Antibiotic use among suspected enteric fever cases in Nepal, Bangladesh and Pakistan

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Outline

Background → **Objectives** → **Methods** → **Results** → **Limitations** → **Conclusions**

Background

- Antibiotic resistance is an emerging threat due to easy access and indiscriminate use of antibiotics

- The accuracy of blood culture is dependent on antibiotic use

- Prior antibiotic use is usually assessed by interview (self-report)

- Validity of interviews for prior antibiotic use is not clear

Study Objectives

- To describe the **pattern** of reported pre-hospital antibiotic use among suspected enteric fever cases in Nepal, Bangladesh and Pakistan

- Determine **validity of reported antibiotic use** by comparing with **antibiotics excreted in urine**

- To describe relationship between prior antibiotic use and subsequent blood culture positivity

Methods

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SAMPLE SELECTION
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  LAB PROCEDURE
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    ANALYSIS
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1. **Study site**: Bangladesh, Nepal and Pakistan
2. **Study Population**: Outpatients with $\geq$ 3 days of fever
3. **Sample Size**: 1000 per country

- Administered questionnaire to ascertain self-reported antibiotic use
- Collected blood for culture
- Collected urine to look for presence of antibiotics

For this episode of fever:
"Before arriving for this visit did you/the participant take any of the following medications?"
- ***Antibiotics***
- *Antipyretics*
- *Analgesics*
- *Antidiarrheals*

Methods

SAMPLE SELECTION

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LAB PROCEDURE

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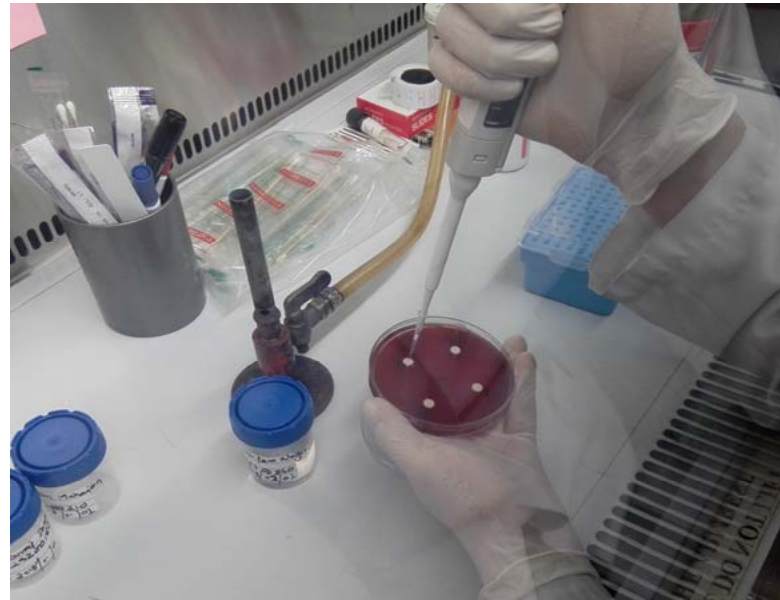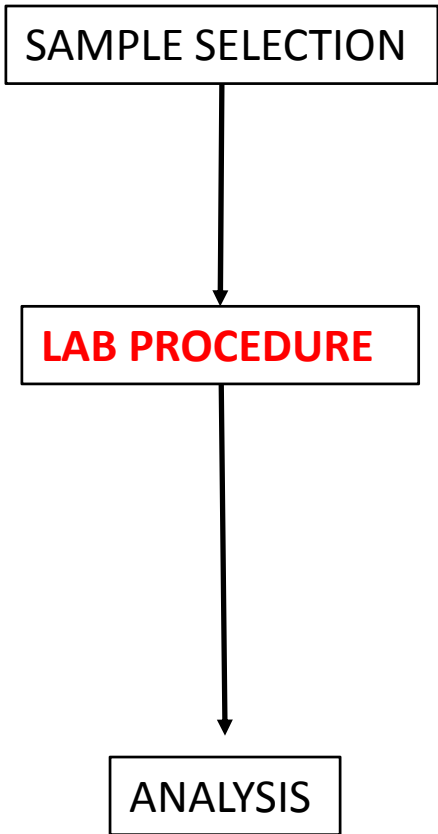
ANALYSIS

