Risks and Benefits Associated with Caesarean Delivery

Metin Gülmezoglu

on behalf of the WHO Maternal and Perinatal Research Network

BBC NEWS

Caesarean rate "still too high"

"The number of women having caesarean sections to deliver their babies is still too high", say experts.

31 March, 2005 bbc.co.uk

Clarín

Tiempo de ocio
Entretenimientos para toda la familia.

▸Vuelo récord
En ala delta llegó a 9.100 metros.

▸Fuerza por Ignacio
Le trasplantaron el hígado y ahora esperan.

▸Novelas po
Con un libro d
arranca la cole

▸UNA PRACTICA CADA VEZ MAS HABITUAL

Cesáreas: hacen más del doble de las necesarias

▸Por razones médicas, el 15% de los nacimientos son esperables por esa vía. Pero aquí llegan al 50% en las clínicas y al 30% en hospitales públicos. Lo revela un estudio de la OMS en 54 países. Hay razones de capacitación, económicas y de comodidad.

Cuáles son las diferencias con el parto natural

Lack of senior doctors puts up caesarean rate

telegraph.co.uk

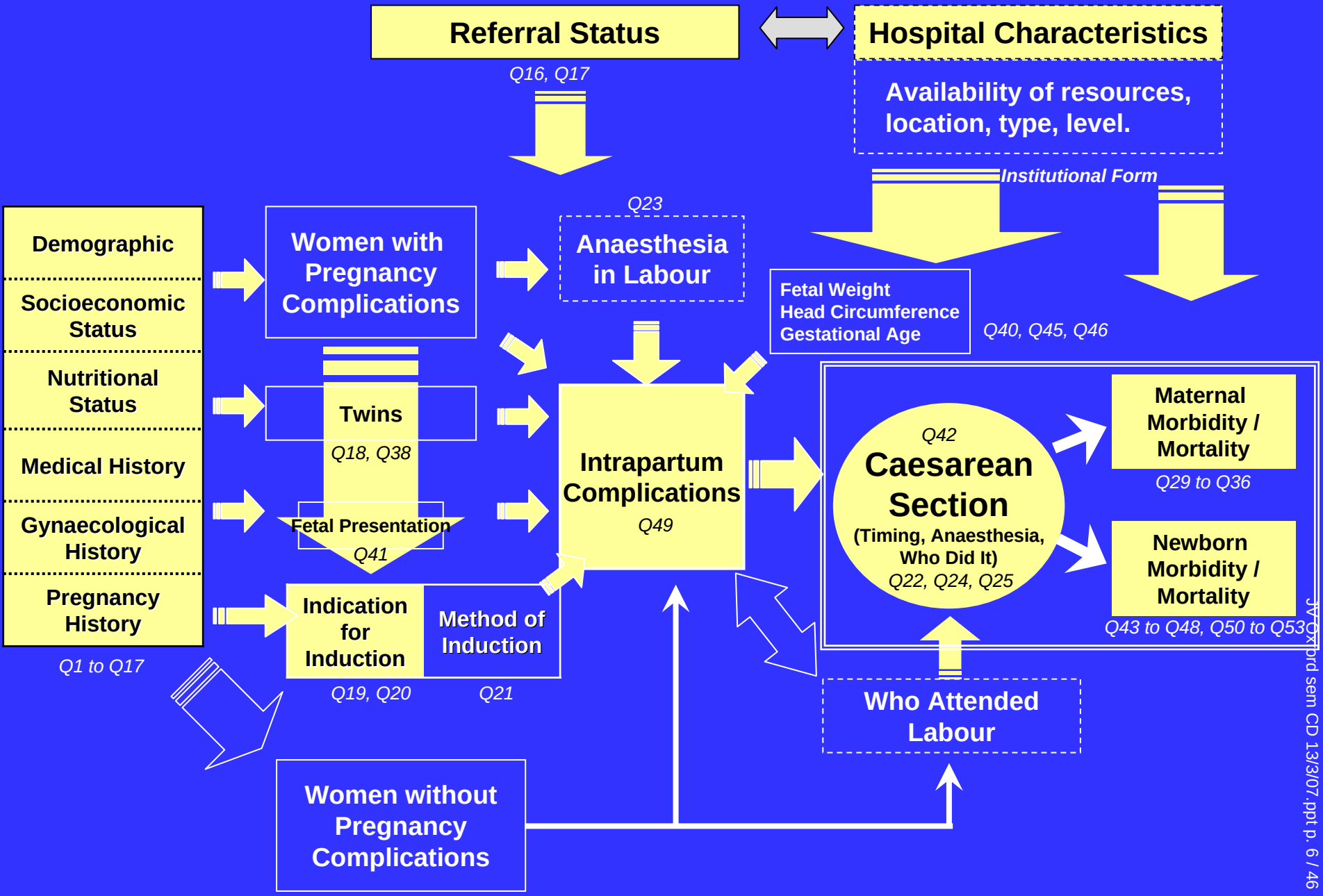
Telegraph.co.uk

22 September 2006

Un estudio de la OMS, al que tuvo acceso **Página/12**, revela el fuerte crecimiento de las cesáreas en la Argentina: ya llegan al 50 por ciento de los partos en las clínicas privadas, el doble de las realizadas en los hospitales públicos. "Ha cambiado la forma de nacer", aseguran los especialistas

