

**Supplemental Table 1. Clinical characteristics and outcomes as stratified by IVH severity and study epoch.**

	No IVH			Grade 1 & 2 IVH			Grade 3 & 4 IVH		
	Epoch 1 (n=12944)	Epoch 2 (n=14567)	Epoch 3 (n=15527)	Epoch 1 (n=2883)	Epoch 2 (n=2897)	Epoch 3 (n=3232)	Epoch 1 (n=1113)	Epoch 2 (n=1051)	Epoch 3 (n=987)
<b>Mean Maternal age (SD)</b>	28.3 (7.4)	29.5 (6.3)	29.7 (6.6)*	27.5 (8.1)	28.8 (6.5)	29.2 (6.6)*	27.7 (7.8)	29.1 (6.6)	28.9 (6.9)*
<b>Maternal Ethnicity (%)</b>									
Indigenous <sup>+</sup>	1350 (12.1)	1666 (12.6)	1770 (12.5)	251 (10.3)	386 (14.8)	385 (13.0)*	140 (15.1)	148 (15.7)	146 (16.0)
Asian	732 (5.7)	889 (6.1)	1335 (8.6)*	151 (5.2)	166 (5.7)	325 (10.1)*	40 (3.6)	50 (4.8)	78 (7.9)*
Caucasian	8939 (69.1)	10478 (71.9)	10661 (68.7)*	2013 (69.8)	2013 (69.5)	2179 (67.4)	736 (66.1)	735 (69.9)	659 (66.6)
Other	156 (1.2)	196 (1.3)	381 (2.5)*	32 (1.1)	45 (1.6)	69 (2.1)*	14 (1.3)	12 (1.1)	28 (2.8)*
<b>Assisted conception (%)</b>	1175 (12.8)	1746 (13.5)	1737 (11.8)*	220 (11.1)	356 (13.4)	326 (10.5)*	68 (8.8)	132 (13.9)	121 (12.8)*
<b>Multiple gestation (%)</b>	3669 (28.3)	4533 (31.1)	4591 (29.6)*	694 (24.1)	731 (25.2)	742 (23.0)	253 (22.7)	284 (27.0)	220 (22.3)*
<b>Vaginal birth (%)</b>	4729 (36.6)	4839 (33.2)	5113 (32.9)*	1592 (55.8)	1543 (53.3)	1734 (53.8)	632 (57.7)	557 (53.0)	559 (56.8)
<b>PROM &gt;24h (%)</b>	2445 (20.5)	3022 (20.8)	3234 (23.0)*	582 (22.9)	699 (24.1)	715 (24.6)	170 (17.6)	216 (20.7)	193 (21.2)
<b>PTL (%)</b>	7768 (60.3)	8461 (58.1)	8220 (53.1)*	2024 (70.6)	2047 (70.7)	2129 (66.0)*	835 (75.7)	787 (75.0)	689 (69.9)*
<b>PIH (%)</b>	2854 (23.0)	2682 (18.5)	2592 (16.8)*	405 (15.3)	343 (11.9)	350 (10.8)*	104 (10.3)	76 (7.3)	76 (7.7)*
<b>APH (%)</b>	2839 (23.9)	3131 (21.5)	3322 (21.5)*	623 (24.6)	650 (22.4)	710 (22.0)*	267 (27.7)	258 (24.6)	229 (23.3)
<b>Antenatal Steroids (%)</b>	10381 (84.5)	12398 (88.2)	13848 (90.6)*	2197 (81.1)	2421 (85.4)	2830 (88.4)*	746 (72.4)	785 (77.6)	784 (80.7)
<b>Gestational age (%) ≤27wk</b>	3495 (27.0)	3845 (26.4)	4215 (27.1)	1321 (45.8)	1379 (47.6)	1504 (46.5)	783 (70.4)	783 (74.5)	753 (76.3)*
<b>Mean GA, wks (SD)</b>	28.7 (2.1)	28.7 (2.0)	28.7 (2.1)	27.6 (2.3)	27.6 (2.3)	27.6 (2.4)	26.3 (2.2)	26.1 (2.2)	25.9 (2.2)*
<b>Mean Birth weight, g (SD)</b>	1227 (368)	1240 (374)	1248 (378)*	1105 (366)	1109 (374)	1138 (387)*	947 (342)	924 (322)	926 (331)
<b>SGA (%)</b>	415 (3.2)	441 (3.0)	473 (3.0)	79 (2.7)	76 (2.6)	82 (2.5)	29 (2.6)	24 (2.3)	25 (2.5)
<b>Outborn (%)</b>	1256 (10.1)	1685 (11.6)	1949 (12.6)*	349 (13.1)	476 (16.5)	491 (15.2)*	222 (21.9)	264 (25.2)	232 (23.6)
<b>Male (%)</b>	6886 (53.2)	7742 (53.2)	8317 (53.6)	1646 (57.1)	1641 (56.7)	1832 (56.7)	690 (62.0)	629 (59.8)	606 (61.4)
<b>Apgar &lt;7 at 5 min (%)</b>	1562 (12.1)	1541 (10.6)	2566 (16.5)*	535 (18.6)	531 (18.4)	836 (25.9)*	389 (35.0)	363 (34.6)	448 (45.3)*

