Surveillance for Enteric fever in Asia Project (SEAP)

Kashmira Date
U.S. Centers for Disease Control and Prevention (CDC)

9th International Conference on Typhoid and Invasive Non-Typhoidal *Salmonella* Disease, Indonesia
May 1, 2015
ENTERIC FEVER IN ASIA
WHAT WE KNOW


<table>
<thead>
<tr>
<th>Year</th>
<th>World</th>
<th>Asia</th>
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<tr>
<td>1986</td>
<td>12.5 million</td>
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<td>2004</td>
<td>21.65 million typhoid, 5.41 million paratyphoid 216,500 typhoid deaths</td>
<td>10.1 million typhoid, 1.35 million paratyphoid 101,000 typhoid deaths</td>
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<td>2010</td>
<td>13 million enteric fever episodes</td>
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<td>2014</td>
<td>11.8 million typhoid cases, 128,000 typhoid deaths</td>
<td>8.6 million typhoid cases 93,000 typhoid deaths</td>
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## Antimicrobial Resistance Studies, 2007–2014

### Table 1
Antimicrobial resistance patterns of *Salmonella enterica* serovar Typhi and Paratyphi A isolated post 2007 in selected studies from Asia and Africa. Studies were selected where the number of isolates was at least 15 and where the resistance results could be divided by serovar.

<table>
<thead>
<tr>
<th>Country</th>
<th>Years</th>
<th>Serovar</th>
<th>No of isolates</th>
<th>% of isolates resistant to antimicrobial&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Chlor</th>
<th>Amp</th>
<th>Sxt</th>
<th>MDR</th>
<th>Cip&lt;sup&gt;KB&lt;/sup&gt;</th>
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“The majority of isolates were S. Typhi (59.6%). Over three years, the incidence of multidrug-resistant (MDR) S. Typhi remained high, ranging from 64.8%-66.0%, while MDR S. Paratyphi A decreased from 4.2% to 0.6%. Fluoroquinolone resistance increased for S. Typhi from 84.7% to 91.7%. Cefixime- and ceftriaxone-resistant S. Typhi were isolated in two children.


“An increase in isolation of MDR S. Typhi was noticed from 2009 (13.6%) to 2013 (25%). Isolation of NaR isolates remained constant (85%) in both the serovars throughout the study period and all NaR isolates were either CiR or showed DCS. Overall around 20% isolates of both the serovars were resistant to ciprofloxacin. Most of the study isolates were likely to be virulent due to the presence of virulence markers.”
Febrile Illness Surveillance Pyramid (Crump et al, 2003)

Figure. Febrile illness surveillance pyramid.
ENTERIC FEVER IN ASIA
WHAT WE DON’T KNOW
Enteric Fever Illness Pyramid

- Ill with enteric fever (acute febrile illness)
- Ill with enteric fever who seek care at outpatient clinics
- Ill with enteric fever severe enough to be admitted to a hospital
- Ill with enteric fever who develop complications
- Ill with severe and complicated enteric fever
- Enteric fever deaths
SURVEILLANCE FOR ENTERIC FEVER IN ASIA PROJECT (SEAP)
Goals

- Use sentinel surveillance sites for enteric fever
- Address shortcomings of previous studies and knowledge gaps through collection and synthesis of existing and prospective information on enteric fever
- Inform global policy recommendations and pave the way for typhoid fever conjugate vaccine use and the development of next generation enteric fever vaccines
Objectives

- **Primary**
  - Estimate the population-burden of enteric fever - disease incidence, severity and mortality stratified by geography, age group, health care access, organism and antimicrobial resistance in selected Asian countries.

- **Secondary**
  - Develop and test epidemiologic tools (rapid assessment tools) to estimate community burden of enteric fever (typhoid/paratyphoid) in other non-SEAP sites.
  - Characterize enteric fever severity and mortality from hospital-based data and long term follow-up of confirmed enteric fever cases.
  - Based on available clinical information, identify proxy indicator(s) for enteric fever severity in the Asian population.
Partners

- Funded by the Bill and Melinda Gates Foundation
- SEAP HQ team: Sabin Vaccine Institute (SVI), US Centers for Disease Control and Prevention (CDC)
- Consultants: Stanford University; Hospital for Sick Children (Canada)
- World Health Organization

Sites
- Dhaka, Bangladesh: Child Health Research Foundation and Dhaka Shishu hospital
- Karachi, Pakistan: Aga Khan University
- Kathmandu, Nepal: Group for Technical Assistance
- India: To be determined
- Indonesia: To be determined

Scientific Advisory Panel for SEAP and a similar project in Africa (SETA/TSAP-II): Emory Global Health Institute with 7 experts from different organizations
SEAP Implementation Plans (1)

- **Phase I (9–12 months)**
  - Form a local stakeholder committee on enteric fever control and prevention, involving stakeholders from all relevant governmental and non-governmental sectors including health, water and sanitation
  - Assess health facilities and select surveillance sites (sentinel site)
  - Determine the catchment population
  - Conduct retrospective review of existing data (if and where available) at the selected health facilities
  - Conduct a community-based health care utilization survey to assess health seeking behaviors
SEAP Implementation Plans (2)

- **Phase 2 (24 months)**
  - Establish standardized enrollment criteria, case definitions and laboratory protocols
  - Collect prospective information on enteric fever cases, clinical and laboratory-confirmed, who seek health care (outpatient and inpatient [medical/pediatric/surgical] facilities)
  - Conduct a second health care utilization survey
  - Conduct longer-term follow-up of severe enteric fever cases to characterize long-term sequelae (under discussion)
  - Conduct a cost of illness study to estimate the economic impact of enteric fever on the health system and society (under discussion)
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  - Mahesh Puri
  - Kshitij Karki
  - GTA colleagues

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  - Maksuda Islam
  - Arif Tanmoy
  - Jamal Uddin
  - Shampa

- **SEAP-Pakistan team**
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  - Tahir Yousafzai
  - Shazia Sultana

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  - Debbi Burgess
  - Duncan Steele
  - Zoey Diaz
  - Megan Carey

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  - Sabin Vaccine Institute
    - Imran Khan
    - Nicole Bradstreet
    - Stacy Davlin

  - CDC - Atlanta
    - Kathleen Wannemuehler
    - Matthew Mikoleit

  - Stanford University
    - Steve Luby

  - Hospital For Sick Children
    - Zulfiqar Bhutta

  - WHO
    - Adwoa Bentsi-Enchill

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  - Se Eun Park
  - Vittal Mogasale
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