Páginas/2/3

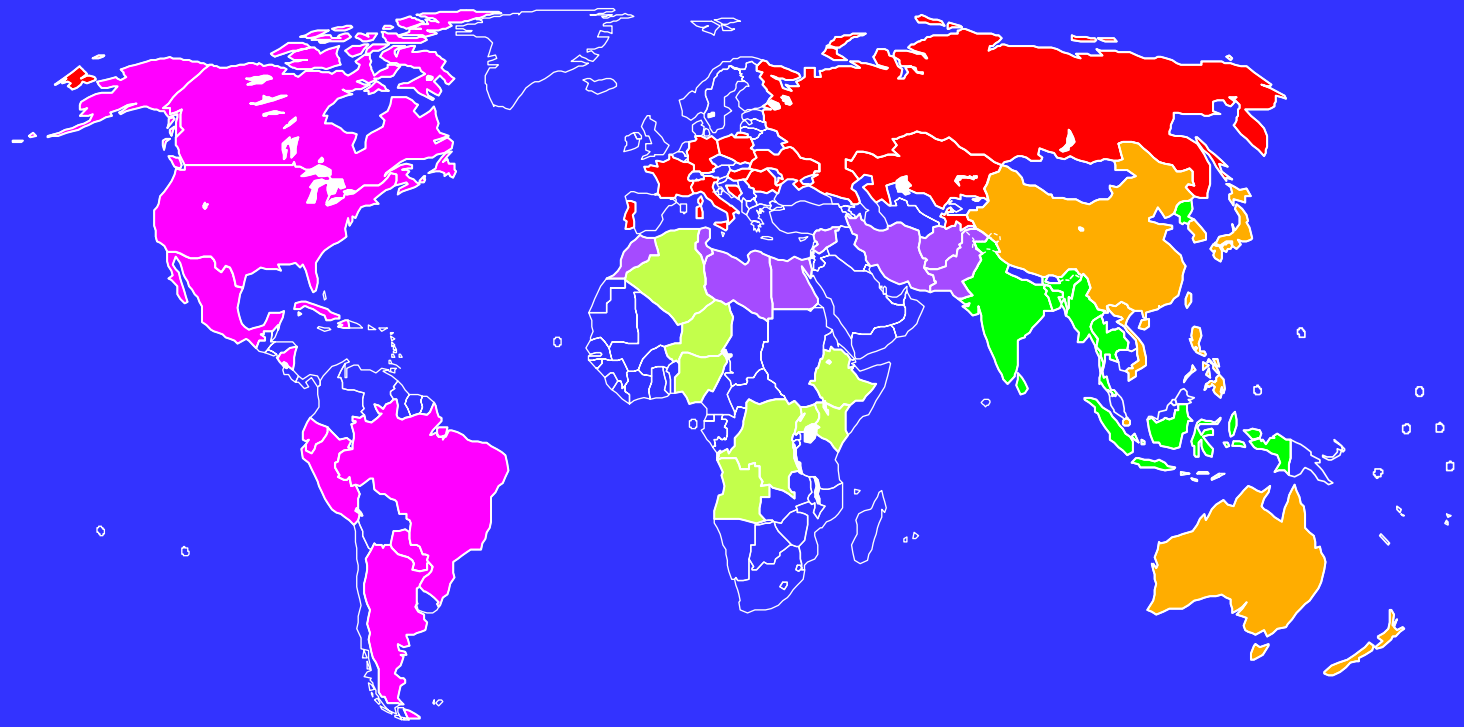
DOLARES DE PARTO


Referral Status
Q16, Q17
Hospital Characteristics
Availability of resources, location, type, level.
Institutional Form
Demographic
Socioeconomic Status
Nutritional Status
Medical History
Gynaecological History
Pregnancy History
Q1 to Q17
Women with Pregnancy Complications
Q23
Anaesthesia in Labour
Fetal Weight
Head Circumference
Gestational Age
Q40, Q45, Q46
Twins
Q18, Q38
Fetal Presentation
Q41
Intrapartum Complications
Q49
Q42
Caesarean Section
(Timing, Anaesthesia, Who Did It)
Q22, Q24, Q25
Maternal Morbidity / Mortality
Q29 to Q36
Newborn Morbidity / Mortality
Q43 to Q48, Q50 to Q53
Indication for Induction
Method of Induction
Q19, Q20
Q21
Who Attended Labour
Women without Pregnancy Complications

The most often asked questions

- When is a high Caesarean rate too high?
- What are the risks and benefits of a Caesarean for individual women?
- "Once a Caesarean always a Caesarean?

WHO Global Survey of Maternal and Perinatal Helth



Latin American countries

Objectives of the WHO Global Survey

- To study the relationship between mode of delivery and pregnancy outcomes world-wide
- To test an on-line data management system for large scale studies
- To provide up to date data on care during childbirth

Sampling

- 14 WHO sub-regions based on levels of child and adult mortality
- Latin America 9, Africa 8, Asia 8 countries randomly selected with probability proportional to population size. USA and Canada also selected
- The capital plus 2 provinces randomly selected with probability proportional to population

Sampling

- If the capital or province was very large, a sample of political subdivisions was randomly taken based on their population size
- Census of all facilities with >1000 births / year in each geographic area
- Random sample of 7 facilities with probability proportional to the number of births

