



**COUNTDOWN**TO2030

MEASURING AND MONITORING COVERAGE AND QUALITY  
OF CARE IN LOW AND MIDDLE INCOME COUNTRIES

# WELCOME!

Please introduce yourself in the chat box while we wait for the webinar to start.



# COUNTDOWNTO2030

MEASURING AND MONITORING COVERAGE AND QUALITY  
OF CARE IN LOW AND MIDDLE INCOME COUNTRIES

Webinar: 26 October 2020, 9:30-11:30  
EDT

Measuring and Monitoring  
Coverage of High Impact  
Health Intervention in Women,  
Children and Adolescents  
in Low and Middle Income  
Countries



Edited by

Agbessi Amouzou • Jennifer Harris Requejo • Liliana Carvajal  
Doris Chou • Hannah H. Leslie • Safia Jiwani • William Weiss

## Panel 1

Moderator: Allisyn Moran, WHO

- *Discordance in postnatal care between mother and newborn: Measurement artifact or missed opportunity* • Agbessi Amouzou, JHU
- *Variance estimation for effective coverage measures: a simulation study* • Hannah Leslie, Harvard University
- *Improving syphilis screening and treatment in ANC to prevent congenital syphilis* • Doris Chou, WHO
- Questions & Answers



# Discordance in postnatal care between mothers and newborns: Measurement artifact or missed opportunity?

Agbessi Amouzou, PhD  
Elizabeth Hazel, PhD  
Lara Vaz, PhD  
Yaya Sanni, PhD  
Allisyn Moran, PhD





# Background

- Postnatal period is critical for the mother and the baby: over 1/3 of newborns and postpartum maternal deaths occur within the first day and over 2/3 within the first week
- WHO recommendations for PNC are integrated for all mothers and babies: 4 PNCs: first day, day 3, 7-14 days, 6 weeks
  - First PNC within 24 hours of delivery is different from the full assessment within the first hour of delivery
- Measurement of PNC captures the first health check, separately for mothers and babies, and is defined as “health check received within first two days of delivery”
- DHS and MICS have led the operational measurement of the PNC indicators, but their measurement approaches have not always been aligned
- Coverage of PNC for mothers and PNC for newborns is not always consistent
  - Countdown to 2030 estimated PNC mothers at 59% compared to 42% for PNC babies on 2012-2016
  - There is substantial level of discordance between PNC for mother and PNC for the newborn
- We assessed the discrepancy in LMICs with available recent DHS
  - Measured the size of the gap, the level of discordance between mother and baby
  - Assessed timing of reporting of PNC with sensitivity analysis on the cutoff periods
  - Analyzed demographic, SES, service provision factors associated with the discordance

# Data and Methods

- Demographic and Health Survey data available since 2011 (phase 6 and 7 of DHS)
  - With PNC questions for mothers and newborns
  - Downloaded as of April 2019
  - Analysis restricted to births in the two years preceding the survey
- 48 countries; 32 survey from phase 6 (223,500 mother-baby pairs), and 16 from phase 7 (57,151 mother-baby pairs)
- Analyzed the distribution of timing of first PNC
  - Sensitivity analysis at cut-off points 0 hour, 1 hour, day 2
- Described PNC agreement between mother and baby: (1) concordance no/no, (2) concordance yes/yes, (3) discordance - mother-favored, (4) discordance – baby-favored
- Analyzed the association between discordance and demographic, SES and health service variables
- Stratified analysis by place of delivery ( health facility versus home) and by phase of the DHS (phase 6 versus phase 7)
  - DHS is currently in phase 8

## DHS – Phase 6 (2008 – 2013)

### Facility delivery

Q436: I would like to talk to you about checks on your health after delivery, for example, someone asking you questions about your health or examining you. Did anyone check on your health while you were still in the facility?

**If yes:** Q440: How long after delivery did the first check take place?

**If no:** Q437: Did anyone check on your health after you left the facility?

**If yes:** Q440: How long after delivery did the first check take place?

### Non-facility delivery

Q438: I would like to talk to you about checks on your health after delivery, for example, someone asking you questions about your health or examining you. Did anyone check on your health after you gave birth to (NAME)?

**If yes:** Q440: How long after delivery did the first check take place?

### Facility deliveries and non-facility deliveries

Q442: In the two months after (NAME) was born, did any health care provider or a traditional birth attendant check on his/her health?

**If yes:** Q443: How many hours, days or weeks after the birth of (NAME) did the first check take place?

## DHS – Phase 7 (2013 – 2018)

### Facility delivery

Q435. would like to talk to you about checks on your health after delivery, for example, someone asking you questions about your health or examining you. Did anyone check on your health while you were still in the facility?

**If yes:** Q436. How long after delivery did the first check take place?

**If no:** Q441. Now I want to talk to you about what happened after you left the facility. Did anyone check on your health after you left the facility?

**If yes:** Q442. How long after delivery did that check take place?

### Non-facility delivery

Q449. I would like to talk to you about checks on your health after delivery, for example, someone asking you questions about your health or examining you. Did anyone check on your health after you gave birth to (NAME)?

**If yes:** Q450. How long after delivery did the first check take place?

### Facility delivery

Q438. Now I would like to talk to you about checks on (NAME)'s health after delivery – for example, someone examining (NAME), checking the cord, or seeing if (NAME) is OK. Did anyone check on (NAME)'s health while you were still in the facility?

**If yes:** Q439. How long after delivery was (NAME)'s health first checked?

**If no:** Q445. I would like to talk to you about checks on (NAME)'s health after you left (FACILITY). Did any health care provider or a traditional birth attendant check on (NAME)'s health in the two months after you left (FACILITY)?

**If yes:** Q446. How many hours, days or weeks after the birth of (NAME) did that check take place?

### Non-facility delivery

Q453. I would like to talk to you about checks on (NAME)'s health after delivery – for example, someone examining (NAME), checking the cord, or seeing if (NAME) is OK. In the two months after (NAME) was born, did any health care provider or a traditional birth attendant check on (NAME)'s health?

**If yes:** Q454. How many hours, days or weeks after the birth of (NAME) did the first check take place?

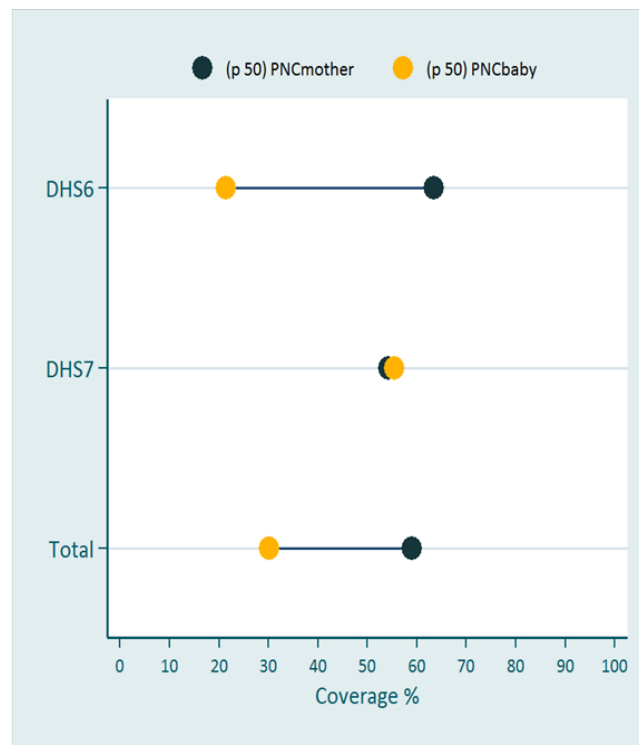
In phase 6, PNC questions were different for mother and baby  
In phase 7, effort was made to make the PNC questions similar for mother and baby



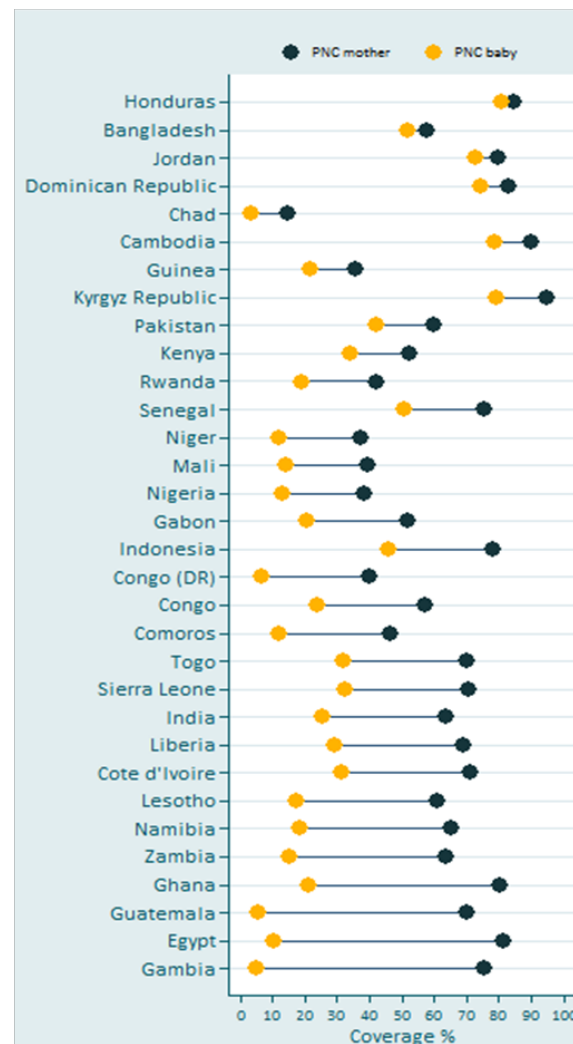
# Gaps in coverage of PNC for mother and baby

- The coverage gap is evident mainly in DHS phase 6 datasets

A) Median gap across 48 countries



B) Country specific gap, DHS 6 surveys

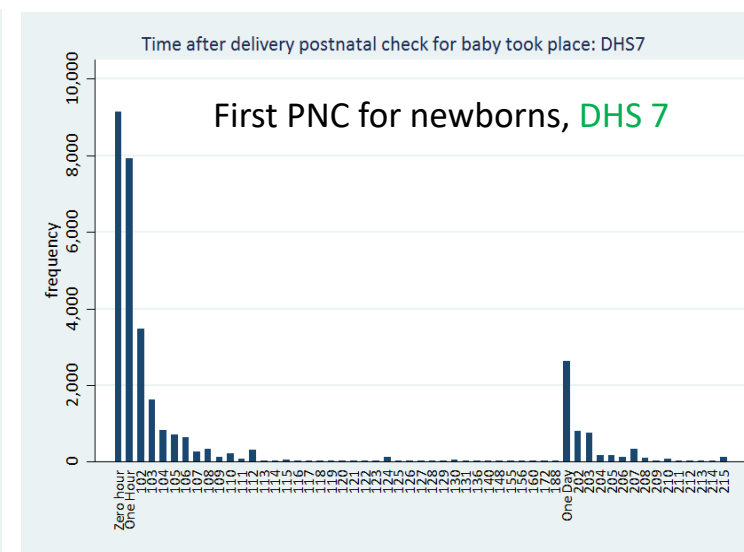
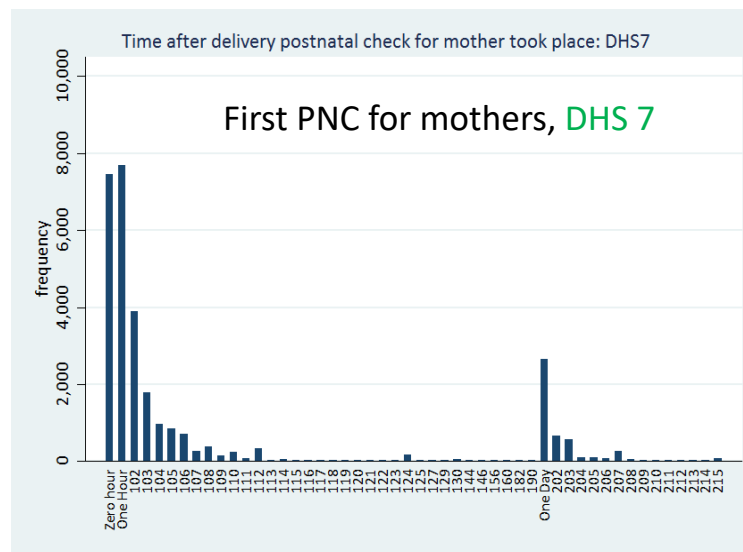
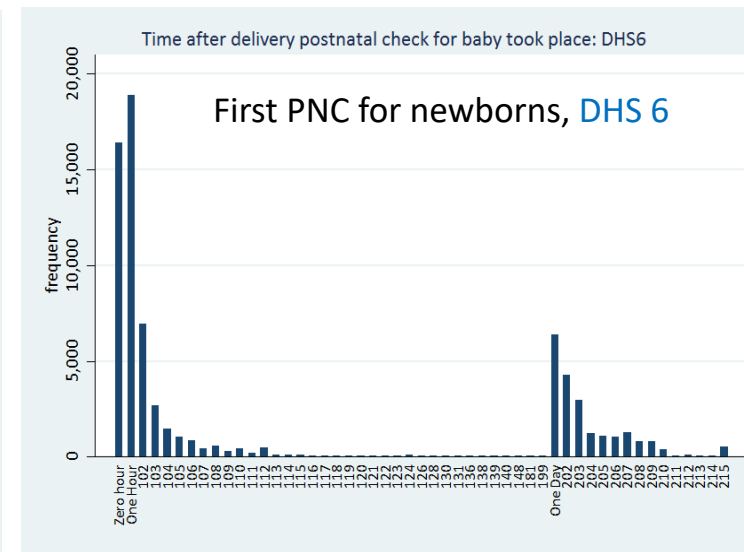
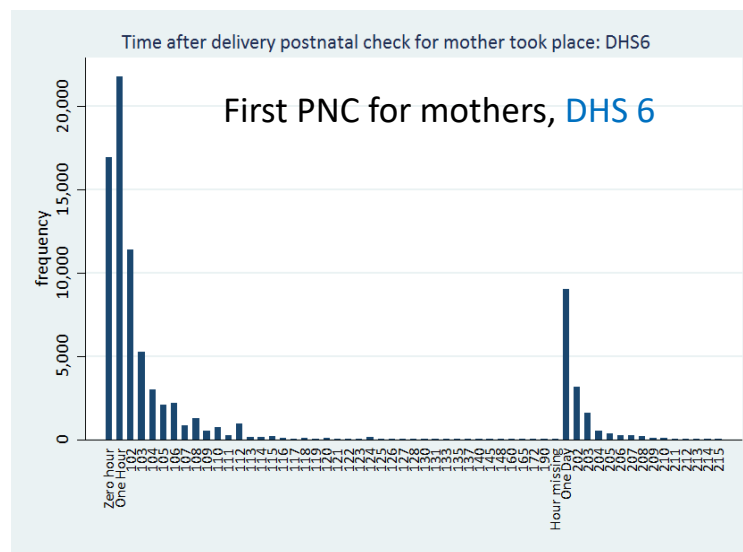


