

# Breaking Good: Making Science Great Again

**Robert Breiman**  
**Emory University**

*International Conference on Typhoid and Other Invasive Salmonellosis*  
*Kampala, Uganda April 6, 2017*

***Vision is not enough, it must be combined with venture.***

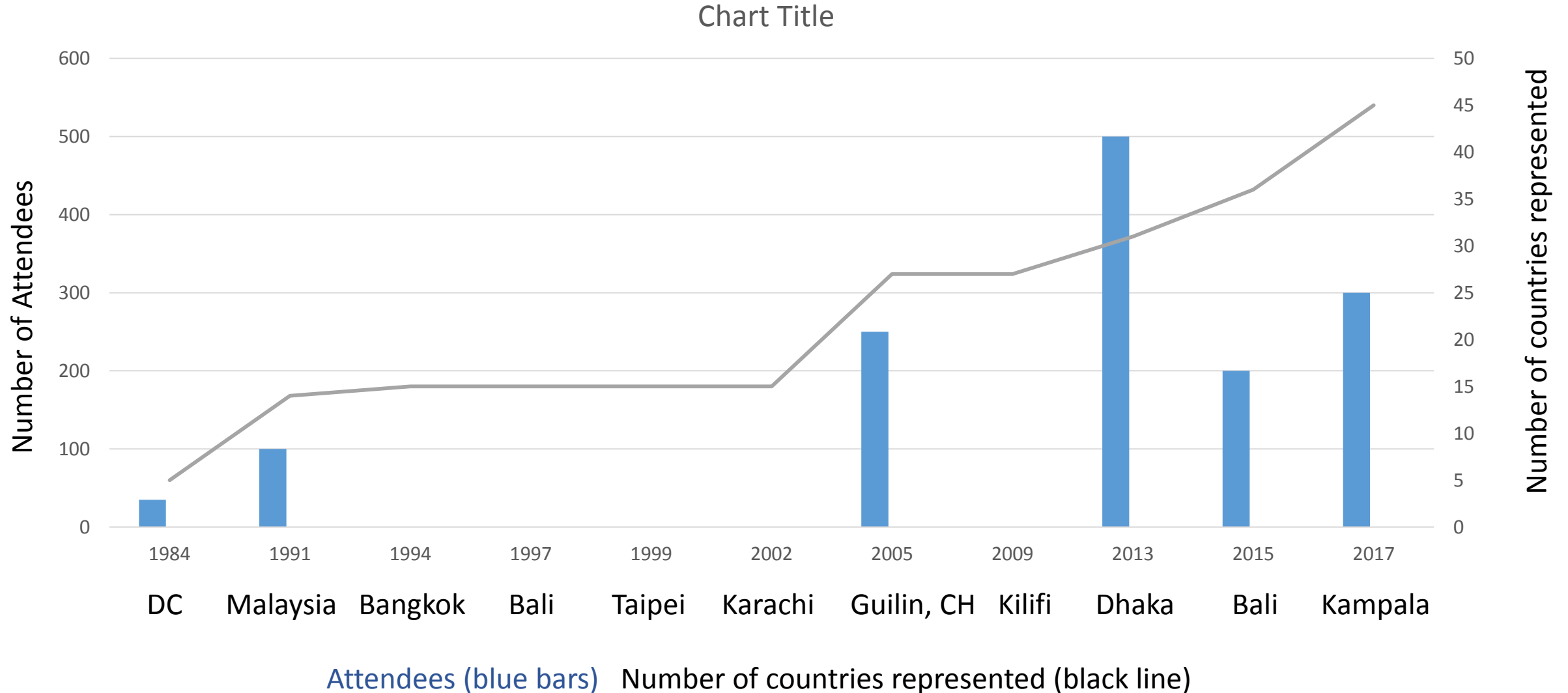
***It is not enough to stare up the steps, we must step up the stairs.***

*- Vaclav Havel*

# Evidence to Action

- **What additional evidence would be helpful to drive action?**
- **Which additional actors need to be engaged?**
- **What additional tools are needed?**

# International Symposia on Typhoid fever and Salmonellosis



# Then and Now—what hasn't changed much

Highlights from the 1991 meeting

## **Limitations of diagnostic tests a problem**

- **dependence on blood culture**
- **New tests on horizon (then it was EIA vs 52kDa protein and the potential for PCR)**
- **OMPs highlighted as potential tools for diagnostic assays**

