Global Burden of Typhoid: Estimates, Methods & Challenges

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Burden estimates...

• Understand importance and trends
• Target interventions
• Understand potential benefit of vaccine use and policy
Methods
Approach: Natural history model

What’s new:

- Typhoid- & paratyphoid-specific estimates
- Modeled case fatality
- Updated sequelae
Typhoid case fatality

Typhoid incidence

Typhoid deaths

Paratyphoid incidence

Paratyphoid case fatality

Paratyphoid deaths
Sequela

Typhoid:
• 35% moderate acute infectious
• 43% severe acute infectious
• 5% gastrointestinal bleeding
• 17% intestinal perforation
Data on case fatality

Unique sources: 35
Countries: 18
Data points: 115
Data on typhoid : paratyphoid

Unique sources 43
Countries 17
Data points 378

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Note...
Mortality estimates final
Non-fatal estimates subject to change
Global cases by year
Age-standardized incidence by country, 2013
Case fatality

\[
\frac{CF_{\text{typhoid}}}{CF_{\text{paratyphoid}}} = 1.89
\]
Mortality estimates
Etiologic breakdown

Cases ≈ 70% typhoid
Deaths ≈ 75% typhoid
## Burden metrics

<table>
<thead>
<tr>
<th>Metric</th>
<th>1990</th>
<th>2013</th>
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</thead>
<tbody>
<tr>
<td>YLDs (thousands)</td>
<td>251 (164 – 362)</td>
<td>199 (131 – 282)</td>
</tr>
<tr>
<td>YLLs (millions)</td>
<td>17.2 (9.2 – 29.0)</td>
<td>14.8 (7.9 – 24.6)</td>
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<tr>
<td>DALYs (millions)</td>
<td>17.5 (9.4 – 29.3)</td>
<td>15.0 (8.1 – 24.8)</td>
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</table>
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Questions
Incidence data

National notifiable disease reports
Population-based cohort studies

X 1.82

DisMod
Adjust for passive surveillance
Covariates: water & monsoon

National notifiable disease reports
Population-based cohort studies
Case fatality data

Notifiable disease reports
Hospital databases
Challenges
Challenges...
Limited data
Questionable data
Challenges...

Limited data
Questionable data
Questionable data...
Surveillance & reporting quality
Representativeness
Hospital- & surveillance-based case fatality
Reported proportions biased by severity
Challenges
Age pattern by income

![Graph showing age pattern by income categories: High income, OECD, High income, nonOECD, Low income, Lower middle income, Upper middle income.](image)
Typhoid deaths by year

Males

Females
Typhoid MRs by age (males, global)