



# The landscape of caesarean sections in low-resource settings:

## Who, where, and why?

Lenka Beňová

Francesca L. Cavallaro

Oona M.R. Campbell

July 27 2017



## A. Multi-country analysis: sub-Saharan Africa and Southeast Asia

1. Data and methods
2. Where do caesareans occur and what are the levels?
3. Who is performing caesarean sections?
4. Who is delivering by caesarean section?

Q&A

## B. Country case studies

1. Bangladesh time trends and caesarean indications
2. Tanzania time trends and facility metrics

Q&A

- Nationally representative Demographic & Health Surveys (2002-2016)
- Countries: 34 sub-Saharan Africa, 10 South/Southeast Asia
- Sample of women age 15-49
- Circumstances of most recent live birth in recall period
- Women's self-report
- Maternal healthcare Markets Evaluation Team (MET) @ LSHTM standardised survey response options

# Three main questions



## Malawi 2010

Who assisted with the delivery of (NAME)?	<b>HEALTH PERSONNEL</b>
Anyone else?	DOCTOR/CLINICAL OFFICER ..... A
	NURSE/MIDWIFE ..... B
	PATIENT ATTNDT ..... C
PROBE FOR THE TYPE(S) OF PERSON(S) AND RECORD ALL MENTIONED.	<b>OTHER PERSON</b>
	TRADITIONAL BIRTH ATTENDANT ..... D
	RELATIVE/FRIEND ..... E
IF RESPONDENT SAYS NO ONE ASSISTED, PROBE TO DETERMINE WHETHER ANY ADULTS WERE PRESENT AT THE DELIVERY.	OTHER ..... X
	NO ONE ..... Y

Was (NAME) delivered by caesarean section?	YES ..... 1
	NO ..... 2

Was (NAME) delivered by caesarean, that is, did they cut your belly open to take the baby out?

Where did you give birth to (NAME)?

PROBE TO IDENTIFY THE TYPE OF SOURCE AND CIRCLE THE APPROPRIATE CODE.

IF UNABLE TO DETERMINE IF A HOSPITAL, HEALTH CENTER, OR CLINIC IS PUBLIC OR PRIVATE MEDICAL, WRITE THE NAME OF THE PLACE.

\_\_\_\_\_  
(NAME OF PLACE)