C) Country specific gap, DHS 7 surveys



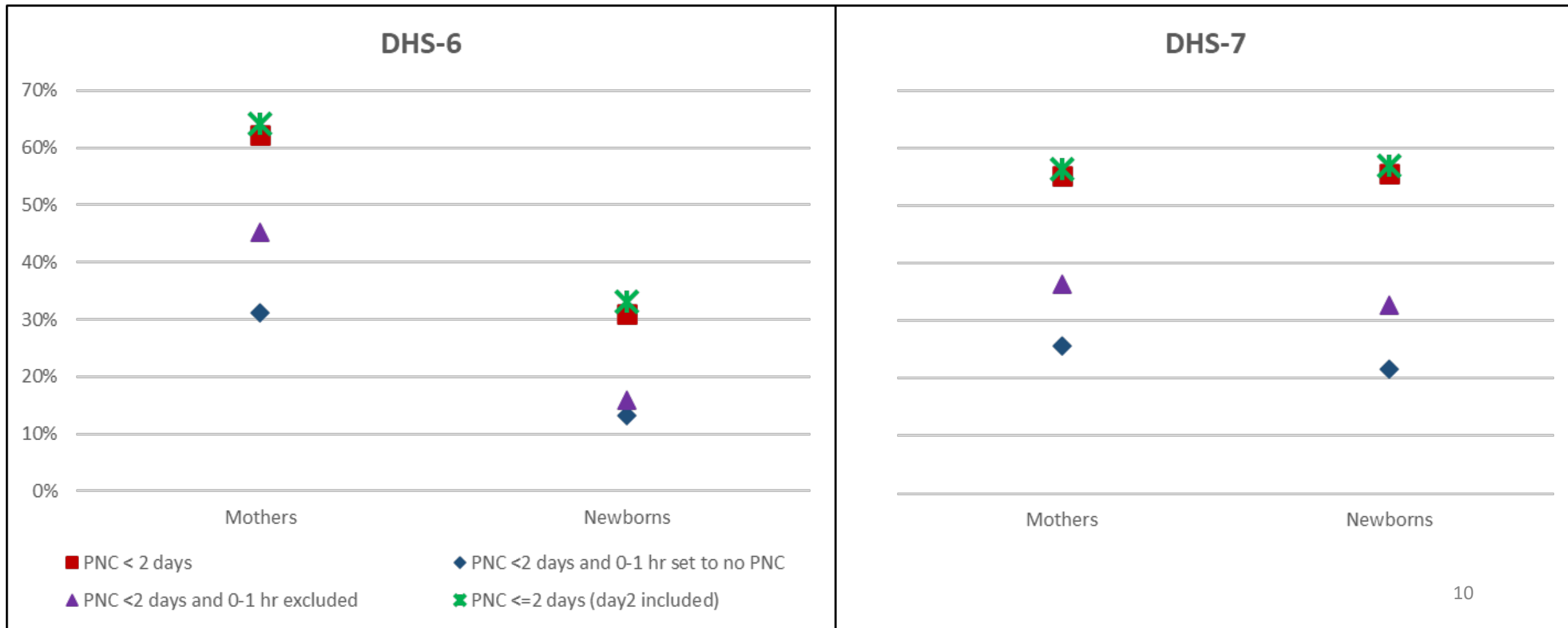
# Timing of reported first PNC contact after delivery for mothers and newborn, by phase of DHS

- The distribution of the timing of PNC is similar for mothers and babies



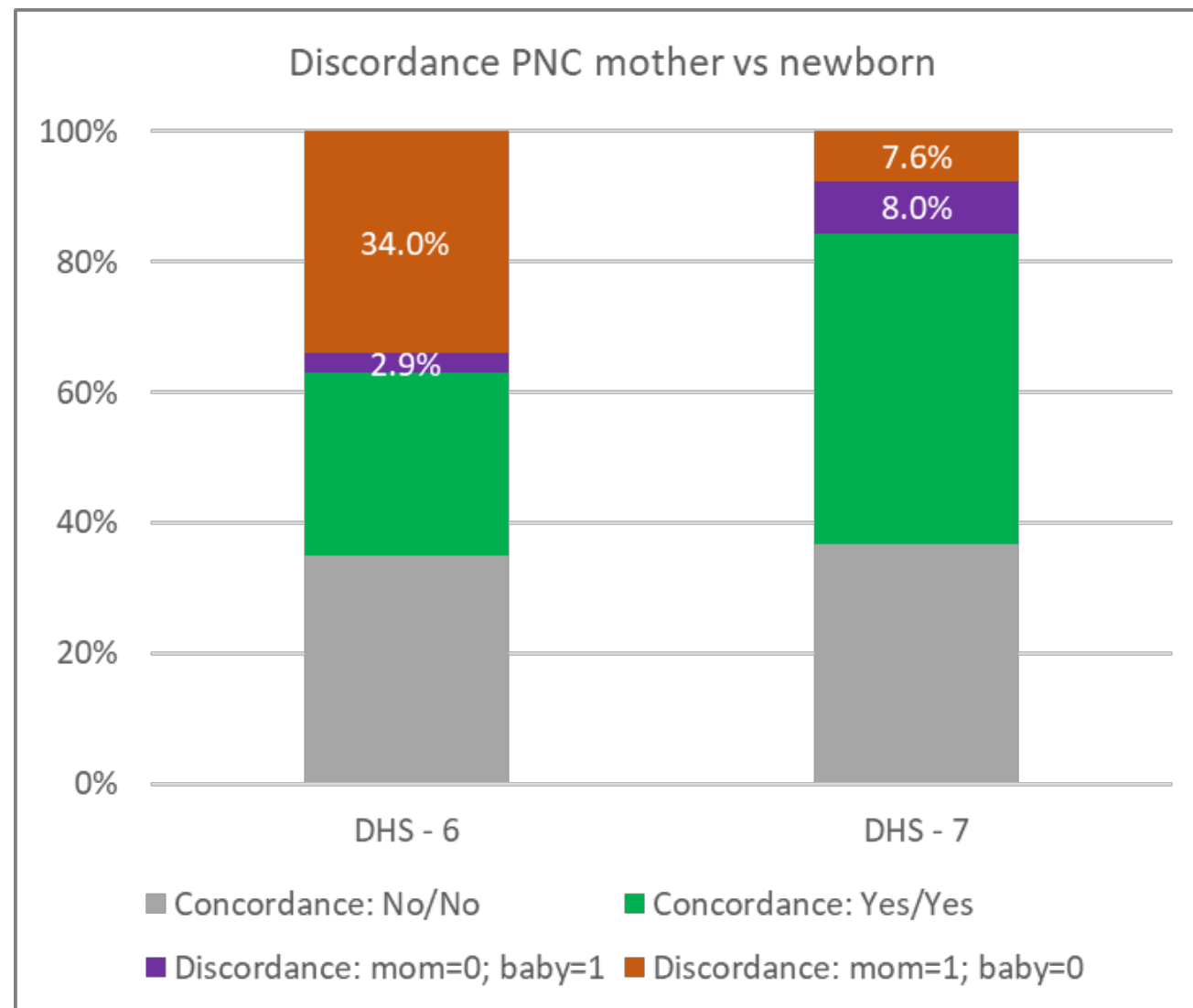
# Sensitivity of PNC indicators: comparison of PNC indicators for mothers and babies, excluding/including 0-1 hours and/or day 2

A substantial portion of reported PNC for mothers and babies occurred within 0-1 hour after birth



# Agreement in PNC for mother and newborn, pooled data across surveys by phase of DHS

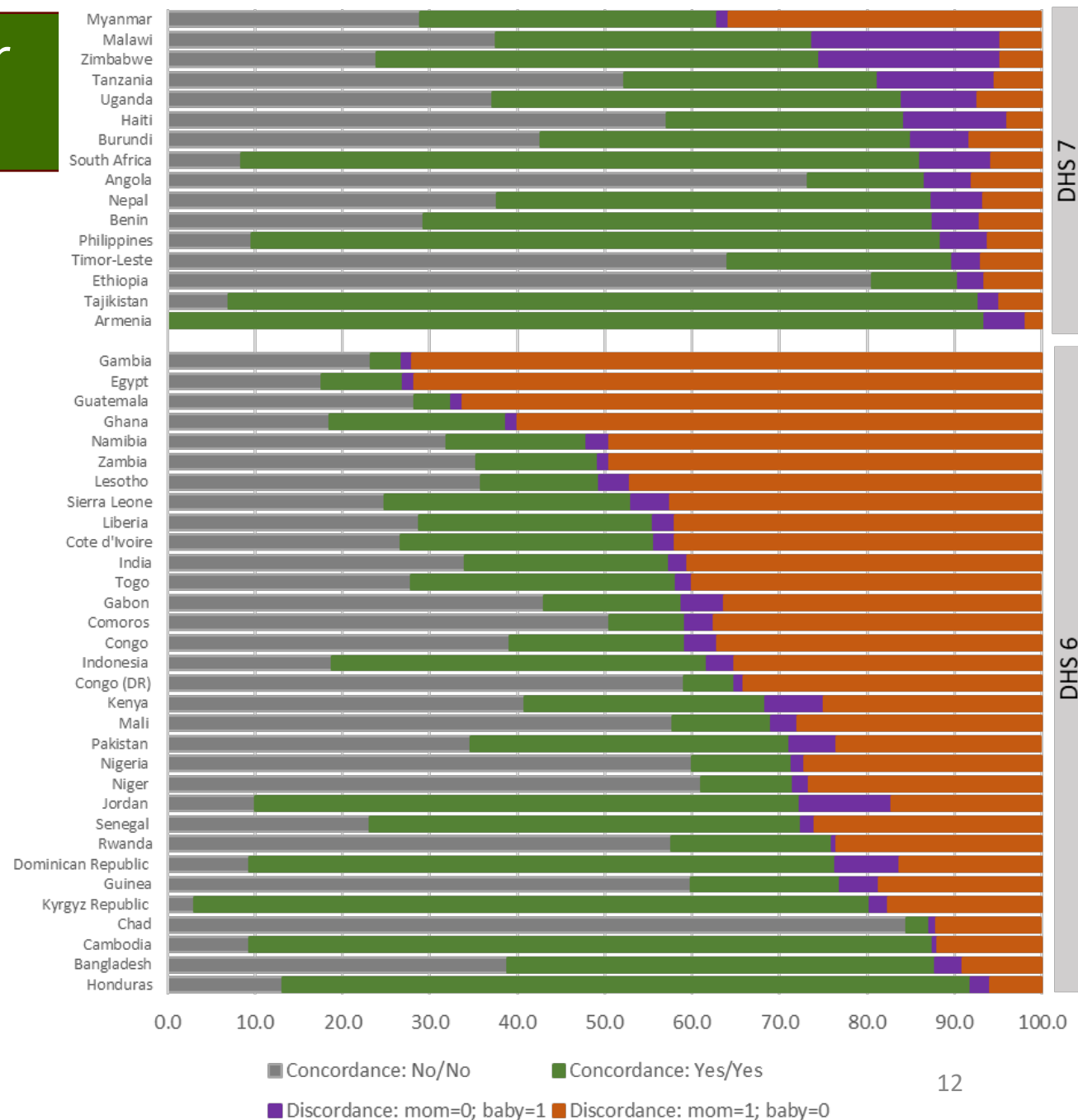
- The level of overall discordance is substantially higher in phase 6 surveys than phase 7
- The discordance largely favored the mother in phase 6 survey





# Agreement in PNC for mother and newborn by country

- The size of the discordance in PNC mother-baby varies by countries, but does not follow any specific regional pattern



# PNC agreement by place of delivery

| CHARACTERISTICS                                                 | % CONCORDANCE No/No |              | % CONCORDANCE Yes/Yes |              | DISCORDANCE, MOM-YES<br>BABY-No |              | DISCORDANCE, MOM-No<br>BABY-Yes |            | TOTAL (%) | N       |
|-----------------------------------------------------------------|---------------------|--------------|-----------------------|--------------|---------------------------------|--------------|---------------------------------|------------|-----------|---------|
|                                                                 | %                   | 95% CI       | %                     | 95% CI       | %                               | 95% CI       | %                               | 95% CI     |           |         |
| Facility delivery:                                              |                     |              |                       |              |                                 |              |                                 |            |           |         |
| No                                                              | 72.3                | (71.6, 73.0) | 11.1                  | (10.6, 11.5) | 12.8                            | (12.3, 13.3) | 3.8                             | (3.6, 4.1) | 100       | 81,991  |
| Yes                                                             | 20.4                | (20.0, 20.8) | 44.5                  | (44.0, 45.0) | 30.2                            | (29.7,30.6)  | 5.0                             | (4.8, 5.1) | 100       | 198,660 |
| Last birth was with caesarean section:                          |                     |              |                       |              |                                 |              |                                 |            |           |         |
| No                                                              | 38.7                | (38.2, 39.1) | 32.9                  | (32.5, 33.4) | 23.6                            | (23.2, 24.0) | 4.8                             | (4.7, 5.0) | 100       | 247,316 |
| Yes                                                             | 12.6                | (11.9, 13.4) | 48.1                  | (46.9, 49.3) | 36.1                            | (35.0, 37.1) | 3.2                             | (2.8, 3.7) | 100       | 33,335  |
| ANC: Blood pressure taken + Blood sample + Iron + Urine sample: |                     |              |                       |              |                                 |              |                                 |            |           |         |
| No                                                              | 47.2                | (46.6,47.8)  | 28.9                  | (28.3, 29.4) | 19.3                            | (18.9, 19.7) | 4.6                             | (4.4, 4.8) | 100       | 133,913 |
| Yes                                                             | 24.9                | (24.5,25.4)  | 40.1                  | (39.5, 40.7) | 30.4                            | (29.8, 30.9) | 4.6                             | (4.4, 4.8) | 100       | 146,738 |
| Child is alive:                                                 |                     |              |                       |              |                                 |              |                                 |            |           |         |
| No                                                              | 43.7                | (41.9,45.4)  | 24.1                  | (22.6, 25.7) | 27.2                            | (25.7, 28.8) | 5.0                             | (4.2, 6.1) | 100       | 9,656   |
| Yes                                                             | 35.3                | (34.9,35.7)  | 35.1                  | (34.7, 35.5) | 25.0                            | (24.6, 25.4) | 4.6                             | (4.5, 4.8) | 100       | 270,995 |

# Summary

- The discordance in PNC for mother and baby may be driven mainly by measurement error, especially in phase 6 DHS
- More than half of reported PNC for mothers and babies occurred within the first hour of delivery, suggesting that the measure is not distinguishing intrapartum care and immediate newborn care from subsequent health checks
- The current measure of PNC attempts to capture only the first PNC; there is no measure for subsequent PNCs.
- Further validation of PNC questions is warranted.

