

Maternal and neonatal outcomes of higher order cesarean deliveries- a registry-based study from Qatar

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Background:

Caesarean delivery (CD) is associated with increased maternal and neonatal morbidity compared to a vaginal delivery, particularly those which are classified as emergency procedures or when there is a high order CD. The aim of this study is to examine the incidence of maternal and neonatal complications for higher-order CDs.

Methods:

Women who delivered a singleton live birth after 24 weeks of gestation by CD were stratified into five groups based on the index CD order, the last group including ≥5th CD order. They were also split into two groups: women who were delivered by their 5th or higher CD (exposed) versus women having up to their 4th CD (unexposed). The maternal outcomes included intra-operative surgical complications, blood loss and admission to intensive care (ICU). The neonatal outcomes include preterm birth, neonatal ICU admission, respiratory distress (RDS) and perinatal death.

Results

Of 6329 women in the study, 2609 (41.2%) had a primary CD. 30%, 17.6% and 7.3% of the cohort underwent their second, third and fourth CD, respectively. Women undergoing 5th CD and above formed the remaining 3.5% (227). Women in group 5 had the highest risk of suffering a surgical complication (3.1% p= 0.015) and postpartum hemorrhage (7.5%, p=0.010). 24% of babies in group 5 were born preterm (p<0.001). An increased incidence of low birth weight (14.3% in group 4 and 13.7 % in group 5; p<0.001), RDS (16.7% in group 4 and 18.9 % in group 5; p<0.001) and NICU admissions (20.8 % in group 4 and 25.6 % in group 5; p<0.001) were noted in the higher-order CD groups. The exposed group had 3.5 times higher risk of having a surgical complication (RR=3.5, 95% CI 1.6-7.6, p=0.002), 1.8 times higher risk of developing PPH (RR=1.8, 95% CI 1.1-2.9, p=0.014), 1.7 times higher risk of delivering between 32-37 weeks of gestation (RR=1.7, 95% CI 1.3-2.2, p<0.001), higher risk of baby getting admitted to NICU (RR=1.3, 95% CI 1.0-1.6, p=0.038) and developing RDS (OR=1.5, 95% CI 1.2-2.0, p=0.002).

Conclusion:

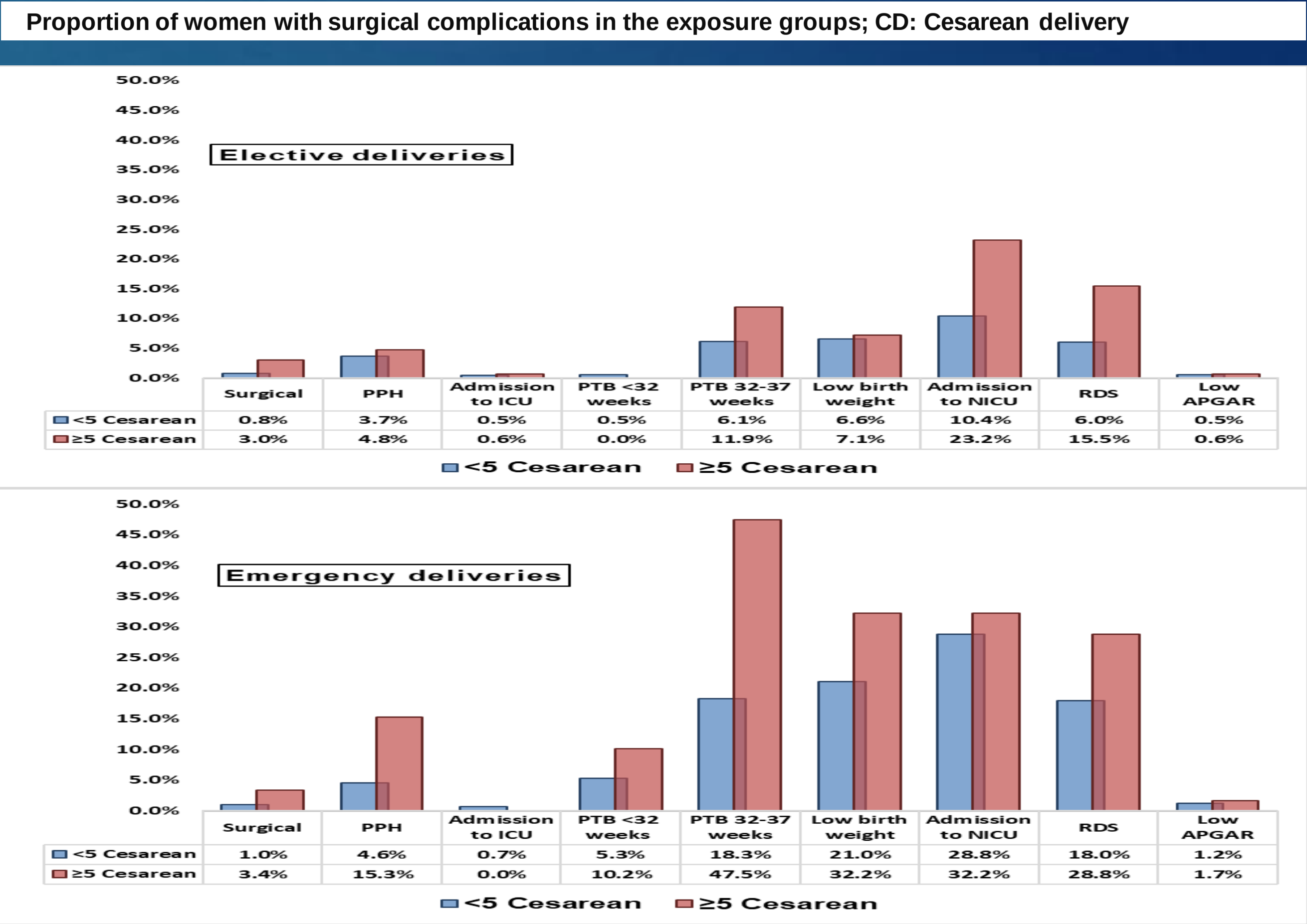
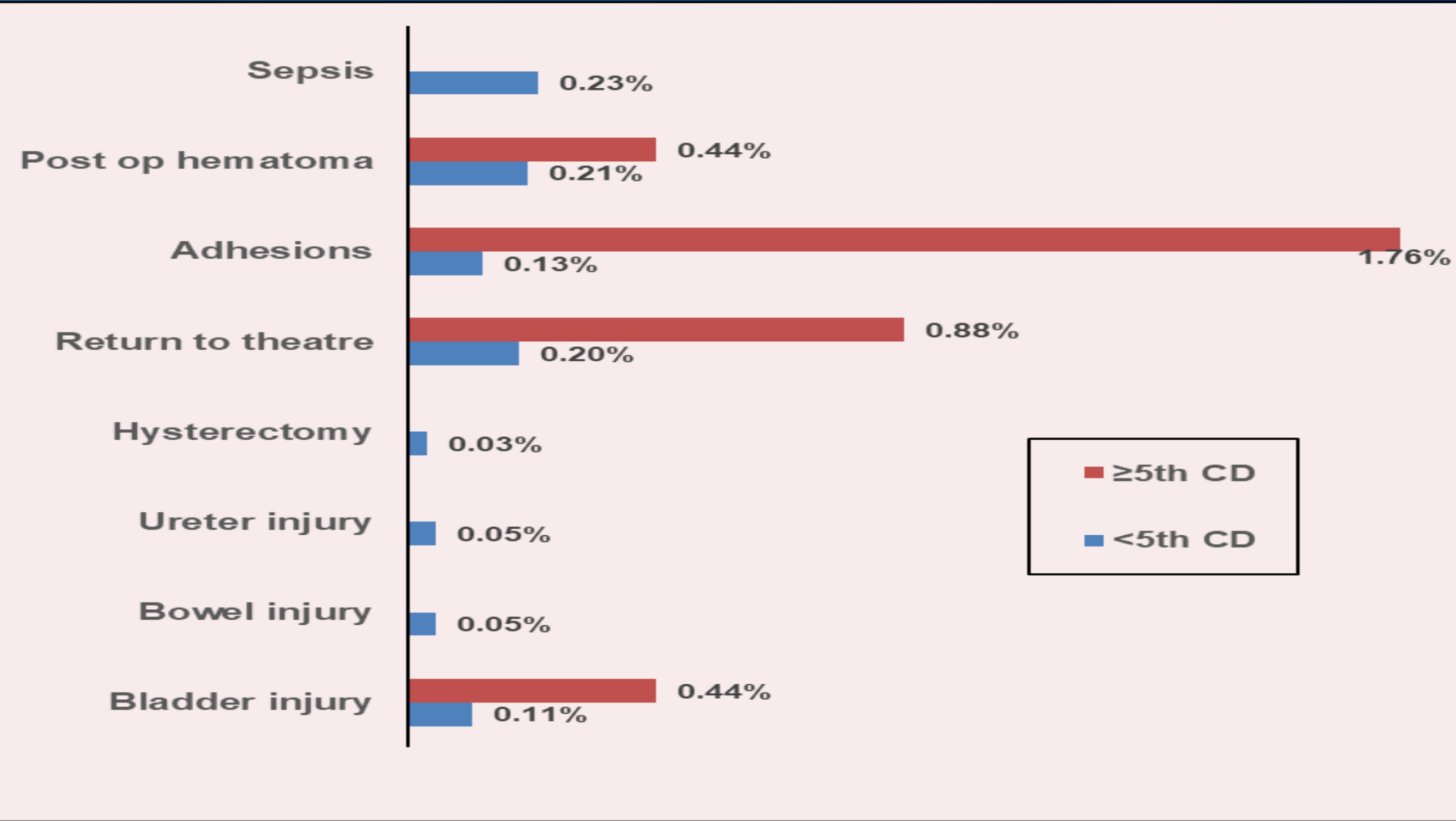
Maternal morbidity significantly increases with increasing order of CD. The increased risk of RDS and NICU admissions in the neonate with increasing order of caesareans reflects lower gestational age and birthweight in these groups. Consideration of preoperative steroids for lung maturation in women with higher-order CDs is valid to reduce neonatal morbidity