### HOME

YOUR HOME ... 11  
(SKIP TO 444) ←  
OTHER HOME ... 12

### PUBLIC SECTOR

GOVT. HOSPITAL 21  
GOVT. HEALTH CENTER ..... 22  
GOVT. HEALTH POST/  
OUTREACH ... 23  
OTHER PUBLIC . 26

### CHAM/MISSION

HOSPITAL ..... 31  
HEALTH CENTER . 32

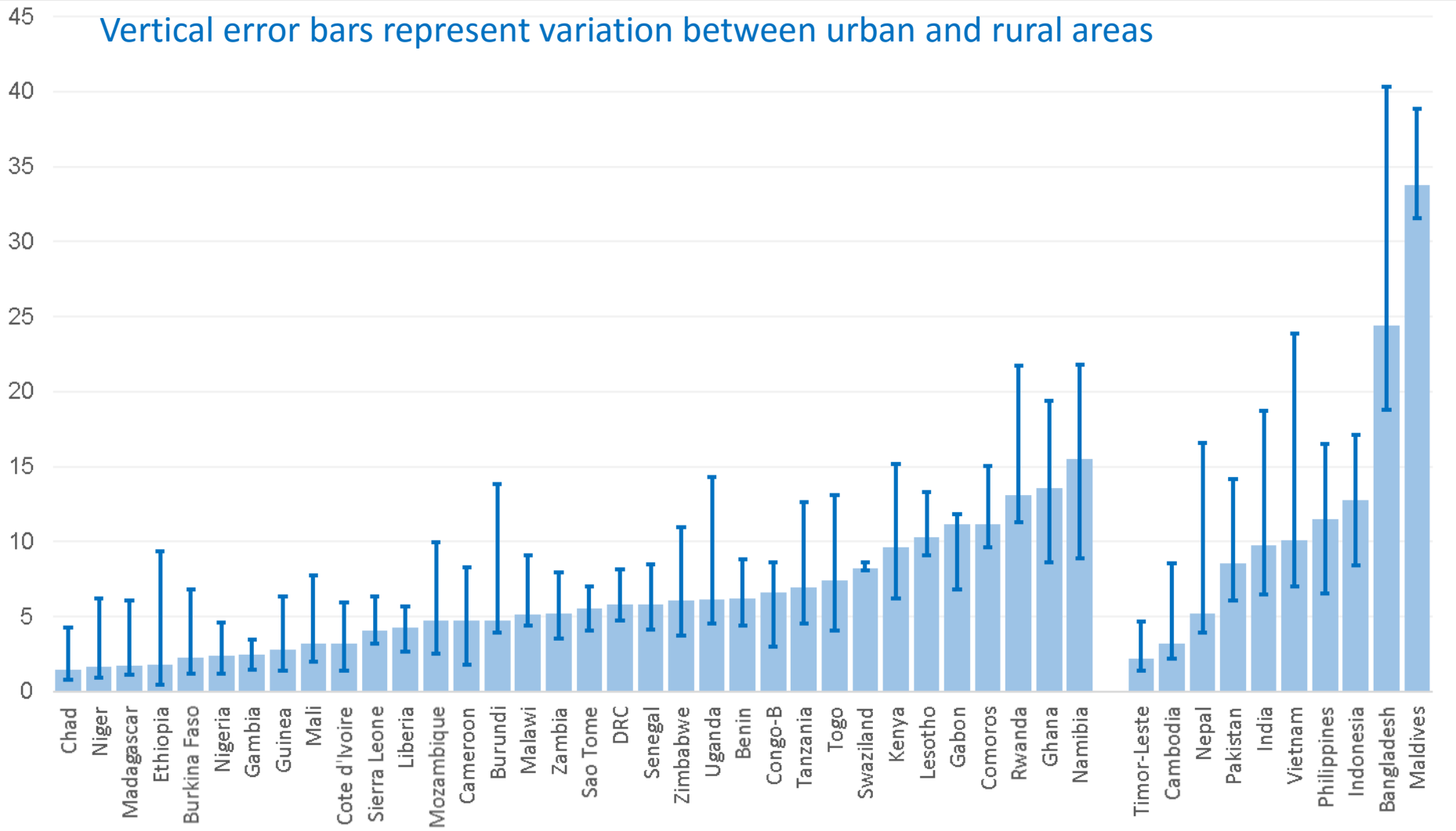
### PRIVATE MED. SECTOR

PVT. HOSPITAL/  
CLINIC ..... 41  
OTHER PRIVATE  
MEDICAL ..... 46

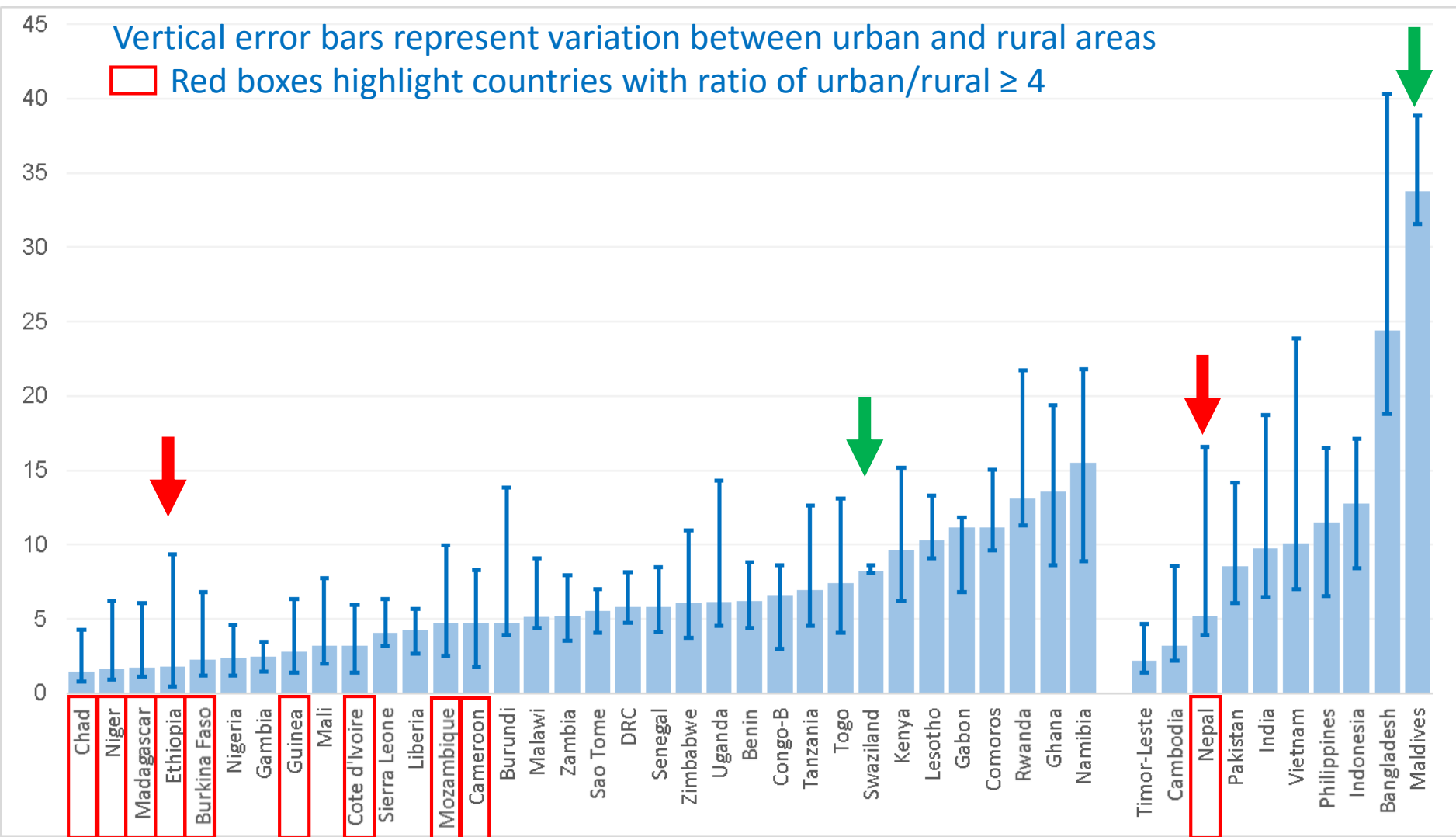
BLM ..... 51

OTHER ..... 96  
(SKIP TO 444) ←

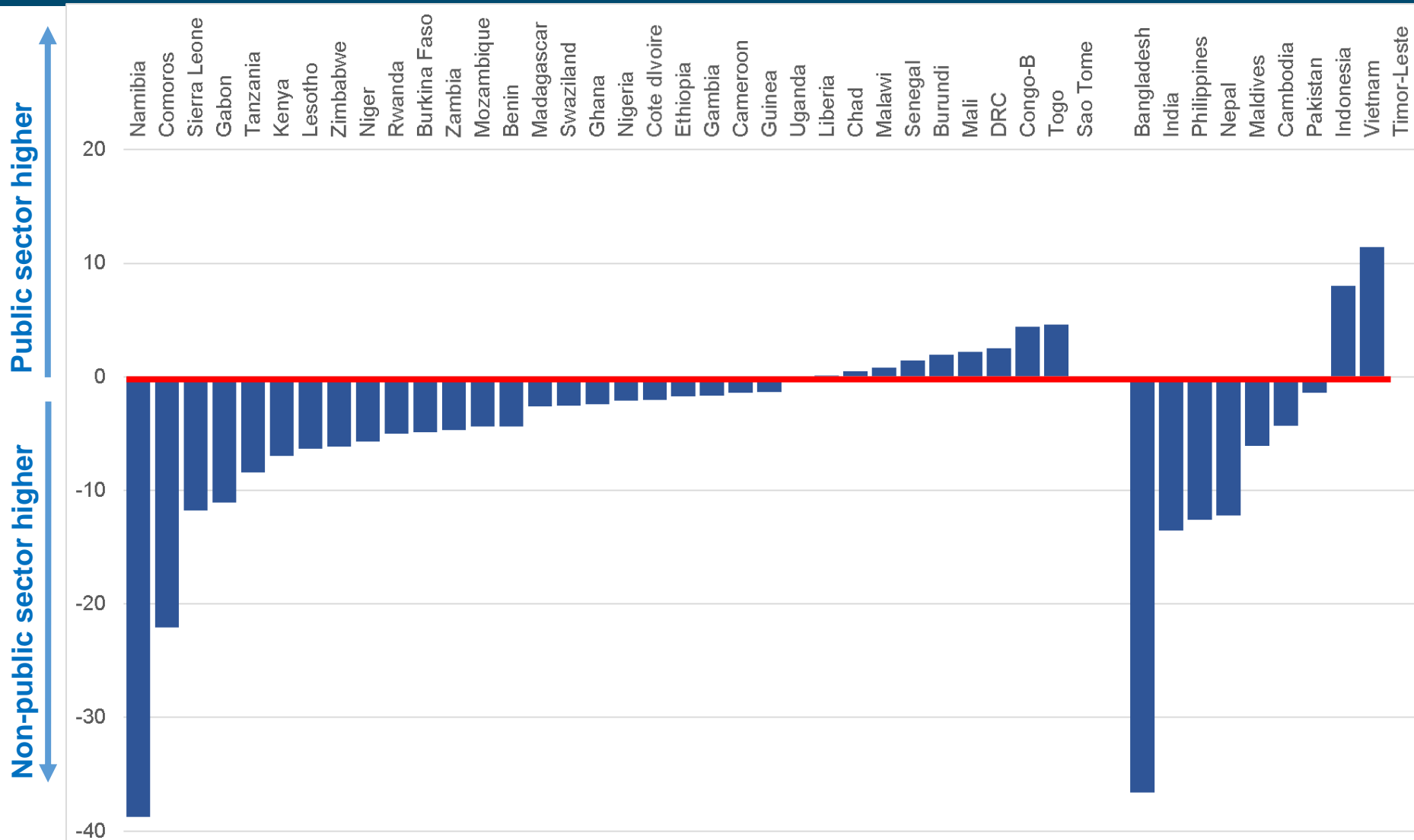
# Where? Locations and rates



# Country rates



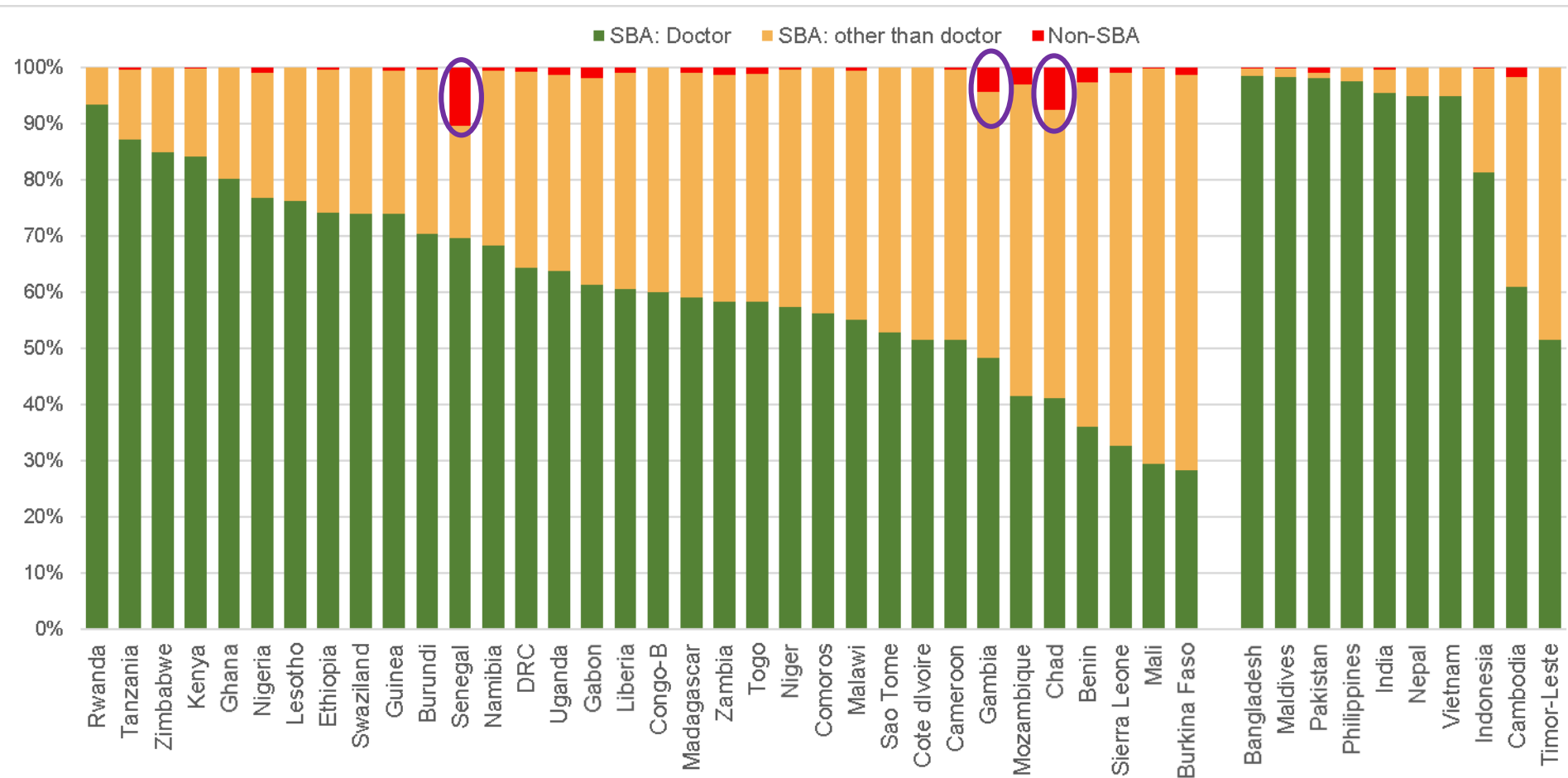
# Difference in rates by sector



# Who performs caesarean sections?



Distribution of caesarean sections by category of provider

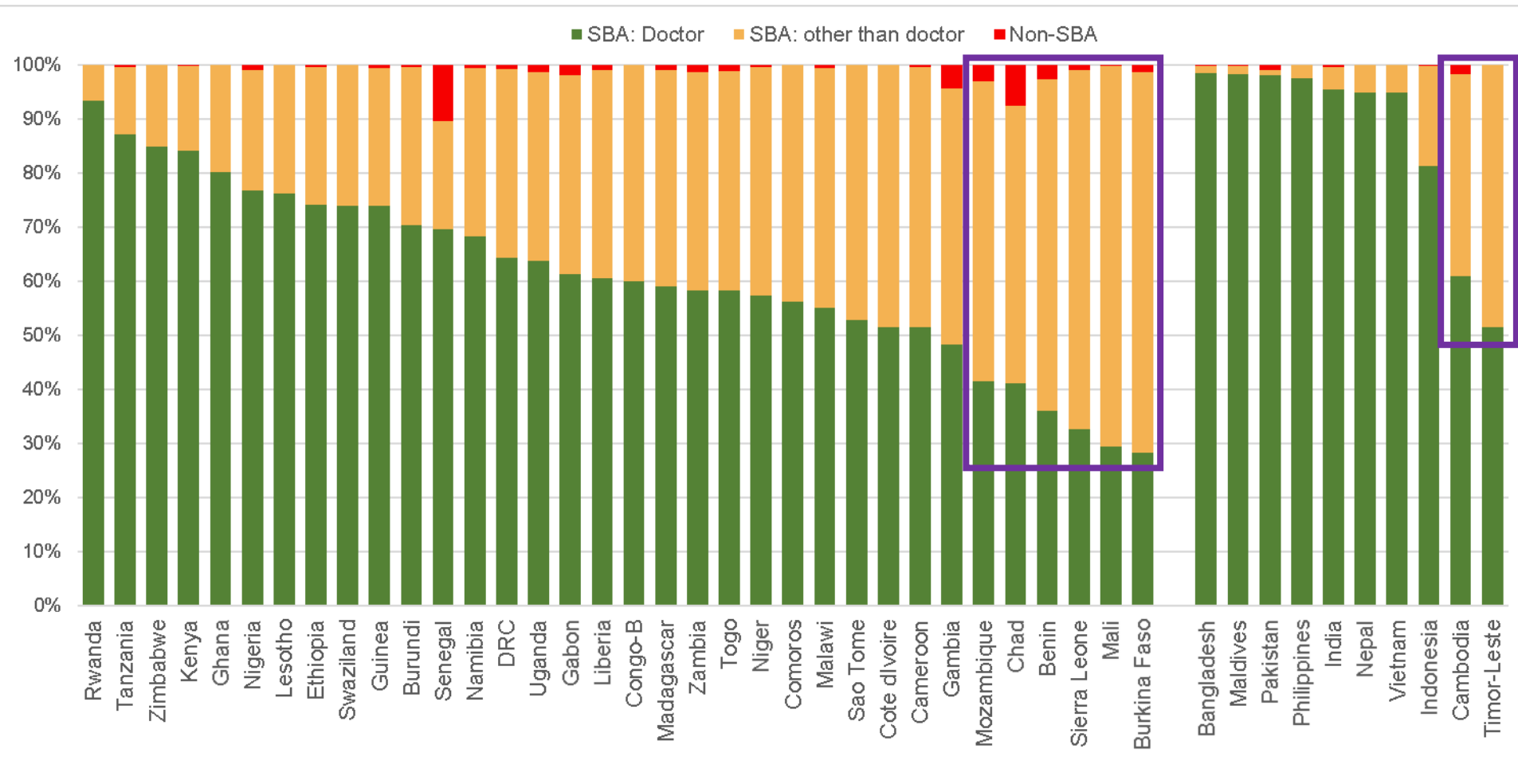




# Who performs caesarean sections?



Distribution of caesarean sections by category of provider



# By sector: Who performs csections?



- Compared % with **non-doctor SBA** by facility ownership
- Sub-Saharan Africa (n=20):
  - 18 countries had a higher % of non-doctor SBA caesareans in public compared to non-public facilities
    - Widest difference in Namibia: public (39%) and non-public (3%)
- In South/Southeast Asia (n=8):
  - Four countries had higher percentages in public
    - Widest difference in India: public (7%) and non-public (3%)
  - Four countries in non-public facilities
    - Widest difference in Indonesia: public (10%) and non-public (23%)

