6)	0.96 (0.87-1.05)
Severe birth trauma	9 (0.4)	9 (0.3)	0.95 (0.82-1.11)
PTB at 24-27 weeks			

BPD	179 (36.6)	170 (28.4)	0.97 (0.94-1.01)
IVH (grade ≥ 3)	45 (9.2)	39 (6.5)	0.95 (0.88-1.01)
PVL	5 (1.0)	12 (2.0)	1.13 (0.96-1.32)
ROP	25 (5.1)	21 (3.5)	0.95 (0.87-1.02)
NEC	37 (7.6)	63 (10.5)	1.04 (0.98-1.10)
Sepsis	169 (34.6)	247 (41.3)	1.05 (1.01-1.09)
Convulsions	8 (1.6)	14 (2.3)	1.02 (0.91-1.14)
Severe birth trauma	4 (0.8)	3 (0.5)	0.94 (0.76-1.15)

CI, confidence interval; PTB, preterm birth; BPD, bronchopulmonary dysplasia; IVH, intraventricular hemorrhage; PVL, periventricular leukomalacia; ROP, retinopathy of prematurity; NEC, necrotizing enterocolitis.

Adjusted odds ratios express the average annual change in the odds for each morbidity.

Bolded value indicates statistical significance at $p < 0.05$

†Calendar year was modelled as a continuous variable; adjusted for temporal changes in maternal age, BMI, race, education, smoking, marital status, parity, chronic hypertension, pre-pregnancy diabetes, assisted conception, health insurance provider, gestational age, SGA infant, sex, and congenital anomalies. NOTE: some covariates were excluded from the regression models due to collinearity.