Blood culture:
1. Blood (Adult: 8-10mL, Pediatric: 1-3mL) collected
2. Standard, automated culture procedure using BacTec system

Urine antibiotic analysis:
1. Prepared a bacterial lawn of pan-susceptible *Kocuria rhizophila (Micrococcus luteus)*
2. Dispensed urine onto a blank antibiotic disc
3. Incubate at room temperature for 18-24 hours
4. Observed any zone of inhibition

Methods

SAMPLE SELECTION

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LAB PROCEDURE

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ANALYSIS
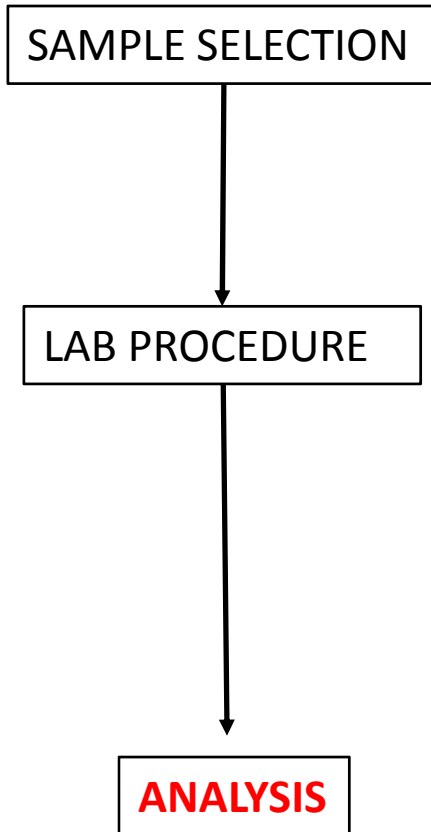
- General trends in antibiotic use
- Sensitivity and specificity for reported antibiotic use
- Blood culture positivity by antibiotic use