# Thank You

Agbessi Amouzou  
aamouzo1@jhu.edu

We are grateful to the Bill & Melinda Gates Foundation for funding  
Countdown to 2030 for Women's Children's and Adolescents' Health



# Variance estimation for effective coverage measures: a simulation study

Hannah H. Leslie, on behalf of Sara Sauer, Thomas Pullum, Wenjuan Wang and Lindsay Mallick

Harvard TH Chan School of Public Health



# Objectives

- Effective coverage reflects both use and quality of health services. These estimates may require combining population data with health facility data.
- Monitoring effective coverage over time requires defining uncertainty around estimates, but applied researchers lack guidance on calculating variance for composite effective coverage estimates.
- We used simulated data to compare the exact, delta, and parametric bootstrap methods of calculating variance and demonstrate their use on antenatal care data from Senegal.

# Methods

## Define

- 1) **Exact method:** apply formula for exact variance of a product:  
 $\text{Var}(ZM) = (\text{Var}(Z) + E[Z]^2) \times (\text{Var}(M) + E[M]^2) - (E[Z]E[M])^2$ . Use a normal approximation to generate a confidence interval
- 2) **Delta method:** use the Delta method approximation to calculate CI on the log scale, take antilogit
- 3) **Parametric bootstrap:** define sample parameters from observed individual and health system data, generate data based on sample parameters, calculate product (EC), use values at 97.5<sup>th</sup> and 2.5<sup>th</sup> percentiles as CI

## Compare

Simulate data for a range of sample sizes and for use and quality from 0 to 100%

Calculate % invalid confidence intervals ( $< 0$  or  $> 1$ )

Calculate % that contain the truth, compare to 95%

$$s^2 = \left( \frac{\partial F}{\partial b_x} \right)^2 s_{bx}^2 + \left( \frac{\partial F}{\partial b_y} \right)^2 s_{by}^2 = \sum_{k=x}^y \left( \frac{\partial F}{\partial b_k} \right)^2 s_{bk}^2$$

Delta approximation

## Apply

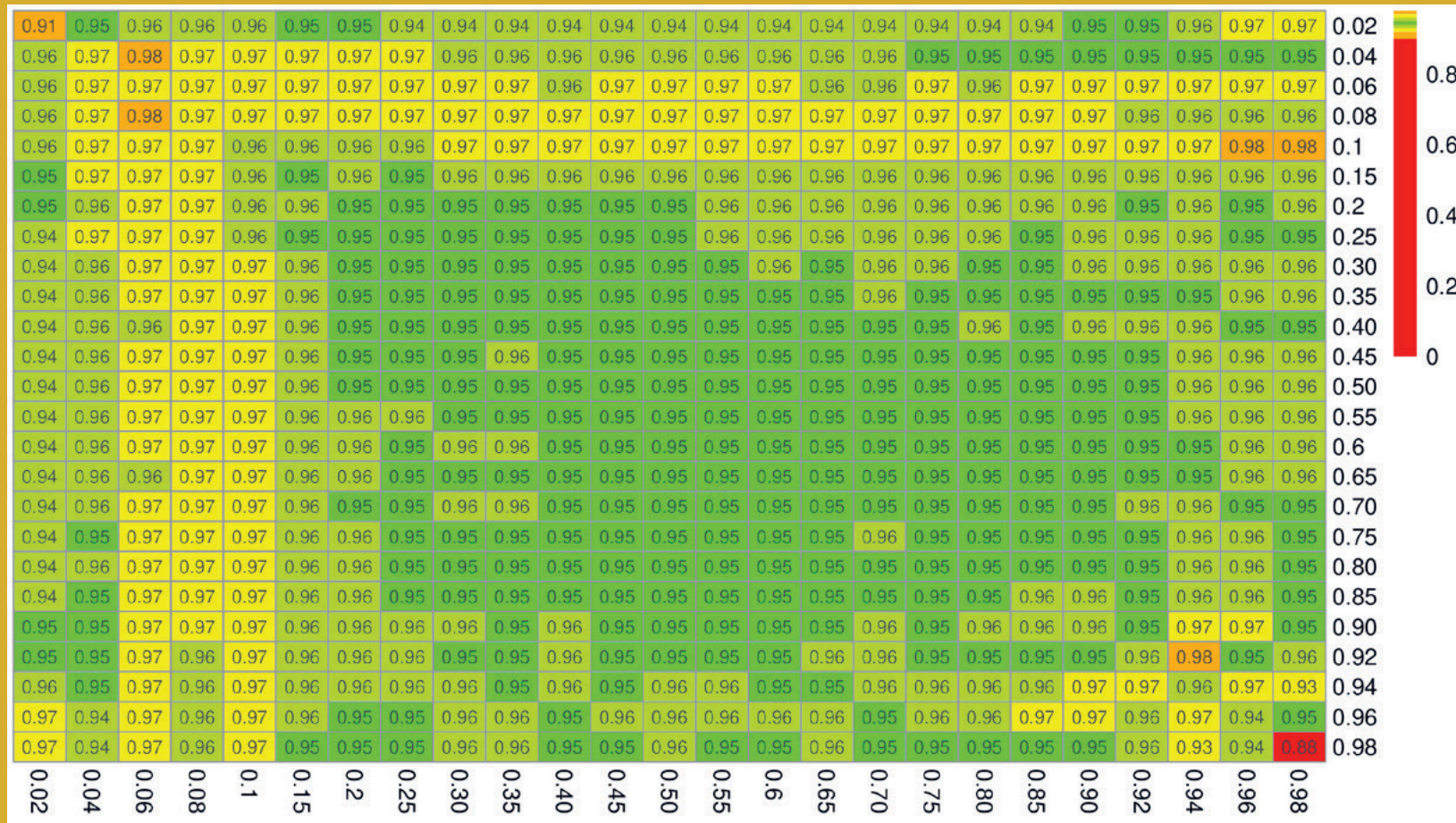
Data: Senegal DHS 2017, SPA 2017

Need: Women reporting live births in past 2 years

Use: ANC1, ANC4, ANC8  
Readiness (structural quality): blood pressure apparatus, hemoglobin and urine protein diagnostic capacity, service readiness score

Linkage: by region and facility type

# Simulation results: Delta method



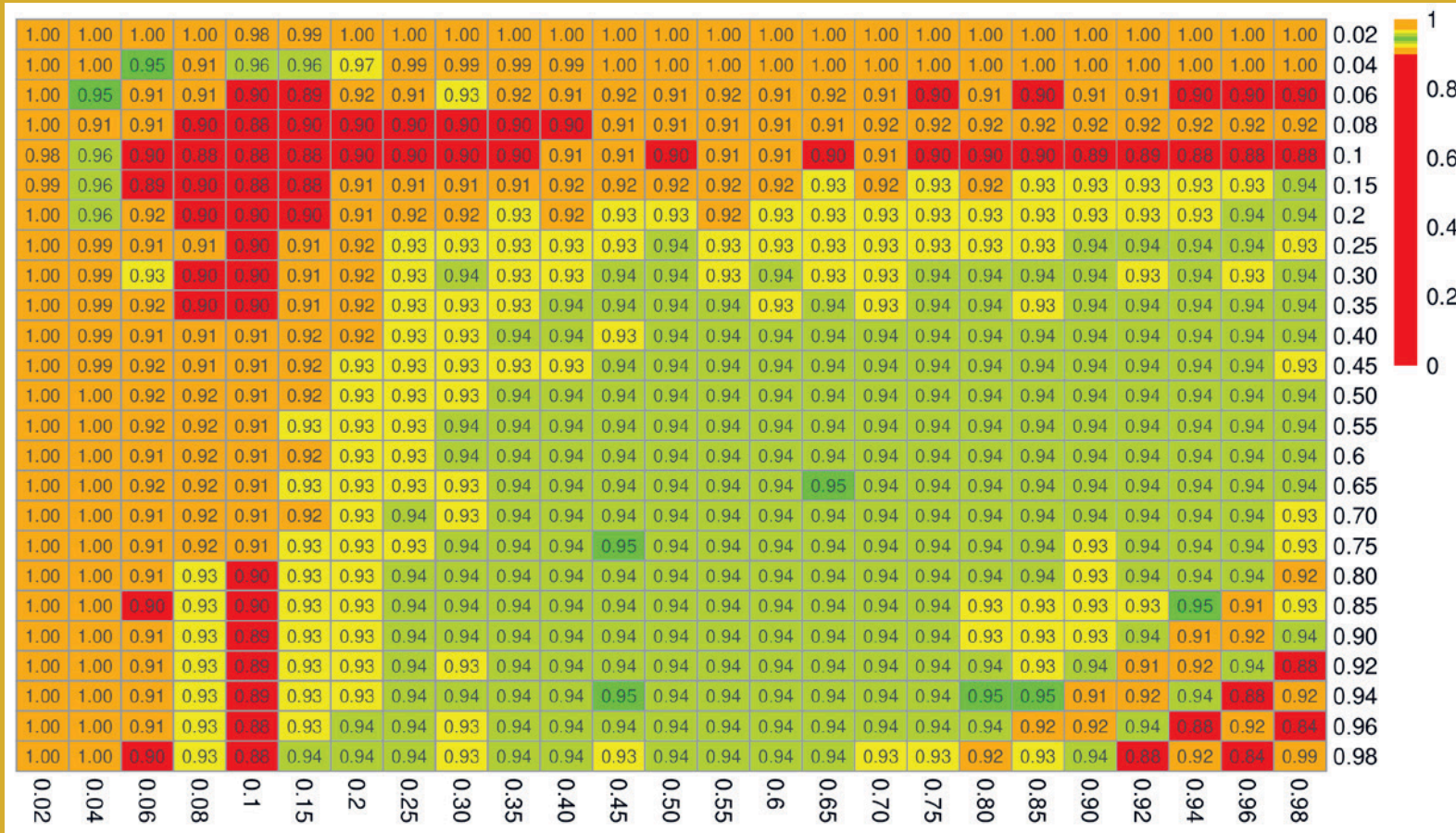
Smallest sample (50 people, 50 facilities)

Valid CIs

Generally good performance with exception of extremes of all values, some overcoverage (CIs too wide) near boundary values



# Simulation results: Exact method

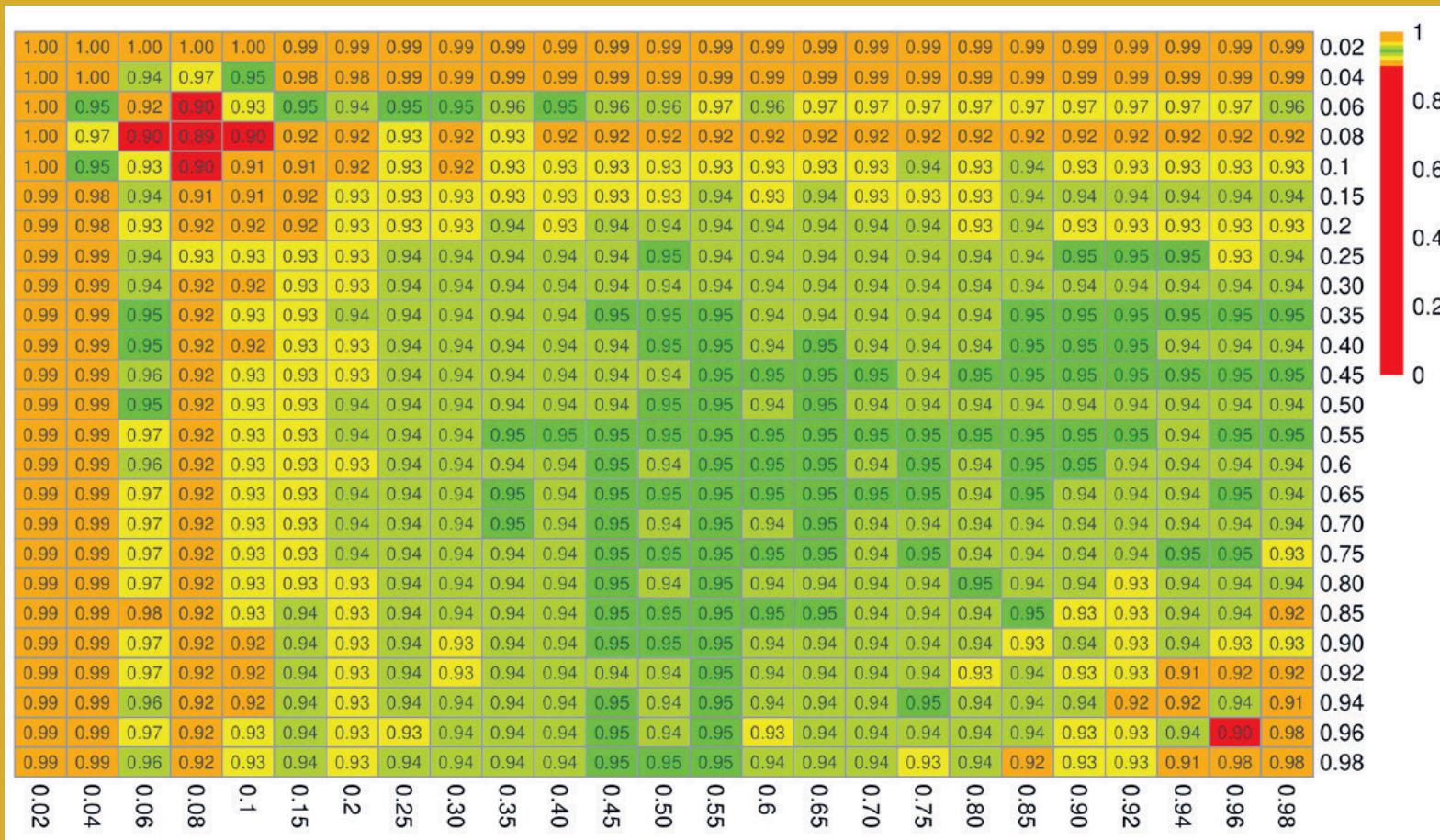


Smallest sample (50 individuals, 50 facilities)