**“The search continues for the one simple reliable and inexpensive test”**

**“Typhoid is mainly a disease of underprivileged people living under conditions of poor hygiene, sanitation, and education and may take a long time to eradicate completely.”**

**1<sup>st</sup> Int’l Symposium on Typhoid Fever**

# Persistent Theme

From the 2002 Karachi meeting

**“There should be surveillance of drug-resistant typhoid at a global level . . . as we know that determinants spread very easily across political and geographical boundaries”**

**Gordon Dougan**

# Then and Now—what has really changed

## Highlights from the 1991 meeting

### Molecular epidemiology/biology

Ribotyping-rRNA gene restriction patterns

PFGE subtyping

OMP studies with oligonucleotide probes; **WGS not an option**

### Treatment

Chloramphenicol was drug of choice

**Fluoroquinolone treatment discussed as effective, but too expensive!**

### Vaccine

Vi and Ty21A (with concerns on variable efficacy) were promoted for use

Whole cell vaccine widely used (especially in developing countries)

OMPs highlighted as potential vaccine candidates/**no mention of TCVs**

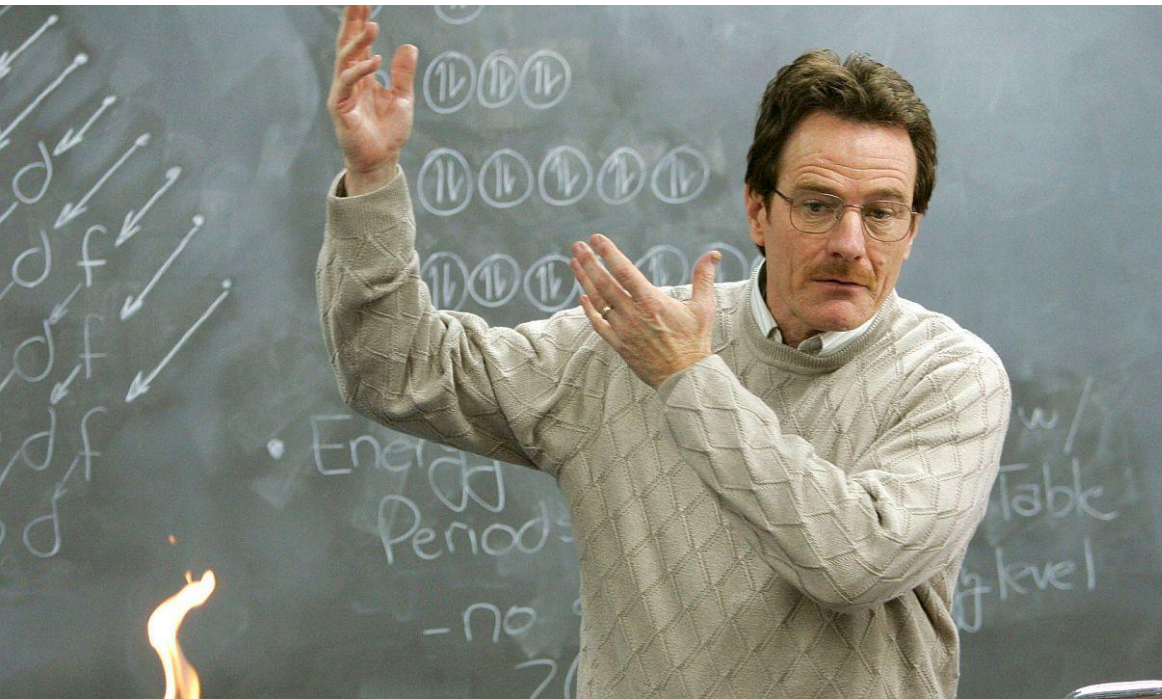
**Human challenge models now available to refine response to vaccines!**