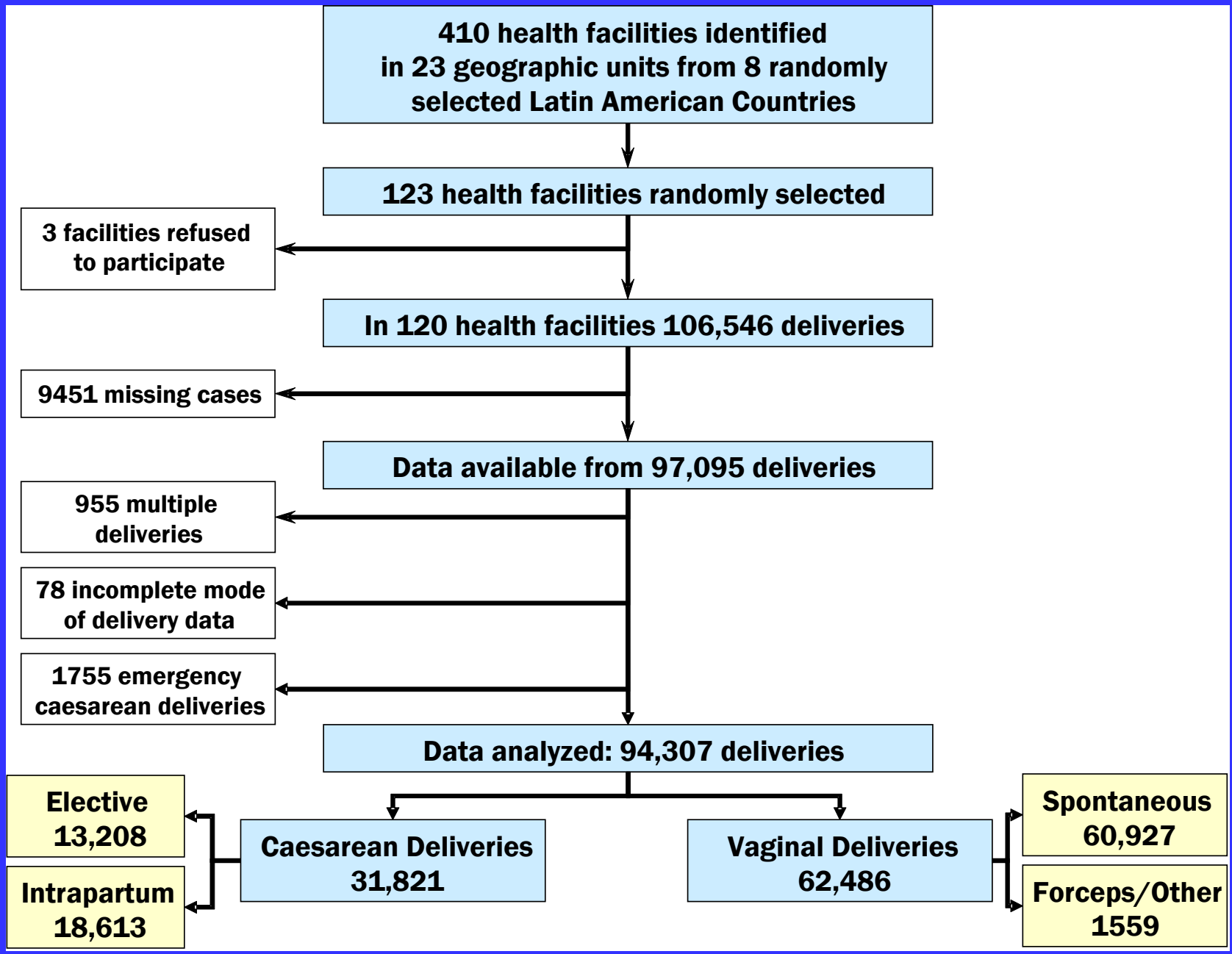
Eligible women

- All women admitted for delivery during study period
- Facilities with < 6000 births/year collected data 3 months; if > 6000 births/year collected data 2 months
- First Survey: 15/09/04 to 15/03/05 (Latin America and Africa)
- Second Survey: 15/10/07 to 15/04/08 (Asia)

