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VALIDATING INDICATORS OF MATERNAL HEALTH CARE: RESULTS FROM KENYA & MEXICO

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Study Objective

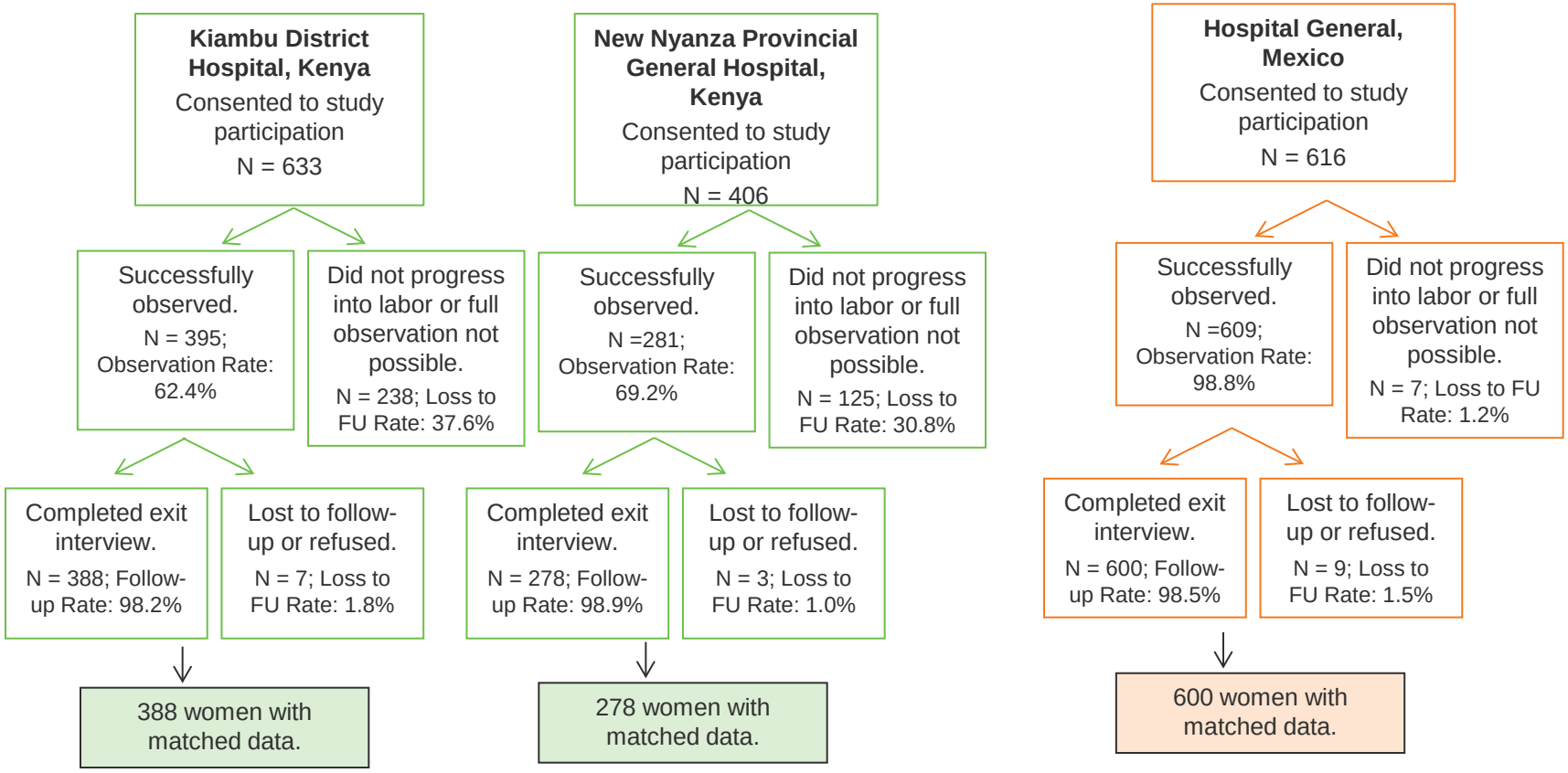
To validate women's recall of care received during labor, delivery and immediate post-partum.