# Who delivers by caesarean section?



- **Nine risk factors for maternal and newborn complications:**
  - Woman's age 35+ years
  - Woman's age <16 years
  - Primiparity (first live birth)
  - Grand multiparity (birth order 6+)
  - Preceding birth interval <12 months
  - Multiple gestation
  - Received no antenatal care
  - Preceding live birth in recall period resulted in neonatal death
  - Caesarean section(s) in recall period
- **Comparison of three groups:**
  - All births
  - Facility-based births
  - Caesarean births

# Who delivers by caesarean section?



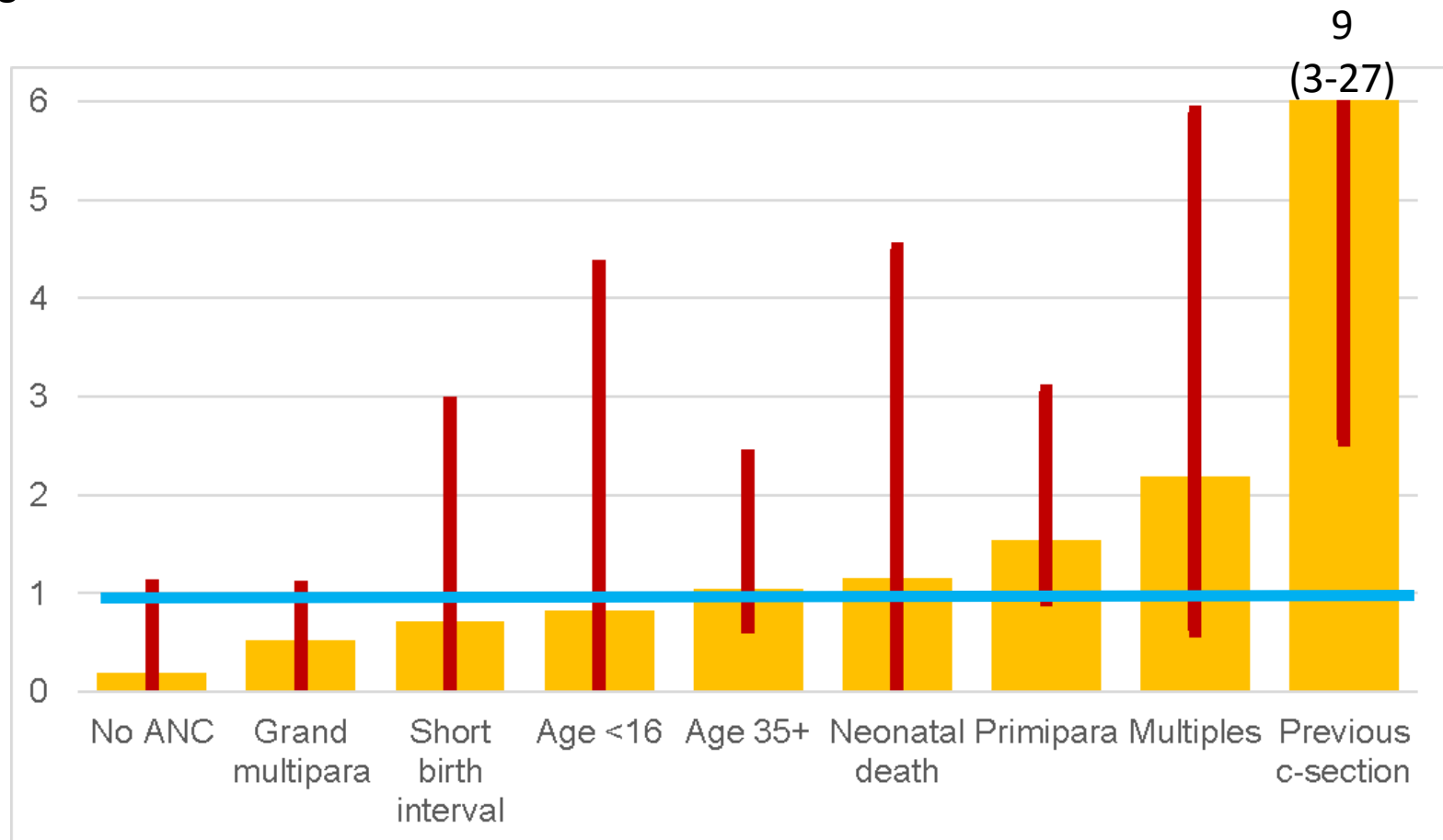
- All women with births
  - Most common risk factors:
    - Primiparity (median across countries 22%)
    - Grand multiparity (20%)
    - Age 35+ (18%)
  - The median percentage with one or more risk factors was 56%, ranging from 46% (Malawi) to 79% (Ethiopia)
- Women delivering by caesarean section
  - Across countries more likely to have had one or more risk factors (median 71%) compared to all women with births (56%)

# Who delivers by caesarean section?



Median ratio of % among women with caesarean sections versus all women with births

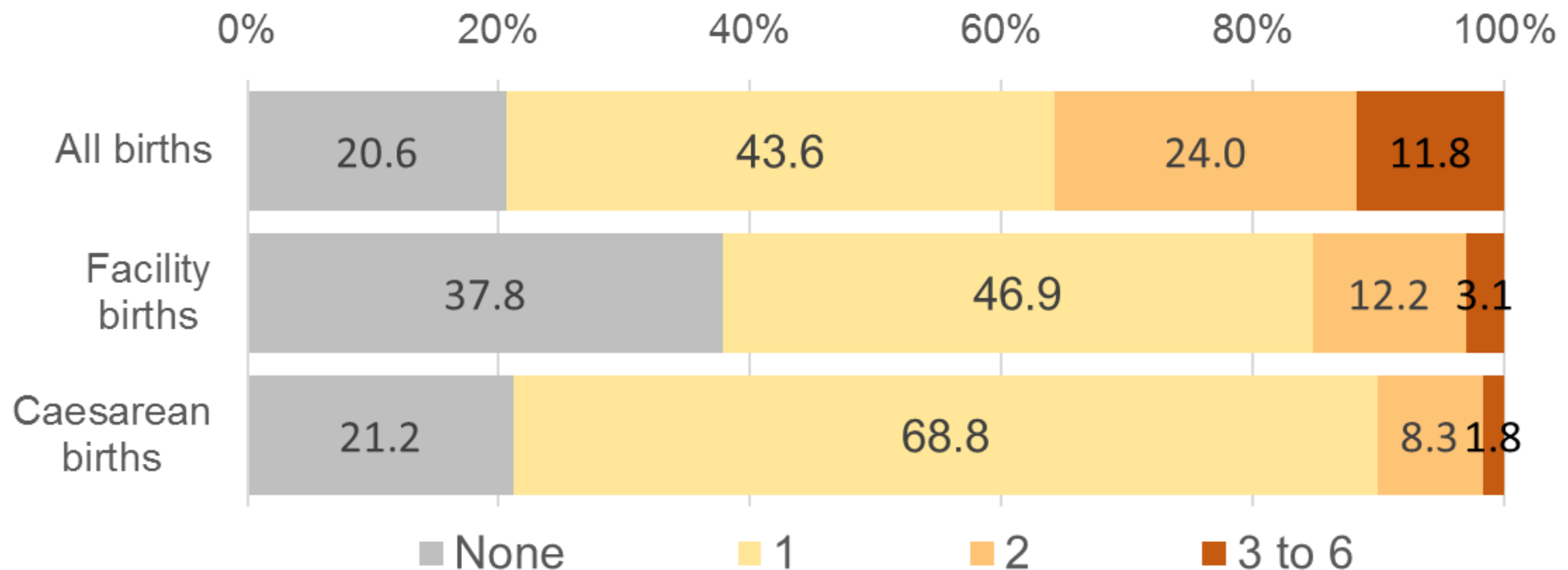
Range of ratios across 44 countries



# Who delivers by caesarean section?



## Ethiopia 2011





- A. Multi-country analysis: sub-Saharan Africa and Southeast Asia
  - 1. Data and methods
  - 2. Where do caesareans occur and what are the levels?
  - 3. Who is performing caesarean sections?
  - 4. Who is delivering by caesarean section?