# Focusing on Better Evidence and Tools to drive Action

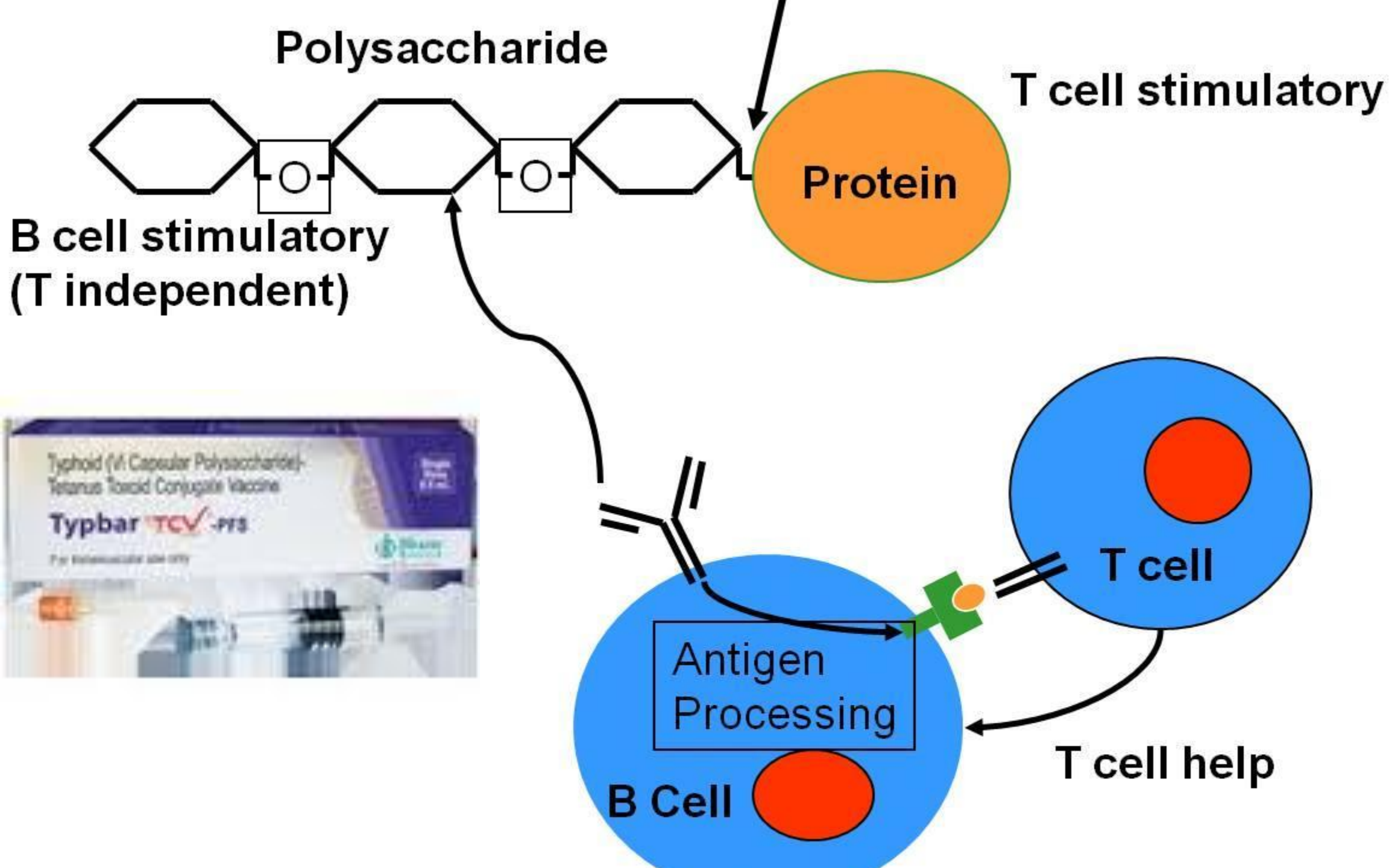


**Caveat—don't discount basic science which may not have current implementation relevance, but will lead to it!**



# Breaking Good? (Breaking Even Better)

- **Long hx of vaccine development with principle focus on prevention of illness in wealthier nations.**
- **Few “inequities vaccines,” primarily addressing infrastructure and systems failures and diseases affecting the poorest of the poor**