<b>Congenital anomalies (%)</b>	677 (5.3)	731 (5.0)	903 (6.1)*	196 (7.1)	184 (6.4)	230 (7.5)*	61 (5.7)	82 (7.8)	80 (8.5)*
<b>Intubated at birth (%)</b>	6163 (48.7)	5125 (35.2)	5762 (37.2)*	1809 (64.8)	1521 (52.5)	1719 (53.3)*	872 (80.6)	792 (75.5)	736 (74.9)*
<b>Surfactant (%)</b>	6671 (52.2)	6884 (47.6)	8427 (54.5)*	1914 (66.9)	1843 (63.8)	2275 (70.6)*	931 (84.9)	925 (88.3)	884 (89.9)*
<b>Pneumothorax (%)</b>	478 (3.7)	546 (3.8)	485 (3.1)*	192 (6.7)	191 (6.6)	178 (5.5)	132 (11.9)	156 (14.9)	106 (10.8)*
<b>Sepsis (%)</b>	3289 (25.9)	1962 (18.3)	1439 (15.3)*	1063 (37.3)	719 (32.9)	547 (26.8)*	420 (38.3)	259 (33.3)	176 (28.5)*
<b>Survival (%)</b>	12213 (94.4)	13843 (95.0)	14891 (95.9)*	2580 (89.5)	2623 (90.5)	2976 (92.1)*	623 (56.0)	557 (53.0)	517 (52.4)
<b>Other major morbidity **</b>	1781 (13.8)	3225 (22.1)	3380(21.8)*	690 (23.9)	1130 (39.0)	1109 (34.3)*	415 (37.3)	450 (42.8)	400 (40.5)*

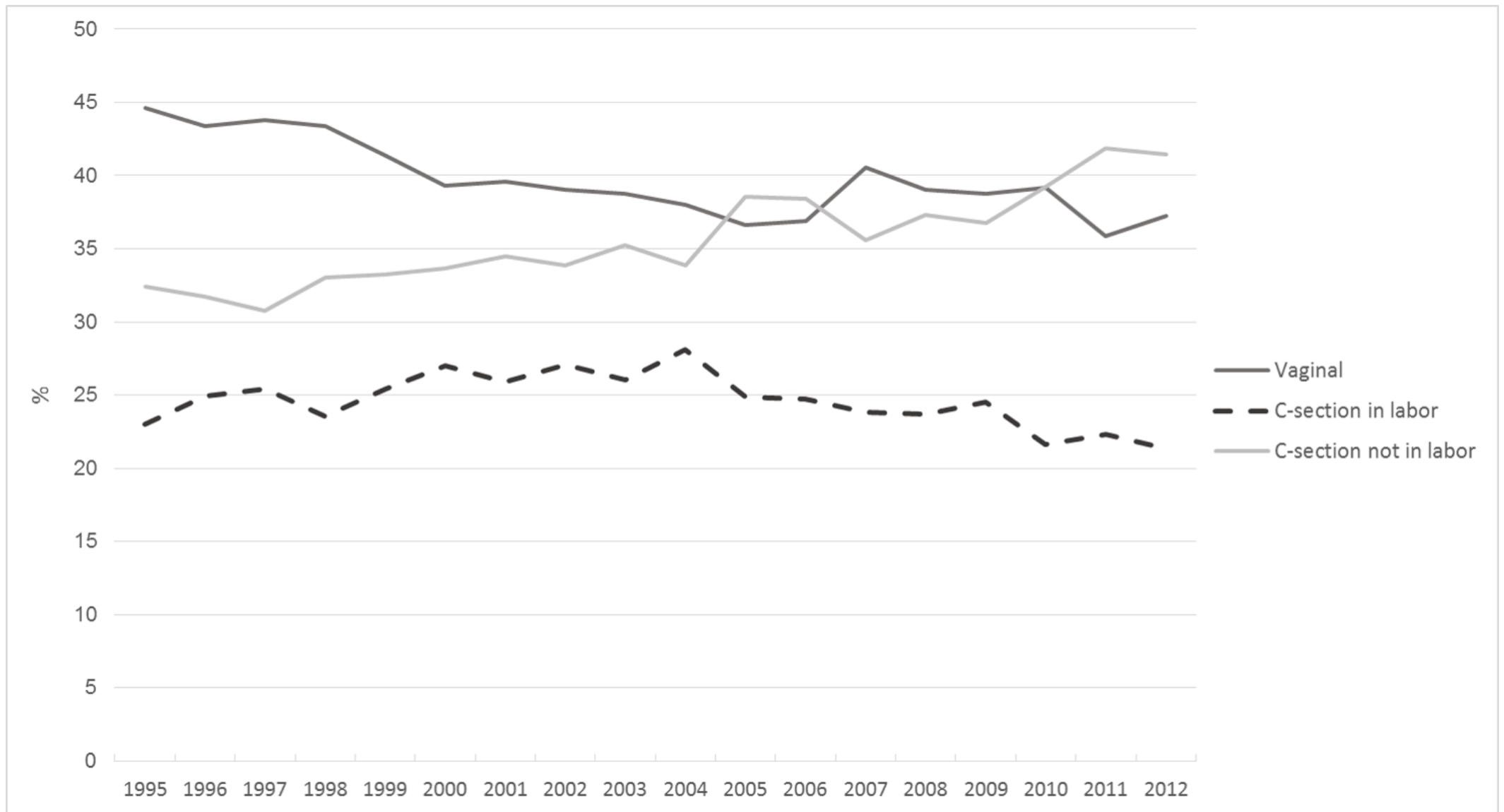
+ includes person of Aboriginal or Torres Strait Islander descent, Pacific Islander background or Maori