Q&A

# Bangladesh case study

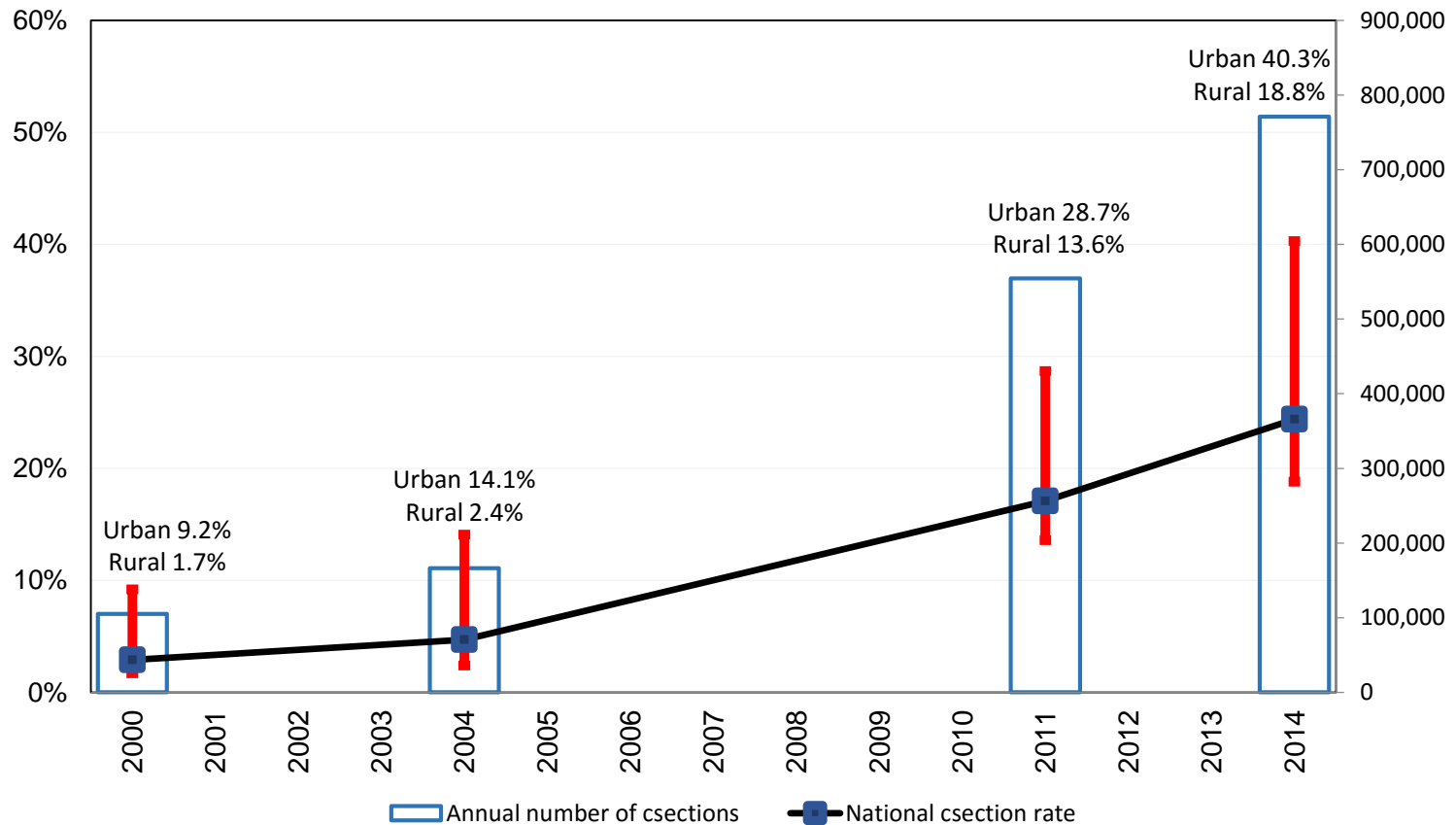




# Trends over time



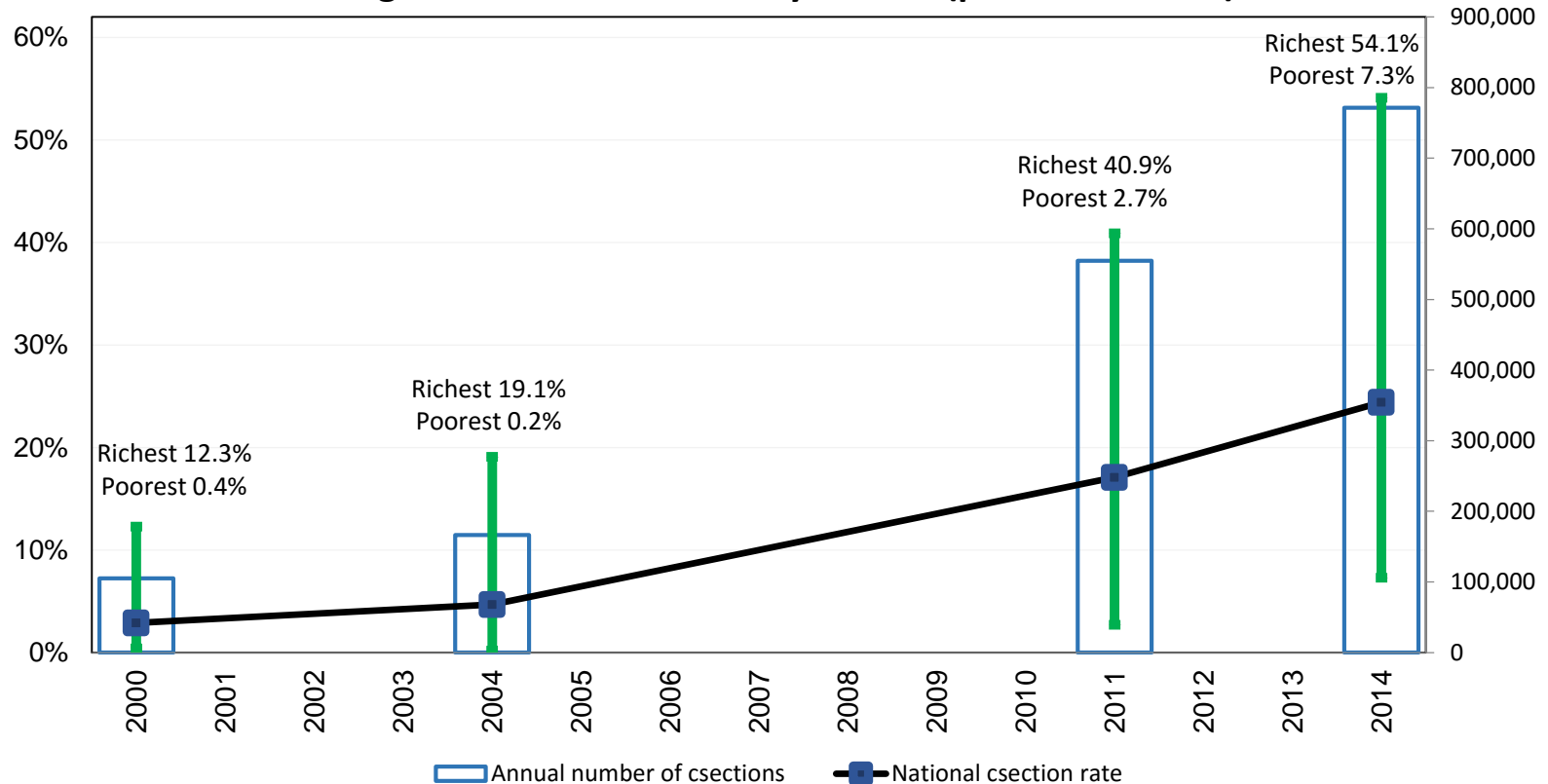
Bangladesh csection rates by residence (urban/rural)



# Trends over time



Bangladesh csection rates by wealth (poorest/richest)



# Key trends

- Facility deliveries increased from 10% in 2000 to 39% in 2014, and the private sector share of facility deliveries rose from 1/3 to 2/3
- Facility caesarean rate doubled from 33% to 63% (faster increase in private than public facilities)
- 99% of caesareans are performed by doctors

# DHS caesarean questions



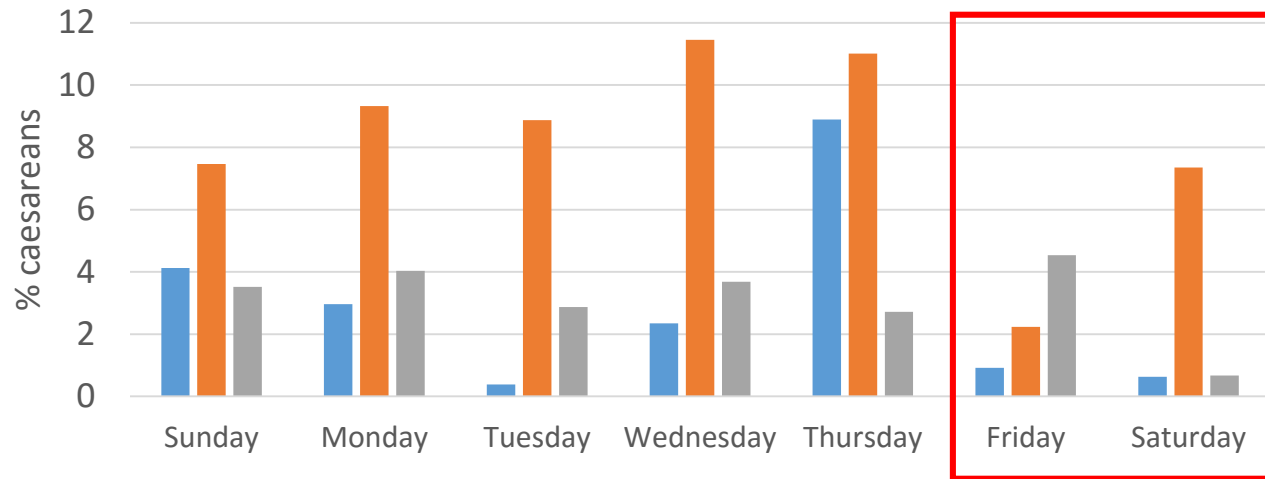
435	Was (NAME) delivered by caesarean section, that is, did they cut your belly open to take the baby out?	YES ..... 1 NO ..... 2 (SKIP TO 435i) ←
435A	What day of the week was the birth delivered by caesarean section?	SUNDAY ..... 01 MONDAY ..... 02 TUESDAY ..... 03 WEDNESDAY ..... 04 THURSDAY ..... 05 FRIDAY ..... 06 SATURDAY ..... 07
435B	At what time of day was the caesarean section or operation done?	06:01 AM TO 09:00 AM ..... 01 09:01 AM TO 12:00 NOON ..... 02 12:01 PM TO 02:00 PM ..... 03 02:01 PM TO 04:00 PM ..... 04 04:01 PM TO 06:00 PM ..... 05 06:01 PM TO 09:00 PM ..... 06 09:01 PM TO 12:00 AM ..... 07 12:01 AM TO 03:00 AM ..... 08 03:01 AM TO 06:00 AM ..... 09
435C	How many days before the delivery was the decision to have caesarean section made?	THE DAY OF DELIVERY ..... 1 THE DAY BEFORE DELIVERY ..... 2 2 - 7 DAYS BEFORE DELIVERY ..... 3 8 - 30 DAYS BEFORE DELIVERY ..... 4 30+ DAYS BEFORE DELIVERY ..... 5