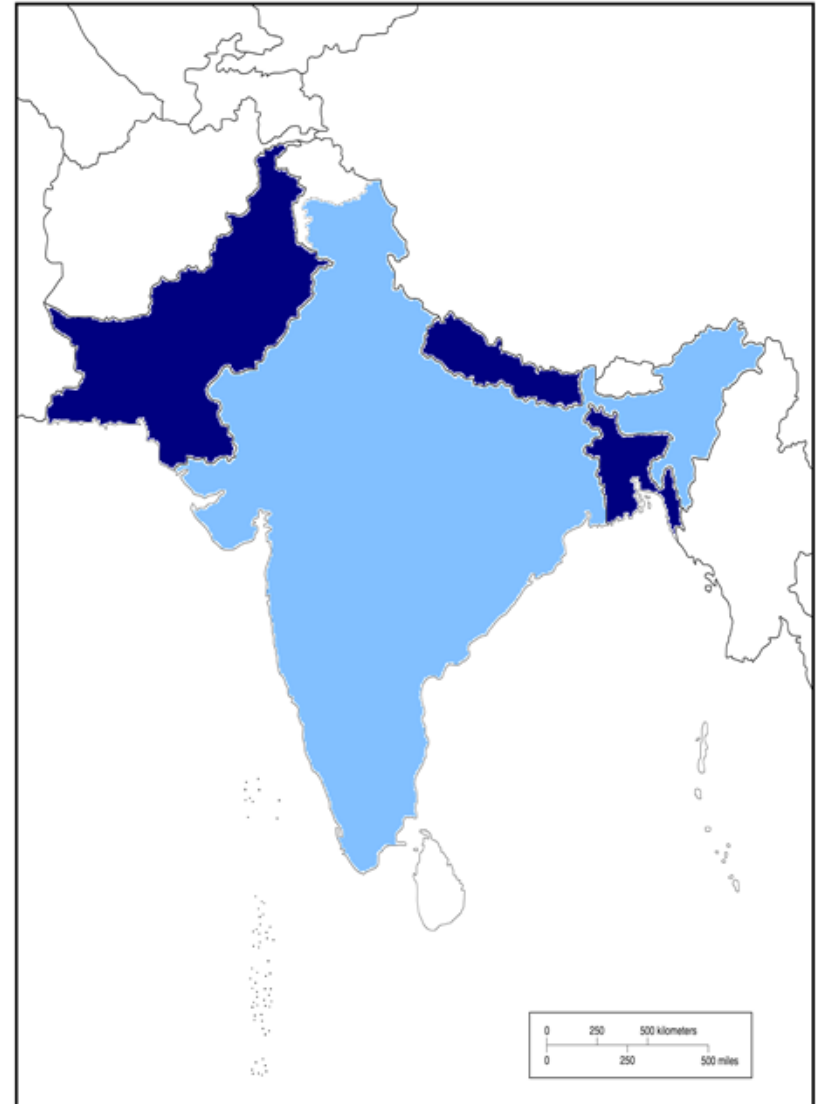




# SETA



# SEAP



# Characterizing Burden of Enteric Fever—SETA/SEAP

- Population-based adjusted incidence
- Risk factors for severe illness
- Incidence of complications
- Case-fatality rates
- Evolving patterns of antimicrobial resistance
- Cost of illness: health care and societal perspective
- *Explore relationship between antimicrobial resistance, antimicrobials prescribed, and outcomes*