Results

Study participant characteristics

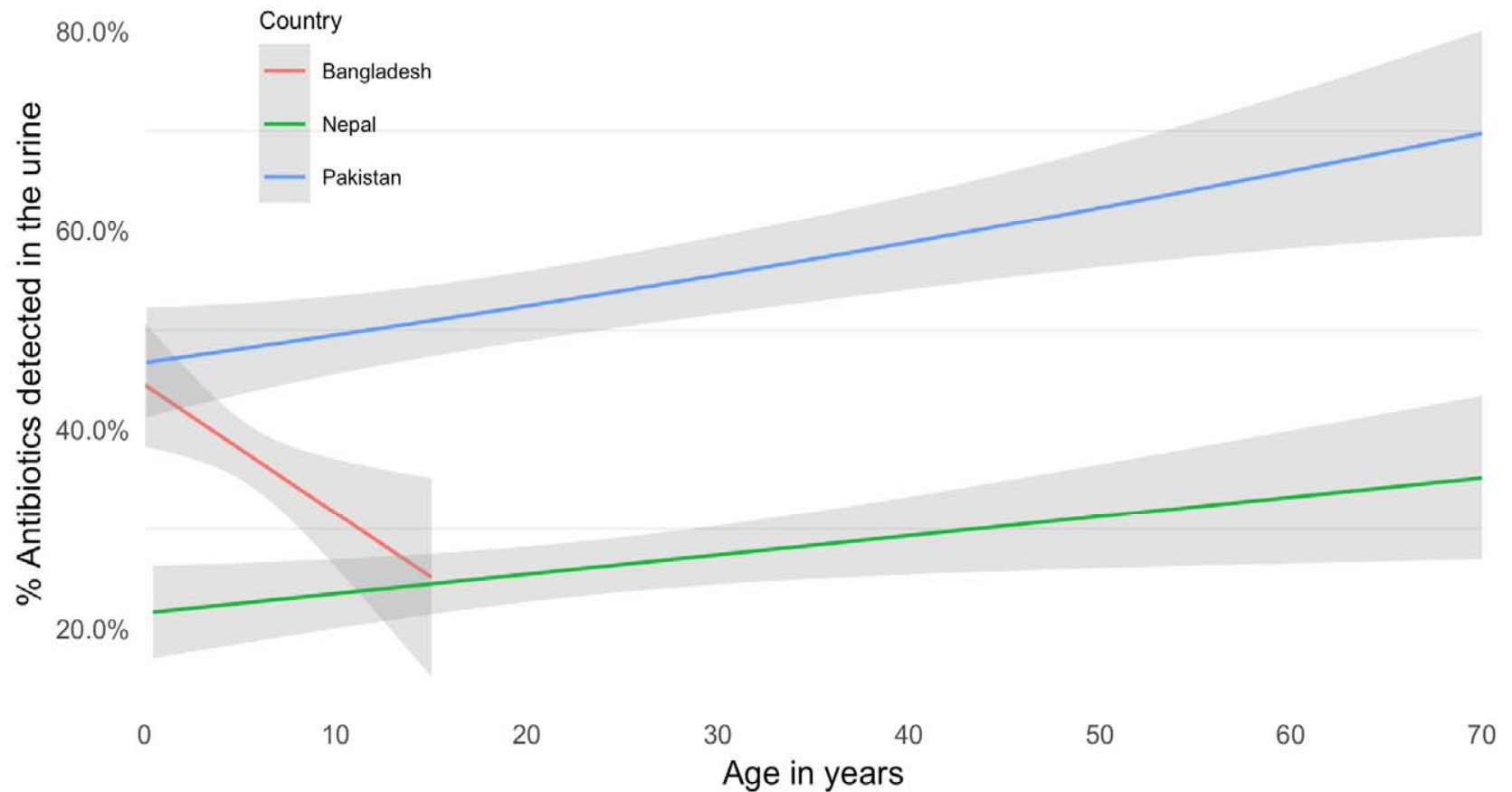|	BANGLADESH	NEPAL	PAKISTAN
N	989	1000	927
Median age (IQR)	5 (3 – 7)	20 (9 – 34)	17 (7 – 34)
N (%) Female	427 (42.5%)	413 (41.3%)	404 (43.5%)
Respondent			
Self	0	585 (58.6%)	457 (49.2%)
Mother	739 (73.8%)	222 (22.2%)	256 (27.6%)
Father	212 (21.2%)	119 (11.9%)	149 (16.1%)
Grandparent	25 (2.5%)	15 (1.5%)	8 (0.9%)
Sibling	7 (0.7%	23 (2.3%)	17 (1.80%)
Aunt or Uncle	17 (1.7%)	20 (2.0%)	31 (3.3%)
Other	2 (0.2%)	15 (1.5%)	10 (1.1%)

