Epidemiology of typhoid and paratyphoid: Implications for vaccine policy

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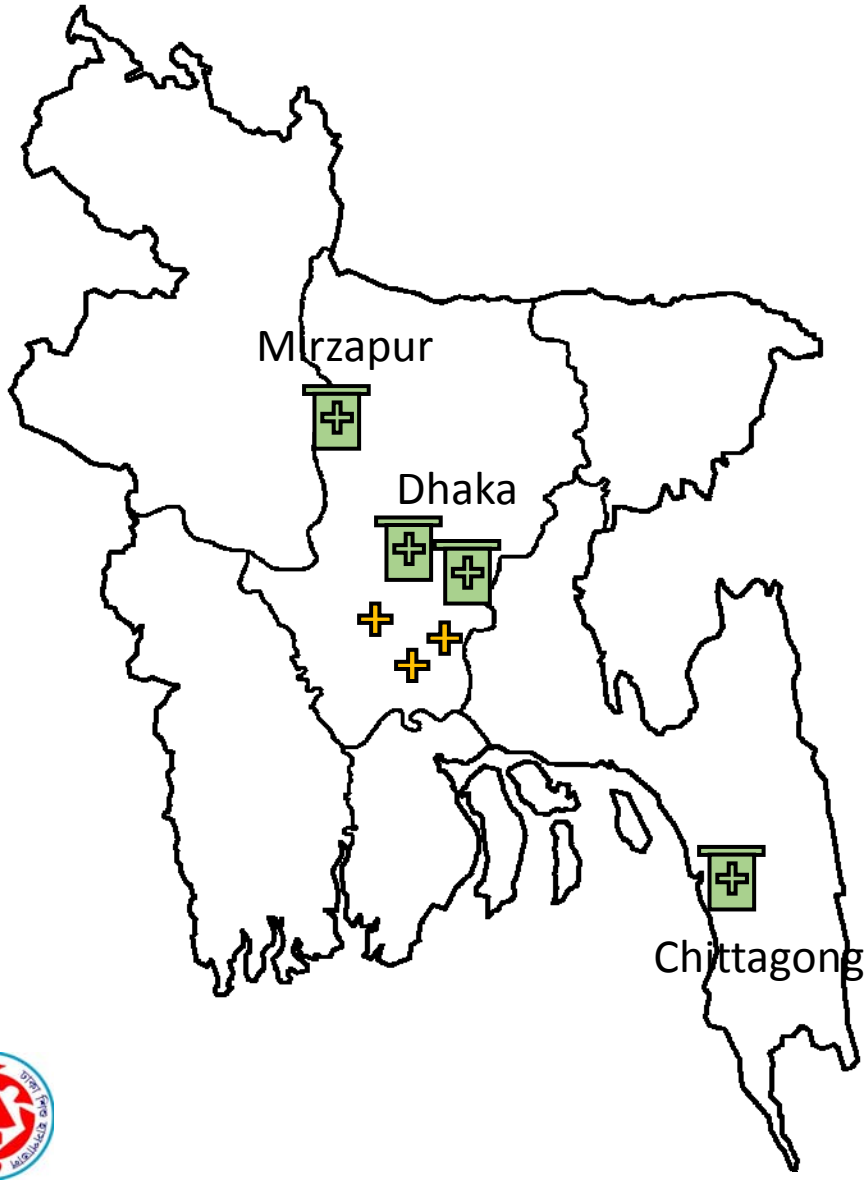
and Other Invasive Salmonelloses, Hanoi, Vietnam

WHO prequalified TCV, but important questions persist

- Lack of **strong** epidemiological data, specifically in <2 y children
- Sporadic, incidence studies, small populations
- Typhoid and paratyphoid are often considered a single disease: no paratyphoid vaccine