Invalid CIs near boundary values

Overly narrow confidence intervals unless use or quality is near 0.5

# Simulation results: Parametric bootstrap



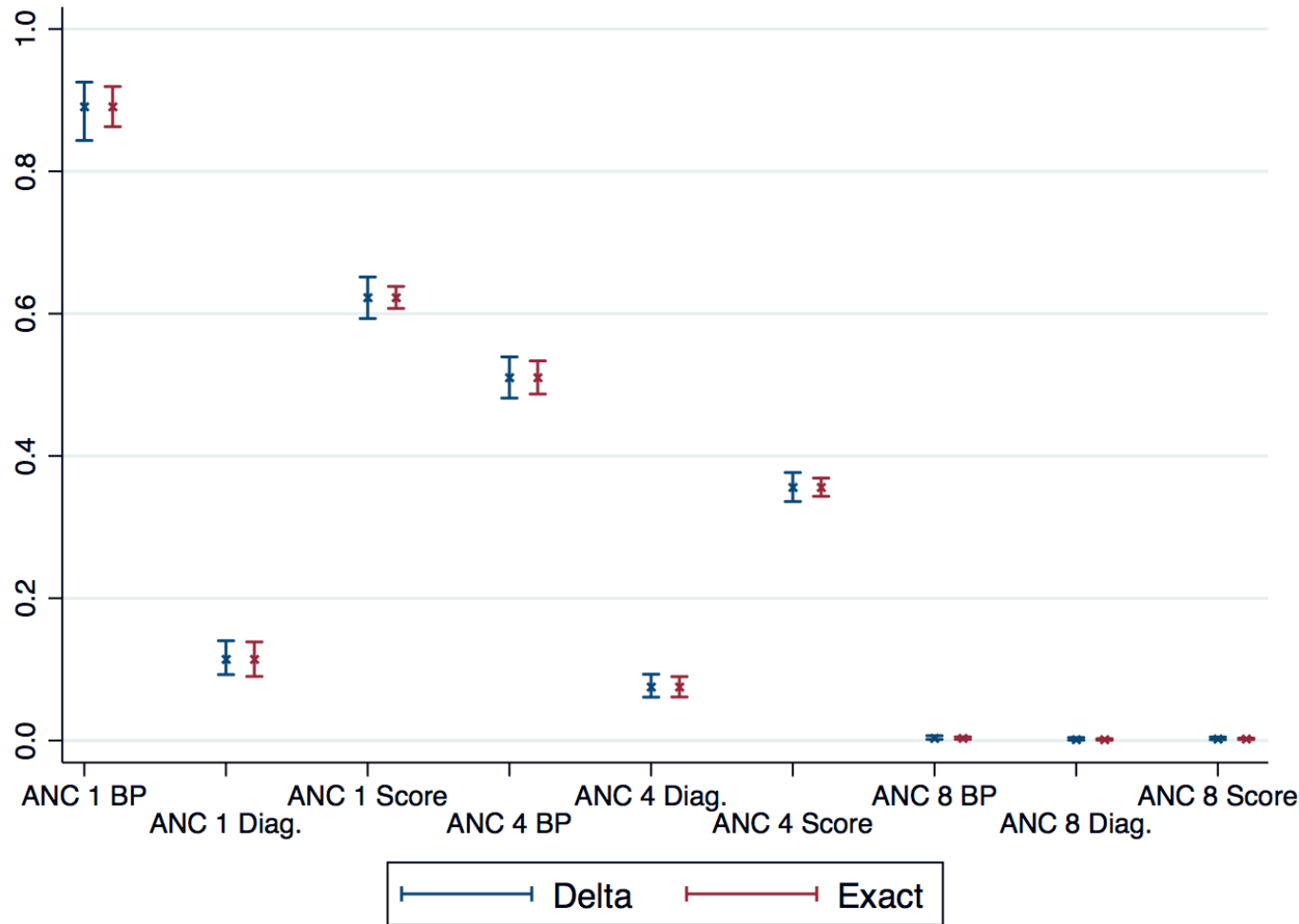
Smallest sample (50 people, 50 facilities)

Valid CIs

Overcoverage (wide CIs) at extremes, undercoverage near extremes, good performance for use or quality near 0.5



# Applied results: input-adjusted coverage of ANC



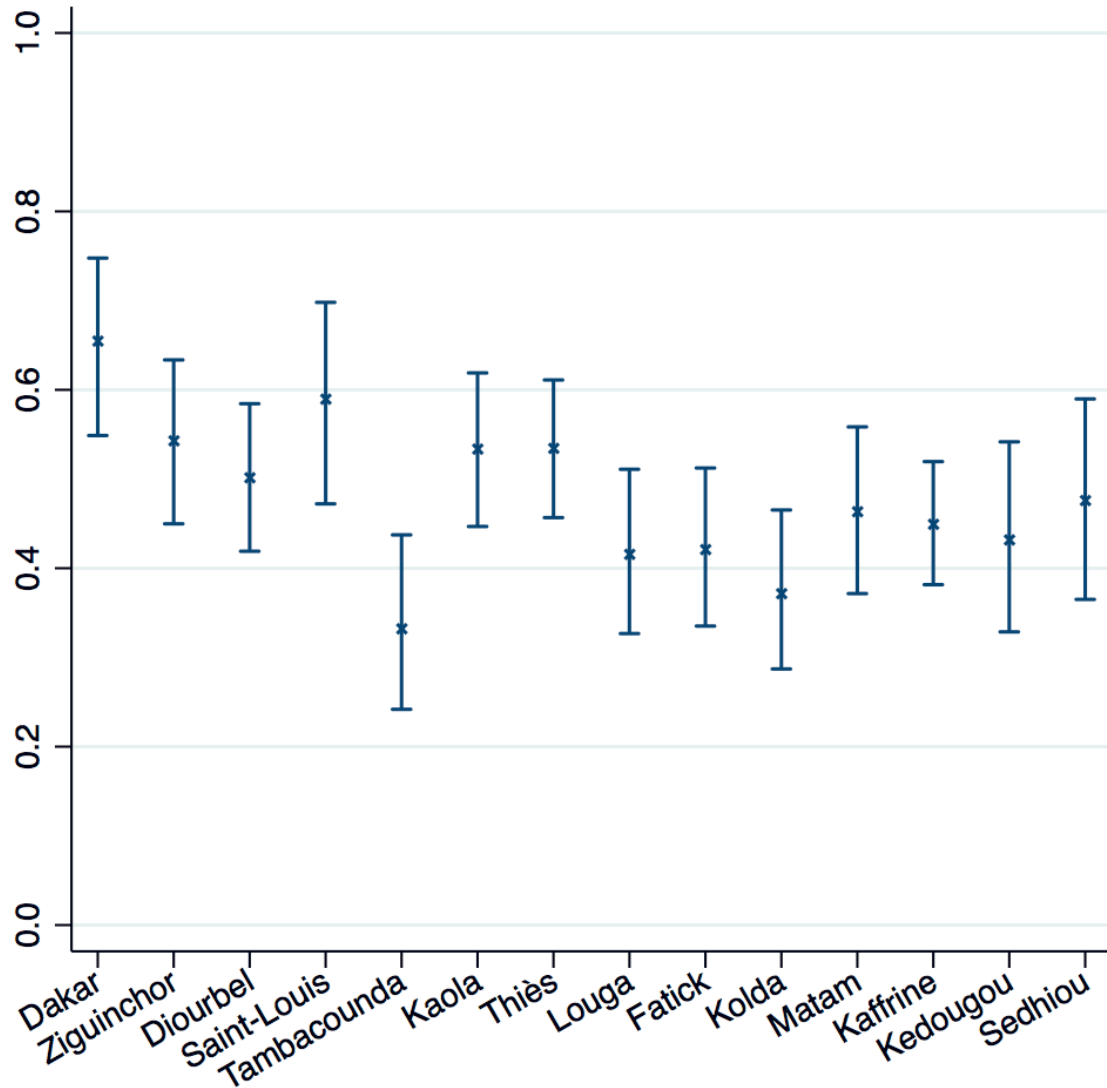
Delta and exact methods can be applied to complex survey data

Generally similar CIs except for small settings and extreme EC values

Exact method produced invalid CIs for 1/4 of estimates at sub-national level



# Steps to application



1. Define use: 4+ ANC visits
2. Define quality/readiness: BP apparatus (binary)
3. Select level of aggregation: 14 regions
4. Align health facility tiers: gov't hosp, gov't health centre, gov't clinic, private facility, health hut
5. Select CI method: Delta
6. Run code
7. Interpret effective coverage

# Discussion

It is feasible to calculate variance for effective coverage estimates calculated from multiple data sources, including complex survey data.

Researchers should assess assumptions of independence when conducting analyses and be cautious in applying these methods below sampling strata.

Delta method showed the best performance, particularly for small samples and extreme values of use or quality. Can produce very wide CIs at times.

Code for effective coverage estimates from survey data with variance: <https://osf.io/9nsaf/>

# Bibliographical References



- Wang W, Mallick L, Allen C, Pullum T. (2019). *Effective coverage of facility delivery in Bangladesh*. PLoS ONE.
- Goodman LA (1960). *On the Exact Variance of Products*. J Am Stat Assoc.
- Hogg RV, Craig AT (1965). *Introduction to mathematical statistics 2<sup>nd</sup> ed*. Macmillan Publishing Co., Inc.
- Efron B (1979). *Bootstrap methods: Another look at the jackknife*. Ann Stat.

# Thank You

Hannah Leslie  
hleslie@hsph.harvard.edu

We are grateful to the Bill & Melinda Gates Foundation for funding Countdown to 2030 for Women's Children's and Adolescents' Health

# Evaluating coverage of maternal syphilis screening and treatment within ANC: opportunities to prevent congenital syphilis in Countdown 2030 Countries

**Doris Chou on behalf of, and with  
Shivika Trivedi, Mary Kamb, Melanie Taylor**

Twitter [@HRPresearch](https://twitter.com/HRPresearch)





# Background

- ❑ Countdown countries account for 90% of under-five child deaths and 95% of maternal deaths
- ❑ Congenital syphilis is the 2nd leading cause of stillbirth globally (after malaria)
- ❑ Untreated maternal syphilis in pregnancy can result in perinatal transmission
- ❑ In 2017, CD 2030 identified syphilis screening and treatment during antenatal care (ANC) as priority indicators for monitoring

# Methods

- ❑ A descriptive study evaluating reporting of syphilis indicators and syphilis diagnostic test type usage (2014-2017) in CD 2030 countries
  - ❑ UNAIDS Global AIDS Monitoring System (GAM)
- ❑ We applied a congenital syphilis (CS) prevention cascade to estimate the number of CS cases that could be attributed to a service gap at each level of ANC service
  - **ANC4 attendance, syphilis testing, and treatment**



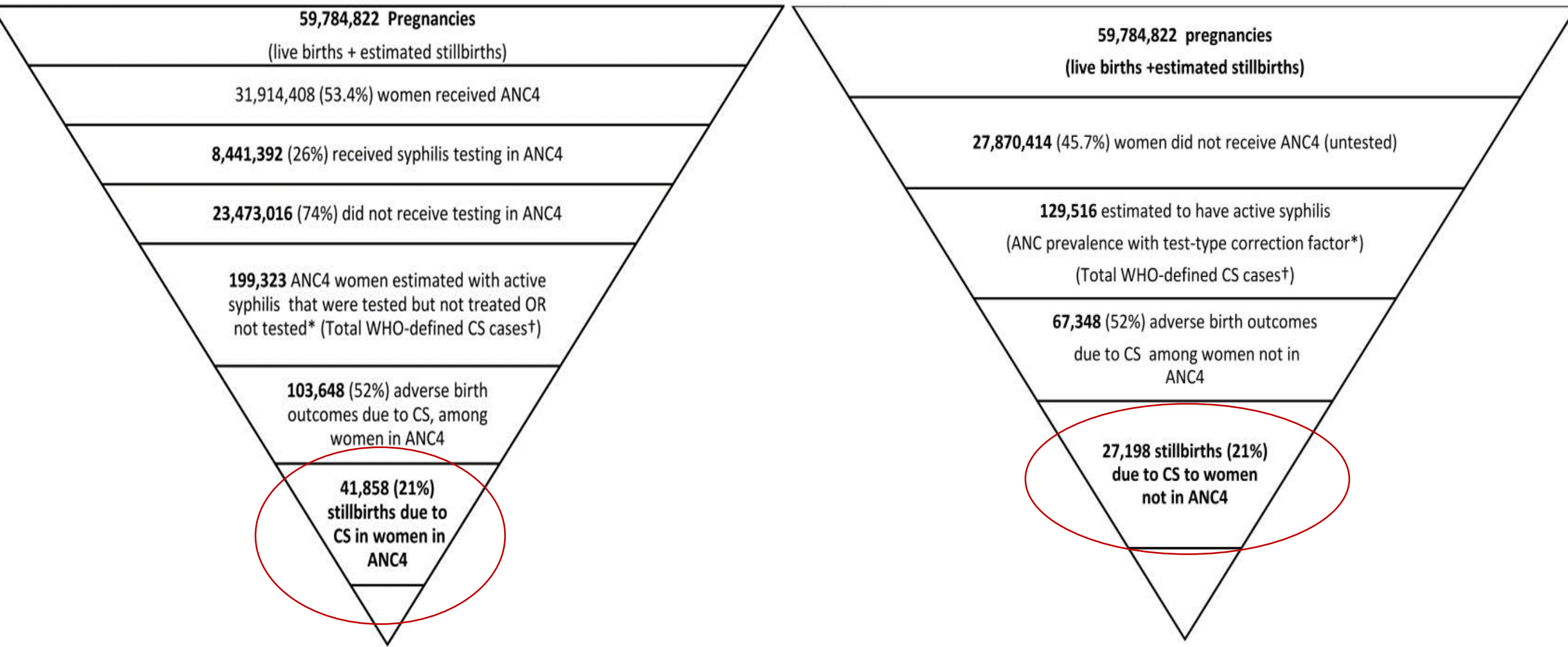
# Results

## ❑ Coverage and performance of syphilis testing and treatment among pregnant women in 81 Countdown countries 2016-2017

- 53 countries (65%) reported data
- 52 countries (64%) reported testing coverage
- 49 countries (60%) reported screen (+)
- 41 countries (51%) reported treatment coverage
- 53 countries (65%) reported test type
- 13 countries (16%) reported congenital syphilis