435D	Who proposed first to have the birth delivered by caesarean section, you, a family member or a doctor?	RESPONDENT ..... 1 (SKIP TO 435F) ← FAMILY MEMBER ..... 2 DOCTOR ..... 3
435E	Were you or your family told the reasons for having the operation?	YES ..... 1 NO ..... 2 (SKIP TO 435G) ←
435F	What were the reasons for making the decision to have the operation?  Any other reason?  CIRCLE ALL MENTIONED.	CONVENIENCE ..... A DO NOT WANT TO GO THROUGH LABOR PAIN ..... B MAL PRESENTATION ..... C PREMATURE BABY ..... D CORD PROLAPSED ..... E MULTIPLE BIRTHS ..... F FAILURE TO PROGRESS IN LABOR ..... G PRE-ECLAMPSIA ..... H DIABETES ..... I PREVIOUS C/S ..... J LESS PRESSURE ON BABY'S BRAIN ..... K OTHER COMPLICATIONS DURING DELIVERY ..... L OTHER ..... X

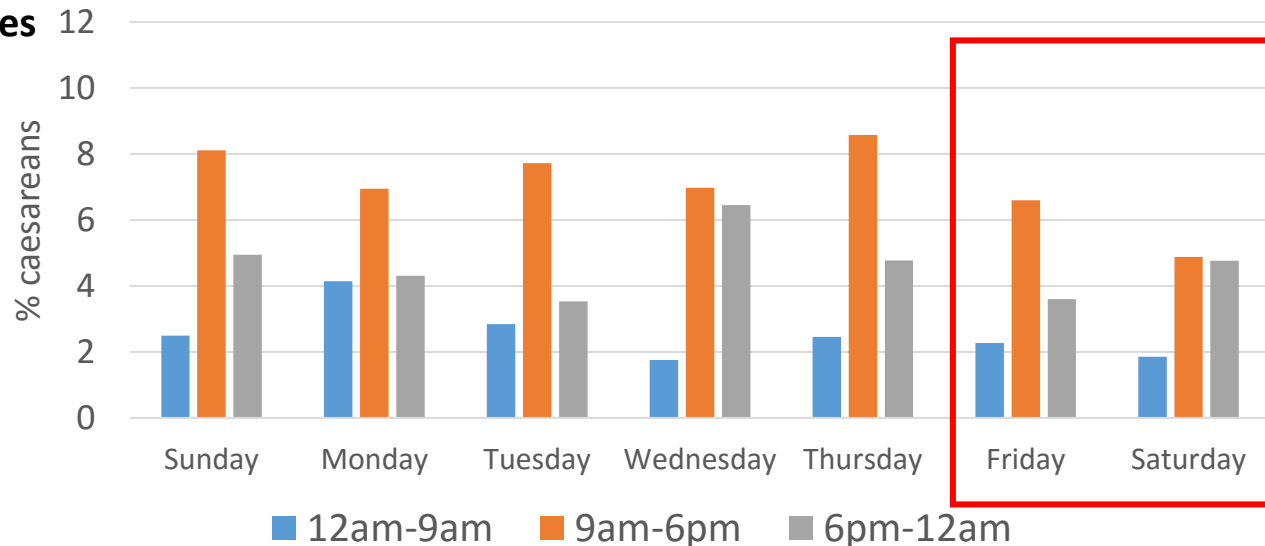
# Day and time of caesareans



## Public facilities



## Non-public facilities



# Circumstances around caesareans



- 71% of caesareans were first suggested by the doctor (22% by a family member, 7% by the woman)
- 98% of women were told the reason for the caesarean, when suggested by a doctor
- Mean length of stay = 6.7 days post-caesarean
- Mean cost = USD 261 (higher in non-public facilities), compared to USD 59 for vaginal delivery

# Reasons for caesareans



- Most women (69%) report a single reason for caesarean; 26% report two reasons (usually one of which is “other”)

Reported reason for caesarean	%	Timing of decision			
		Day of (%)	Day before (%)	Week before (%)	Earlier (%)
Other complications during delivery	32.7	54.2	11.8	11.8	22.2
Malpresentation	32.5	42.0	17.2	11.6	29.1
Failure to progress in labour	17.3	59.6	13.9	8.9	17.5
Previous caesarean section	15.4	12.6	6.5	15.5	65.4
Cord prolapsed	1.9	44.2	18.8	4.0	32.9
Multiple births	0.4	16.9	19.7	0.0	63.4
<b>All caesareans</b>		<b>45.2</b>	<b>12.6</b>	<b>12.0</b>	<b>30.2</b>

# Key findings – Bangladesh case study



- Much faster rise in caesarean rate among richest than poorest women, and in facility caesarean rate in non-public than public facilities
- Relatively low facility delivery rates and high caesarean rate in facilities
- Self-reported information – caution needed in interpretation, especially for reasons for caesarean