Results
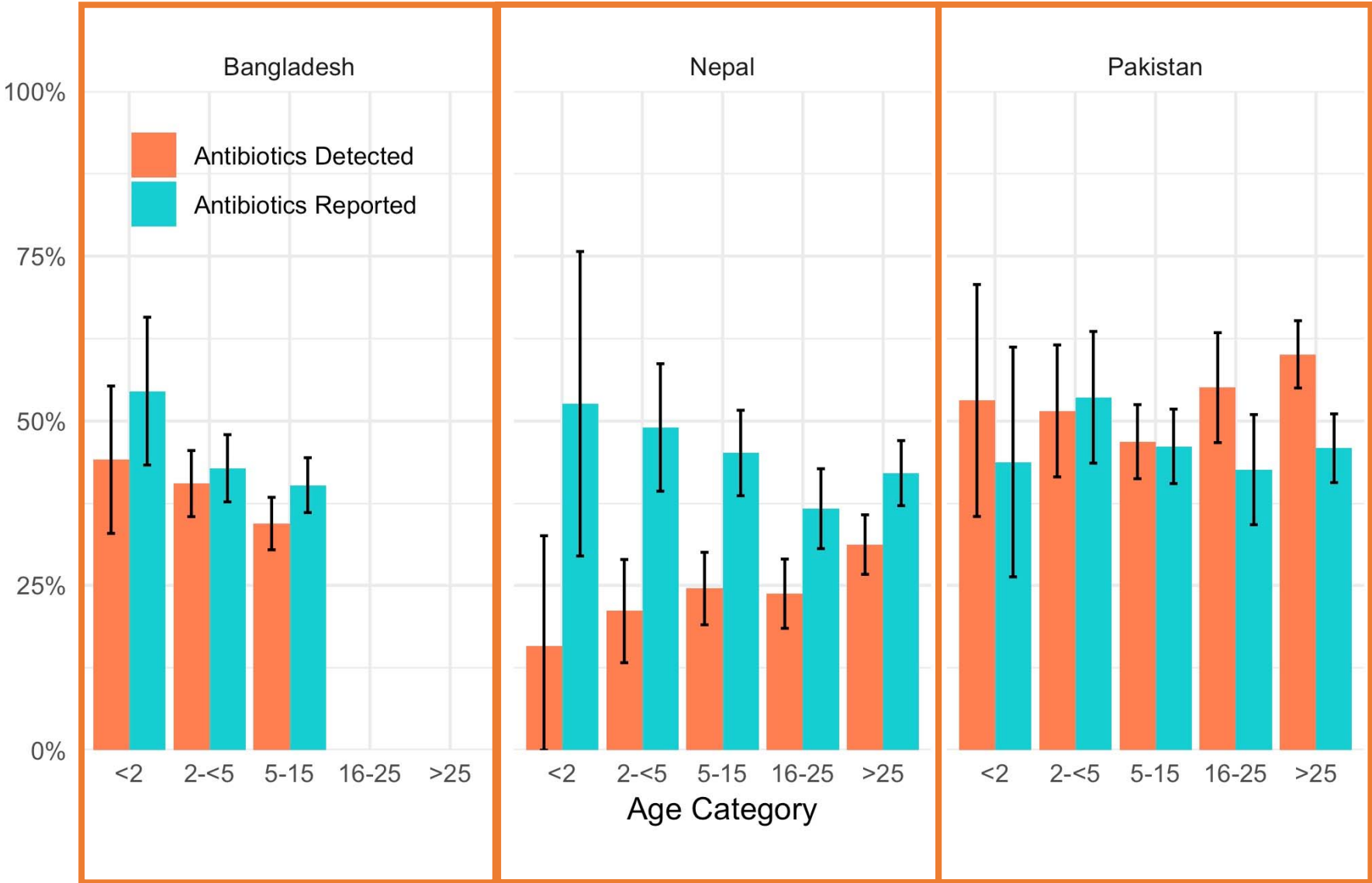*Reported antibiotic use, by