Typhoid Fever in Samoa

A Burden of Disease Assessment

8th International Conference on Typhoid Fever & other Invasive Salmonelloses
1st - 2nd March 2013, Pan Pacific Sonargaon
Dhaka, Bangladesh

T K Naseri., MPH, MB BS
Ministry of Health
Samoa
Independent State of Samoa
(Country Brief)

• Total Population: ~200,000 (2011 Census)
• Land mass: 2,934 sq.km
• Consist of
  2 main islands: Upolu & Savaii
  2 smaller islands: Apolima & Manono
  5 uninhabited islets
• Land is volcanic with mountainous interiors, coastal plains where the majority of the population reside
• Tropical climate: rainy season from Nov.- April
• Nearly $\frac{3}{4}$ of population reside on Upolu with a significant concentration around the capital of Apia
• Life Exp. at birth is 68 yrs for males, 70 yrs for females.
Healthcare Service Providers

- National Health Service (NHS)
  - 2 main hospitals:
    - Tupua Tamasese Meaole (TTM Hosp.-Upolu)
    - Malietoa Tanumafili II (MT II hosp.- Savaii)
  - 4 district-level hospitals
  - 8 health centres
  - only TTM & MT II are staffed by doctors, rest are by nurses (appr. Referral System)

- 1 Doctor: 2,442 local inhabitants,
- 1 Nurse : 746 inhabitants
SITUATIONAL ANALYSIS

• **Demographic Issues**: Urbanisation, Aging Population.
• **Political issues**: IHR, WTA, Legislation, SDS
• **Changing Disease Patterns**: NCDs, EID, Re-EID
• **Health Service Delivery Issues**: HIS, Surv. Syst, Prev. & Curative Care,
• **Health Workforce Issues**: spec. training, pay, short staff
NATIONAL STRATEGY FOR THE DEVELOPMENT OF SAMOA (SDS) 2008 – 2012

• **Vision**: “Improved Quality of Life for All”

• set out through seven national development goals,

• fall under the three priority areas:
  - economic policies,
  - social polices
  - public sector management and environmental sustainability.
NATIONAL STRATEGY FOR THE DEVELOPMENT OF SAMOA (SDS) 2012 – 2015

• **Priority Area 1: Economic Policies**
  Goal 1: Sustained Macroeconomic Stability
  Goal 2: Private Sector Led Economic Growth and Employment Creation

• **Priority Area 2: Social Policies**
  Goal 3: Improved Education Outcomes
  **Goal 4: Improved Health Outcomes**
  Goal 5: Community Development: Improved Economic and Social Wellbeing and Improved Village Governance

• **Priority Area 3: Public Sector Management and Environmental Sustainability**
  Goal 6: Improved Governance
  Goal 7: Environmental Sustainability and Disaster Risk Reduction.
Typhoid in Samoa
Burden of Disease Assessment

Eric Nilles¹, Silpa Gadiraju², Tile Ah Leong-Lui³, Toleafoa Take Naseri³, Jacob Kool¹

¹ Emerging Disease Surveillance and Response Unit, Division of Pacific Technical Support, World Health Organization, Suva, Fiji

² Division of Global Health, Department of Emergency Medicine, Yale University School of Medicine, New Haven, CT, USA

³ National Disease Surveillance & IHR Division Ministry of Health, Apia, Samoa(Western)
Clinical Features

• Variable clinical picture!
  – From very mild to very severe
  – Clinical diagnosis is very difficult
  – 60-90% do not get medical attention or are treated as outpatients
  – Young patients (<4) are often atypical, but highest case-fatality
Clinical typhoid fever cases
Samoa, 1993-2011

YEAR

CASES

0 200 400 600 800 1000 1200 1400
Typhoid fever cases
Samoa, 2009-11
Rationale

• Despite ongoing control and prevention activities by the Samoa MOH, typhoid remains a serious public health threat
• Discussion between MOH and WHO on typhoid vaccination and control options
• First step: Need to systematically assess and describe the burden of typhoid
  – Inform optimal control strategies
  – Provide evidence for resource mobilization
  – Establish baseline for monitoring and evaluation
Assessment goal

To provide information for decision makers on the typhoid burden of disease in Samoa
Specific Objectives

Objective 1:
• To provide a **reliable estimate of the typhoid fever burden of disease** in Samoa, and describe the epidemiology, using available laboratory and clinical data.

