

PPH at Caesarean section: impact on maternal mortality



Dr. Soha Sobhy- Academic clinical lecturer, QMUL

Background

- The need for safe surgery globally is recognised as a public health priority.
- Caesarean section is the most commonly performed procedure globally
- Universal and timely access to a safe caesarean section is a key requirement for safe childbirth and is life saving
- At a time when the caesarean delivery rate are rising globally, there is concern about unnecessary caesarean sections and increase in morbidity and mortality



Over and under use of caesarean section

- **Too little, too late:** Absent, delayed or inadequate care often linked to insufficient resources such as staff, supplies, medicines or training
- **Too much, too soon:** Over-medicalization of pregnancy and childbirth often resulting in unnecessary interventions/ c/s

POSTPARTUM HAEMORRHAGE (PPH)

Severe bleeding after giving birth, known as PPH, is the biggest single cause of mothers dying after childbirth



20,000 WOMEN
21 COUNTRIES
193 HOSPITALS

14m

mothers develop PPH each year globally



An estimated

100,000

women died from PPH in 2015

99%

of these deaths were in developing countries



PPH can also lead to **hysterectomy** and **severe anaemia**



Find out more at
bit.ly/womanvideo

Source: The WOMAN trial (2017)
Credit: Rebeccah Robinson/LSHTM

Rate of caesarean section

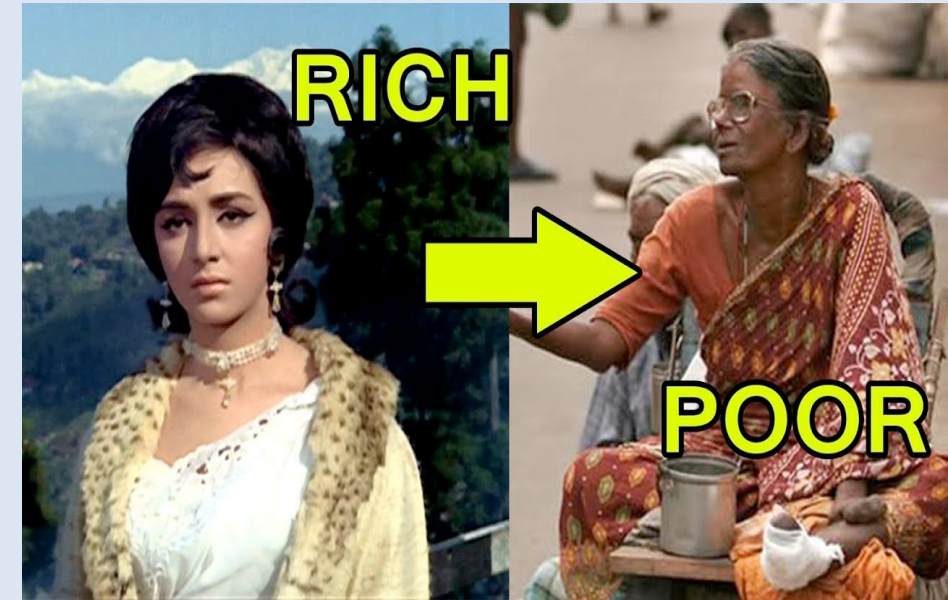
The risk of death in mothers delivered by caesarean section was:

Higher in countries with CS rates $< 10\%$

Low in countries with CS rates $> 15\%$

Caesarean section disparities

- Within-country disparities in CS use were very large:
 - **Rich V Poor**- 5x more frequent CS use in LMIC's
 - **Private V public settings**: 1.8X More frequent use of CS in private institutions than in public health facilities
 - markedly high CS use was observed among low obstetric risk births, especially among more educated women.
 - **Urban V rural** – population level rate in Ethiopia 2% but in Addis 21%