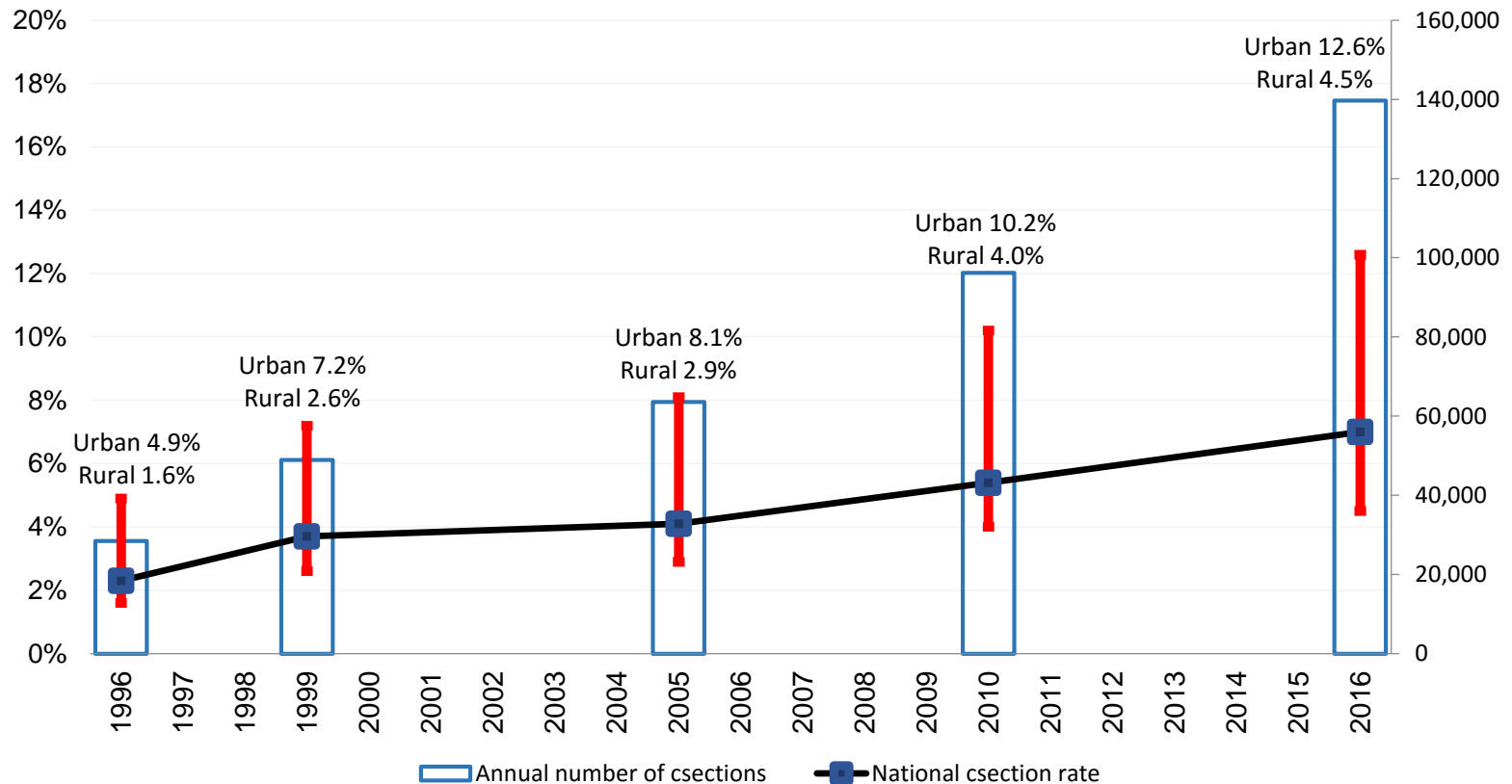
# Tanzania case study



# Trends over time

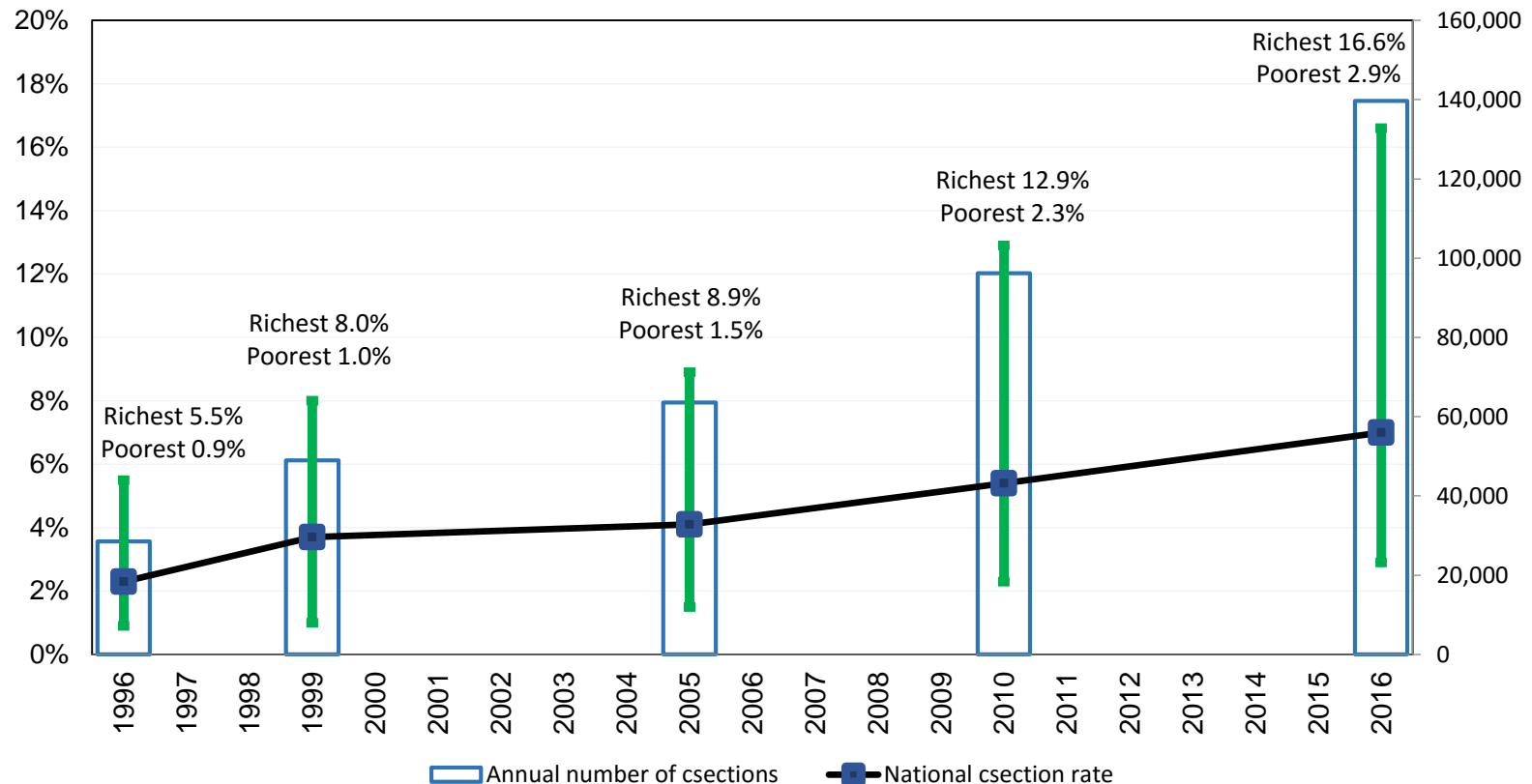


Tanzania csection rates by residence (urban/rural)



# Trends over time

Tanzania csection rates by wealth (poorest/richest)



# Key trends

- Facility delivery rate increased from 50% in 1996 to 68% in 2015-16
- Facility caesarean rate doubled from 4.7% to 10.3%, faster increase in private sector facilities
- One fifth of facility births occur in private facilities
- 10-14% of caesareans are performed by provider other than doctor/AMO

# SPA methodology



- Service Provision Assessments (SPA) are nationally representative surveys of health facilities (public, private for-profit, FBO, parastatal)
  - Infrastructure
  - Equipment
  - Staffing
- “Does this facility offer any of the following client services?”

# SPA questions



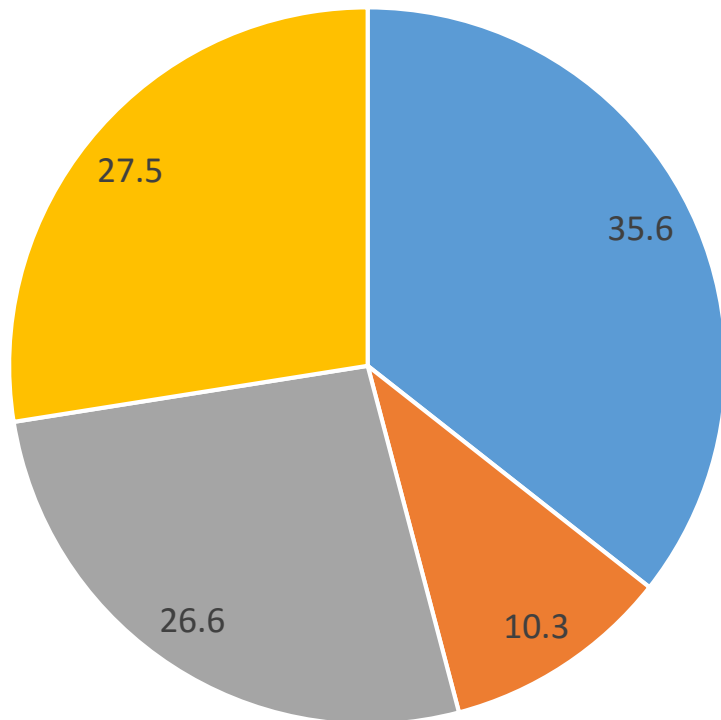
ASK TO BE SHOWN THE LOCATION IN THE FACILITY WHERE CESAREAN DELIVERY ARE DONE.  
FIND THE PERSON MOST KNOWLEDGEABLE ABOUT PROVISION OF SUCH SERVICES IN THE FACILITY.  
INTRODUCE YOURSELF, EXPLAIN THE PURPOSE OF THE SURVEY AND ASK THE FOLLOWING QUESTIONS.

2501	Does the facility have a health worker who can perform Cesarean delivery present at the facility or on call 24 hours a day (including weekends and on public holidays)?	YES..... 1 NO..... 2	→ 2504
2502	Is there a duty schedule or call list for 24-hr staff assignment?	YES..... 1 24-HOUR DUTY SCHEDULE NOT MAINTAINED.. 2	→ 2504
2503	May I see the duty schedule or call list for 24-HR staff assignment?	SCHEDULE OBSERVED..... 1 SCHEDULE REPORTED, NOT SEEN..... 2	
2504	Does this facility have an anesthetist present in the facility or on call 24 hours a day (including weekends and on public holidays?)	YES..... 1 NO..... 2	→ 2507
2505	Is there a duty schedule or call list?	YES..... 1 24-HOUR DUTY SCHEDULE NOT MAINTAINED.. 2	→ 2507
2506	May I see the duty schedule or call list?	SCHEDULE OBSERVED..... 1 SCHEDULE REPORTED, NOT SEEN..... 2	
2507	Has Cesarean section been performed in this facility during the past 3 months?	YES..... 1 NO..... 2	→ 2510
2507A	How many C-sections were performed at this facility during the past 3 completed months?	# OF C-SECTIONS <div style="display: inline-block; border: 1px solid black; width: 40px; height: 30px; margin-right: 5px;"></div> <div style="display: inline-block; border: 1px solid black; width: 40px; height: 30px; margin-right: 5px;"></div> <div style="display: inline-block; border: 1px solid black; width: 40px; height: 30px; margin-right: 5px;"></div> <div style="display: inline-block; border: 1px solid black; width: 40px; height: 30px;"></div> DON'T KNOW.....9998	