Provide baseline rate for assessing impact of future interventions

Archive isolates and plasma for future use in a Biobank



# CHAMPS

Child Health and  
Mortality Prevention  
Surveillance

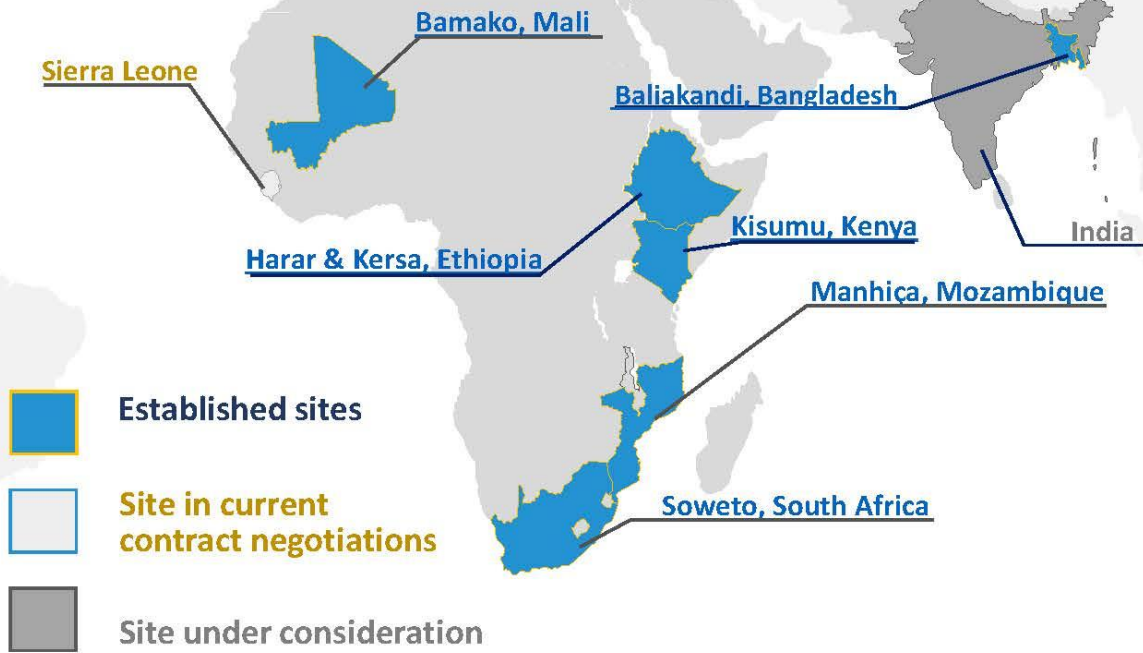
## COUNTRY SITE MAP

6M

CHILDREN  
UNDER 5 DIE  
EACH YEAR  
GLOBALLY

82%

of these deaths occur in  
**SUB-SAHARAN AFRICA  
+ SOUTH ASIA**



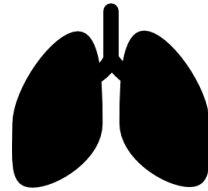




# Specimen Collection: Minimally Invasive Tissue Sampling



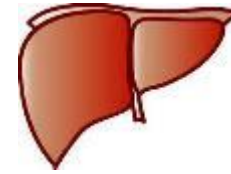
*Brain*



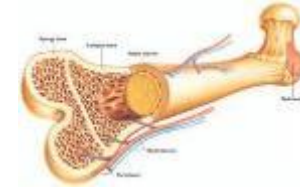
*Lung*



*Heart*



*Liver*



*Bone Marrow*



*Blood*



*CSF*



*Stool*



*NP/OP swab*

- **Abdominal approach - spleen / kidney**
- Placenta (P) , umbilical cord (U) if stillbirth or death immediately following birth
- Skin lesion if present and lymph node if palpable

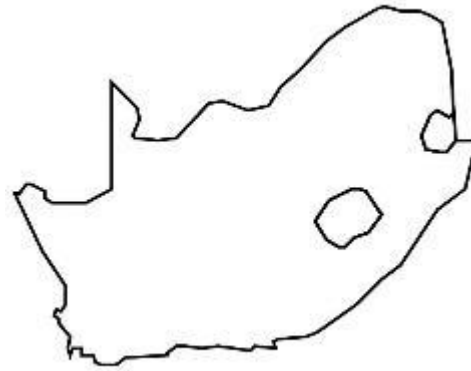
# CHAMPS Data to Action

CHAMPS data will help inform a range of public health decisions – including policy – to help save young lives.



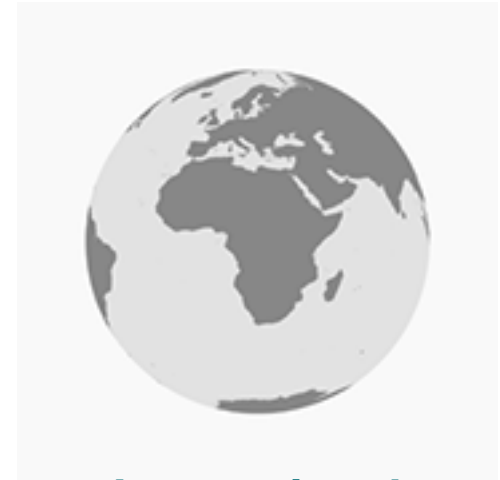
## Local

Households, communities, health clinics, local and traditional leaders



## National

Ministries of Health, National Public Health Institutes (NPHIs) – country ownership and sustainability



## International

Building partnerships and networks to disseminate data, share knowledge and catalyze action

# Evidence to Action

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# Evidence to Action

- **What additional evidence would be helpful to drive action?**
  - **Ensure that we can say about antimicrobial resistance is evidence driven—i.e. specter of a post-antibiotic era**
  - **Evaluate efficacy/effectiveness/impact of vaccines—TyVac!**
  - **What about environmental/sewage surveillance to help to fill in national/regional gaps from sentinel surveillance data?**
  - **Characterize increasing mobility of people making typhoid more “egalitarian”**