Caesarean section deaths as a proportion of all maternal deaths

	Studies or cohorts	Caesarean section deaths (n)	Total maternal deaths (N)	Prevalence (% per 100; 95% CI)	τ^2	p value for interaction
Region*	..	..	..	..	..	0.012
Sub-Saharan Africa	31	4330	17 219	22.0 (18.8–25.4)	0.67	..
East Asia and Pacific	11	610	3398	18.4 (15.9–21.1)	0.04	..
Middle East and north Africa	14	855	3177	34.5 (21.6–48.7)	1.11	..
South Asia	12	355	2364	20.7 (13.8–28.5)	0.35	..
Latin America and the Caribbean	1	202	459	44.0 (39.5–48.6)	-	..
Europe and central Asia	1	50	174	28.7 (22.5–35.9)	-	..
Year of study	..	..	..	..	..	0.87
Before 2000	28	1325	6162	23.5 (18.7–28.7)	0.49	..
2000 or later	44	5345	21489	24.0 (20.6–27.7)	0.71	..
Study design	..	..	..	..	..	0.11
Prospective	11	570	1893	28.8 (22.0–36.1)	0.42	..
Retrospective	61	6100	25758	22.9 (20.0–26.1)	0.64	..
Income setting	..	..	..	..	..	0.31
Low	13	696	2287	25.2 (16.2–35.4)	0.60	..
Lower-middle	34	1034	5975	21.0 (16.0–26.4)	0.71	..
Upper-middle	22	4660	18 474	25.9 (22.4–30.0)	0.47	..
Quality	..	..	..	..	..	0.48
Low	9	213	844	20.3 (11.4–31.0)	0.73	..
High	63	6457	26 807	24.2 (21.3–27.3)	0.61	..
Overall	72	6670	27 651	23.8 (21.0–26.7)	0.62	..

Maternal mortality following caesarean section

	Studies or cohorts	Maternal deaths (n)	Caesarean sections (N)	Risk (n/N per 1000; 95% CI)	τ^2	p value for interaction
Region*	..	..	..	..	..	0.011
Sub-Saharan Africa	87	5843	1 891 505	10.9 (9.5-12.5)	0.81	..
South Asia	13	266	77 239	4.3 (2.0-7.3)	1.75	..
East Asia and Pacific	5	121	115 866	0.9 (0.3-1.9)	0.49	..
Europe and central Asia	2	51	130 596	0.3 (0.2-0.4)	0.00	..
Latin America and the Caribbean	3	379	534 734	0.9 (0.4-1.4)	0.10	..
Middle East and north Africa	4	37	27 662	3.2 (0.3-8.3)	4.54	..
Year of study	..	..	..	..	..	0.27
Before 2000	24	947	298 976	9.7 (6.3-13.7)	1.31	..
2000 or later	92	6035	2 634 481	6.9 (5.9-7.9)	1.59	..
Study design	..	..	..	..	..	0.58
Prospective	49	1780	344 042	8.0 (5.7-10.6)	1.43	..
Retrospective	67	5202	2 589 415	7.8 (6.7-8.9)	1.62	..
Income setting	..	..	..	..	..	0.012
Low	50	1904	138 827	13.2 (10.1-16.7)	0.99	..
Lower-middle	23	474	129 634	3.1 (1.8-4.6)	0.46	..
Upper-middle	41	4336	2 509 141	5.4 (4.5-6.4)	2.18	..
Quality of study	..	..	..	..	..	0.063
Low	28	1351	134 999	10.0 (6.4-14.2)	1.34	..
High	88	5631	2 798 458	6.9 (6.0-7.8)	1.58	..
Type of hospital	..	..	..	..	..	0.014
District hospital	18	167	19 393	8.7 (5.9-11.9)	0.39	..
Mixed†	29	5185	2 484 212	5.1 (3.9-6.4)	2.47	..
Private hospital	1	3	1120	2.7 (0.9-7.8)	..	..
Tertiary or teaching hospital	66	1359	272 877	10.3 (7.5-13.4)	1.27	..
Overall	116	6982	2 933 457	7.6 (6.6-8.6)	0.81	..