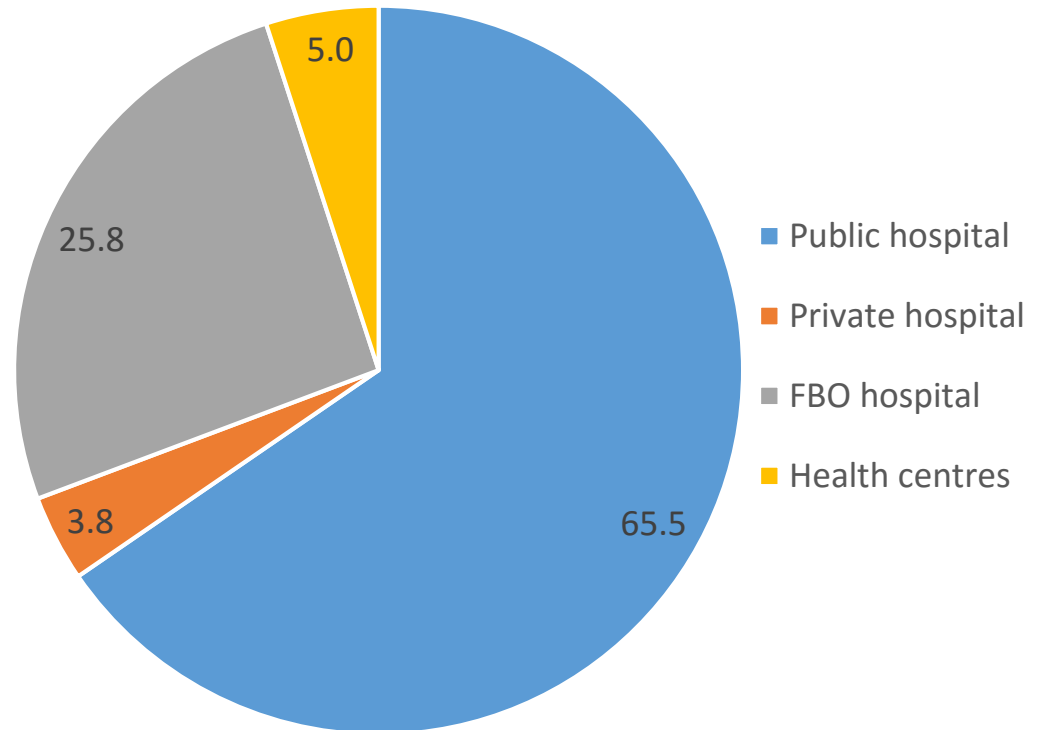
# Facility type and sector



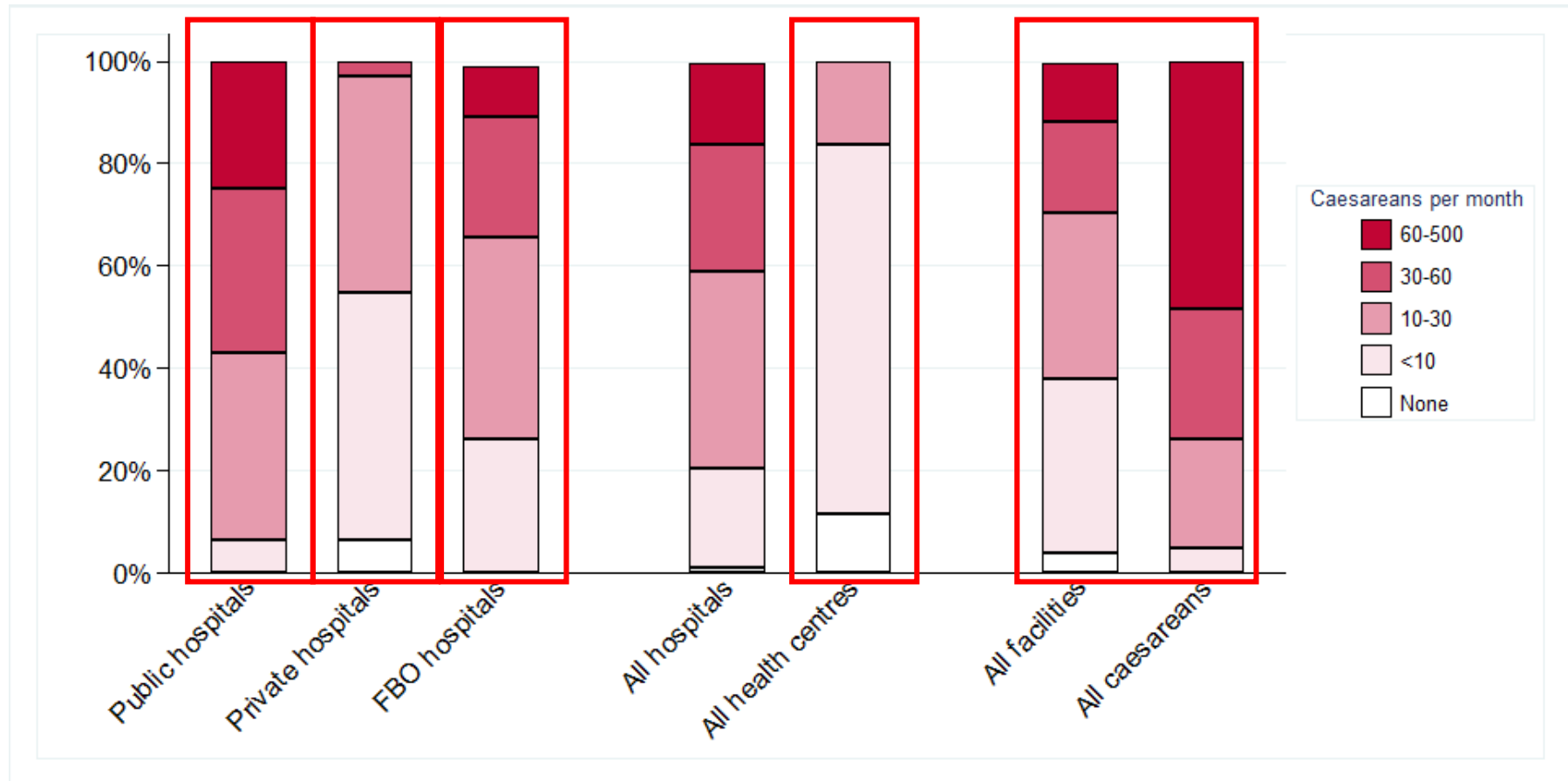
Facilities reporting to provide  
caesareans



Caesareans



# Delivery volume



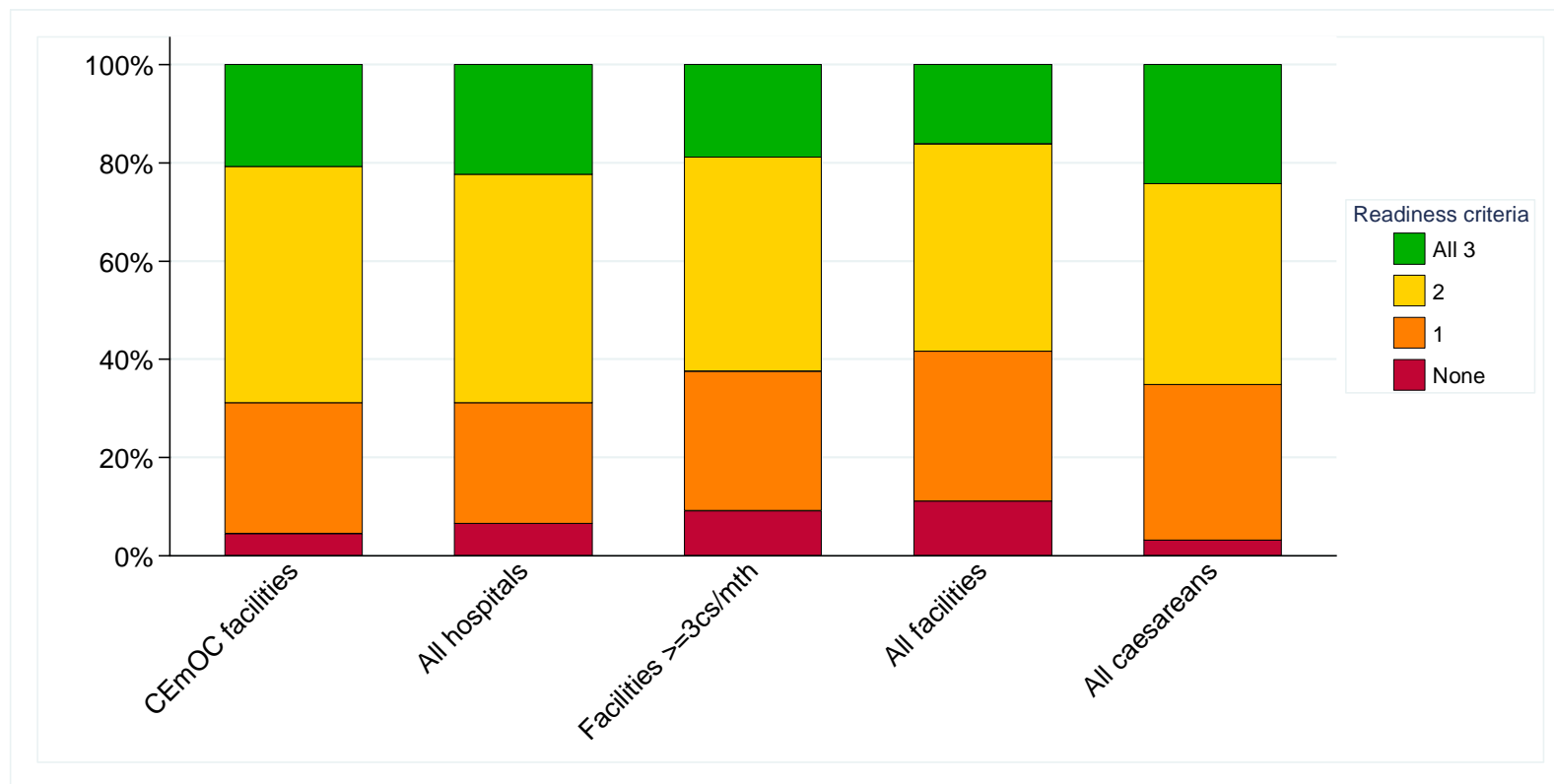


# Staffing & infrastructure



	Facilities reporting to provide caesareans	Full-time doctor (%)	Full-time anaesthetist (%)	24hr provider and anaesthetist (%)	Piped water and consistent electricity (%)	All CEmOC signal functions (%)	All general anaesthesia equipment (%)
Public hospital	112	94	79	86	59	55	34
Private hospital	31	94	90	74	55	26	61
FBO hospital	84	81	92	88	37	41	66
All hospitals	227	89	85	85	50	46	49
All health centres	44	54	84	44	34	19	30
<b>Overall (facilities)</b>	<b>271</b>	<b>79</b>	<b>85</b>	<b>74</b>	<b>46</b>	<b>38</b>	<b>44</b>
<b>Overall (caesareans)</b>	<b>-</b>	<b>92</b>	<b>87</b>	<b>91</b>	<b>49</b>	<b>62</b>	<b>46</b>

# Minimum readiness criteria



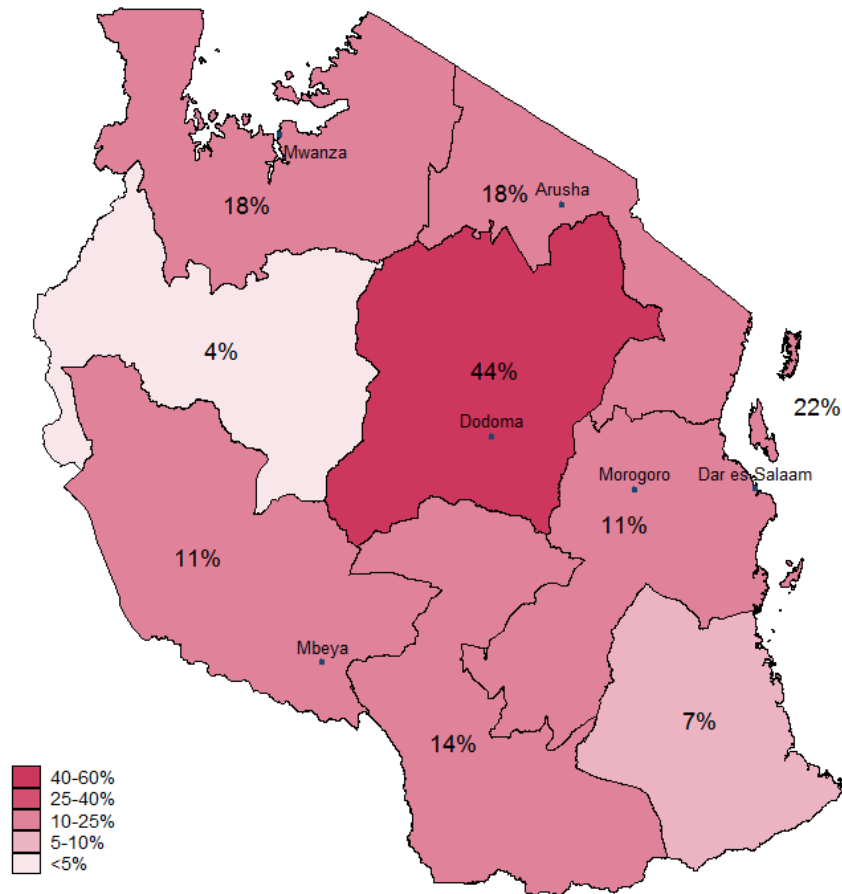
Minimum readiness criteria:

- Piped water into facility and consistent electricity
- All general anaesthesia equipment available
- 24hr caesarean provider and anaesthetist rota

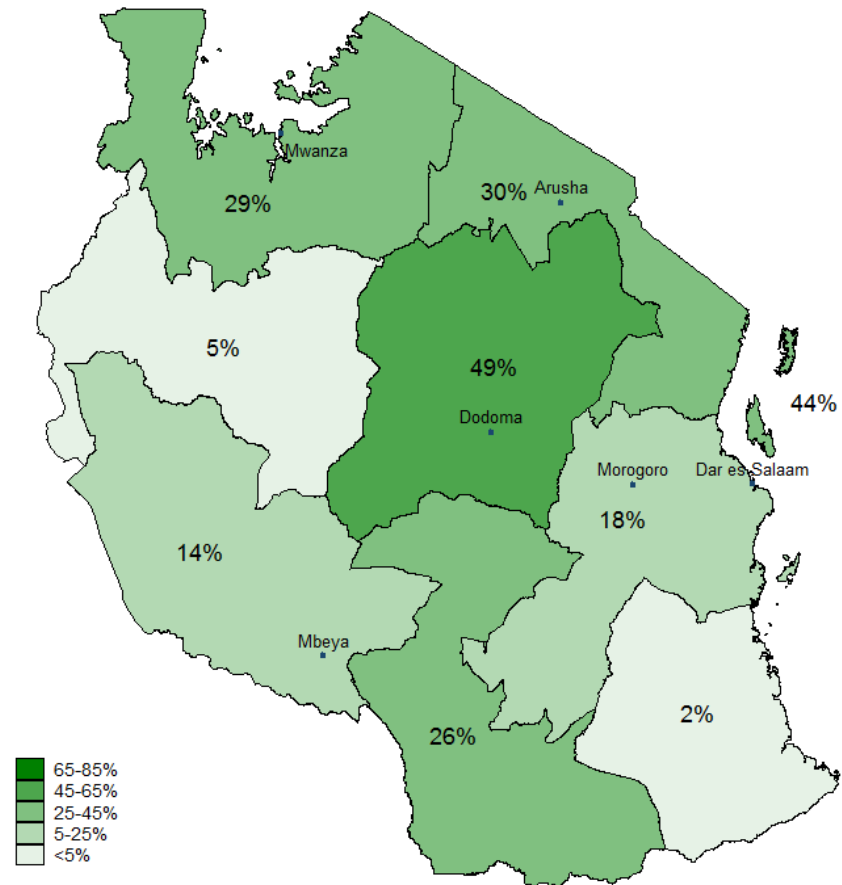
# Minimum readiness by zone



Percent facilities meeting 3 minimum criteria



Percent caesareans in facilities meeting 3 minimum criteria



# Key findings – Tanzania case study



- Over 90% of caesareans in Tanzania are conducted in public or faith-based organisation hospitals
- Half of caesareans are done in high volume facilities, 5% are done in facilities with less than 10 caesareans per month
- Only 25% of caesareans are done in facilities meeting 3 minimum readiness criteria
- Service readiness varies across facility types and geographical zones



## B. Country case studies

1. Bangladesh time trends and caesarean indications
2. Tanzania time trends and facility metrics

Q&A

# Discussion



Additional  
slides

# Reasons for caesareans

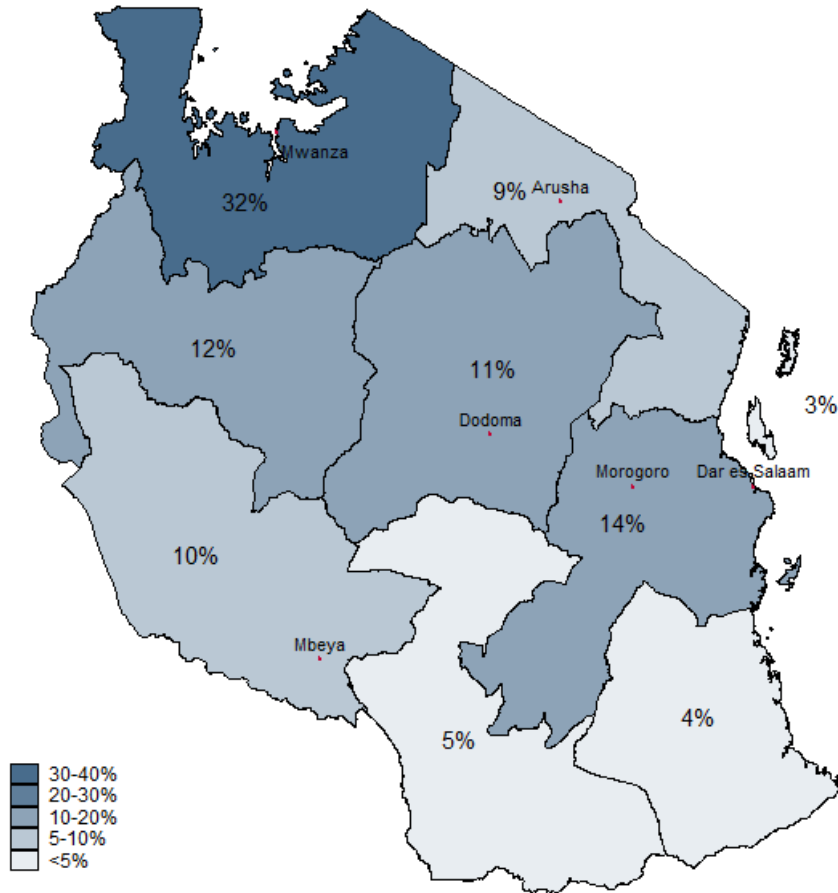


Reported reason for caesarean	N (%)	Timing of decision			
		Day of (%)	Day before (%)	Week before (%)	Earlier (%)
Cord prolapsed	1.9	44.2	18.8	4.0	32.9
Failure to progress in labour	17.3	59.6	13.9	8.9	17.5
Other complications during delivery	32.7	54.2	11.8	11.8	22.2
Less pressure on baby's brain	6.3	61.9	10.5	5.8	21.8
Pre-eclampsia	2.4	37.5	11.6	11.2	39.8
Malpresentation	32.5	42.0	17.2	11.6	29.1
Premature baby	2.1	41.6	6.7	2.8	48.9
Diabetes	0.6	6.4	0.0	22.7	70.9
Convenience	9.4	45.3	1.9	12.8	40.0
Avoid labour pain	7.0	40.1	13.3	14.8	31.9
Multiple births	0.4	16.9	19.7	0.0	63.4
Previous caesarean section	15.4	12.6	6.5	15.5	65.4
Other	4.4	44.8	6.4	37.5	11.3
<b>All caesareans</b>		<b>45.2</b>	<b>12.6</b>	<b>12.0</b>	<b>30.2</b>

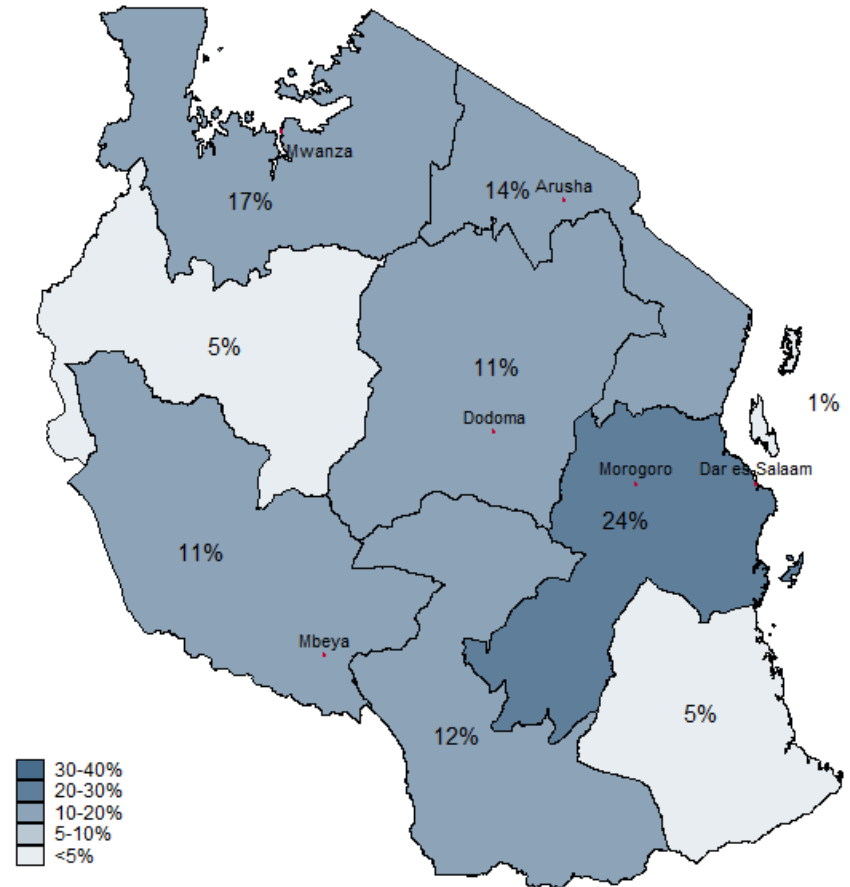
# Distribution of caesareans by zone



Percentage of all births



Percentage of all caesareans





# Providers of delivery and surgical care



**Among providers interviewed, qualification of providers reporting to provide delivery care and surgery [no survey weights/not representative of all providers]**

Qualification	N	%
generalist medical doctor	103	9.91
specialist medical doctor	42	4.04
assistant medical officer	210	20.21
clinical officer	180	17.32
assistant clinical officer	44	4.23
registered nurse	130	12.51
enrolled nurse	197	18.96
nurse assistant/attendant	123	11.84
laboratory technologist	1	0.1
laboratory technician	2	0.19
laboratory assistant	2	0.19
other	5	0.48