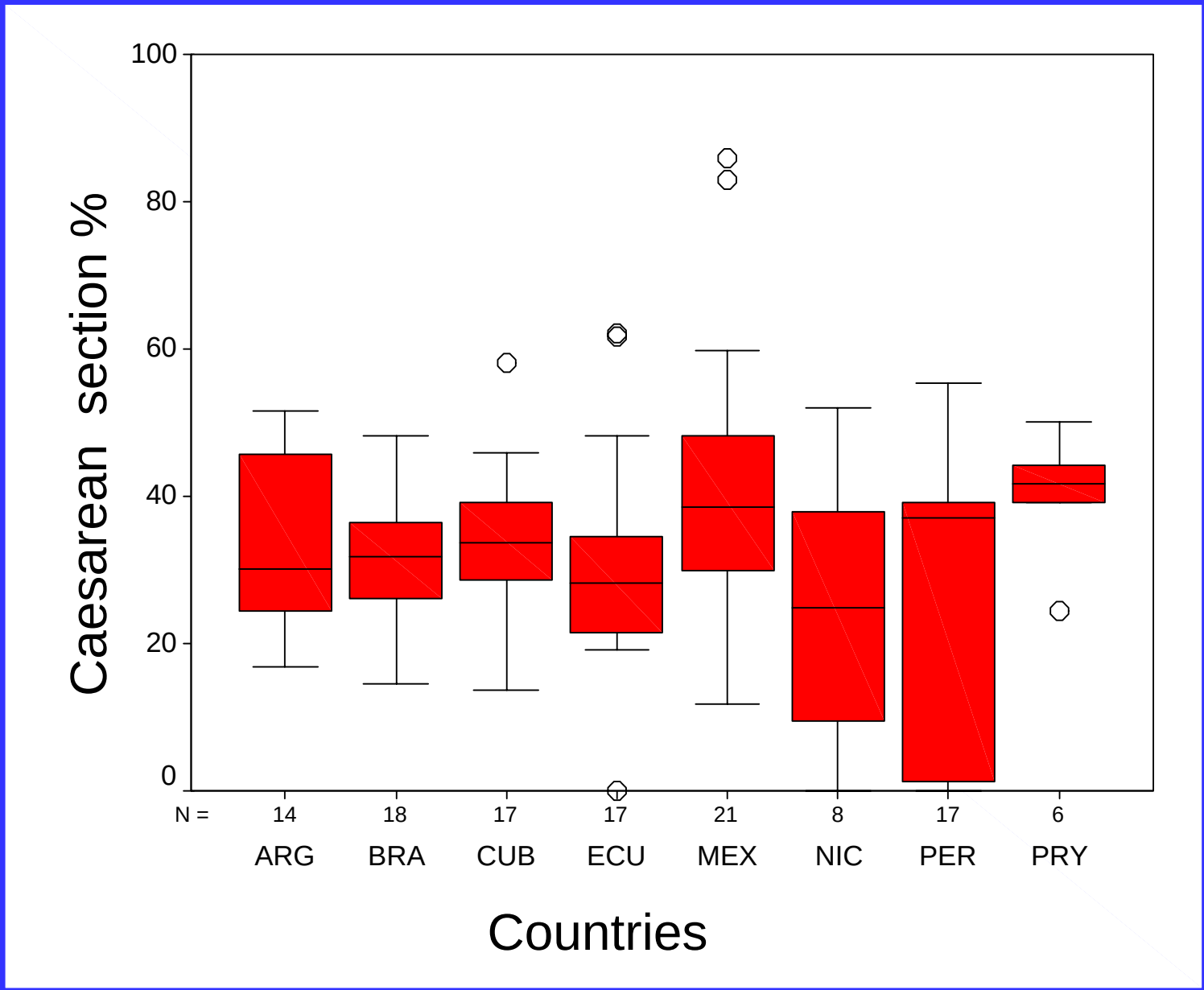
Levels of analysis

- Institutional
  - risks-benefits (Lancet 2006)
  - expected versus observed rates (on-going)
- Individual
  - risks-benefits (completed 2007)
  - repeated caesarean delivery (on-going)

Latin America: Individual level analysis; Study population flow



Caesarean delivery in Latin America (2005)



Mode of delivery

Country	Forceps	Vacuum	C-Section
Argentina	2.5	0.1	35.3
Brazil	2.1	0.0	28.4
Cuba	0.7	0.0	35.8
Ecuador	0.2	0.1	40.4
Mexico	1.6	0.1	37.7
Nicaragua	0.1	0.0	30.8
Paraguay	0.8	0.1	41.8
Peru	0.2	0.1	33.9
Total	**1.1**	**0.1**	**35.3**

Caesarean delivery according to type of facility: Latin America 2005

Type of institution	Number of institutions	Number of births	% C-Delivery
Public	86	67,698	32.6
"Social security"	22	19,905	42.4
Private	11	6,397	46.6