World Map

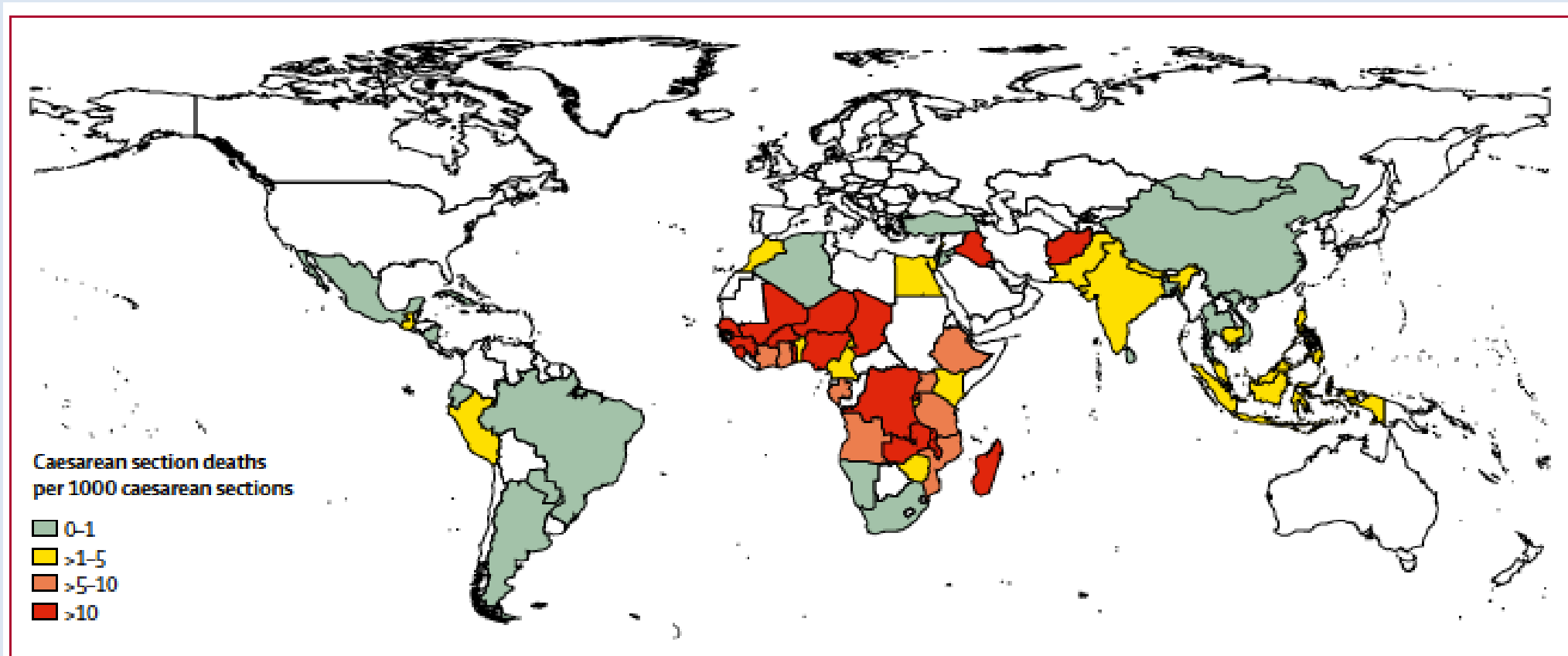