Comparison of facility-based observation (gold standard) and women's self-report prior to discharge.

Photo by Flynn Warren,
courtesy of the Population Council
Tigoni District, Kenya

Participant Enrollment

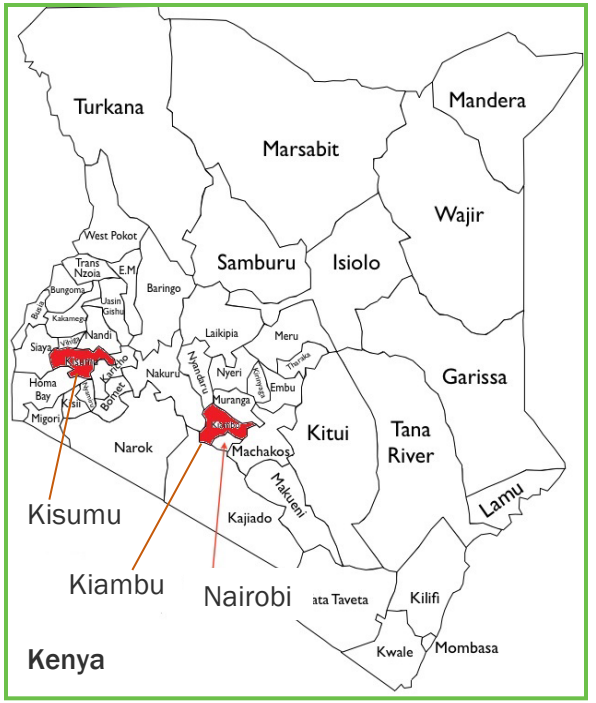
1. Kenya: (a) Kiambu District; (b) Kisumu District
2. Mexico: Hospital General de México, Mexico City



Target: 600 women per country, aged 15-49, admitted for delivery

Sample Descriptives

		Kenya (%) (N=666)	Mexico (%) (N=600)
Age	15-19	14.5	27.2
	20-24	42.0	36.3
	25-29	28.9	19.2
	30-34	8.5	9.7
	35-39	5.7	5.9
	40+	0.4	1.6
Prior Parity (Live Births)	0	50.2	47.7
	1	26.5	29.4
	2	14.0	14.7
	3+	9.3	8.2
Education Level	None	10.2	0.2
	Primary	43.6	8.4
	Secondary	29.2	42.3
	Higher	16.2	49.2
Marital Status	Single, never married	14.7	25.5
	Married	78.1	17.8
	Living together	5.3	55.7
	Separated/ widowed	2.0	1.0



Indicator Selection

1. Landscaping scan conducted April – July 2012
    - Included indicators in use or proposed for use, population and facility-based indicators
    - Key word search of electronic databases + ancestry approach, grey literature and reports included
    - Identified 2,505 documents, 71 relevant, 285 indicators
2. Expert group meeting, September 2012
    - Indicators selected on basis of wide use or potential to assess critical elements of maternal and newborn care
    - 95+ indicators selected for validity testing

***Where applicable- DHS question wording used**

DHS/MICS Indicators Attempted

1. Type of facility where gave birth*
    - Study not designed to assess
2. Low birthweight infant (<2,500 grams)
3. Person who assisted with delivery
4. Baby delivered by caesarean section (C/S)
5. When decision for C/S was made (before / after labor)*
6. Length of time after birth to first breastfeed (1 hour)
7. Infant given anything other than breastmilk in first hour

*Indicators where robust analysis not possible

Global Core Indicators Attempted

I. Proportion of women receiving oxytocin immediately after birth of baby

   - Project indicator: women receiving an injection, IV medication or tablets within first few minutes of delivery

II. Proportion of women with prolonged labor

   - Project indicator: women reporting long labor time (>12 hrs)