\* p<0.01 for comparison between three epochs

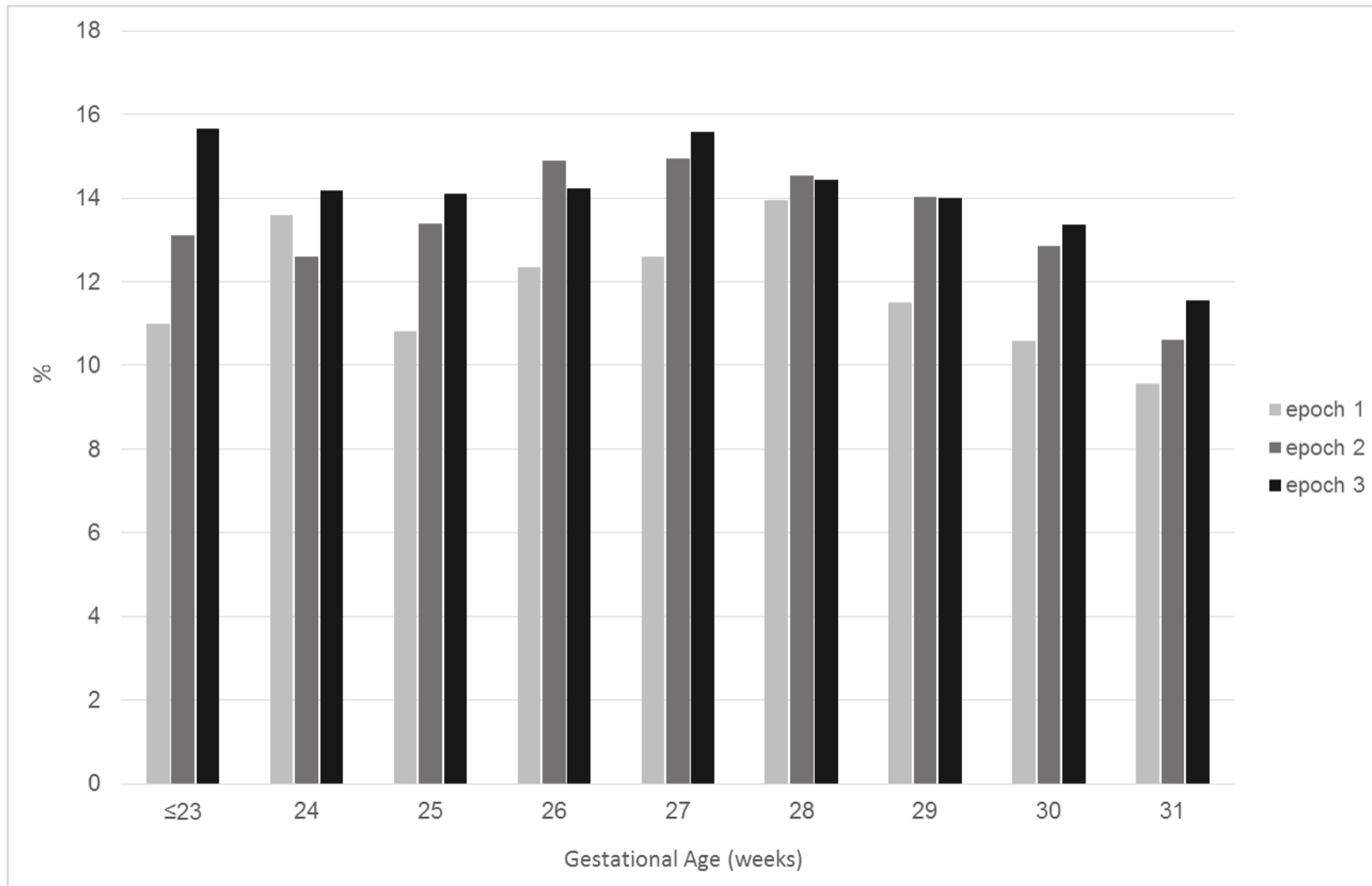
\*\* having any one or more of: NEC Stage 2 or higher, BPD, Stage 3 or higher ROP, excluding severe IVH