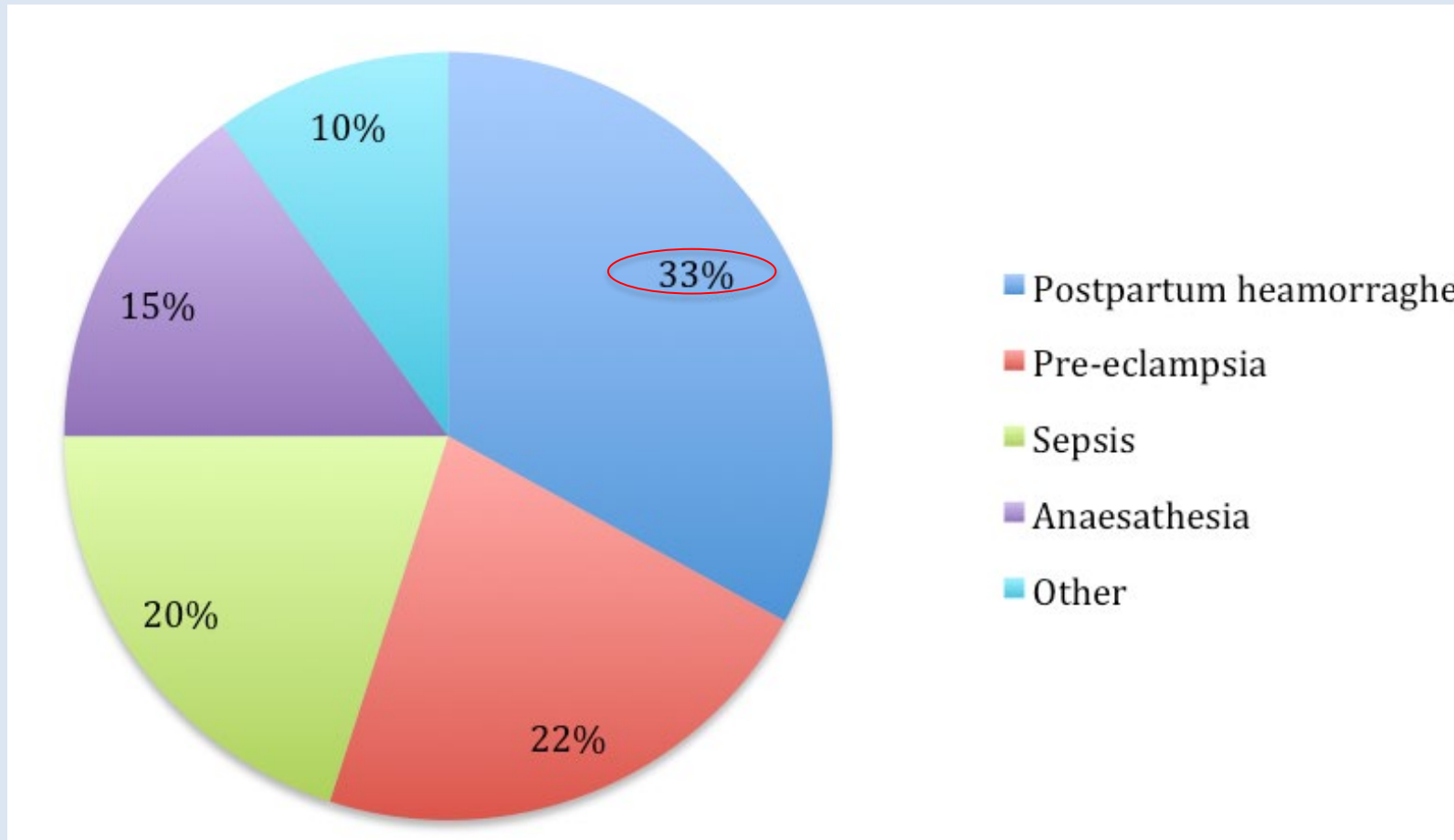