III. Proportion of newborns who received all 4 elements of essential newborn care.

   - Project indicators: immediately dried + skin to skin + breastfed in first hour

*Women not asked about delayed cord clamping (4th component)

Validation Analysis

1. Individual Level:

- Sensitivity and specificity analysis
- **Area under receiver operating curve (AUC)** used to summarize individual-level accuracy.
- 0 – 1 scale, >0.6 benchmark

		STANDARD: Positive	STANDARD: Negative	Total
SURVEY Question	Positive	True positive (TP)	False positive (FP)	All with positive answer (TP + FP)
	Negative	False negative (FN)	True negative (TN)	All with negative answer (TN + FN)
	Total	All observed positive (TP +FN)	All observed negative (TN + FP)	Total (TP + FP + TN + FN)

Sensitivity: TP / (TP + FN)

Specificity: TN / (TN + FP)

2. Population Level:

- Estimated prevalence that would be obtained using population-based survey methods (Vecchio et al., 1996)
- **Inflation factor (IF)**- ratio of estimated survey-based prevalence to true population prevalence (Campbell et al., 2008)
- 0.75 < IF < 1.25 benchmark

Validation Results

i. Validated Indicators

ii. Indicators Not Recommended

iii. 4 Key Indicators – In Depth

- Type of facility
- Skilled birth attendance
- Uterotonic for PPH
- Newborn thermal care (skin-to-skin)

Indicators that Met Both Criteria

Indicator	In DHS?	Individual Level (AUC)	Population Level (IF)
Provider takes urine sample at admission		MX	MX
Injection or IV medication given during labor, before birth		MX	MX
Hemorrhage		MX	MX
Blood products given		MX	MX
Episiotomy		MX	MX
Cesarean operation	☐	KY	KY
Main provider delivery –nurse/midwife	☐	KY	KY
Support person present during birth		KY	KY
Newborn low birthweight (<2,500g)*	☐	KY	KY

* Women given card/bracelet with gram weight, although analysis restricted to women who recalled

Indicators: Met Population-Level Criteria (IF)

Indicator	In DHS?	Kenya	Mexico
HIV status checked		NA	Yes
Blood pressure taken		Yes	NA
Skilled main provider	☐	Yes	NA
Main provider - doctor or medical resident	☐	No	Yes
Injection or medication received 1-3 minutes after delivery		NA	Yes
Palpitates uterus after delivery of placenta		No	Yes
AMSTL: uterotonic, cord traction, uterine massage		NA	Yes
Baby placed with mother immed. following birth		Yes	No
3 elements of newborn care: baby immed. dried, skin-to-skin*, breastfed in first hour		Yes	NA
In first post-delivery exam, provider: checks for bleeding, examines perineum, takes blood pressure checks for involution (each separately)		Yes *for involution only	Yes
Woman receives pain relief medication		No	Yes

*2 item indicator

Indicators: Met Individual-Level Criteria (AUC)

Indicator	In DHS?	Kenya	Mexico
Induces labor with uterotonic		Yes	No
Augments labor with uterotonic		Yes	Yes
Injection or medication received to bring on or strengthen labor (induction or augmentation)		Yes	Yes
Blood pressure taken		Yes	NA
Skilled main provider	☐	Yes	NA
Main provider - doctor or medical resident	☐	Yes	No
Episiotomy		Yes	Yes
Breastfeeding in first hour after birth	☐	Yes	Yes
In first post-delivery exam, provider: checks temperature and blood pressure (each separately)		Yes	No
Woman receives pain relief medication		Yes	No
Hemorrhage		Yes	Yes
Eclampsia		NA	Yes
Prolonged labor (>12 hours)		Yes	NA
No complications		Yes	Yes

Indicators Not Recommended

SELF-REPORT

Kenya	% Don't Know
Did the health provider wash his/her hands with soap and water or use antiseptic before examining you?	30
Was your baby wrapped in a towel or cloth immediately after birth?	21
In your first physical examination after delivery, did a health provider do a perineal exam?	10
Mexico	
Did anyone give you a medication called 'oxytocin' to make your womb contract or become firm?	37
While you were at the facility, did anyone test you for HIV?	23
Did your baby have anything besides breastmilk to eat or drink in the first hour after delivery?	21