Relationship between caesarean delivery and maternal mortality and morbidity

Maternal morbidity and mortality index	%	OR (95% CI)
Vaginal delivery (Reference level (62,078)	1.8	1.00 (1)
Elective CD vs Vaginal delivery (13,081)	5.5	2.3 (1.7 – 3.1)
Intrapartum CD vs Vaginal delivery (18,463)	4.0	2.0 (1.6 – 2.5)
Antibiotic treatment postnatally		
Vaginal delivery (Reference level)	24.6	1.0 (2)
Elective CD vs vaginal delivery	62.0	4.2 (2.8 – 6.5)
Intrapartum CD vs vaginal delivery	69.6	5.5 (3.8– 8.1)
3rd/4th Degree perineal laceration and/or postpartum fistula		
Vaginal delivery (Reference level)	0.8	1.0
Elective CD vs vaginal delivery	0.3	0.1 (0.03 – 0.30)
Intrapartum CD vs vaginal delivery	0.1	0.07 (0.01 – 0.97)

At least one of the following: blood transfusion and hysterectomy, maternal admission to an intensive care unit, maternal death or maternal hospital stay >7 days.

(1) odds ratios adjusted by parity, any pathology previous to current pregnancy, any pathology during current pregnancy, hypertensive disorders, vaginal bleeding in 2nd half pregnancy, suspected intrauterine growth restriction and other medical conditions.

(2) odds ratios adjusted by parity, previous reproductive tract surgery or fistula, any pathology previous to current pregnancy, vaginal bleeding in 2nd half pregnancy, urinary infection, prelabour rupture of membranes, foetal presentation and type of onset of labour (induced/not induced)

Relationship between caesarean delivery and intrapartum fetal death according to fetal presentation

Cephalic presentation	N	%	OR (95% CI)
Vaginal delivery (Reference level)	61,870	0.4	1.0 (1)
Elective CD vs Vaginal delivery	11,300	0.3	0.7 (0.4 – 1.0)
Intrapartum CD vs Vaginal delivery	16,543	0.4	1.3 (0.9 – 1.7)
Breech and other presentations			
Vaginal delivery (Reference Level)	547	9.7	1.0 (2)
Elective CD vs Vaginal delivery	1874	1.0.	0.3 (0.1 – 0.5)
Intrapartum CD vs Vaginal delivery	2043	0.7	0.2 (0.1 – 0.4)

(1) odds ratios adjusted by gestational age, maternal age, education, previous stillbirth or neonatal death, vaginal bleeding in 2nd half of pregnancy, other medical conditions, type of onset of labour (induced/not induced) and country.

(2) odds ratios adjusted by gestational age and type of onset of labour (induced/not induced).

Relationship between caesarean delivery and >7 days in NICU according to fetal presentation

Cephalic presentation	N	%	OR (95% CI)
Vaginal delivery (Reference level)	61,264	1.9	1.0 (1)
Elective CD vs Vaginal delivery	11,239	5.0	2.1 (1.8 – 2.6)
Intrapartum CD vs Vaginal delivery	16,428	3.5	1.9 (1.6 – 2.3)
Breech and other presentation			
Vaginal delivery (Reference level)	422	13.0	1.0 (2)
Elective CD vs Vaginal delivery	1845	6.8	1.3 (0.8 – 2.1)
Intrapartum CD vs Vaginal delivery	2014	7.0	1.3 (0.8 – 2.2)

(1) Odds ratios adjusted by gestational age, maternal age, caesarean section in previous delivery, any pathology during current pregnancy, hypertensive disorders, suspected intrauterine growth restriction, other medical conditions, pre-labour rupture of membranes and country.

(2) odds ratios adjusted by gestational age, any pathology previous to current pregnancy and country.