## ❑ Only 40 countries (49%) reported ALL indicators of coverage (test, positivity, treatment)

# Estimated numbers of stillbirth among women with/without ANC due to congenital syphilis



**MISSED OPPORTUNITIES!!!**

# Summary

- ❑ Congenital syphilis is a preventable cause of stillbirths
- ❑ Screening and treatment for syphilis in pregnancy is sub-optimal despite feasible and cost-effective strategies for point of care testing and treatment
- ❑ Increasing testing and treatment coverage of maternal syphilis helps drive progress towards meeting the goals of the GSWCAH and SDGs



# Acknowledgements

- ❑ Ann-Beth Moller (assistance in data collection)
- ❑ Countdown to 2030
- ❑ U.S. Centers for Disease Control and Prevention (CDC)
- ❑ HRP (the UNDP/UNFPA/UNICEF/WHO/World Bank Special Programme of Research, Development and Research Training in Human Reproduction)

Follow us on Twitter [@HRPresearch](https://twitter.com/HRPresearch)

Visit our website [who.int/reproductivehealth](http://who.int/reproductivehealth)

# Q&A



**COUNTDOWN**TO2030

MEASURING AND MONITORING COVERAGE AND QUALITY  
OF CARE IN LOW AND MIDDLE INCOME COUNTRIES



## COUNTDOWNTO2030

MEASURING AND MONITORING COVERAGE AND QUALITY  
OF CARE IN LOW AND MIDDLE INCOME COUNTRIES



### Panel 2

Moderator: Jennifer Requejo, UNICEF

- *Timing and number of antenatal care contacts in low and middle-income countries: Analysis in the Countdown to 2030 priority countries* • Safia Jiwani, JHU
- *Examining coverage and content of antenatal nutrition counseling and impact on breastfeeding and low birth weight* • Naima Joseph, Emory University
- *Strong health systems and national governance predict improvement in coverage of oral rehydration solution (ORS): a multilevel longitudinal model* • Liliana Carvajal, UNICEF
- *Coverage and continuum of maternal care among adolescents in 22 sub-Saharan African countries with high adolescent birth rates* • Liliana Carvajal, UNICEF
- Questions & Answers

# Antenatal care:

## Does timing of initiation matter?

### *Findings from the Countdown to 2030 priority countries*

Safia Jiwani, MSPH

Johns Hopkins Bloomberg School of Public Health

 [sjiwani1@jhu.edu](mailto:sjiwani1@jhu.edu)

 @SafJiwani

Electronic supplementary material:  
The online version of this article contains supplementary material.

# Timing and number of antenatal care contacts in low- and middle-income countries: Analysis in the Countdown to 2030 priority countries

Safia S Jiwani<sup>1</sup>, Agbessi Amouzou<sup>1</sup>, Liliana Carvajal-Aguirre<sup>2</sup>, Doris Chou<sup>3</sup>, Youssouf Keita<sup>1</sup>, Allisyn C Moran<sup>4</sup>, Jennifer Requejo<sup>2</sup>, Sanni Yaya<sup>5,6</sup>, Lara ME Vaz<sup>7</sup>, Ties Boerma<sup>8</sup>

**Background** The 2016 World Health Organization (WHO) guidelines for antenatal care (ANC) shift the recommended minimum number of ANC contacts from four to eight, specifying the first contact to occur within the first trimester of pregnancy. We quantify the likelihood of meeting this recommendation in 54 Countdown to 2030 priority countries and identify the characteristics of women being left behind.

**Methods** Using 54 Demographic and Health Surveys (DHS) and Multiple Indicator Cluster Surveys (MICS) since 2012, we reported the proportion

# Background

In 2016, WHO released updated recommendations on antenatal care for a positive pregnancy experience:



8 or more ANC contacts during pregnancy



First ANC during first trimester (up to 12 weeks) of gestation

WHO recommendations on  
antenatal care for a  
positive pregnancy experience





# Research Questions



## Timing of 1st ANC

How likely are women to initiate ANC within their first trimester? What are the characteristics of those who do?

## ANC 8+

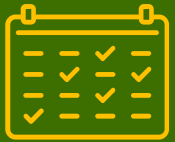
How likely are women to achieve 8 or more ANC contacts? What are the characteristics of those who do?

## Association

Is there an association between timing of ANC initiation and number of ANC contacts?

# Methodology

## Data Source



45 DHS and 9 MICS surveys covering 54 countries in period 2012-2018

## Main variables



- Timing of first ANC (months)
- Number of ANC contacts

## Statistical Analysis



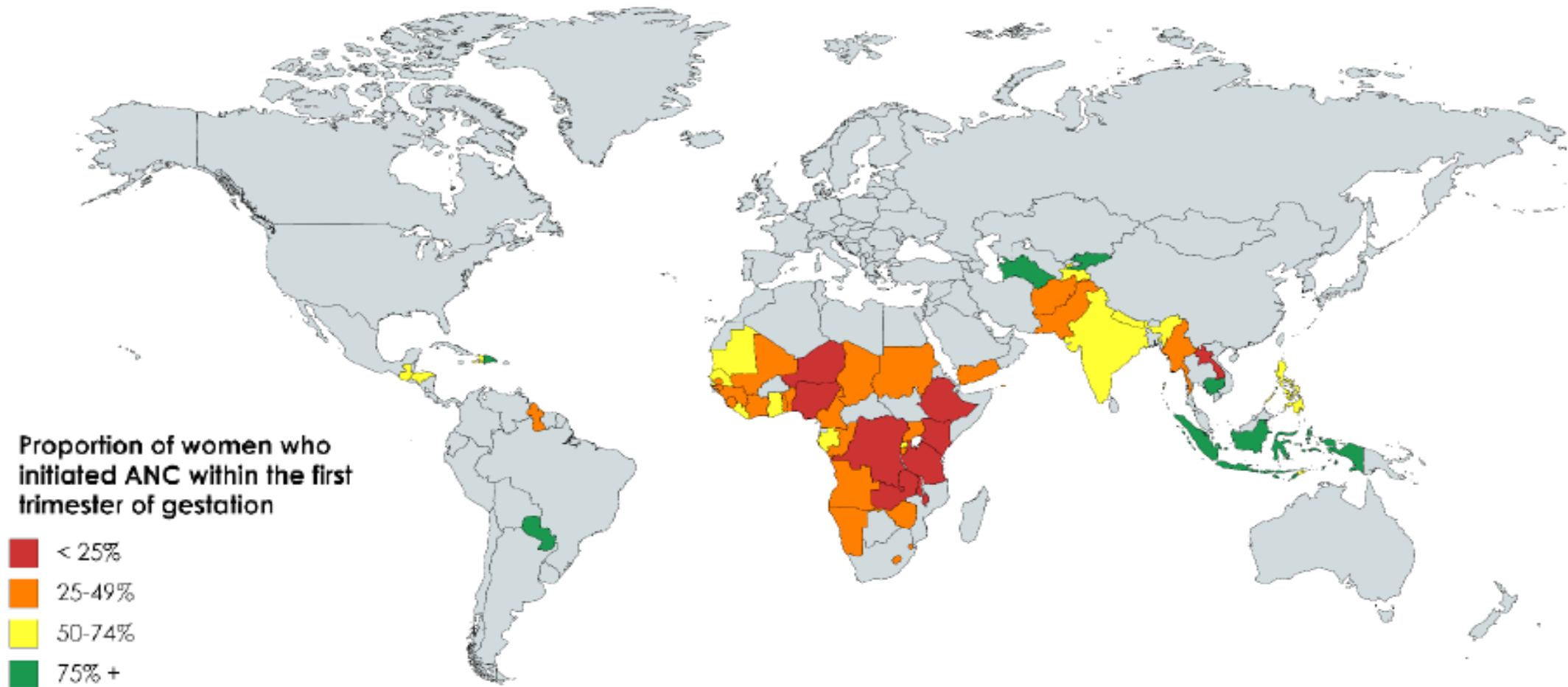
- Stratification by ANC4+ coverage and SDG regions
- Linear and logistic regression models to quantify associations between timing and number of ANC contacts

For detailed methodology:

<http://www.jogh.org/documents/issue202001/jogh-10-010502.pdf>

# 54 countries covered in the analysis, N= 243,967 women with ANC1+

Figure S1: Map of timely ANC initiation coverage in countries included in the analysis.



# Overall, 50% women initiate ANC within 1st trimester

## This varies by ANC4+ coverage and geographic region

**Table 1.** Distribution of timely ANC initiation by level of ANC4+ coverage and region among women with at least one ANC\*

|                                         | MEDIAN GESTATIONAL AGE<br>AT FIRST ANC CONTACT<br>(IQR) | TIMING OF FIRST ANC AMONG WOMEN WITH ANC1+ (N = 243 967) |                                                       |                                                       |
|-----------------------------------------|---------------------------------------------------------|----------------------------------------------------------|-------------------------------------------------------|-------------------------------------------------------|
|                                         |                                                         | 1 <sup>st</sup> trimester (n = 128 495),<br>% (95% CI)   | 2 <sup>nd</sup> trimester (n = 99 168),<br>% (95% CI) | 3 <sup>rd</sup> trimester (n = 16 304),<br>% (95% CI) |
| Country groups by ANC4+ coverage level: |                                                         |                                                          |                                                       |                                                       |
| 1 (<50%)                                | 3 (3-5)                                                 | 37.9 (37.2-38.7)                                         | 51.3 (50.7-52.0)                                      | 10.7 (10.3-11.1)                                      |
| 2 (50%-74%)                             | 4 (3-5)                                                 | 47.2 (46.5-47.9)                                         | 45.9 (45.2-46.5)                                      | 6.9 (6.6-7.2)                                         |
| 3 (75% +)                               | 3 (2-4)                                                 | 61.3 (60.6-62.1)                                         | 34.9 (34.2-35.6)                                      | 3.8 (3.6-4.1)                                         |
| SDG region:                             |                                                         |                                                          |                                                       |                                                       |
| Central and Southern Asia†              | 3 (2-4)                                                 | 69.1 (67.9-70.3)                                         | 25.0 (24.0-26.1)                                      | 5.9 (5.4-6.4)                                         |
| Eastern and South-Eastern Asia‡         | 3 (2-4)                                                 | 63.5 (62.3-64.7)                                         | 31.4 (30.3-32.5)                                      | 5.1 (4.6-5.6)                                         |
| Latin America and the Caribbean §¶      | 3 (2-4)                                                 | 68.1 (66.9-69.2)                                         | 28.5 (27.4-29.7)                                      | 3.4 (3.0-3.8)                                         |
| Northern Africa and Western Asia        | 3 (2-5)                                                 | 54.6 (53.0-56.1)                                         | 32.9 (31.6-34.3)                                      | 12.5 (11.6-13.5)                                      |
| Sub-Saharan Africa¶                     | 4 (3-5)                                                 | 40.8 (40.3-41.4)                                         | 51.7 (51.2-52.2)                                      | 7.5 (7.3-7.7)                                         |
| Total among women with ANC1+:           |                                                         |                                                          |                                                       |                                                       |
| Pooled                                  | 3 (3-5)                                                 | 49.9 (49.5-50.4)                                         | 43.3 (42.9-43.7)                                      | 6.8 (6.6-7.0)                                         |

ANC – antenatal care, IQR – interquartile range, CI – confidence interval, SDG – Sustainable Development Goal

\*Note: % are row percentages, n unweighted.