# Evidence to Action

**Which additional actors need to be engaged? (expanding the choir!)**

- **Local and Regional Champions!**
  - **Engage and involve National Public Health Institutes and corresponding MoHs**
  - **Work with up and coming local public health leaders (FETP, MSc, PhD students)**
- **The media—typhoid fever cases should spark concern/outrage**
- **Business community?**
- **Align with the growing Planetary Health/Resilient Cities movements**

# Evidence to Action

- **What additional tools are needed?**

- **Still need better diagnostic tests!**
- **More vaccine options/vaccine companies engaged—ensure supply, quality, and efficacy**
- **More “genetic epidemiology” to understand how S Typhi (and iNTS) moves around, changes, becomes more dangerous**
- **New treatment options**

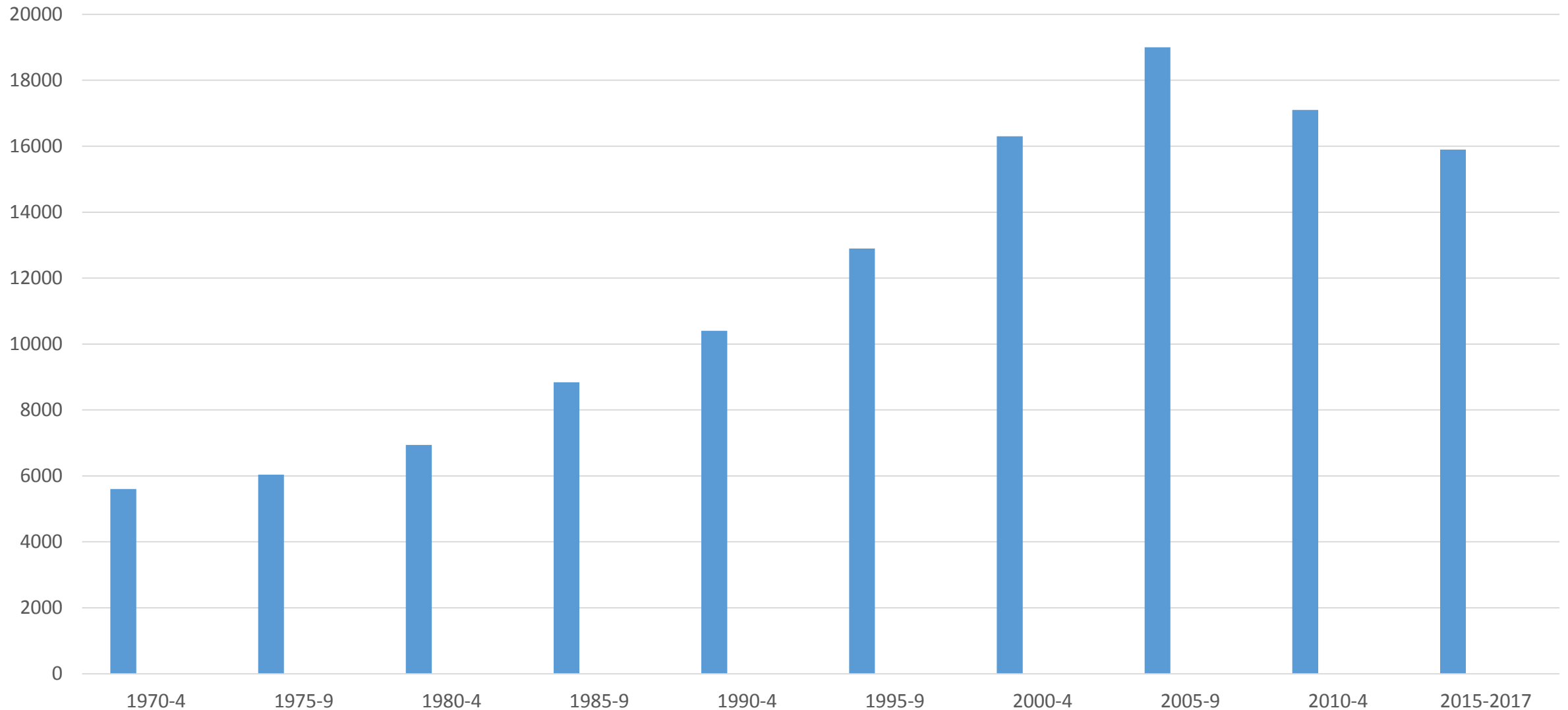


**Action speaks louder than  
words but not nearly as often.**

-- Mark Twain

**The stars are truly aligned for action on  
preventing typhoid.**

# Publications on typhoid/*S. Typhi*\*



\* caveat: From Google Scholar