Relationship between caesarean delivery and neonatal death according to fetal presentation at delivery

Cephalic presentation	N	%	OR (95% CI)
Vaginal Delivery (Reference Level)	61,299	0.4	1.0 (1)
Elective CD vs Vaginal delivery	11,237	0.8	1.7 (1.3 – 2.2)
Intrapartum CD vs Vaginal delivery	16,434	0.7	2.0 (1.5 – 2.6)
Breech and other presentations			
Vaginal delivery (Reference level)	421	8.6	1.0 (2)
Elective CD vs Vaginal delivery	1846	1.8	0. 7 (0.4 – 1.3)
Intrapartum CD vs Vaginal delivery	2021	1.6	0.6 (0.3 – 1.0)

(1) Odds ratios adjusted by gestational age, hypertensive disorders, any anaesthesia during labour and ty of facility.

(2) Odds ratios adjusted by gestational age.

Relationship between caesarean delivery and neonatal outcomes among fetuses in cephalic presentation excluding all caesarean deliveries indicated for fetal distress

>7 days in neonatal intensive care unit	N	%	OR (95% CI)
Vaginal delivery (Reference level)	61,264	1.9	1.0 (1)
Elective CD vs Vaginal delivery	10,713	4.9	2.1 (1.8 – 2.5)
Intrapartum CD vs Vaginal delivery	11,881	3.3	1.8 (1.5 – 2.1)
Neonatal death			
Vaginal delivery (Reference level)	61,299	0.4	1.0 (2)
Elective CD vs Vaginal delivery	10,711	0.8	1.8 (1.3 – 2.3)
Intrapartum CD vs Vaginal delivery	11,884	0.5	1.3 (0.9 – 1.8)

(1) odds ratios adjusted by gestational age, maternal age, caesarean section in previous delivery, hypertensive disorders, suspected intrauterine growth restriction, other medical conditions, pre-labour rupture of membranes and country.

(2) odds ratios adjusted by gestational age.

Relationship between elective caesarean delivery and neonatal outcomes among fetuses in cephalic presentation according to initiation of labour before the elective caesarean

>7 days in neonatal intensive care unit	N	%	OR (95% CI)
Spontaneous onset / Vaginal delivery	53,361	1.9	1.0 (1)
Spontaneous onset / Elective CD	1501	2.7	1.5 (1.0 – 2.2)
No labour / Elective CD	9203	5.3	2.3 (1.9 – 2.7) *
Neonatal death			
Spontaneous onset / Vaginal delivery	53,379	0.4	1.0 (2)
Spontaneous onset / Elective CD	1500	0.6	1.4 (0.6 – 3.2)
No labour / Elective CD	9202	0.8	1.9 (1.5 – 2.5)

(1) odds ratios adjusted by gestational age, maternal age, caesarean section in previous pregnancy, hypertensive disorders, suspected intrauterine growth restriction, other medical condictions, pre-labour rupture of membranes and type of facility.

(2) odds ratios adjusted by gestational age

* P <0.05

Association between maternal and neonatal outcomes and mode of delivery at individual level in cephalic presentation (based on adjusted odds ratios)

	Vaginal delivery (N = 62486) (Reference)	Caesarean delivery	
		Elective (N = 13208)	Intrapartum (N = 18613)
Maternal morbidity and mortality index	———	↑↑	↑↑
Maternal antibiotic treatment postnatally	———	↑↑↑	↑↑↑
3rd and/or 4th degree perineal laceration and/or postpartum fistula	———	↓↓↓	↓↓↓
Fetal death	———	↓ (S)	↑ (NS)
More than 7 days in NICU	———	↑↑	↑↑
Neonatal death	———	↑ (NS)	↑↑

↑ OR < 2 ↑↑ OR ⩾ 2 ↑↑↑ OR > 3

Summary of the association between neonatal outcomes and mode of delivery at individual level among fetuses in breech presentation (based on adjusted odds ratios)

	Vaginal delivery (N = 62,486) (Reference)	Caesarean delivery	
		Elective (N = 13,208)	Intrapartum (N = 18,613)
Fetal death	____	↓↓↓	↓↓↓
> 7 days in neonatal intensive care unit	____	↑ (NS)	↑ (NS)
Neonatal death	____	↓ (NS)	↓↓ (NS)

* The presence of at least one of the following: Blood transfusion and hysterectomy, maternal admission to intensive care unit, maternal death or maternal hospital stay >7 days.