country and age group*
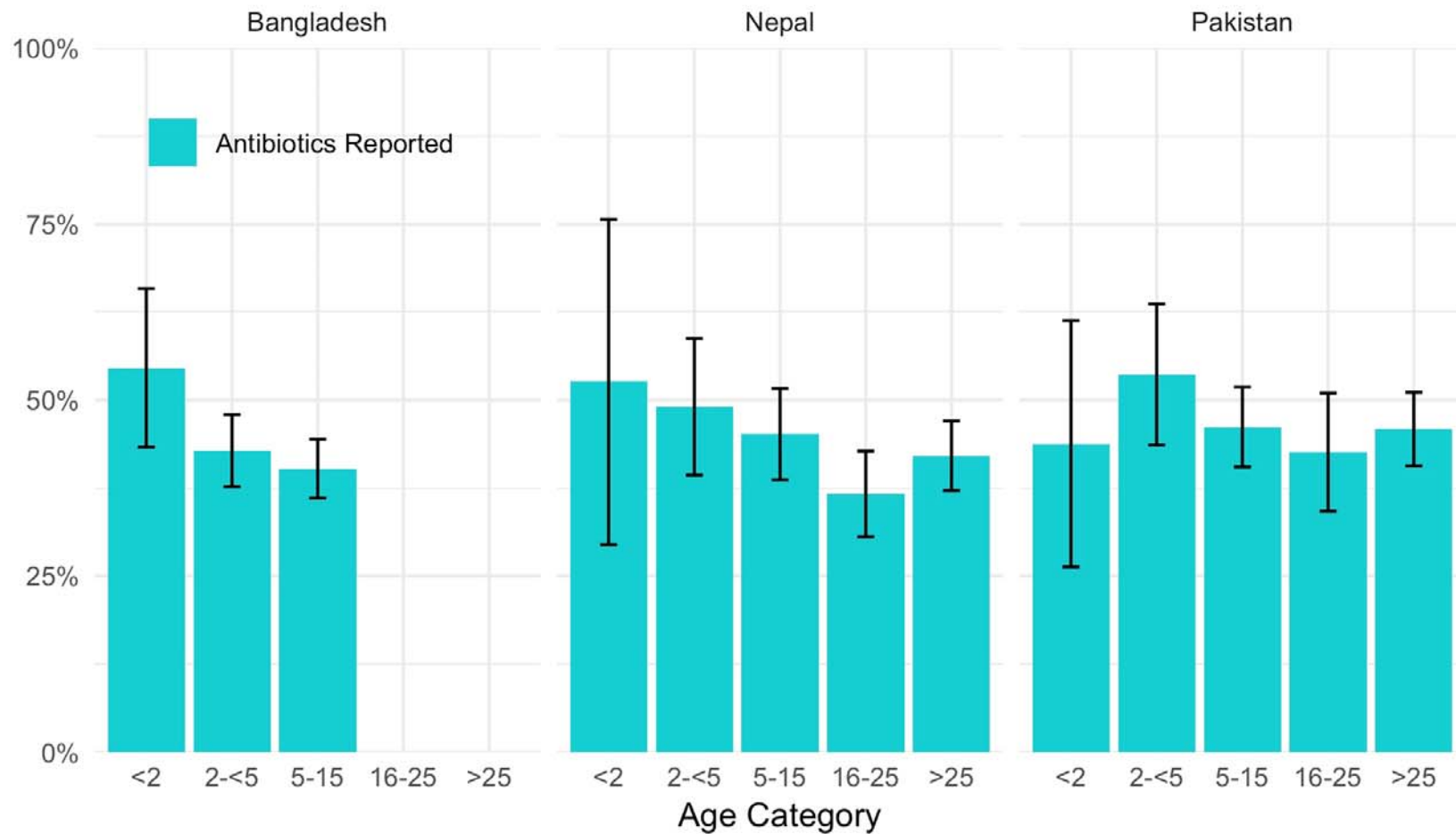
Results