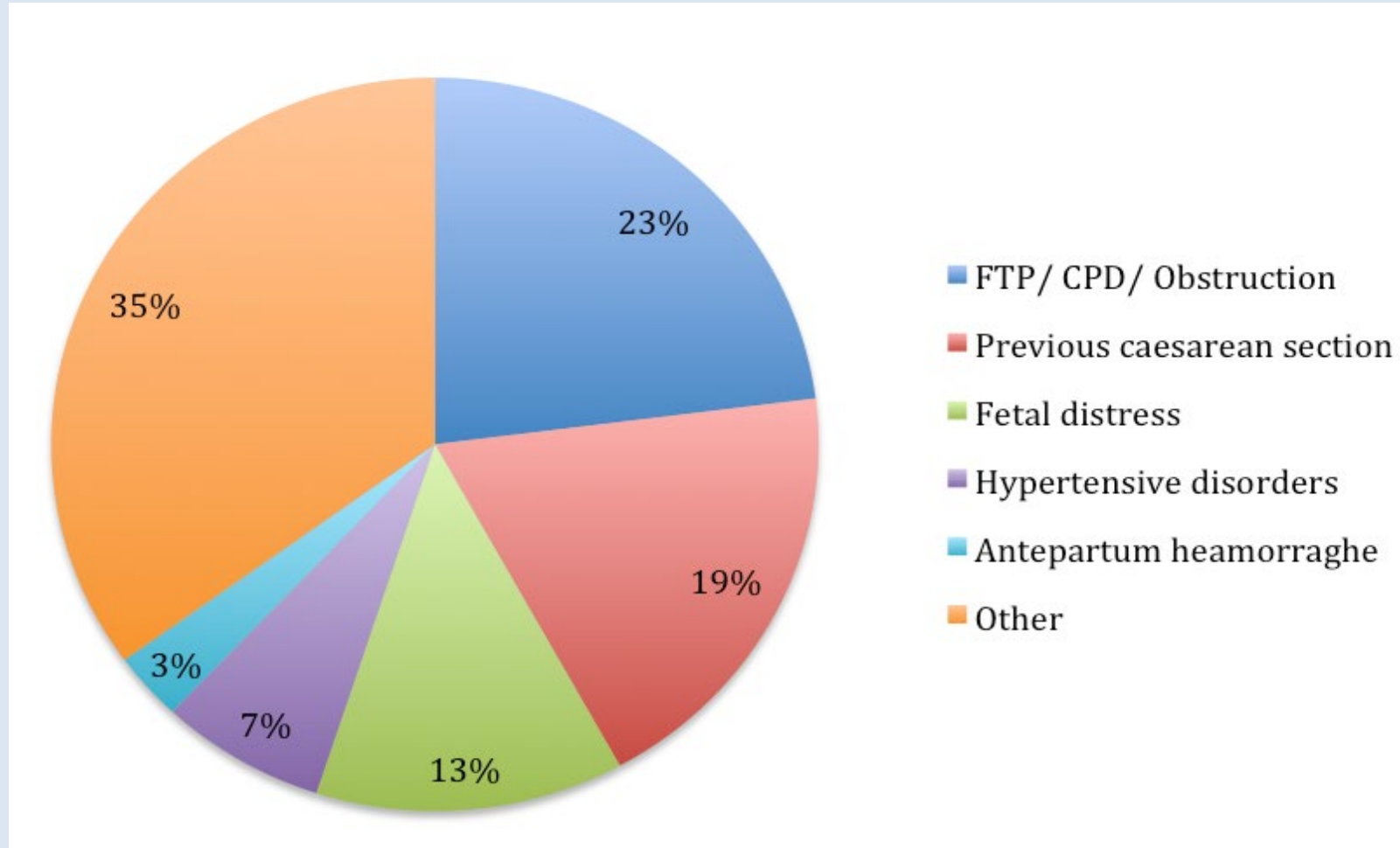