Summary: Limitations

- Extensive statistical adjustments: still residual confounding
- Intrapartum indications: biased?
- Data quality from many uncontrolled sources
- Potential misclassifications

Summary: Interpretation

- Emergency CD should be done, of course
- If breech always CD, we agree.
- "Social" CD ….. and others ….indications for caesarean can be risky……women and providers should be informed

The future

- "False positives" for intrapartum "distress": how to reduce them?
- A RCT testing a policy of CD offered to all women is not recommended at this point
- Once a CD, always a Caesarean?, next report .

Trainees resort to caesareans too often, warn doctors

Sarah Boseley
Health editor

guardian.co.uk/medicine »

Guardian.co.uk/medicine

22 September 2006

Characteristics of the study population

	Vaginal delivery (N = 62486)	Caesarean delivery	
		Elective (N = 13208)	Intrapartum (N = 18613)
	%	%	%
Previous to pregnancy			
Marital status (single)	23.4	17.4	18.0
Maternal age $\leqslant$ 16 years	4.8	2.2	4.3
Maternal age $\geqslant$ 35 years	8.8	17.3	11.9
Less than 7 years of education	27.6	21.6	24.3
Primigravida	34.5	26.6	40.0
Primiparous	41.2	32.2	49.2
Previous low birth weight (< 2500 g.)	3.8	5.5	3.7
Previous high birth weight ($\geqslant$ 4500 g.)	0.5	1.0	0.5
Previous neonatal death or stillbirth	1.0	1.9	1.4
Previous fistula or uterus-cervix surgery	3.3	21.0	12.0
Previous caesarean delivery	3.4	46.1	24.7

Characteristics of the study population

	Vaginal delivery (N = 62486)	Caesarean delivery	
		Elective (N = 13208)	Intrapartum (N = 18613)
	%	%	%
Current pregnancy			
Any pathology before index pregnancy*	3.9	9.0	5.2
Any pathology during current pregnancy**	29.6	40.2	41.2
Gestational hypert., pre-eclampsia or eclamp.	5.6	18.9	13.3
Vaginal bleeding in second half of pregnancy	1.8	3.7	3.7
Urinary tract infection	14.6	16.2	15.8
Condyloma accuminatae	0.3	0.9	0.7
Suspected intrauterine growth restriction	1.0	2.6	1.3
Any other medical condition	8.6	13.1	11.8
Prelabour rupture of membranes	11.7	8.4	15.1
Any antenatal antibiotic treatment	17.5	20.9	20.0
Breech or other non-cephalic presentations	0.9	14.2	11.0
Referred for pregnancy or delivery-related complications	31.4	42.8	37.9
Induced labour	12.5	--	17.3

* The presence of at least one of the following conditions: HIV, chronic hypertension, cardiac or renal diseases, chronic respiratory, c
mellitus, malaria, sickle cell anaemia or severe anaemia.

** The presence of at least one of the following conditions: prelabour rupture of membranes, pregnancy induced hypertension, eclam
in 2nd half of pregnancy, pyelonephritis or urinary infection, any genital ulcer disease or condyloma acuminata.

Missing data

Variable	Latin America		Africa	
	Available for analysis	% of missing data	Available for analysis	% of missing data
Caesarean	97,988	0.09	81,594	0.11
Birth weight	97,872	0.20	80,922	0.93
Gestational age	97,488	0.60	79,058	3.21
Newborn status at discharge	96,931	0.09	78,453	0.17
Maternal status at discharge	97,035	0.06	79,873	0.43

Hospital complexity index