# Overall, only 11% women received at least 8 ANC contacts during pregnancy

**Table 4.** Distribution of number of ANC contact coverage by ANC4+ country groups and regions among all women\*

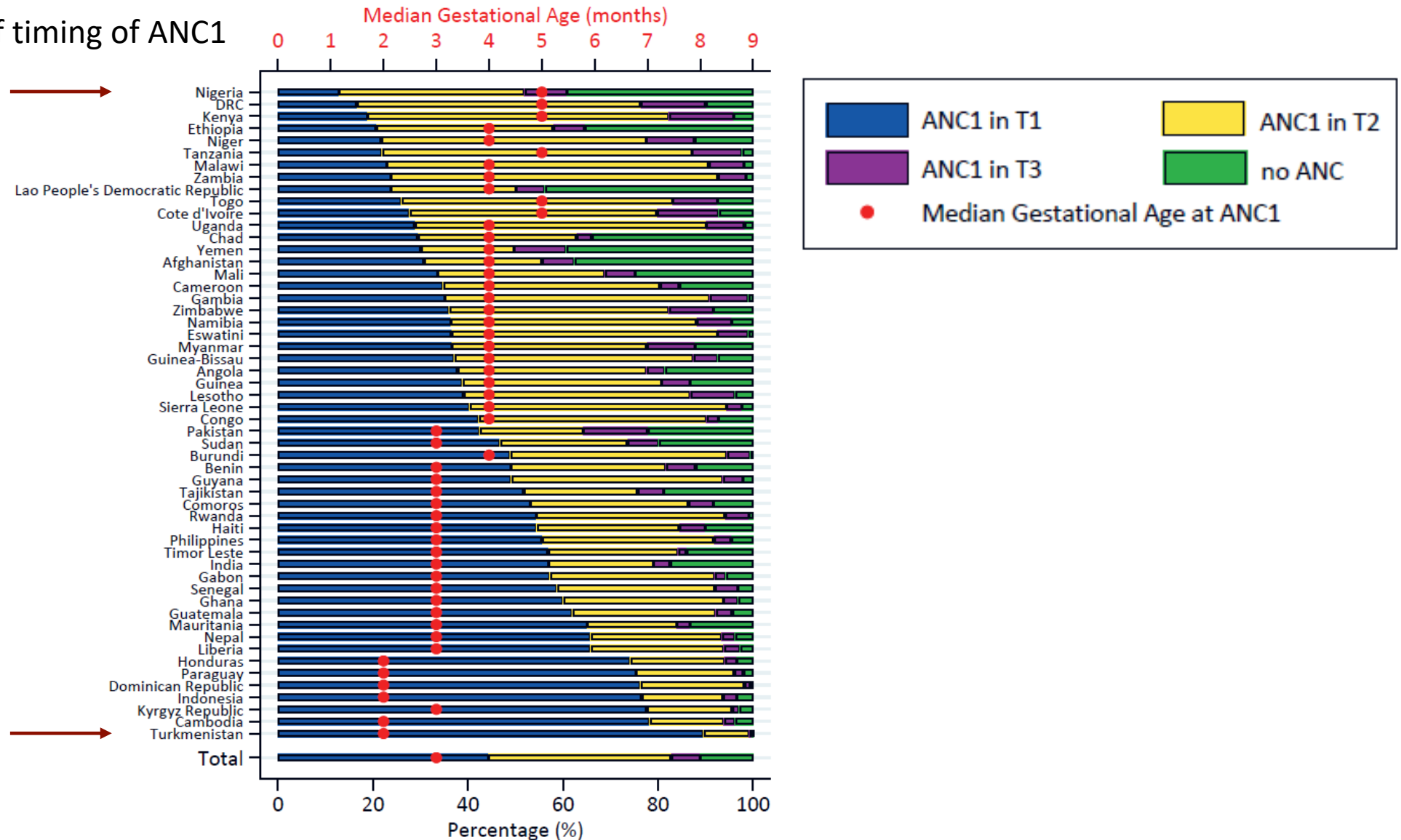
|                                      | NUMBER OF ANC CONTACTS (N = 290 783) |                    |                     |                     |
|--------------------------------------|--------------------------------------|--------------------|---------------------|---------------------|
|                                      | No ANC (n=46 816)                    | 1-3 ANC (n=95 425) | 4-7 ANC (n=120 578) | 8-10 ANC (n=27 964) |
| <b>Country group by ANC4+ level:</b> |                                      |                    |                     |                     |
|                                      | % (95% CI)                           | % (95% CI)         | % (95% CI)          | % (95% CI)          |
| 1 (<50%)                             | 21.6 (20.9-22.4)                     | 40.1 (39.4-40.8)   | 34.5 (33.8-35.2)    | 3.8 (3.6-4.0)       |
| 2 (50%-74%)                          | 9.2 (8.8-9.7)                        | 31.9 (31.3-32.5)   | 52.7 (52.0-53.4)    | 6.2 (5.8-6.5)       |
| 3 (≥75%)                             | 4.1 (3.8-4.4)                        | 13.9 (13.4-14.3)   | 58.5 (57.8-59.2)    | 23.5 (22.9-24.2)    |
| <b>SDG regions:</b>                  |                                      |                    |                     |                     |
| Central and Southern Asia†           | 14.9 (13.9-16.0)                     | 27.5 (26.4-28.7)   | 44.2 (42.9-45.6)    | 13.3 (12.5-14.1)    |
| Eastern and South-Eastern Asia‡      | 14.0 (13.2-14.8)                     | 17.6 (16.7-18.5)   | 46.8 (45.7-47.9)    | 21.7 (20.8-22.7)    |
| Latin America and the Caribbean§     | 4.3 (3.9-4.8)                        | 12.1 (11.3-13.0)   | 49.3 (48.0-50.5)    | 34.3 (33.0-35.7)    |
| Northern Africa and Western Asia¶    | 29.6 (28.1-31.0)                     | 32.8 (31.6-34.1)   | 29.9 (28.5-31.2)    | 7.8 (7.1-8.5)       |
| Sub-Saharan Africa¶                  | 9.7 (9.3-10.1)                       | 32.3 (31.8-32.8)   | 51.9 (51.4-52.5)    | 6.1 (5.8-6.3)       |
| <b>Total:</b>                        |                                      |                    |                     |                     |
| Pooled                               | 11.2 (10.9-11.5)                     | 28.3 (27.9-28.7)   | 49.3 (48.8-49.7)    | 11.3 (11.0-11.6)    |

ANC – antenatal care, IQR – interquartile range, CI – confidence interval

\*Note: % are row percentages, n unweighted.

# Large variability in timing of first ANC across countries

Fig 1. Distribution of timing of ANC1





# Who are the women who had timely ANC initiation and at least 8 ANC contacts?



Urban Residents,  
Smaller households



Secondary+  
education



Wealthiest  
households



Had an institutional  
delivery or a skilled  
attendant at birth

# There is a strong positive association between timely ANC initiation and number of ANC contacts received

Timely ANC  
initiation



ANC 4+

**aOR= 5.24\***

(5.04, 5.45)

\*P<0.001

Women who initiated ANC within 1<sup>st</sup> trimester of gestation had **5.2 times** higher odds of receiving **4 or more** ANC contacts

Timely ANC  
initiation



ANC 8+

**aOR= 4.66\***

(4.35, 4.99)

\*P<0.001

Women who initiated ANC within 1<sup>st</sup> trimester of gestation had **4.7 times** higher odds of receiving **8 or more** ANC contacts

# Conclusions



**Timing of ANC initiation matters!**  
Timely ANC initiation is a major driving force for achieving the recommended minimum of 8 ANC contacts.

WHO 2016 recommendation is a steep curve for most countries and needs to be accompanied by strategies to ensure health systems are prepared to take on a higher service demand, and to provide adequate quality of care.

Efforts needed to reach the most vulnerable women who are less likely to meet the guidelines.



# Thank You

✉ [sjiwani1@jhu.edu](mailto:sjiwani1@jhu.edu)  
🐦 @SafJiwani

We are grateful to the Bill & Melinda Gates Foundation for funding Countdown to 2030 for Women's Children's and Adolescents' Health



# Examining coverage, content, and impact of maternal nutrition interventions: the case for quality-adjusted coverage measurement

Naima Joseph, MD, MPH on behalf of Ellen Piwoz, Dennis Lee, Address Malata, Hannah Leslie and the Countdown Coverage Technical Working Group

Maternal Fetal Medicine  
Department of Gynecology and Obstetrics  
Emory University School of Medicine



# Antenatal care quality impacts neonatal mortality



- Maternal and child undernutrition underlie 45% of child deaths
- Health system interventions to support breastfeeding and improve maternal nutrition can improve outcomes
- Antenatal care quality should be linked to neonatal outcomes



To develop maternity care coverage measures for quality of nutrition interventions and their association with infant birth weight and breastfeeding, two significant determinants of neonatal mortality

Objective

# Using existing data to generate quality-adjusted measures



Recently pregnant  
women  
Antenatal care  
attendance



Provision of iron-folate  
supplementation  
Counseling on importance  
of nutrition, breastfeeding  
Immediate breastfeeding



Maternal  
breastfeeding  
practices



Infant birthweight

# Analysis and Outcomes

## Defining Coverage:

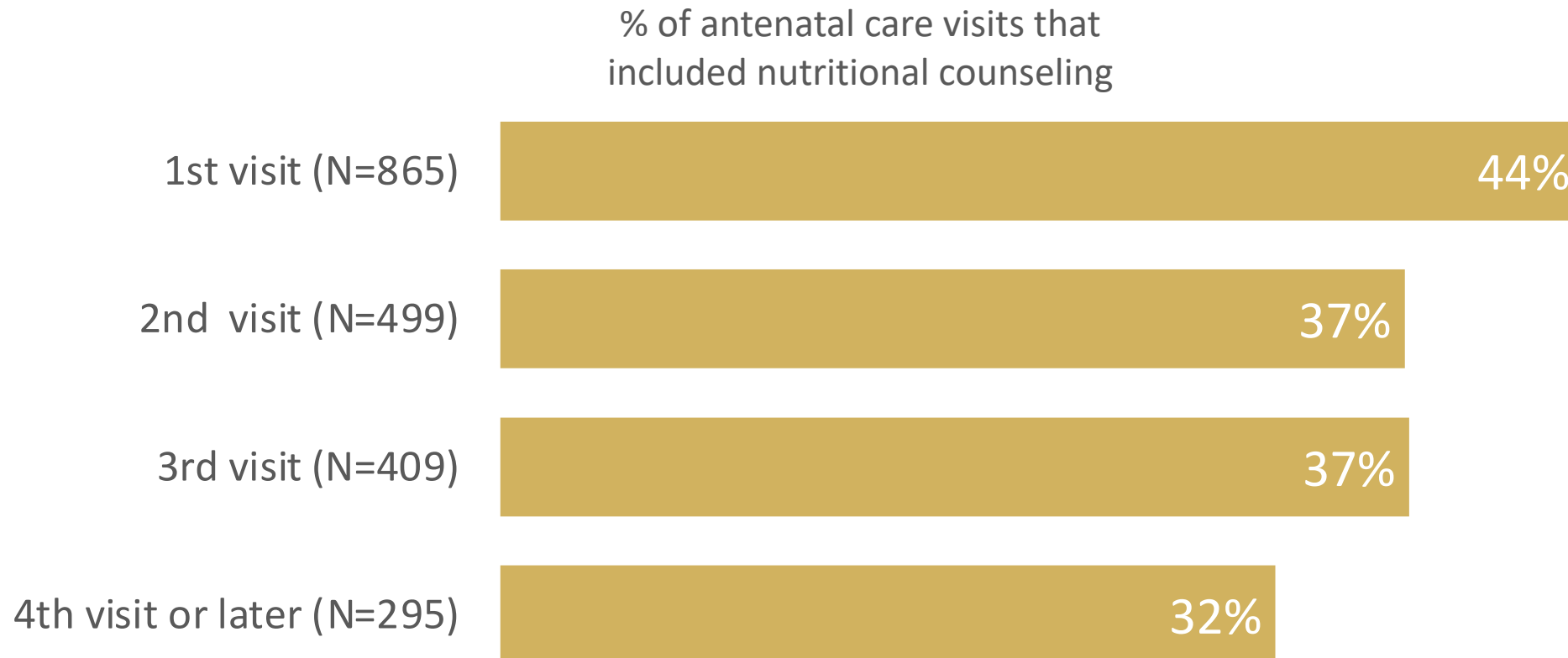
- Household survey data (MICS) used to generate estimates of healthcare utilization (crude coverage).
- Health facility clinical observations (SPA) to summarize content of care.
- Linked crude coverage to service environment information to adjust individual-level coverage metrics.

## Defining Quality

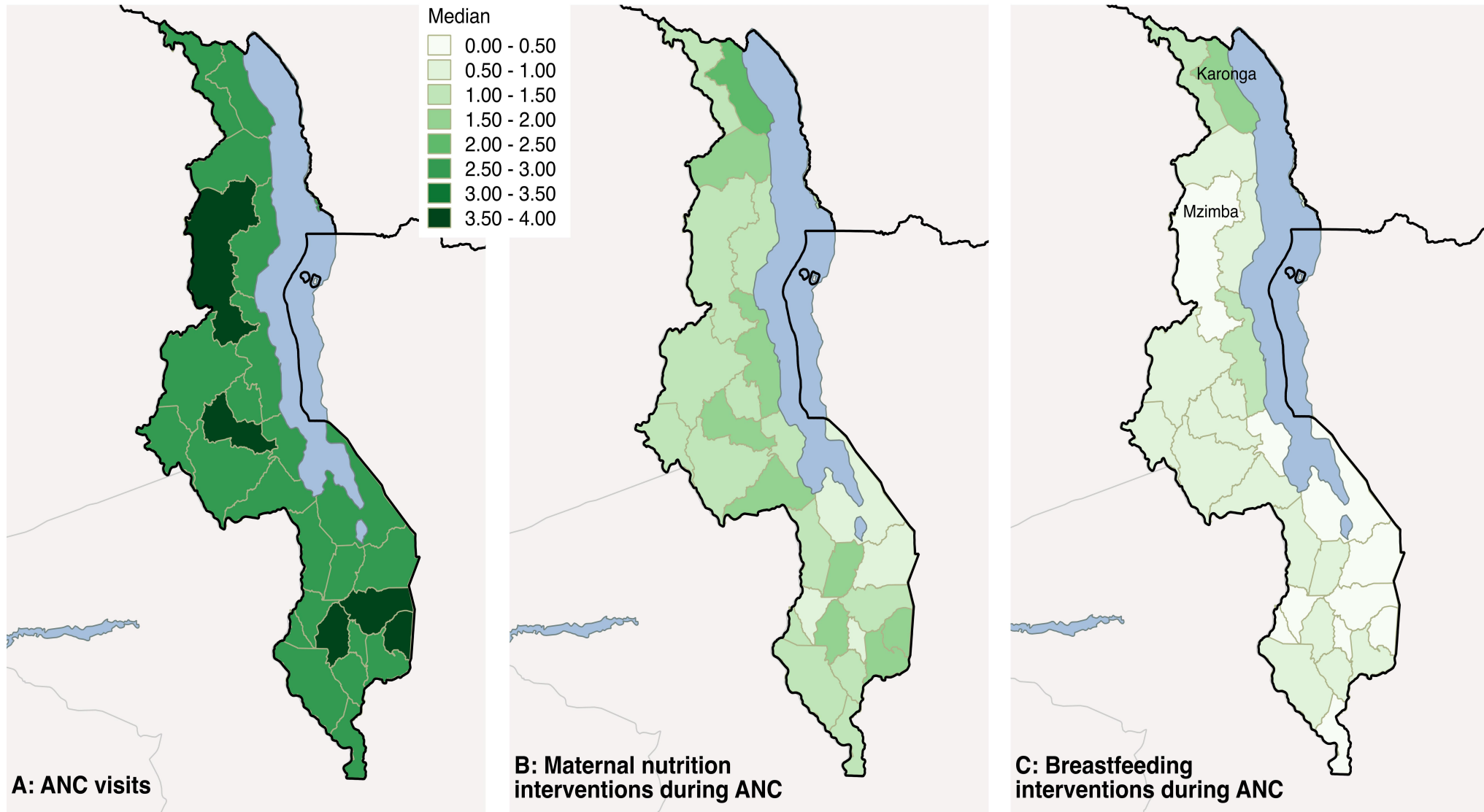
- Quality of nutrition interventions at health facilities scores defined using direct observations of ANC and delivery care (SPA) to estimate how frequently facilities provided evidence-based nutrition interventions, averaged per number of ANC visits in a specific geographic area.
- Calculated service environment quality scores to capture health system contributions to birthweight and breastfeeding for a given number of ANC visits.