Figure 3: World map of maternal death risk following caesarean section in women from low-income and middle-income countries

Contributory Causes of CS deaths



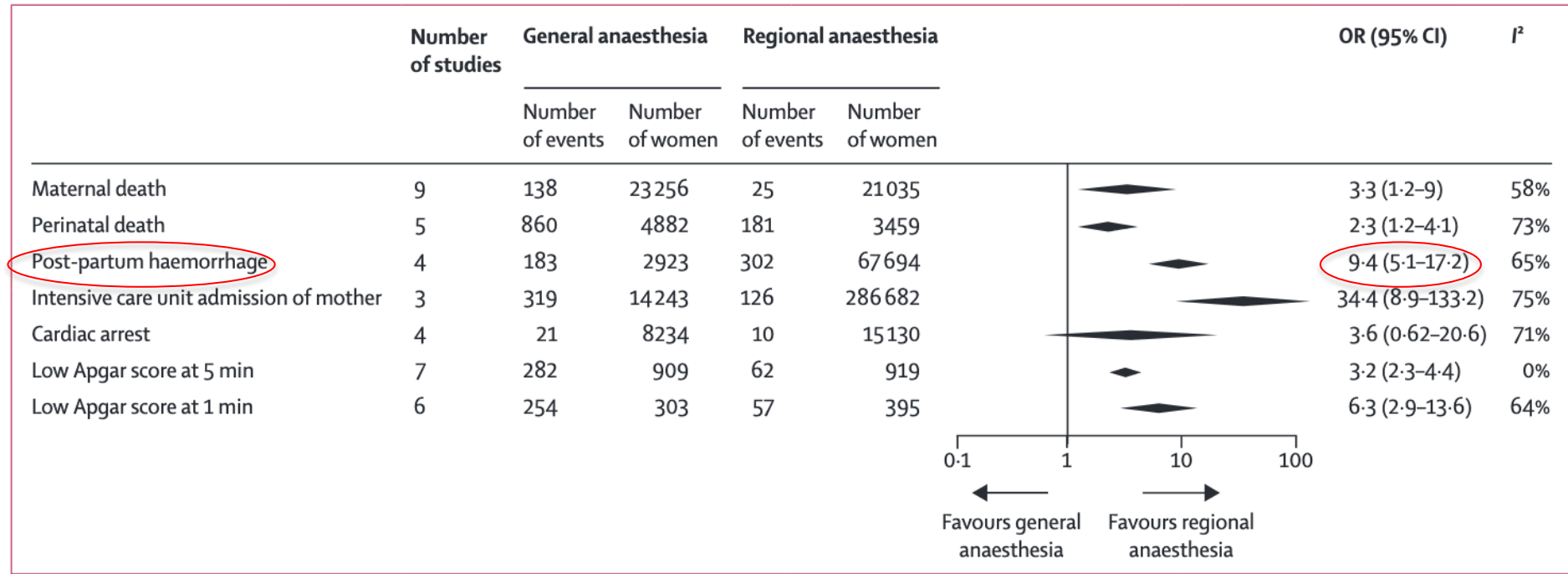
Indication for CS



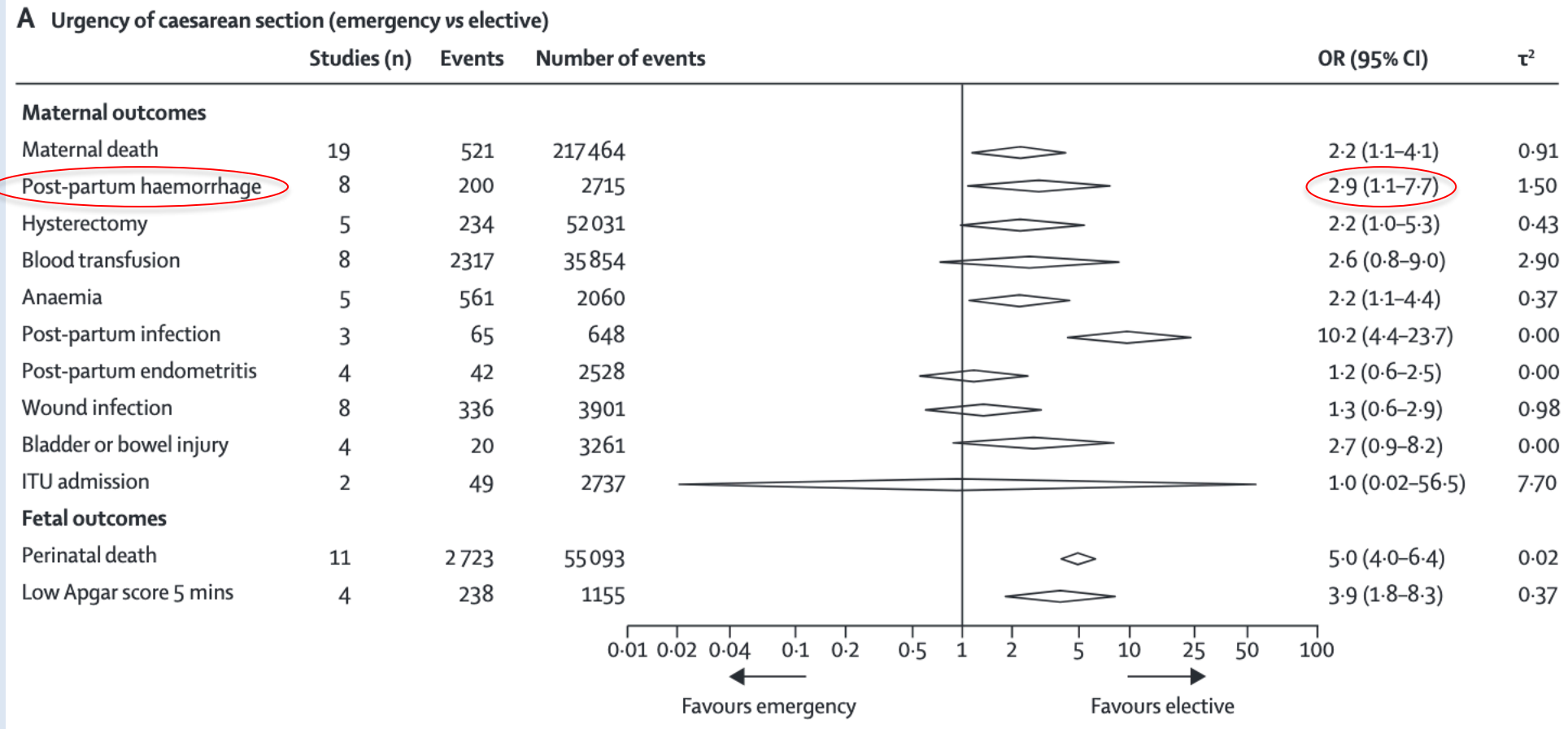
Predictors of maternal mortality- ASOS data

