Out of Sight, Out of Mind - Typhoid Fever Surveillance and Response in Africa

8th Symposium on Invasive Salmonelloses, March 2, 2013, Eric Mintz, MD, MPH
Outline

• Prevalence of fever in Africa
• Prevalence of typhoid fever in Africa
• Enteric fever among visitors to Africa
• Outbreaks of typhoid fever in Africa
• Antimicrobial susceptibility of *S. Typhi* in Africa
Acute respiratory illness, diarrhea, and fever in the past 2 weeks, western Kenya, 2005 (n=6,223)

- Acute respiratory illness (6.1%)
- Diarrhea (6.3%)
- Fever (24.4%)

Acute respiratory illness, diarrhea, and fever in the past 2 weeks, Nairobi, Kenya, 2005 (n=8,580)

Acute respiratory illness (7.7%)

Fever (17.0%)

Diarrhea (10.5%)


- *Salmonella* Typhi isolated by blood culture from
  - 10.4% of patients presenting with fever
  - 7.7% of patients presenting with ARI
- Crude rate = 247 cases per 1,000,000 person years
- Highest rates in children
  - 5-9 years old (596 per 100,000 pyo)
  - 2-4 years old (521 cases per 100,000 pyo)
- Crude rate in Lwak only 29 per 100,000 pyo

Crude incidence in Africa:  
50 cases per 100,000 people per year

Global adjusted total:  
21.5 million illnesses  
200,000 deaths

Estimated Burden of Typhoid Fever, 2010

• Global adjusted total
  – 26.9 million episodes of typhoid fever

• Africa
  – Crude incidence of 362 cases per 100,000 persons per year

Typhoid fever and paratyphoid fever: systematic review to estimate global morbidity and mortality, for 2010
Revised Map of Typhoid Fever Incidence, 2010

*Not adjusted for blood culture sensitivity

Brian Maskery and colleagues, International Vaccine Institute, Unpublished Data
Progress on drinking water and sanitation: 2012 update (WHO/UNICEF Joint Monitoring Program)
Coverage with Improved Water Sources by Region, 2010

Progress on drinking water and sanitation: 2012 update (WHO/UNICEF Joint Monitoring Program)
Progress towards MDG for Sanitation by Country, 2010

ON TRACK: Coverage rate in 2010 was >95% or was within 5% of the 2010 rate required to meet the target

PROGRESS BUT INSUFFICIENT: Coverage rate in 2010 was between 5% and 10% of the 2010 rate required to meet the target

NOT ON TRACK: Coverage rate in 2010 was the same or lower than the rate in 1990 or below 10% of the 2010 rate required to meet the target

INSUFFICIENT DATA OR NOT APPLICABLE: Data were unavailable or insufficient to estimate trends or a progress assessment was not applicable

Progress on drinking water and sanitation: 2012 update (WHO/UNICEF Joint Monitoring Program)
Coverage with Improved Sanitation by Region, 2010

Progress on drinking water and sanitation: 2012 update (WHO/UNICEF Joint Monitoring Program)
Typhoid Fever in Travelers, 1996 -2011

• GeoSentinel network of 57 travel and tropical medicine clinics in 26 countries
• Identified 3,655 patients with acute, life-threatening febrile illnesses
  – 428 (11.7%) had typhoid fever
  – 233 (6.4%) had paratyphoid fever
• About half of all patients with enteric fever were hospitalized; none died

Cases of selected acute life-threatening diseases by exposure region among travelers to the tropics, 1996-2011 (n=82,825)

Typhoid Fever Outbreaks in ProMED, 1994 - 2013

- Search yielded 223 matches → 106 events
- 38 (36%) reported typhoid outbreaks in Africa
  - 1994-2000 = 1 (1 country)
  - 2001-2007 = 23 (10 countries)
  - 2008-2013 = 13 (8 countries)
- Reported cases ranged from 1 to 42,564
- Reported deaths ranged from 0 – 50
- Recent outbreaks occurred in urban settings (Lusaka, Zambia and Harare, Zimbabwe)
Typhoid Fever Outbreaks in ProMED, 1994 - 2013
### Characteristics of Selected Outbreaks of Typhoid Fever in Africa

<table>
<thead>
<tr>
<th>Country</th>
<th>Dates</th>
<th>Cases</th>
<th>Severity</th>
</tr>
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<tbody>
<tr>
<td>DRC</td>
<td>10/2004 - 1/2005</td>
<td>42,564 (ProMED)</td>
<td>Int. Perf. 4.6%</td>
</tr>
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<td></td>
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<td>CFR 1% (WHO)</td>
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<tr>
<td>Uganda</td>
<td>12/2007 – 7/2009</td>
<td>577 – 24,900</td>
<td>Int. Perf. ~ 5% - 8%</td>
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<tr>
<td></td>
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<td>Outbreak is ongoing</td>
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</tbody>
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Global Burden of Typhoid Resistance

Figure: Global distribution of antimicrobial resistance in typhi (1990–2004)
Adapted from Parry and colleagues* and updated on basis of data from past 3 years.

### Evolution of Antimicrobial Resistance among S. Typhi Strains in Uganda

<table>
<thead>
<tr>
<th>Dates</th>
<th>Number</th>
<th>% Pan Suscept</th>
<th>% MDR</th>
<th>% Nal R &amp; Cip I</th>
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<tbody>
<tr>
<td>March-April, 2009</td>
<td>21</td>
<td>19</td>
<td>76</td>
<td>0</td>
</tr>
<tr>
<td>Oct – Dec, 2011</td>
<td>18</td>
<td>11</td>
<td>83</td>
<td>6</td>
</tr>
<tr>
<td>Aug – Oct, 2012</td>
<td>7</td>
<td>14</td>
<td>71</td>
<td>86</td>
</tr>
</tbody>
</table>
Evolution of Antimicrobial Resistance among *S. Typhi* Strains in Africa

- No systematically collected data available
- Some data from individual sites
  - Nalidixic acid resistance and DCS in DRC
  - NAR and DCS in Kibera, Kenya
  - Abuja, Nigeria ~ 2-3% NAR
  - Agogo, Ghana NAR strains detected.
- Widespread FQ-resistance likely to follow
Thank you

The findings and conclusions in this presentation are those of the author and do not necessarily represent the views of the Centers for Disease Control and Prevention
Projected Urbanization in Africa, 2010 - 2025

The urbanization of Africa: growth areas. Graphic Detail, The Economist, December 13, 2010