- In KY, receiving C/S associated with not knowing if the baby was wrapped in a towel after birth (OR 2.7± 1.1, $p<0.02$), or immediately dried (OR 15.3± 4.8, $p<0.01$)

Validation Results for 4 Key Indicators

Photo by Flynn Warren,
courtesy of the Population Council
Tigoni District, Kenya

i. Type of facility
ii. Skilled birth attendance
iii. Uterotonic for PPH
iv. Newborn thermal care (skin-to-skin)

Type of Facility

- Both aspects of DHS and MICS methodology- categorical response and specific facility names- are important in capturing self-reported information on the type of facility (MX data).

Box 1A. Descriptive frequencies: Type of facility.

Can you tell me the type of facility where you gave birth to your baby? (Self'-report)

	Number	Percent
Public Sector		
Govt. hospital	380	85.2
Govt. clinic/health center	7	1.6
Govt. health dispensary	0	0
Other public sector	11	2.5
Private Sector		
Private hospital	45	10.1
Private clinic	3	0.7
Private maternity home	0	0
Other private sector	0	0
Total Reported in Categories	**446**	**100**

Box 1B: Woman not able to determine whether private or public but specified facility details.

	Number	Percent
Facility name (Hospital General de Mexico)	120	83.3
Hospital and public/ govt. type	5	3.5
Hospital (other)	13	9.0
Other facility detail (location, level, etc.)	6	4.2
Total Specified	**144**	**100**

Photo of Hospital, Mexico City, Mexico

Skilled Provider Delivery

Doctor, Medical Resident, Nurse/Midwife (Kenya)

Observations

Self-Report	No	Yes	Total
No	7	30	37
Yes	39	568	607
Total	46	598	644

Sensitivity	**95**
Specificity	**15**
AUC	**0.55**
IF	**1.02**

- High prevalence of skilled attendance during delivery (KY & MX)
- In Kenya, low specificity, AUC not met
- IF close to 1- may be suitable for generating population-based coverage estimates, not for individual level classification (KY)
- In Mexico- not sufficient variation to assess, but similar story

Main Provider Delivery

Nurse/Midwife (Kenya)

Observations

Self-Report	No	Yes	Total
No	93	72	165
Yes	33	450	483
Total	126	522	648

Sensitivity	**86**
Specificity	**73**
AUC	**0.80**
IF	**0.93**

- In Kenya- nurse/midwife most common (81% observed prevalence)
  - High sensitivity and specificity, both validation criteria met (above)
- In Mexico- doctor/medical resident most common (97%)
  - High sensitivity, low specificity – only population-level criteria met

Skilled Birth Attendance: Summary

- Nurse/midwife as main provider during delivery may be validly reported in areas where provider type is common
- Some evidence less common providers are less accurately reported
  - Student nurse did not meet either criteria, low sensitivity (KY)
- Composite indicators of skilled attendance met population-level criteria
  - Skilled provider (KY)
  - Doctor /medical resident (MX)
  - High false positive rate at individual level

Uterotonic for PPH (Y/N)

- Composite indicator constructed from self-report, "*In the first few minutes after the delivery of your baby, did anyone give you… (1) an injection in thigh or buttock, (2) medication through tube in arm, or (3) tablets (in mouth or rectum).*"

Observations

Self-Report	No	Yes	Total
No	1	17	18
Yes	6	538	544
Total	7	555	562

Reported %	**97**
True %	**99**

- KY results presented, but similar story in Mexico
- Nearly all women received uterotonic after delivery
- Most women report receiving a uterotonic, robust analysis limited by lack of variation

Uterotonic for PPH- Timing

- Injection/medication after placenta did not meet criteria in either country
- Indicator on if received within 3 minutes of birth met IF criteria in Mexico
- In Kenya, not able to be robustly assessed, but low specificity in cross tab results (below)

Cross tabulation: Uterotonic received within 3 minutes of delivery (KY)

Self-Report	Observations: No	Observations: Yes	Total
No	3	14	17
Yes	99	436	535
Total	102	450	552

Reported %	**97**
True %	**82**

- Taken together, women *may* be able to report on some aspects of if a uterotonic was received
- Remaining question - do women understand what injection was for?