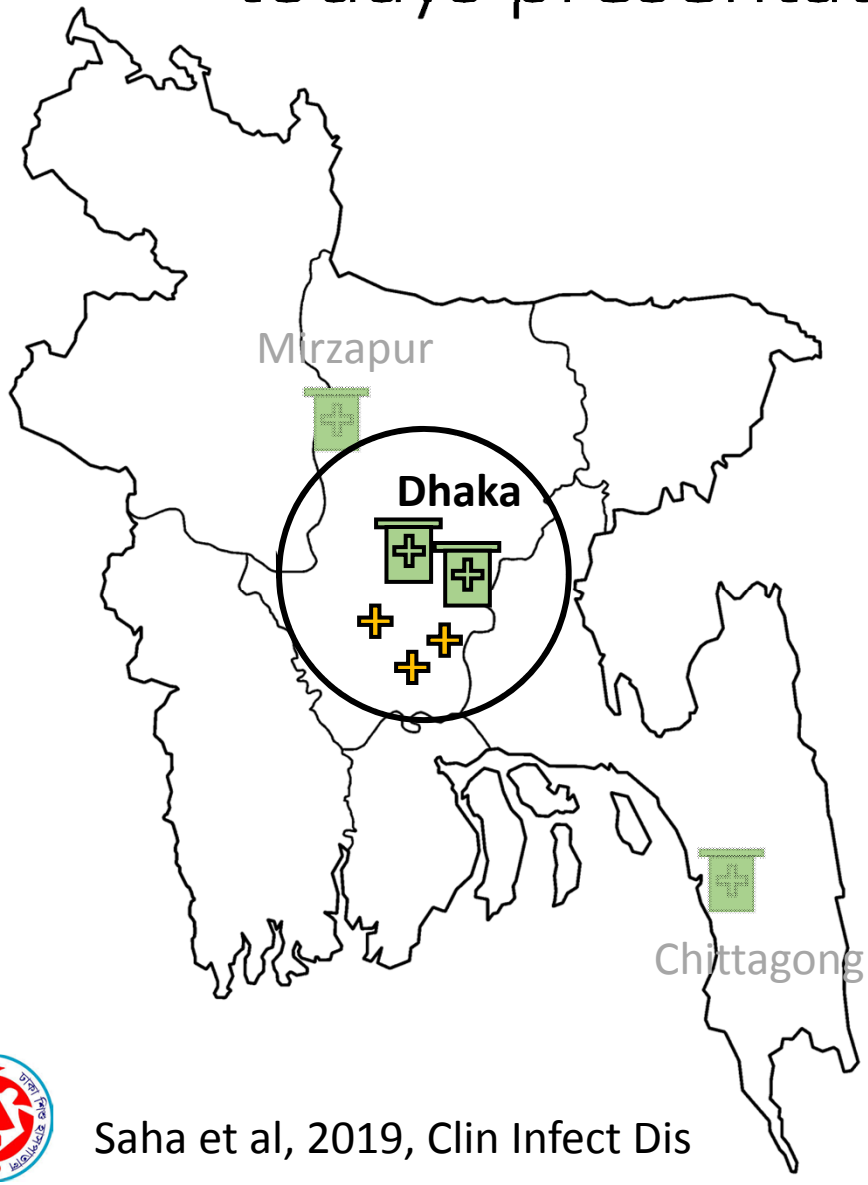
Enteric fever surveillance in Bangladesh



Network of 4 hospitals with 1,280 beds

3 consultation clinics

Enteric fever surveillance in Bangladesh: todays presentation, 2004 - 2016



Sites:

- 2 pediatric hospital with IPD and OPD
- 3 OPD-based consultation clinics

Dataset:

- 13 years: 2004 - 2016
- **8,882** culture-confirmed cases
- Typhoid: 7,072 (80%)
- Paratyphoid: 1,810 (20%)

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WHO prequalified TCV, but important questions persist

- **Have the proportions of typhoid and paratyphoid changed over the past 13 years?**
- **What are the age distributions of these two diseases?**
- **How severe are these diseases, specifically in young children?**

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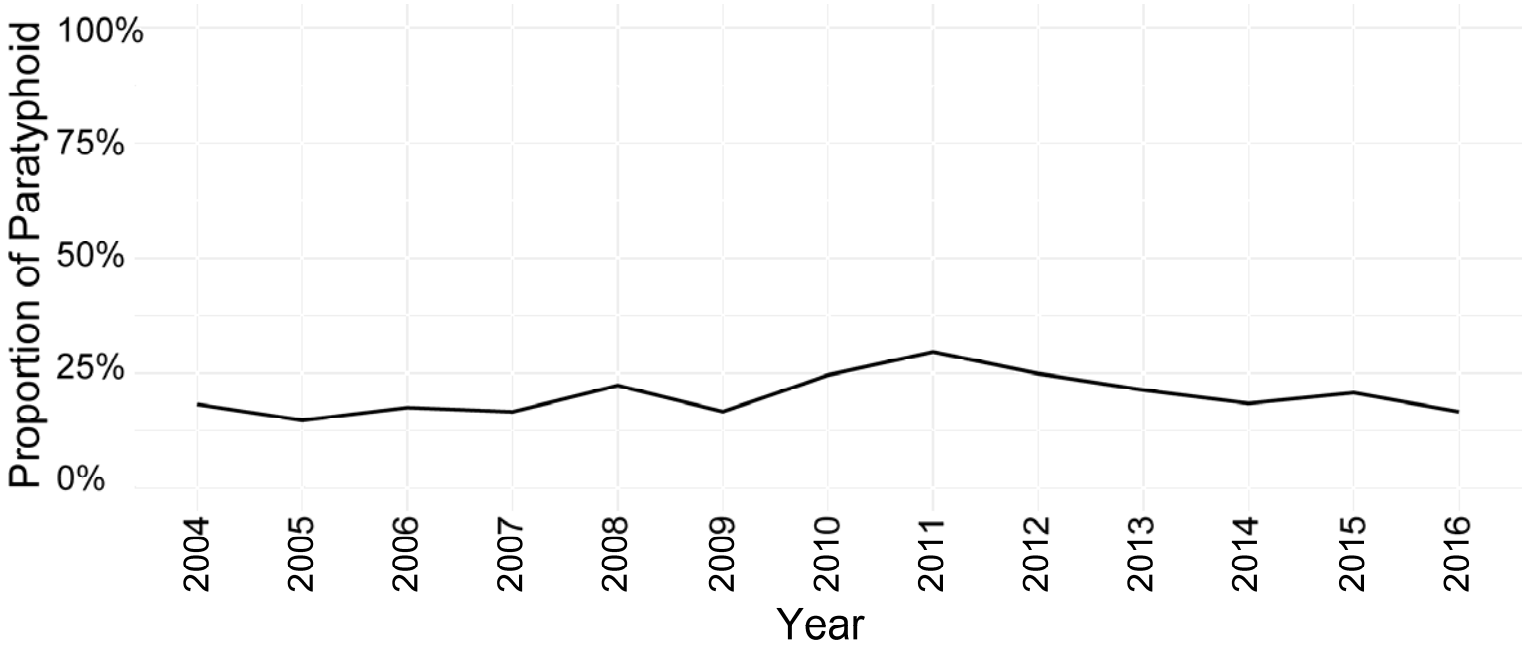
No change in proportion of paratyphoid in the last 13 years



