

# At a Glance: Surveillance for Enteric Fever in Asia Project (SEAP)



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10<sup>th</sup> International Conference on Typhoid and Other Invasive Salmonellosis  
Kampala, Uganda, April 4-6, 2017

# Outline

**Rationale**

**Objectives**

**Methods**

**Results**

**Summary**



# **Surveillance for Enteric Fever in Asia Project (SEAP)**

## **Rationale**

- **Address some shortcomings of previous studies and fill knowledge gaps**
  - **Population-based incidence rates**
    - ✓ **Burden on children under 2 years**
  - **Severity of illness and clinical complication rates**
  - **Case-fatality rates**
  - **Antimicrobial resistance patterns as it relates to clinical outcomes**
  - **Economic impact**
  - **Burden in peri-urban and rural areas**



# Objectives

## Characterize the burden of enteric fever in selected countries in Asia

- **Age-specific population-based adjusted incidence**
- **Risk factors for severe illness**
- **Long-term impact**
  - ✓ **Incidence of complications**
  - ✓ **Case-fatality rates**
- **Evolving patterns of antimicrobial resistance for *S. Typhi* and *Paratyphi***
- **Cost of illness: health care and societal perspective**
- **Explore the relationship, if any, between antimicrobial resistance, antimicrobials prescribed, and outcomes**

## Establish a biobank of *Salmonella* bacterial strains and plasma



# Methods

## Phase I

- Retrospective data collection to inform design of phase II
- Four countries: Bangladesh, Nepal, Pakistan, India

## Phase II

- September 2016 to August 2018
- Multi-country, multi-site, prospective, population-based surveillance

### Bangladesh

Dhaka Shishu Hospital (DSH)  
Shishu Sasthya Foundation  
Hospital

- ~15,000 blood cultures/year
- Serve the majority of Dhaka City population (~8.5M)
  - ~3.4M catchment area
  - Urban and peri-urban



### Nepal

Kathmandu Medical College and  
Teaching Hospital  
Dhulikhel Hospital

- ~5,000 blood cultures/year
- Serve the entire Kathmandu Valley (~2.5M)
  - ~330,000 catchment area
  - Urban, peri-urban and rural



### Pakistan

Aga Khan University Hospital  
Kharadar General Hospital  
National Institute of Child Health\*

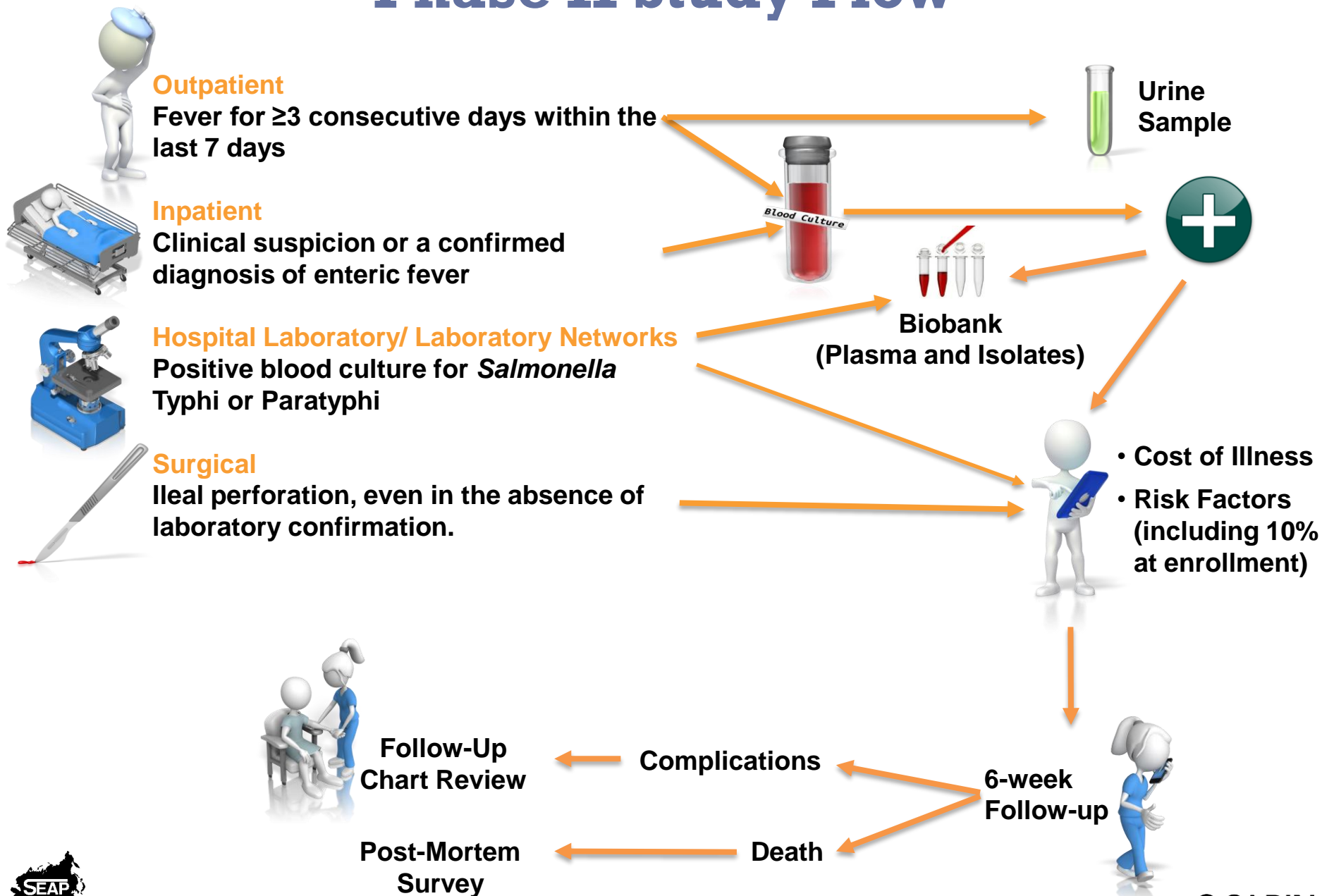
- ~38,000 blood cultures/year
- Serve the majority of Karachi population (~20M)
  - ~3M catchment area
  - Urban, peri-urban, slum settlements