Uterotonic for PPH- Oxytocin

- Oxytocin was uterotonic administered to nearly all women, via IV line.
- High 'DK' indicator (37%) (MX)
- Of women who reported receiving medication by IV line after delivery, 70% (125/177) also reported receiving oxytocin.
- 30% reported no oxytocin and of those nearly all were observed to receive it.

Mexico

Cross-tabulation (Self-Report): Uterotonic for PPH and oxytocin.

Q1. In the first few minutes after the delivery of your baby, did anyone give you… (1) an injection in the thigh or buttock? (2) medication intravenously through a tube in your arm? (3) tablets to swallow or hold in your mouth or placed in your rectum?

Q2. Immediately after the birth of your baby or sometime before the delivery of the placenta, did anyone give you a medication called oxytocin? (*constructed in analysis*)

Self-report (Number) Q1.	Self-Report (Number) Q2. No oxytocin	Yes oxytocin	Total
Injection	9	21	30
IV line	52	125	177
Tablet	0	1	1
Total	61	147	208

- Not all women can report on receiving oxytocin by name

Self-Report: Skin to Skin Indicator

1. Did someone place the baby on your chest, against your skin immediately after delivery? → **Yes, No**
2. Was your baby wrapped in a towel while lying against your chest or naked against your skin? → **Wrapped in cloth, Naked on skin**

		Q.2		
		Wrapped in cloth	Naked on skin	Total
Q.1	Not placed on skin	351	71	422
	Yes placed on skin	148	26	174
	Total	499	97	596

- 85% of women who said “yes” to Q.1 then said baby was wrapped in cloth while lying against chest, not naked against skin

Summary

Of DHS/MICS & WHO-PMNCH indicators, 3 met both validation criteria:

- Main provider during delivery was a nurse/midwife (KY)
- Infant was low birthweight (<2,500 grams) (KY)
- Cesarean section was performed (KY)

Skilled birth attendance – may produce valid estimate at population level

- At individual level, women tend to overestimate qualifications of provider, but at aggregate level, cancels out
- Finer provider distinctions may be less clinically meaningful (e.g., doctor vs. medical resident)

Summary

Validity of some indicators highly dependent on context & wording

- E.g., aspects related to timing, sequence of events, names of terms (‘primary’ vs. ‘other’ provider, HIV vs. HPV)
- Two-step questions may improve reporting
  - Evidence from skin-to-skin and institutional delivery indicators

One context that influences reporting is C/S status:

- Associated with high “DK” for some immediate postpartum events
- C/S women often do not receive same postpartum care

Remaining Questions

Near universal practices may be validly reported, but full analysis limited

- Tendency for false positive reports when few 'true negative' cases
- Unclear if high sensitivity due to facility bias
- E.g., Potential for uterotonic for PPH (Y/N), but not timing of intervention

- To explore further - are currently conducting follow-up study

Photo by Flynn Warren,
courtesy of the Population Council
Tigoni District, Kenya

Phase 2: Follow-up Interview

Activity 1:

Re-interview baseline participants who consented to follow-up (n=606) regarding the care received ~ 1 year prior.

1) Assess validity of self-report at follow-up: compare women's self report- at follow-up with observer report at baseline
2) Assess reliability of women's self-report over time: compare self-report at re-interview to her self-report at baseline

Activity 2:

Qualitative interviews among random sub-sample of participants (n=20) to gain insight into: (1) women's understanding of questions asked, and (2) what factors may influence reporting.

Research Team

Photo by Uri Carrasco,
courtesy of the Population Council

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