Objective 2:
• Review, propose, and help initiate, as feasible, **typhoid fever control strategies**, including, potentially, **vaccination programs**.
Typhoid burden of disease assessment

Methods

• Analyzed blood culture and clinical data for 12 month period
  – 1 July 2010 – 30 June 2011

• Developed a typhoid burden of disease model
  – Blood culture data
  – Hospitalization data
  – Rapid assessment tool data
Typhoid burden of disease assessment
Results

<table>
<thead>
<tr>
<th>Disease burden assessment tool</th>
<th>Preliminary estimated cases</th>
<th>Sensitivity analysis adjustment factor (range)</th>
<th>Projected total cases</th>
<th>Projected cases per 100,000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total</td>
<td>Lower limit</td>
</tr>
<tr>
<td>Blood culture</td>
<td>212</td>
<td>1.5 (1.0-2.0)</td>
<td>318</td>
<td>212</td>
</tr>
<tr>
<td>Typhoid Rapid Assessment Tool</td>
<td>593</td>
<td>1.0 (0.5-2.0)</td>
<td>593</td>
<td>297</td>
</tr>
<tr>
<td>Hospital incidence rate*</td>
<td>73</td>
<td>6.25 (2.5-10.0)</td>
<td>456</td>
<td>183</td>
</tr>
<tr>
<td>Final combined estimates</td>
<td></td>
<td></td>
<td>456</td>
<td>230</td>
</tr>
</tbody>
</table>

* Date from Upolu only
## Typhoid burden of disease assessment

### Results

<table>
<thead>
<tr>
<th>Disease burden assessment tool</th>
<th>Sensitivity analysis adjustment factor (range)</th>
<th>Projected cases per 100,000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Total</td>
</tr>
<tr>
<td>Blood culture</td>
<td>1.5 (1.0-2.0)</td>
<td>171</td>
</tr>
<tr>
<td>Typhoid Rapid Assessment Tool</td>
<td>1.0 (0.5-2.0)</td>
<td>319</td>
</tr>
<tr>
<td>Hospital incidence rate*</td>
<td>6.25 (2.5-10.0)</td>
<td>321</td>
</tr>
<tr>
<td>Final combined estimates</td>
<td></td>
<td>270</td>
</tr>
</tbody>
</table>

* Date from Upolu only
## Typhoid burden of disease

### Results

<table>
<thead>
<tr>
<th>Age group (years)</th>
<th>S. Typhi isolated</th>
<th>Percentage of S. Typhi isolated by age group</th>
<th>Any bacteria isolated</th>
<th>Percentage of all culture isolates that were S. Typhi</th>
<th>Total blood cultures reported*</th>
<th>Percent of total cultures from which S. Typhi was isolated</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;2</td>
<td>2</td>
<td>1.9%</td>
<td>28</td>
<td>7.1%</td>
<td>174</td>
<td>1.1%</td>
</tr>
<tr>
<td>2-4</td>
<td>5</td>
<td>4.8%</td>
<td>19</td>
<td>26.8%</td>
<td>121</td>
<td>4.1%</td>
</tr>
<tr>
<td>5-9</td>
<td>16</td>
<td>15.4%</td>
<td>35</td>
<td>45.7%</td>
<td>193</td>
<td>8.3%</td>
</tr>
<tr>
<td>10-14</td>
<td>16</td>
<td>15.4%</td>
<td>31</td>
<td>51.6%</td>
<td>171</td>
<td>9.4%</td>
</tr>
<tr>
<td>15-19</td>
<td>18</td>
<td>17.3%</td>
<td>36</td>
<td>50.0%</td>
<td>149</td>
<td>12.1%</td>
</tr>
<tr>
<td>20-24</td>
<td>12</td>
<td>11.5%</td>
<td>37</td>
<td>32.4%</td>
<td>206</td>
<td>5.8%</td>
</tr>
<tr>
<td>25-29</td>
<td>11</td>
<td>10.6%</td>
<td>27</td>
<td>40.7%</td>
<td>167</td>
<td>6.6%</td>
</tr>
<tr>
<td>30-34</td>
<td>4</td>
<td>3.8%</td>
<td>14</td>
<td>28.6%</td>
<td>122</td>
<td>3.3%</td>
</tr>
<tr>
<td>35-39</td>
<td>6</td>
<td>5.8%</td>
<td>19</td>
<td>31.6%</td>
<td>127</td>
<td>4.7%</td>
</tr>
<tr>
<td>40-44</td>
<td>4</td>
<td>3.8%</td>
<td>25</td>
<td>16.0%</td>
<td>104</td>
<td>3.8%</td>
</tr>
<tr>
<td>&gt;45</td>
<td>6</td>
<td>5.8%</td>
<td>151</td>
<td>4.0%</td>
<td>689</td>
<td>0.9%</td>
</tr>
<tr>
<td>No age data</td>
<td>4</td>
<td>3.8%</td>
<td>20</td>
<td>20.0%</td>
<td>112</td>
<td>3.6%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>104</strong></td>
<td><strong>100%</strong></td>
<td><strong>442</strong></td>
<td><strong>23.5%</strong></td>
<td><strong>2335</strong></td>
<td><strong>4.5%</strong></td>
</tr>
</tbody>
</table>