# Phase II Components

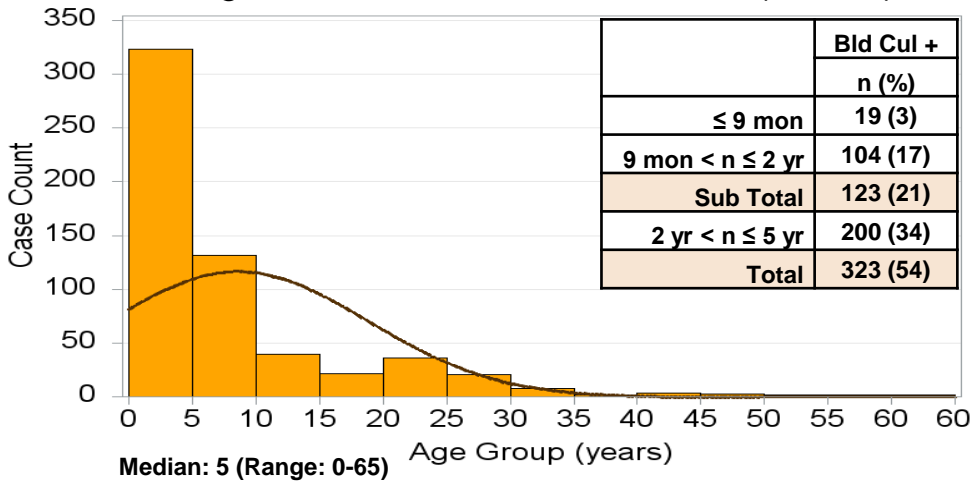


# Phase II Study Flow

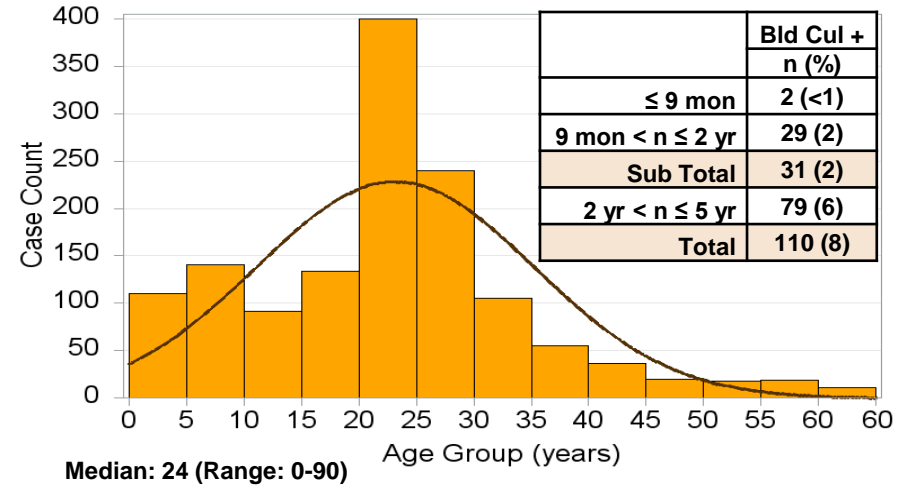


# Age Distribution of Confirmed Enteric Fever Cases Phase I and Phase II (n=5328)

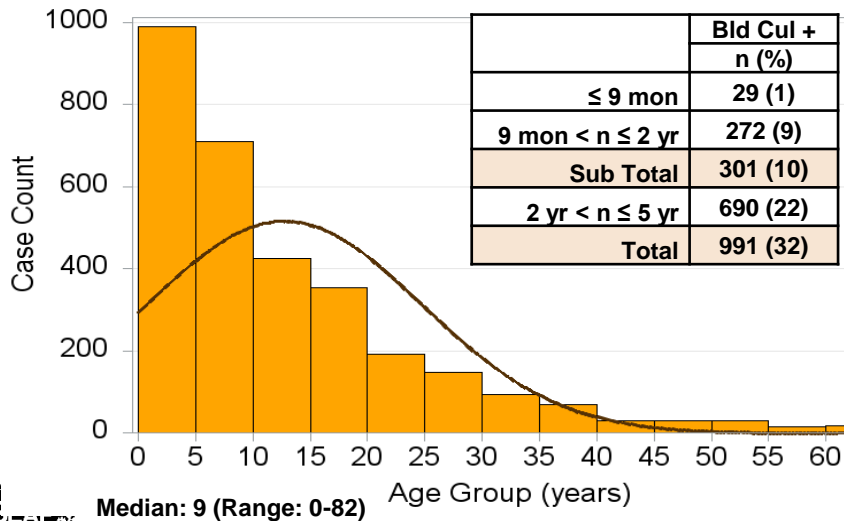
Bangladesh, 2013-2014, 2016-2017 (n= 597)



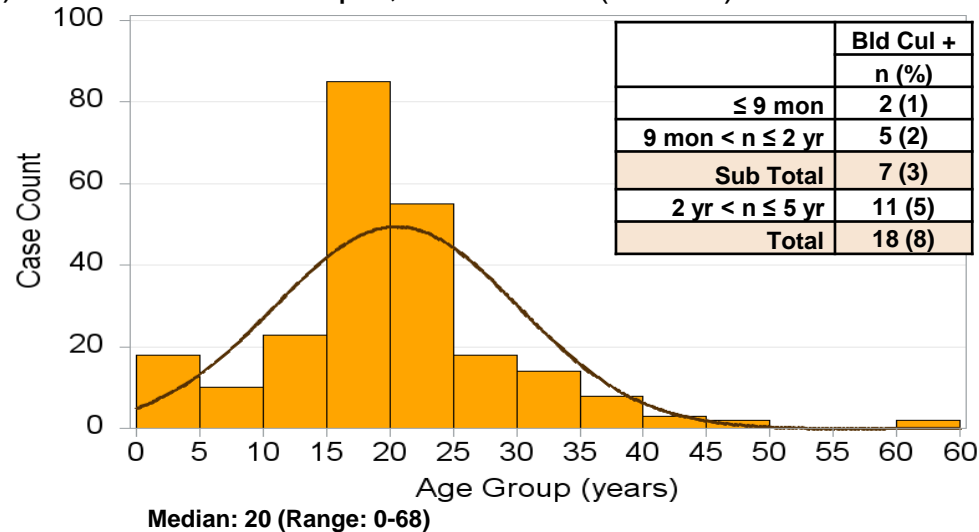
India, 2014-2015 (n= 1382)



Pakistan, 2012-2014, 2016-2017 (n= 3108)