Antibiotics detected in urine, by country and age group

Results

Results
Sensitivity and specificity of reporting antibiotic use with urine antibiotic detection as a reference

	SENSITIVITY	SPECIFICITY
BANGLADESH	0.79 (0.75, 0.83)	0.80 (0.77, 0.83)
NEPAL	0.79 (0.73, 0.83)	0.80 (0.77, 0.83)
PAKISTAN	0.58 (0.53, 0.62)*	0.67 (0.63, 0.72)*

*Pakistan sensitivity and specificity significantly different from Nepal and Bangladesh, p<0.0001

Results

Comparing antibiotic detected in urine and subsequent blood culture positivity
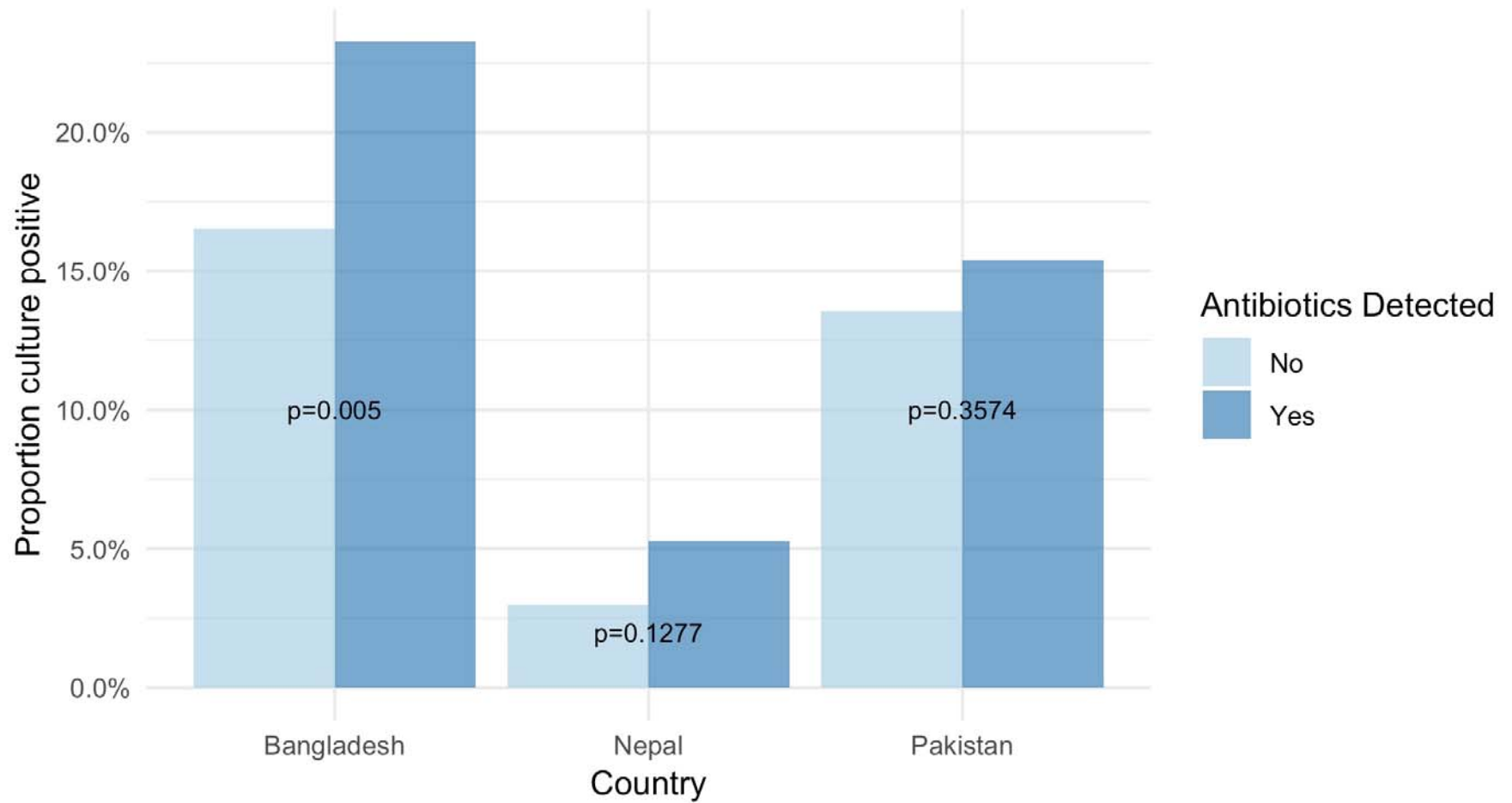
Limitations

- Unknown validity of the lab assay

- Unknown type of antibiotic used by patient prior to seeking medical care

- Time since reported antibiotic use

Conclusions

- Substantial pre-hospital antibiotic use in patients with suspected enteric fever

- Sensitivity and specificity of reported antibiotic use varies by setting

- Relationship between prior antibiotic use and subsequent blood culture positivity is unclear