# Counseling on nutrition interventions peaks at 44% and declines with follow up visits

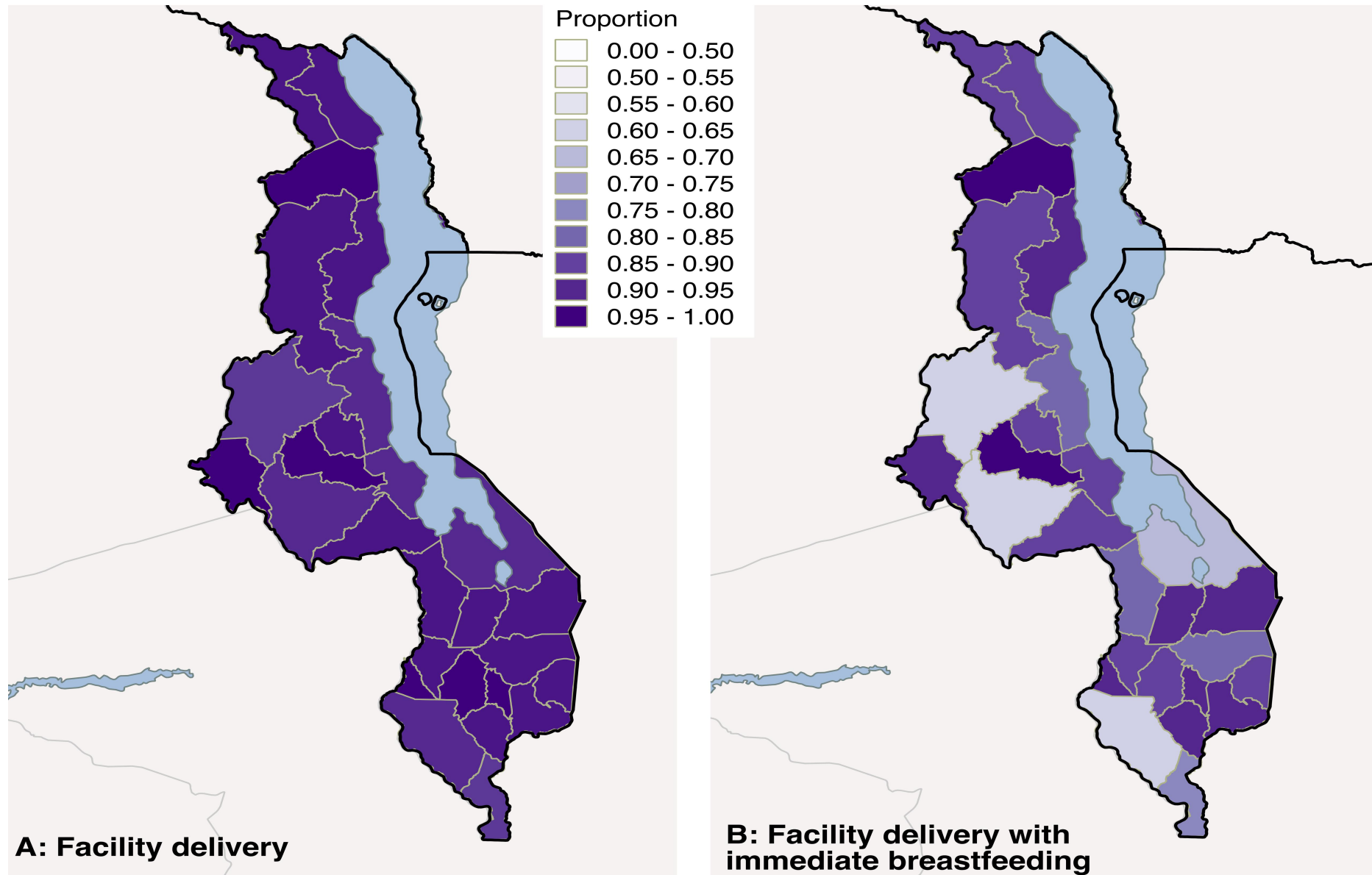
## Delivery of nutrition-related interventions during ANC visits (N=2068 directly observed visits)



# Despite high ANC utilization, women received low nutrition interventions targeting infant birthweight and breastfeeding



# Facility based delivery correlates with high coverage of immediate breastfeeding





# Nutrition quality-adjusted coverage and health outcomes

|                                                      | ADJUSTED RELATIVE<br>RISK | 95% CONFIDENCE INTERVAL |
|------------------------------------------------------|---------------------------|-------------------------|
| <b>A: Low birthweight (N = 7225):</b>                |                           |                         |
| Model A1:*                                           |                           |                         |
| Number of ANC† visits                                | 0.90                      | 0.85, 0.95              |
| Model A2:*                                           |                           |                         |
| Number of nutrition-related interventions in ANC     | 0.87                      | 0.79, 0.96              |
| <b>B: Immediate breastfeeding (N = 7235):</b>        |                           |                         |
| Model B1:*                                           |                           |                         |
| Number of ANC visits                                 | 1.01                      | 1.00, 1.02              |
| Facility delivery                                    | 1.06                      | 1.00, 1.13              |
| Model B2:*                                           |                           |                         |
| Number of breastfeeding-related interventions in ANC | 1.04                      | 1.02, 1.07              |
| Facility delivery with immediate breastfeeding       | 1.08                      | 1.02, 1.14              |

ANC – antenatal care

\*All models are controlled for: rural/urban location, maternal age at birth and age squared, wealth quintile, maternal education (none, primary, secondary or greater), first birth, birth spacing (months). Models are weighted to account for observations excluded due to missing data; confidence intervals account for clustering due to repeated samples within enumeration area. Models with low birthweight as an outcome are based on 5 data sets with multiple imputation for missing birthweight.

Nutrition quality-adjusted ANC coverage/ delivery care was associated with:

- Reduced risk of low birthweight
- Increased likelihood of immediate breastfeeding
- Greater uptake of immediate breastfeeding

# Impact

Reduce  
Low Birth  
Weight



13.7%



10.0%

Increase  
Immediate  
Breastfeeding



75.9%



86.0%

# Key Points



- Health systems fundamentally accountable for producing value.
- Focus on crude indicators (inputs, process measures, coverage) insufficient.
- Must use measures that reliably capture the relationship between health service delivery and population outcomes.
- Despite high utilization of maternal health services, low provision of nutrition interventions.
- Provision of high-quality nutrition health interventions will lead to immediate gains in infant and child health.

# Thank You

Naima Joseph MD, MPH

[ntjose2@emory.edu](mailto:ntjose2@emory.edu)



@NaimaJosephMD

We are grateful to the Bill & Melinda Gates Foundation for funding Countdown to 2030 for Women's Children's and Adolescents' Health

# Strong community health systems and governance: a multilevel longitudinal model of ORS coverage

Liliana Carvajal  
UNICEF – Division of Data Analysis Planning and Monitoring

# Paper Authors

- **Althea Andrus**, Alutiiq, US Department of State contractor, Washington, DC, USA
- **Robert Cohen**, CAMRIS International, Inc., USAID contractor, Bethesda, Maryland, USA
- **Liliana Carvajal**, UNICEF, New York, New York, USA
- **Shams El Arifeen**, icddr,b, Dhaka, Bangladesh
- **William Weiss**, Department of International Health, John Hopkins University, Baltimore, Maryland, USA 6 Sustaining Technical and Analytic Resources (STAR) Project, Public Health Institute, USAID Contractor, Washington, DC, USA



# Diarrheal diseases are a leading cause of childhood mortality



ORS – one of the most effective interventions for preventing childhood diarrhea deaths

ORS is low-cost and widely available

But use of ORS as treatment of childhood diarrhoea is uneven with coverage below 50% in many low and middle income countries.

# Study Objectives



## Predictive Factors

Identify the predictive factors for increased ORS use at a population level

## Generalization

Using a longer time series, with more countries, and previously untested variables to generate generalizations at the population level

## Targets

Estimates of potential impact of each driver of ORS use to support policy-makers in setting targets

# Methodology



## Literature Review

Reviewed the literature on ORS coverage to identify variables



## Key Informant Interviews

Asked key informants about what factors impacted ORS coverage in countries with high and low coverage

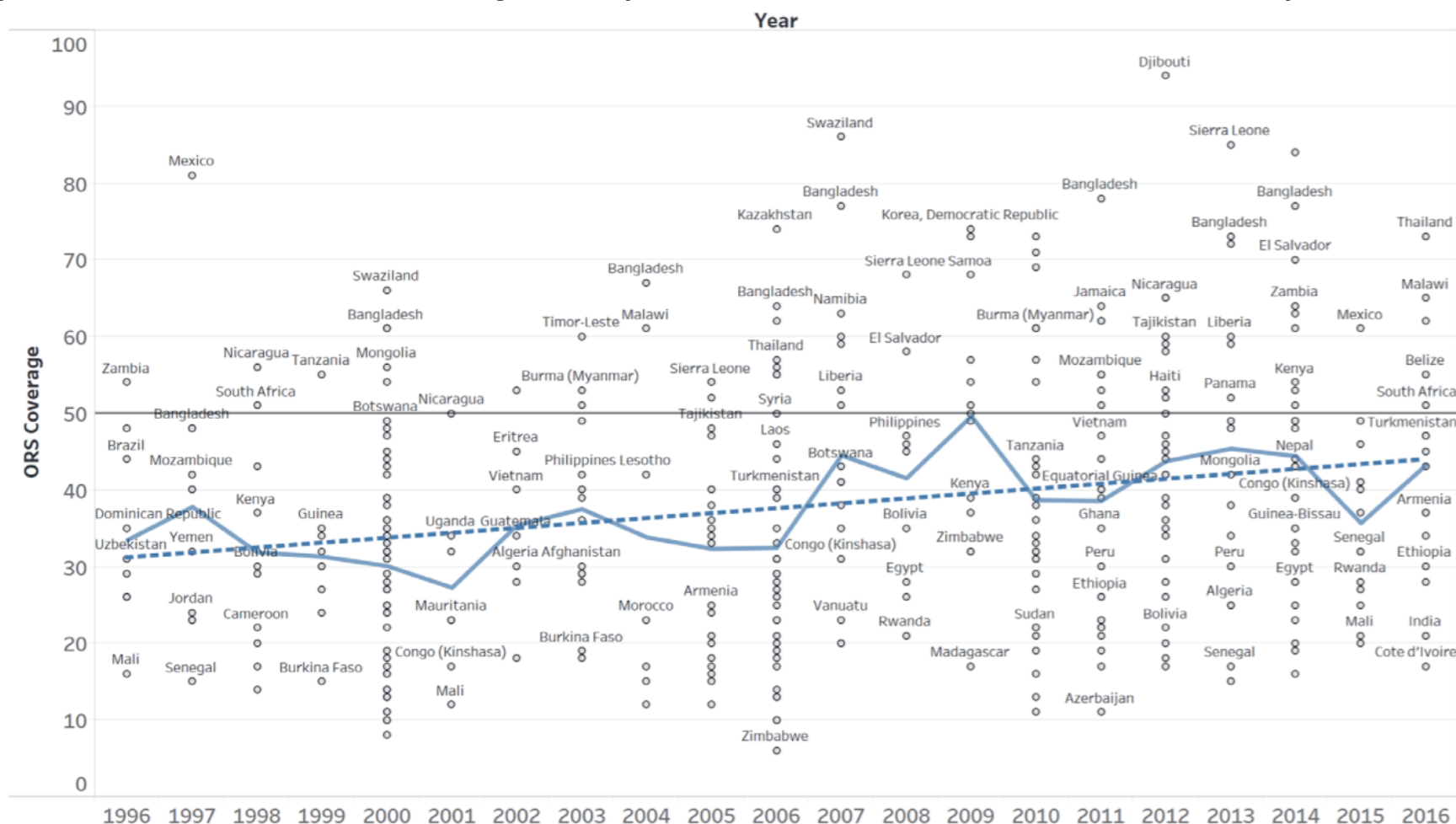


## Multi-Level Longitudinal Model

Utilized data from 1996-2016 with ORS treatment among children with diarrhea as dependent variable

# Changes in ORS coverage

Percentage of children with diarrhea receiving oral rehydration salt (ORS) – based on household survey data, 1996-2016. n=307



Source: National level household survey data predominantly DHS and MICS

# Independent Variable Results: Final multi-variable model

| Variable                             |    | Coefficient | Robust <i>P</i> -value | Significance |
|--------------------------------------|----|-------------|------------------------|--------------|
| Care-seeking for pneumonia           | 0  | .152        | 0.0379                 | $P < .05$    |
| Government effectiveness             | 5  | .80         | 0.0000                 | $P < .01$    |
| Out-of-pocket expenditures           | -0 | .0945       | 0.0778                 | $P < .10$    |
| Antenatal care (four or more visits) | 0  | .0983       | 0.0578                 | $P < .10$    |
| Year                                 | 0  | .387        | 0.0013                 | $P < .01$    |
| Constant                             | 21 | .05         |                        |              |

N = 235 observations

# Discussion and Results

The results of this study suggest that health systems strengthening is essential to accelerate the use of ORS to treat childhood diarrhea on a population level (SGD 3 – child mortality reduction)

- Governance plays vital role in improving child health
- Strengthening the government to carry out maternal and child health programs at the community level
- Effective and affordable community health programs can play a vital role in improving the coverage of cost-effective child health services.