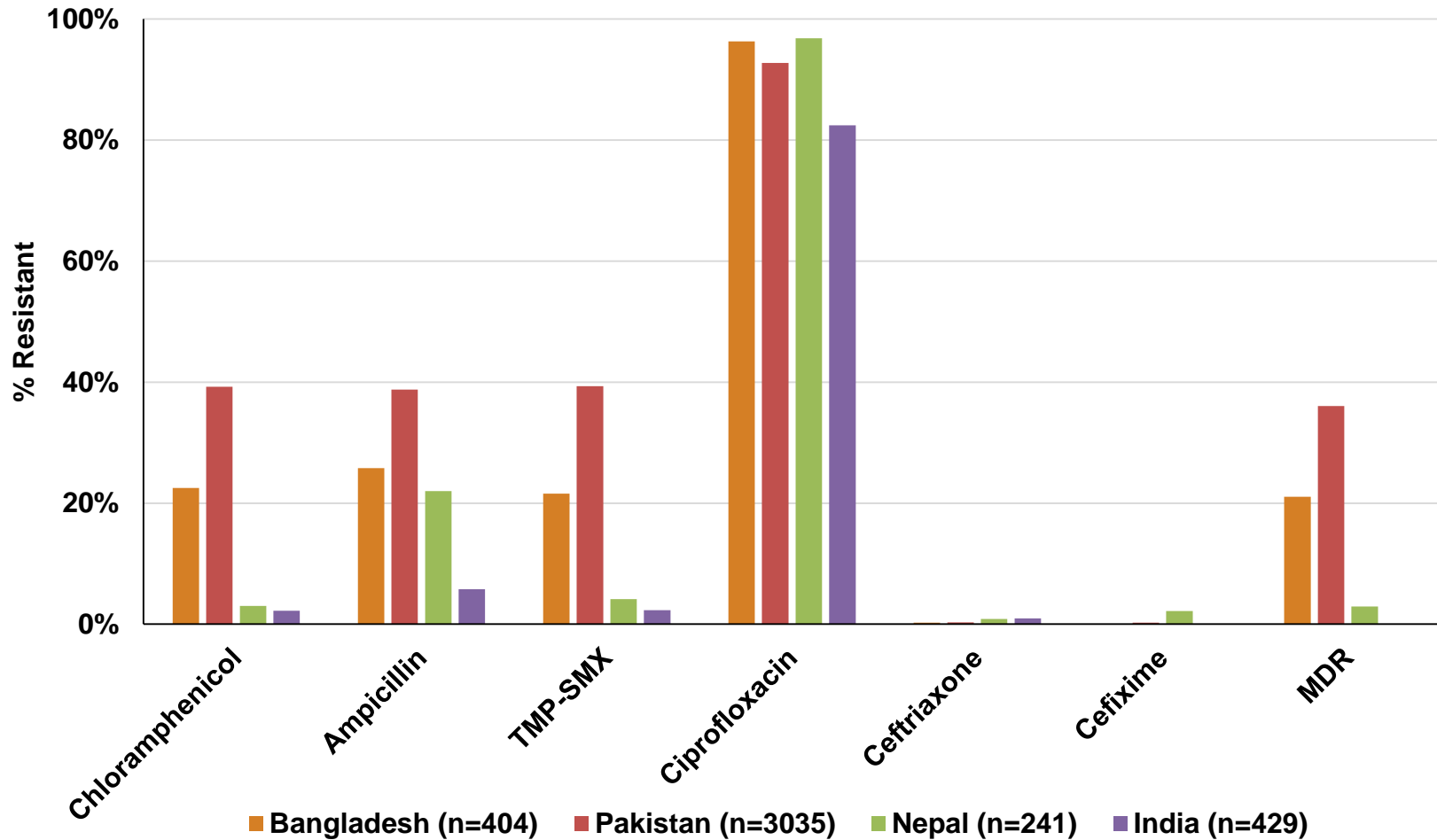
Nepal, 2013-2017 (n= 241)





# Antimicrobial Resistance by Country

## Phase I and Phase II (n=4109)



### MDR

- Resistant to Ampicillin OR Amoxicillin, AND
- Resistant to Chloramphenicol, AND
- Resistant to TMP-SMX



# Summary

**SEAP is a cost-effective surveillance approach that has collected patient-level data on >5,000 enteric fever cases from four countries**

- **Expected to enroll over 3500 cases prospectively (Phase II)**

**Phase II ongoing activities will:**

- **Identify high-risk populations who would benefit from prevention interventions**
- **Measure the individual and societal economic burden of typhoid**
- **Describe risk factors for typhoid including household water and sanitation practices**
- **Characterize the clinical outcomes and case-fatality rate in different settings and subpopulations**
- **Quantify the relationship between antimicrobial resistance and severe outcomes including mortality rates**
- **Provide baseline rate for assessing impact of future interventions**
- **Archive isolates and plasma for future use in a Biobank**



# Acknowledgements

## Site PIs

- Jason Andrews, Stanford University
- Farah Qamar, Aga Khan university
- Samir Saha, CHRF
- Dipika Sur (India, Phase I)

## Co-Investigators

- Kashmira Date, CDC
- Steve Luby, Stanford University

## Research staff at study sites

## Economists

- Taiwoo Abimbola, CDC
- Nelly Gonzales, CDC
- Sarah Pallas, CDC

## SETA

- Florian Marks, IVI

## Scientific Advisory Process for Optimal Research on Typhoid (SAPORT)

- Rob Breiman
- Bill MacWright
- Keriann Conway
- SAPORT Panel of Typhoid Experts

## Sabin Vaccine Institute

- Caitlin Barkume
- Bruce Gellin
- Ben Klekamp
- Sarah Lindsay



BILL & MELINDA  
GATES *foundation*