APH – antepartum haemorrhage, BPD – bronchopulmonary dysplasia. GA – gestational age, IVH – intraventricular haemorrhage, IUGR- Intrauterine growth restriction, NEC- Necrotising enterocolitis, PIH – pregnancy induced hypertension, PPHN – persistent pulmonary hypertension, PROM – prolonged Rupture of Membrane, PTL – preterm Labour, SD – standard deviation, ROP – retinopathy of prematurity

**Supplemental Figure 1. Change in the proportion of different delivery methods over study period**



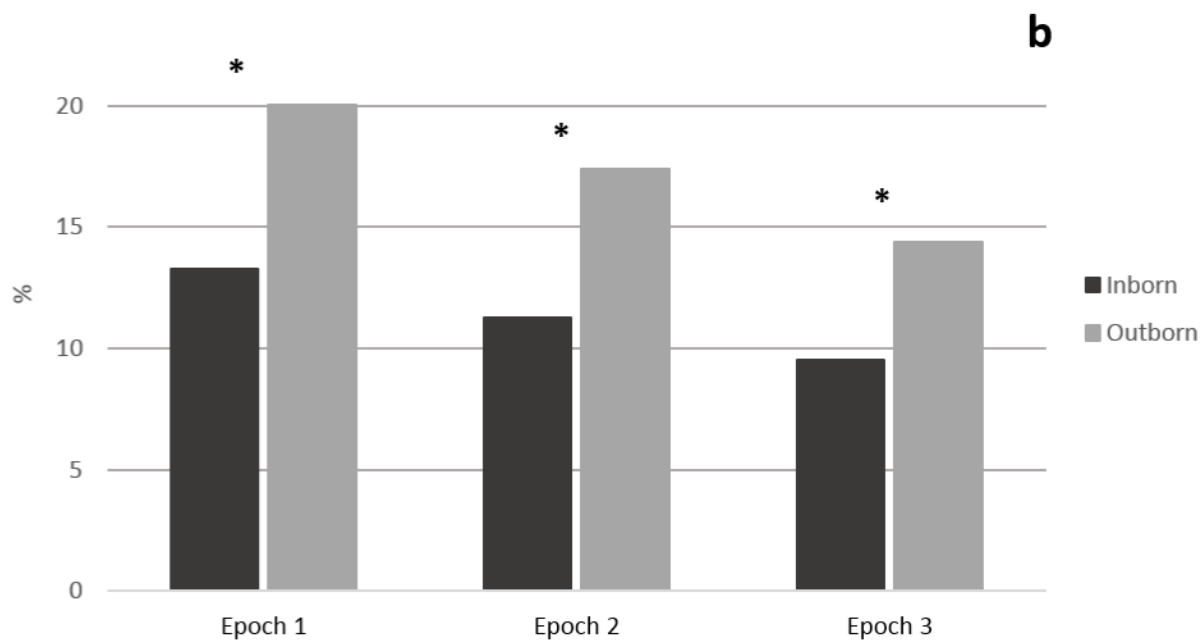
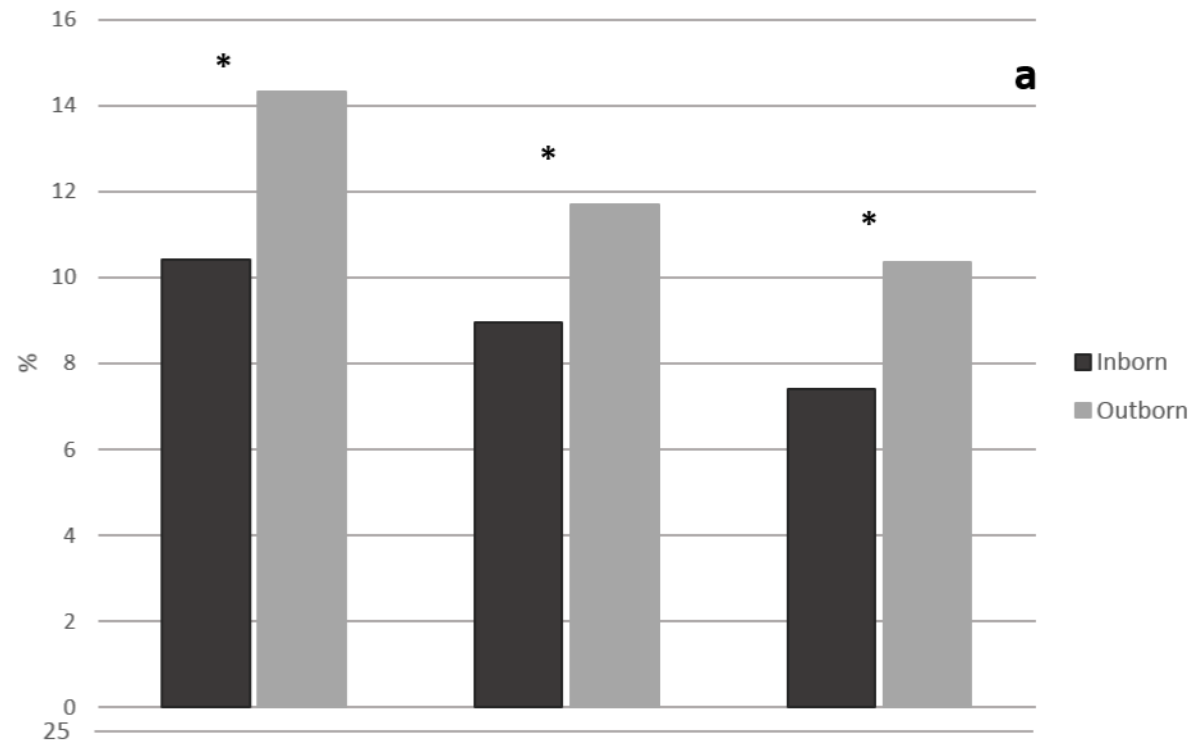
**Supplemental Figure 2. Proportion of outborns stratified by gestational age and epoch**



**Supplemental Table 2. Death rate stratified by gestational age**

	<b>Gestational age (weeks)</b>								
	<b>≤23</b>	<b>24</b>	<b>25</b>	<b>26</b>	<b>27</b>	<b>28</b>	<b>29</b>	<b>30</b>	<b>31</b>
<b>Epoch 1 n, (%)</b>	282 (66.7)	376 (42.1)	340 (27.5)	309 (18.8)	181 (10.2)	150 (6.6)	133 (4.8)	103 (3.1)	89 (2.2)
<b>Epoch 2 n, (%)</b>	219 (61.7)	430 (42.4)	327 (24.9)	275 (16.5)	182 (9.3)	148 (5.9)	118 (3.9)	92 (2.5)	85 (1.8)
<b>Epoch 3 n, (%)</b>	179 (51.0)	380 (35.8)	303 (20.7)	233 (12.7)	168 (8.2)	154 (5.7)	103 (3.3)	80 (2.0)	87 (1.7)

**Supplemental Figure 3. Mortality and severe IVH outcomes among outborn infants compared to inborn infants across epochs**



Proportion of death (a) and death and/or severe IVH (b) among outborn infants compared to inborn infants across epochs