Risk for maternal mortality	Definition	Odds ratio (95% CI)
<i>Preoperative</i>		
Major bleeding risk	Placenta praevia, abruptio, ruptured uterus, or antepartum haemorrhage	4.5 (1.5-13.7)
<i>Perioperative</i>		
Severe obstetric haemorrhage	Ante-partum haemorrhage, >1000ml intraoperative bleeding or severe postoperative bleeding	5.9 (2.0-17.3)
Anaesthesia complications	Failed intubation, aspiration, cardiac arrest or hypoxia	11.5 (1.2-109.2)

Risk factor : Type of anaesthesia



Risk factors: Type of caesarean section

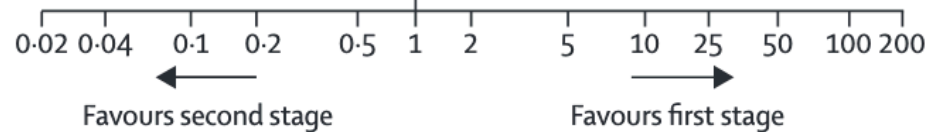


Risk factor: Timing of CS

B Timing of caesarean section (second vs first stage)

Maternal outcomes

Maternal death	4	7	6061		12.3 (2.9-52.5)	0.00
ITU admission	3	13	2238		16.7 (4.9-56.8)	0.00
Hysterectomy	5	23	5942		22.1 (7.6-64.4)	0.00
Blood transfusion	7	251	8403		2.0 (1.0-3.8)	0.49
Post-partum haemorrhage	4	348	5748		5.2 (1.8-14.7)	0.85
Intraoperative complications	3	323	5708		17.8 (3.3-95.3)	1.70
Bladder injury	5	75	8395		5.6 (3.0-10.6)	0.19
Post-partum endometritis	2	199	3965		1.7 (1.1-2.6)	0.00
Wound infection	7	321	7332		2.8 (1.2-6.5)	0.93
Uterine angle extension	4	241	6840		11.5 (4.2-31.2)	0.82
Fetal outcomes						
Perinatal death	5	33	6157		9.2 (4.2-20.1)	0.00
Low Apgar score 5 mins	3	21	2537		11.9 (1.1-130.3)	2.90
Neonatal intensive care admission	6	357	7488		3.6 (2.2-5.8)	0.24



Conclusions

- Caesarean section deaths disproportionately high in LMIC
- Biggest contributor to caesarean section mortality is PPH.
- Risk factors include emergency c/s especially 2nd stage
- More needs to be done to prevent unnecessary caesarean sections and increase safety of procedures.

References

- Sobhy S, Arroyo-Manzano A, et al, Maternal and perinatal mortality and complications associated with caesarean section in low and middle-income countries: A systematic review and meta-analysis involving 12 million pregnancies. The Lancet 2019.
[https://doi.org/10.1016/S0140-6736\(18\)32386-9](https://doi.org/10.1016/S0140-6736(18)32386-9)
- Sobhy S, Zamora J, Dharmarajah K, Arroyo-Manzano, et al. Anaesthesia-related maternal mortality in low-income and middle-income countries: a systematic review and meta-analysis. The Lancet Global Health. 2016;4(5):e320-e7.
- A.Boatin et al, Within country inequalities in caesarean section rates: observational study of 72 low and middle income countries, BMJ, 2018 Jan 24;360:k55,doi: 10.1136/bmj.k55.
- D. Bishop et al, Maternal and neonatal outcomes after caesarean delivery in the African Surgical Outcomes Study: a 7-day prospective observational cohort study, The Lancet Global Health, 2019 7(4),
[:https://doi.org/10.1016/S2214-109X\(19\)30036-1](https://doi.org/10.1016/S2214-109X(19)30036-1)



Queen Mary

University of London

Barts and The London

Any Questions?