# Thank You

Liliana Carvajal  
lcarvajal@unicef.org

We are grateful to the Bill & Melinda Gates Foundation for funding Countdown to 2030 for Women's Children's and Adolescents' Health

# Coverage and continuum of maternal care among adolescents in 22 sub-Saharan African countries with high adolescent birth rates

Liliana Carvajal  
UNICEF – Division of Data Analysis Planning and Monitoring

# Authors and Affiliations

- Liliana Carvajal | *UNICEF – Division of Data Analysis Planning and Monitoring, HQ, New York USA*
- Emily Wilson | *JHU, Department of International Health, Baltimore, Maryland, USA*
- Jennifer Harris Requejo | *UNICEF - Division of Data Analysis Planning and Monitoring, HQ, New York USA*
- Holly Newby | *Independent Consultant, Stockholm, Sweden*
- Cristina de Carvalho Eriksson | *UNICEF Program Division HQ, New York USA*
- Mengjia Liang | *UNFPA New York, USA*
- Mardieh Dennis | *London School of Hygiene and Tropical Medicine, LSHTM, London, UK*
- Fatima Gohar | *UNICEF, Regional Office for Eastern and Southern Africa ESARO, Nairobi, Kenya*
- Aline Simen Kapeu | *UNICEF, Regional Office for West and Central Africa, Dakar, Senegal*
- Priscilla Idele | *UNICEF, Office of Research, Florence, Italy*
- Agbessi Amouzou | *JHU, Department of International Health, Baltimore, Maryland, USA*

# Background



- Globally, 11% of all births are adolescents aged 15 to 19 years
- Sub-Saharan Africa:
  - Highest adolescent birth rate in the world (100.5 births per 1000 girls aged 15-19)- 2.4 times greater than the global average.
  - 1 in 4 adolescent girls give birth before reaching 18 years.

# Why does this matter?



Sub-Saharan Africa is projected to experience the highest increase in the number of adolescent births between 2010 and 2030

Poor perinatal health outcomes among adolescent mothers such as increased risk of death, pregnancy-related morbidity

Potential long-term negative economic and social consequences for adolescent mothers

Determine if adolescent mothers are more disadvantaged than older women when it comes to receiving a basic package of maternal health interventions and assessing coverage levels and determinants among adolescents in countries with high adolescent birth rate settings.

## Study Aim



# Analysis

1

**Pool DHS/MICS data  
from 22 countries  
(22,135 girls age 15-19)**



● Not a Study Area ● Study Area

2

**Analyze  
maternal  
basic health  
coverage by  
age group**

3

**Multi-level  
logistic  
regression  
model to  
measure  
factors  
associated  
with  
coverage**

# Key Indicators

Study explored an initial set of 11 indicators related to intervention coverage and content of care for basic maternal health care:

1. Demand for family planning satisfied with modern methods
2. Antenatal care contacts (first visit by 3rd trimester)
3. ANC at least four visits
4. ANC at least 8 visits
5. ANC content (blood pressure measured, blood test, urine test, receiving tetanus toxoid)
6. Skilled birth attendant
7. Institutional delivery
8. Staying in health facility at least 24 hours after delivery
9. Postnatal care visits for mother
10. Postnatal care visits for baby
11. Early initiation of breastfeeding

However, a **basic package of maternal healthcare** was defined based on **WHO recommendations** for the antenatal, delivery, and postnatal period, as well as **data availability**

# Key Indicators

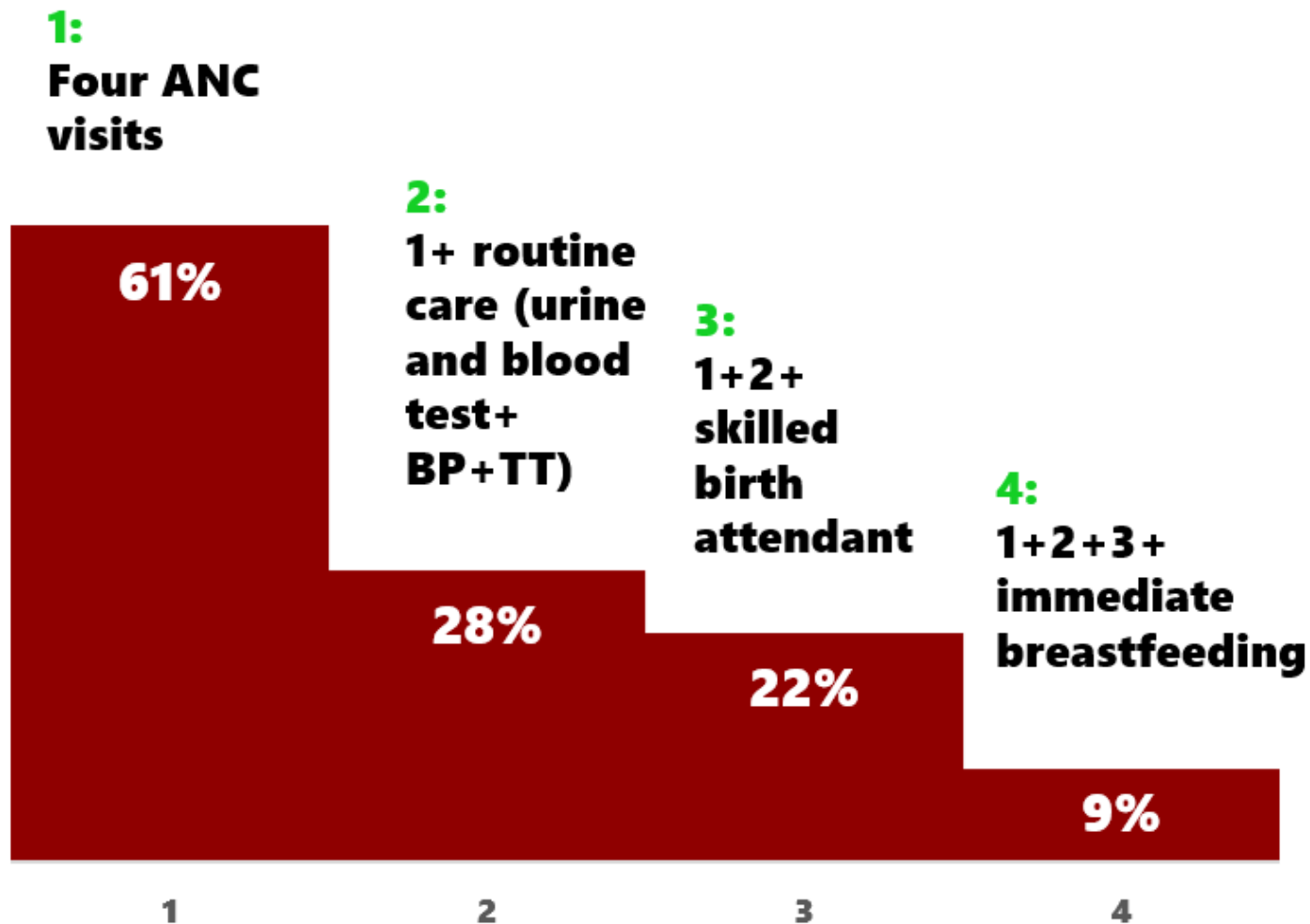
Study explored an initial set of 11 indicators related to intervention coverage and content of care for basic maternal health care:

1. Demand for family planning satisfied with modern methods
2. Antenatal care contacts (first visit by 3rd trimester)
3. **ANC at least four visits**
4. ANC at least 8 visits
5. **ANC content (blood pressure measured, blood test, urine test, receiving tetanus toxoid)**
6. **Skilled birth attendant**
7. Institutional delivery
8. Staying in health facility at least 24 hours after delivery
9. Postnatal care visits for mother
10. Postnatal care visits for baby
11. **Early initiation of breastfeeding**

However, a **basic package of maternal healthcare** was defined based on **WHO recommendations** for the antenatal, delivery, and postnatal period, as well as **data availability**

# Results

## Cascade of loss of coverage



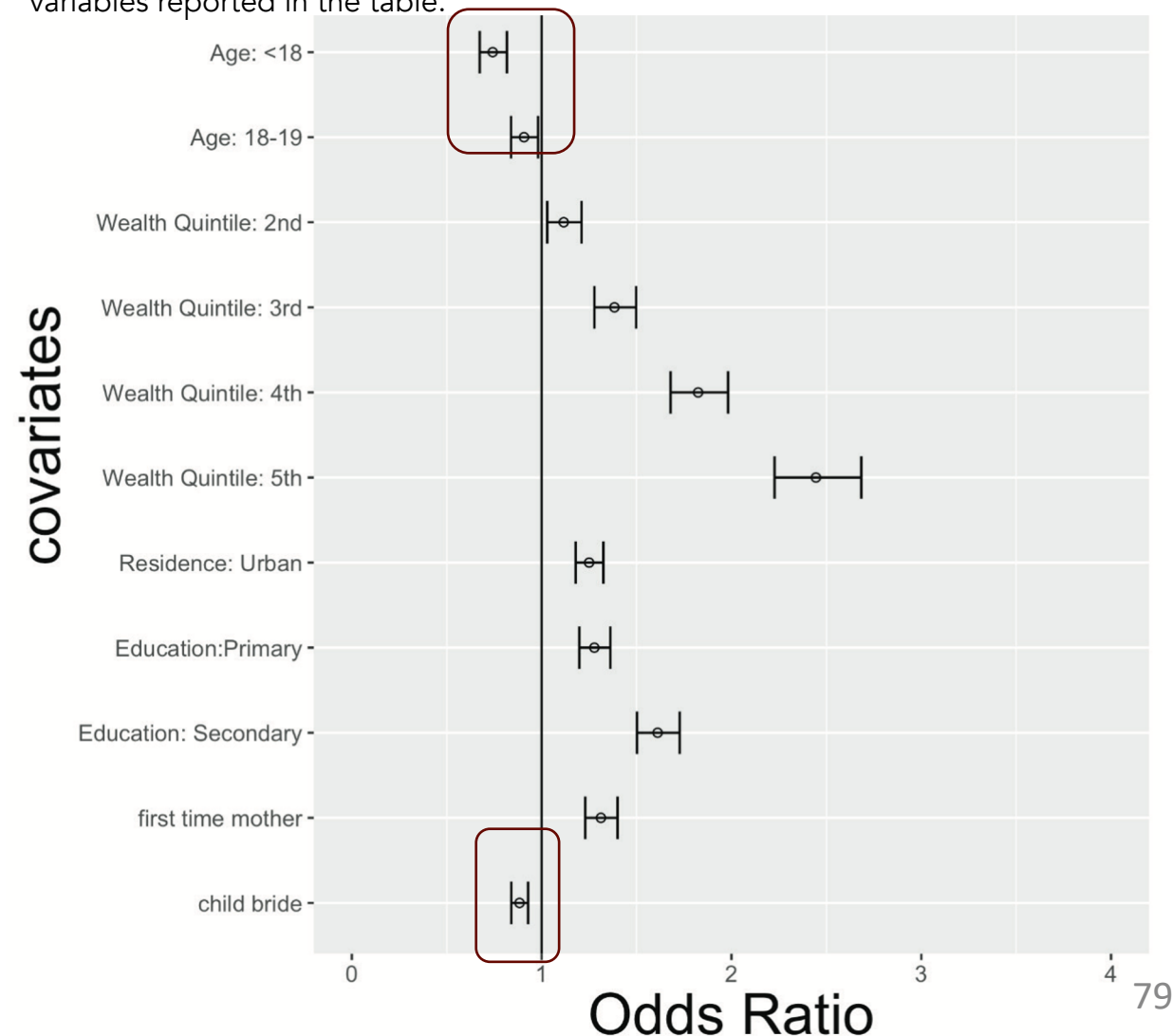
Source: authors' analysis using data from DHS and MICS surveys included in the analysis.

# Results

Logistic regression model with fixed effects of age, wealth, residence, education, parity, and child marriage, and random effects for

| countries.                                       | ADJUSTED†         |         |
|--------------------------------------------------|-------------------|---------|
|                                                  | AOR† (95% CI)     | P-VALUE |
| <b>Age (years) of woman at time of delivery:</b> |                   |         |
| 15-17                                            | 0.74 (0.67, 0.82) | <0.001  |
| 18-19                                            | 0.91 (0.84, 0.98) | <0.001  |
| 20-49                                            | reference         |         |
| <b>Wealth quintile:</b>                          |                   |         |
| Poorest                                          | reference         |         |
| Poorer                                           | 1.12 (1.03, 1.21) | <0.001  |
| Middle                                           | 1.38 (1.28, 1.50) | <0.001  |
| Richer                                           | 1.82 (1.68, 1.98) | <0.001  |
| Richest                                          | 2.44 (2.23, 2.68) | <0.001  |
| <b>Area of residence:</b>                        |                   |         |
| Rural                                            | reference         |         |
| Urban                                            | 1.25 (1.18, 1.33) | <0.001  |
| <b>Highest level of education:</b>               |                   |         |
| No education                                     | reference         |         |
| Started primary education                        | 1.28 (1.20, 1.36) | <0.001  |
| Started secondary education/higher               | 1.61 (1.50, 1.73) | <0.001  |
| <b>First time mother:</b>                        |                   |         |
| No                                               | reference         |         |
| Yes                                              | 1.31 (1.23, 1.40) | <0.001  |
| <b>Child marriage:</b>                           |                   |         |
| No                                               | reference         |         |
| Yes                                              | 0.88 (0.84, 0.93) | <0.001  |

**Figure (right)** | Adjusted odds ratio (aOR): odds ratio adjusted for all other variables reported in the table.



# Discussion & Conclusions

## Policy relevant messages:

- Coverage of basic maternal health care for adolescent mothers is inadequate in the countries with the highest adolescent birth rates in the world

## Why does this matter?

- Sub-Saharan Africa will experience the highest increases in adolescent births in the coming decades.
- Region with highest maternal mortality

## What can be done?

- Ensure that reproductive and adolescent responsive health services are made available, accessible, and acceptable at all points throughout the reproductive, maternal, and child health continuum.
- Address reproductive needs of adolescents
- Address issues related to child marriage practices which lead to premature childbearing
- Address discriminatory gender and social norms, and economic inequality



# Thank You

Liliana Carvajal  
lcarvajal@unicef.org

We are grateful to the Bill & Melinda Gates Foundation for funding Countdown to 2030 for Women's Children's and Adolescents' Health



# Q&A



**COUNTDOWN**TO2030

MEASURING AND MONITORING COVERAGE AND QUALITY  
OF CARE IN LOW AND MIDDLE INCOME COUNTRIES



# Closing Remarks

We are grateful to the Bill & Melinda Gates Foundation for funding Countdown to 2030 for Women's Children's and Adolescents' Health