*There were no result reported for 46 blood cultures (45 from Upolu, 1 from Savaii). These cultures were excluded from analysis.*
S. Typhi positive blood cultures by age group, Samoa, July 2010-June 2011
Percent positive blood cultures by age group, Samoa, July 2010-June 2011

[Bar chart showing positive blood cultures by age group from 0-4 to 45-49, with percentages of S. typhi and any organism for each age group.]
## Economic cost of typhoid in Samoa from 2006-11

<table>
<thead>
<tr>
<th></th>
<th>Typical cost/case (USD)</th>
<th>Typical cost/case (Tala)</th>
<th>Number of cases (2006-11)</th>
<th>Total cost (USD)</th>
<th>Total cost (Tala)</th>
<th>Tala per year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospitalized cases</td>
<td>$450</td>
<td>1039</td>
<td>1151</td>
<td>$520,000</td>
<td>1.2 million</td>
<td>240,000</td>
</tr>
</tbody>
</table>

* DOMI Project: The use of typhoid vaccines in Asia: the DOMI experience. CID, 2007
Conclusions

• Estimate rate is 270 cases/100,000/year
  – Range 134-460/100,000/yr
  – High endemic is defined as >100/100,000/yr
  – On a few countries globally have reported higher rates

• Typhoid fever is a serious public health threat in Samoa requiring a committed and coordinated response.
Recommendations

• Establish a **typhoid fever vaccination taskforce** to develop a vaccination proposal.

• Potential strategies exist including:
  – Mass vaccination (with injectable Vi vaccine) of the entire population greater than 2 years of age
  – Mass vaccination (with injectable Vi vaccine +/- Ty21a oral vaccine) of identified high risk areas and age groups
  – **Introduction of childhood vaccination program (with the Ty21a oral vaccine)** at primary school entry and exit
  – Routine immunization (with Vi or Ty21a vaccines) in specific groups every 3-5 years:
    • All health care and hospital laboratory workers
    • Food handlers working in food establishments
  – A combination of the above
Recommendations (continued)

• All typhoid vaccination programs **should be implemented in the context of other efforts to control the disease**, including health education, water quality and sanitation improvements, and training of health professionals in diagnosis and treatment.

• Early Detection and Treatment – Continue to support the implementation of **treatment guidelines using ciprofloxacin** at adequate doses, and standard patient management.

• Safe Water – ensure all drinking water has **sufficient chlorine**, or other controlled treatment process.

• Sanitation – Continue to support the Samoa MOH initiative to **promote the use of other types of toilets** such as ventilation-improved pit (VIP) latrines as an alternative to flush toilets, especially where water is scarce.
Typhoid Vaccination

SAMOA

TYPHOID VACCINATION PROPOSAL 2012

SEPTEMBER 2012
THANKS.....