Table 2: Maternal and fetal outcomes between the groups of index caesarean births												
Maternal fetal outcomes		CD- 1 N=2609		CD- 2 n=1917		CD-3 N=1113		CD- 4 N=463		CD ≥ 5 N=227		p value
		n	%N	n	%N	n	%N	n	%N	n	%N	
Surgical complications (any one of injury to bladder, bowel, ureter, hysterectomy, hematoma, return to theatre or sepsis)		20	0.8	17	0.9	15	1.4	2	0.4	7	3.1	0.015*
Estimated blood loss (Median ± IQR)		400 ± 250		350 ± 200		300 ± 100		350 ± 200		400 ± 200		<0.001*
Postpartum haemorrhage		129	4.9	65	3.4	42	3.8	17	3.7	17	7.5	0.010*
Admission to intensive care #		21	0.8	5	0.3	8	0.7	1	0.2	1	0.4	0.104
Gestational age at delivery	Preterm <32 weeks	108	4.1	35	1.8	22	2.0	18	3.9	6	2.6	<0.001*
	Preterm 32-37 weeks	349	13.4	191	10.0	142	12.8	81	17.5	48	21.1	
	Term >37 weeks	2,152	82.5	1,691	88.2	949	85.3	364	78.6	173	76.2	
Low birth weight		478	18.3	194	10.1	129	11.6	66	14.3	31	13.7	<0.001*
NICU admission		688	26.4	265	13.9	174	15.7	96	20.8	58	25.6	<0.001*
Respiratory distress		390	15.0	159	8.3	123	11.1	77	16.7	43	18.9	<0.001*
APGAR 5 min less than 7 #		24	0.9	15	0.8	9	0.8	5	1.1	2	0.9	0.970
Birth outcome #	Live birth	2,592	99.4	1,899	99.1	1,103	99.1	459	99.1	225	99.1	0.170
	Still birth	1	0.0	5	0.3	5	0.5	2	0.4	0	0	
	Neonatal death	16	0.6	13	0.7	5	0.5	2	0.4	2	0.9	

CD- index Caesarean delivery; IQR- interquartile range; NICU- neonatal intensive care unit
#- compared using Fishers exact; all other categorical by Chi square; Estimated blood loss compared using Kruskal Wallis test; p<0.05 considered evidence against null hypothesis

Table 3: Crude Risk Ratios comparing ≥5 th index caesarean with <5 th index caesarean (in both elective and emergency)										
Maternal fetal complications	<5 th CD N= 6,102 (Baseline)		≥5 th CD N= 227		Overall N=6329		Elective Cesarean N=3,053		Emergency Cesarean N=3,276	
	n	%N	n	%N	RR (95% CI)	p value	RR (95% CI)	p value	RR (95% CI)	p value
Surgical complications (any one of injury to bladder, bowel, ureter, hysterectomy, hematoma, return to theatre or sepsis)	54	0.9	7	3.1	3.48 (1.6- 7.6)	0.002*	3.9 (1.5- 10.2)	0.005*	3.4 (0.8- 13.9)	0.087
Postpartum haemorrhage	253	4.2	17	7.5	1.8 (1.1-2.9)	0.014*	1.3 (0.6- 2.6)	0.469	3.3 (1.8- 6.2)	<0.00 1*
Admission to intensive care #	35	0.6	1	0.4	0.8 (0.1-5.6)	0.794	-	-	-	-
Preterm birth <32 weeks #	183	3.0	6	2.6	0.9 (0.4-2.0)	0.758	-	-	-	-
Preterm birth 32-37 weeks	763	12.5	48	21.1	1.7 (1.3-2.2)	<0.001*	2.0 (1.3- 3.0)	0.003*	2.6 (2.0- 3.4)	<0.00 1*
Low birth weight	867	14.2	31	13.7	1.0 (0.7-1.3)	0.815	1.1 (0.6- 1.9)	0.778	1.5 (1.1- 2.2)	0.027*
NICU admission	1,22 3	20.1	58	25.6	1.3 (1.0-1.6)	0.038*	2.2 (1.7- 3.0)	<0.001*	1.1 (0.8- 1.6)	0.557
Respiratory distress	749	12.3	43	18.9	1.5 (1.2-2.0)	0.002*	2.6 (1.8- 3.8)	<0.001*	1.6 (1.1- 2.4)	0.023*
APGAR 5 min less than 7	53	0.9	2	0.9	1.0 (0.2-4.1)	0.984	1.2 (0.2- 9.3)	0.843	1.4 (0.2- 10.0)	0.739

Baseline: Baseline groups in the calculation of risk ratios; CD: Caesarean delivery; NICU: Neonatal intensive care unit; RR: Risk Ratios;
CI: confidence interval; #: 0 cases in one strata; p<0.05 is evidence against null hypothesis of no difference



Comparison of percentages of maternal and neonatal groups between women with <5 CD and ≥5 CD, undergoing elective and emergency deliveries; CD- cesarean delivery, PPH- post partum hemorrhage; ICU- intensive care unit; PTB- preterm birth; NICU- neonatal intensive care unit, RDS- respiratory distress syndrome