\*  $p < 0.001$  for comparisons between inborn and outborn

**Supplemental Table 3. Multivariable regression model for presence of severe IVH**

<b>Variable</b>	<b>Severe IVH n, (%)</b>	<b>OR (95%CI)</b>	<b>AOR (95%CI)</b>	<b>p-value</b>
Antenatal steroids No antenatal steroids	2315 (5.0) 698 (10.0)	0.5 (0.4,0.5)	0.6 (0.5,0.7)	<0.001
Male Female	1923 (6.4) 1226 (4.9)	1.3 (1.2,1.4)	1.3 (1.2,1.4)	<0.001
5 min Apgar score <7 5 min Apgar score ≥7	1198 (13.7) 1951 (4.2)	3.6 (3.3,3.9)	2.0 (1.9,2.2)	<0.001
Intubated at birth Not intubated at birth	2400 (9.8) 714 (2.4)	4.5 (4.1,4.9)	2.0 (1.8,2.2)	<0.001
Gestational age ≤ 27 weeks Gestational age 28-31 weeks	2319 (12.8) 832 (2.2)	6.4 (5.9,7.0)	4.0 (3.7,4.4)	<0.001
Outborn Inborn	718 (10.4) 2330 (4.9)	2.2 (2.0,2.4)	1.6 (1.5,1.8)	<0.001
Pregnancy induced hypertension (PIH) No PIH	256 (2.7) 2781 (6.2)	0.4 (0.4,0.5)	0.8 (0.7,0.9)	<0.001
Vaginal delivery C-Section in labour C-Section no labour	1746 (8.2) 720 (2.1) 663 (2.0)	2.1 (1.9,2.2) 0.9 (0.8,1.0) 0.5 (0.4,0.5)	1.0 (referent) 0.7 (0.6,0.8) 0.6 (0.5,0.7)	<0.001 <0.001 <0.001
Epoch 1 2 3	1113 (6.6) 1051 (5.7) 987 (5.0)	1.3 (1.2,1.3) 1.0 (0.9,1.1) 0.8 (0.7,0.9)	1.0 (referent) 1.0 (0.9,1.1) 0.8 (0.7,0.9)	 0.9 <0.001

**Supplemental Table 4. Multivariable regression model for presence of severe IVH and/or mortality**

<b>Variable</b>	<b>Severe IVH / mortality, n (%)</b>	<b>OR (95%CI)</b>	<b>AOR (95%CI)</b>	<b>p-value</b>
Antenatal steroids No antenatal steroids	5479 (10.9) 1442 (18.3)	0.5 (0.5,0.6)	0.6 (0.6,0.7)	<0.001
Male Female	4316 (13.2) 2895 (10.6)	1.3 (1.2,1.4)	1.3 (1.2,1.4)	<0.001
5 min Apgar score <7 5 min Apgar score ≥7	3014 (31.0) 4197 (8.3)	4.9 (4.7,5.2)	2.7 (2.5,2.8)	<0.001
Intubated at birth Not intubated at birth	5701 (22.0) 1457 (4.3)	6.2 (5.9,6.6)	2.5 (2.3,2.6)	<0.001
Gestational age ≤27 weeks Gestational age 28-31 weeks	5245 (27.5) 1978 (4.8)	7.5 (7.1,7.9)	4.5 (4.2,4.8)	<0.001
Outborn Inborn	1278 (16.9) 5784 (11.2)	1.6 (1.5,1.7)	1.3 (1.2,1.4)	<0.001
Pregnancy induced hypertension (PIH) No PIH	769 (7.6) 6272 (12.8)	0.6 (0.5,0.6)	0.7 (0.7,0.8)	<0.001
SGA Not SGA	454 (26.0) 6769 (11.6)	2.7 (2.4, 3.0)	3.7 (3.2,4.2)	<0.001
Vaginal delivery C-Section in labour C-Section no labour	3577 (15.2) 1531 (10.4) 2054 (9.6)	1.6 (1.5,1.7) 0.8 (0.8,0.9) 0.7 (0.7,0.7)	1.0 (referent) 0.7 (0.6,0.7) 0.7 (0.8,0.9)	<0.001 <0.001 <0.001
Epoch 1 Epoch 2 Epoch 3	2586 (14.1) 2433 (12.1) 2204 (10.2)	1.3 (1.3,1.4) 1.0 (1.0,1.1) 0.8 (0.7,0.8)	1.0(referent) 1.0 (0.9,1.0) 0.7 (0.7,0.8)	 0.4 <0.001