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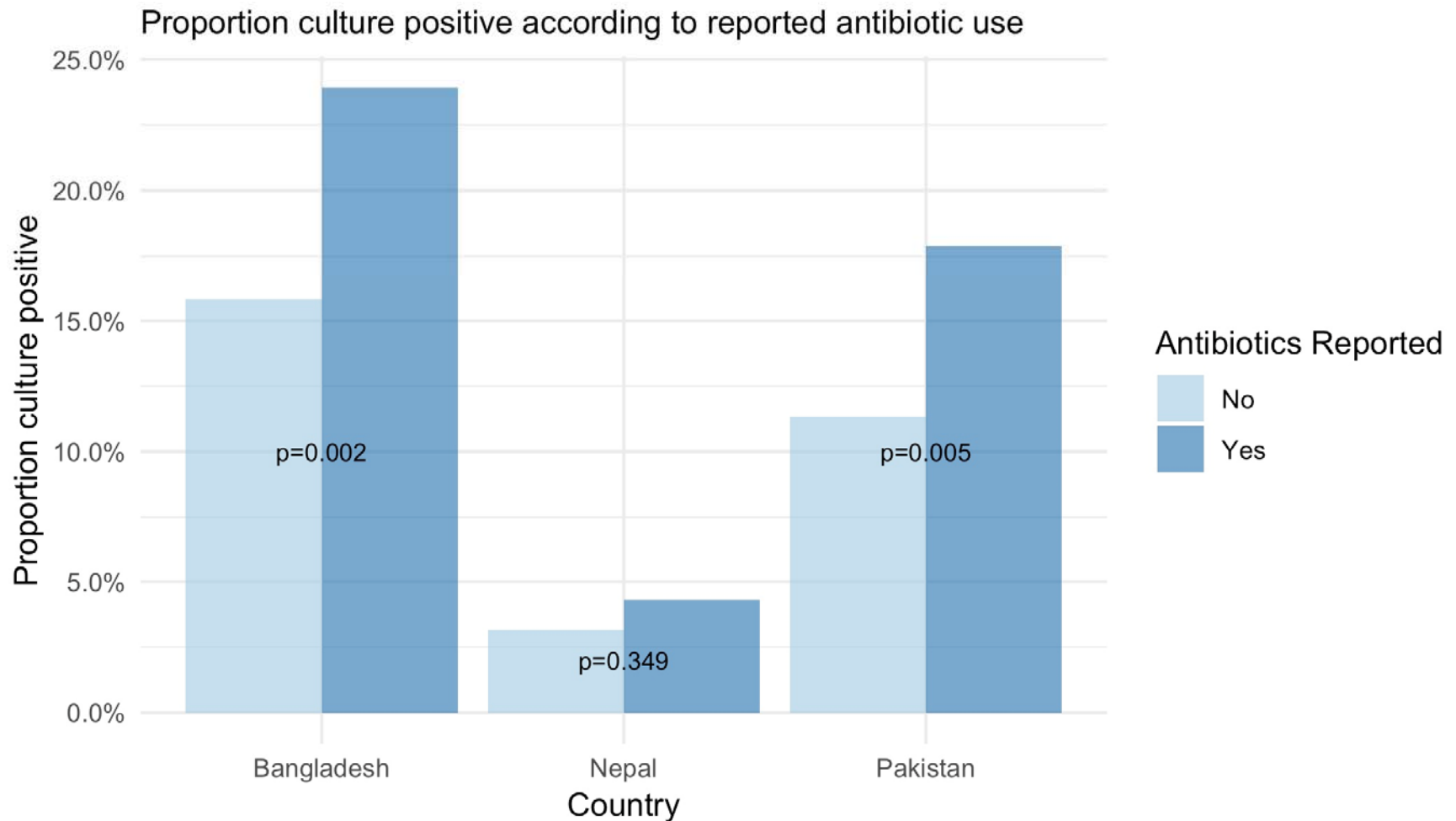 - Farah Qamar

- o Bangladesh team

- o Pakistan team

EXTRA SLIDES

Results

Comparing reported antibiotic use and subsequent blood culture positivity

3. Methods

SAMPLE SELECTION

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LAB PROCEDURE

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STATISTICAL METHOD

Reported Antibiotic use	Antibiotics detected in the urine Reference standard		Total
	Yes	No	
Yes	TP	FP	TP + FP
No	FN	TN	FN + TN
Total	TP + FN	FP +TN	

Sensitivity = TP/(TP+FN)

Specificity = TN/(FP+TN)

4. Results

Restricted to report by mother or father

	SENSITIVITY	SPECIFICITY
BANGLADESH	0.81 (0.76, 0.85)	0.80 (0.77, 0.83)
NEPAL	0.88 (0.79, 0.94)	0.66 (0.60, 0.72))
PAKISTAN	0.56 (0.49, 0.63)	0.63 (0.56, 0.70)

4. Results
Restricted to self report (Age >= 18)

	SENSITIVITY	SPECIFICITY
BANGLADESH	-	-
NEPAL	0.75 (0.68, 0.81)	0.73 (0.68, 0.77)
PAKISTAN	0.58 (0.52, 0.64)	0.74 (0.67, 0.80)

4. Results
Restricted to Age < 5

	SENSITIVITY	SPECIFICITY
BANGLADESH	0.79 (0.73, 0.85)	0.78 (0.73, 0.83)
NEPAL	0.57 (0.46, 0.67)	0.76 (0.55, 0.91)
PAKISTAN	0.52 (0.40, 0.65)	0.50 (0.37, 0.63)

4. Results

Restricted to Age 5 to <16

	SENSITIVITY	SPECIFICITY
BANGLADESH	0.81 (0.74, 0.86)	0.80 (0.76,0.84)
NEPAL	0.91 (0.81, 0.97)	0.70 (0.63, 0.77)
PAKISTAN	0.59 (0.51, 0.68)	0.66 (0.58, 0.73)