Typhoid cases: n = 7,072

Paratyphoid cases: n = 1,810

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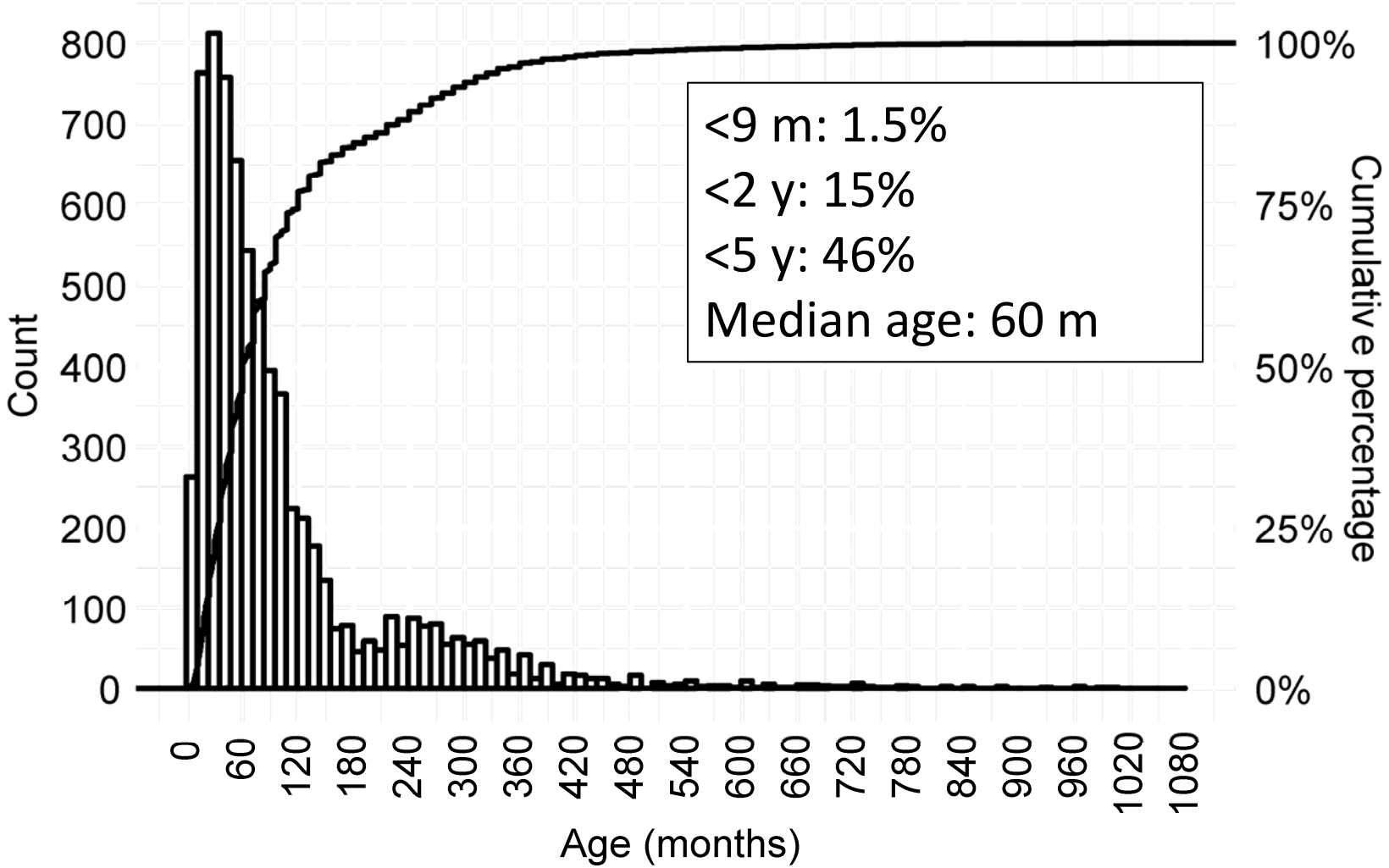
Age distribution of typhoid cases



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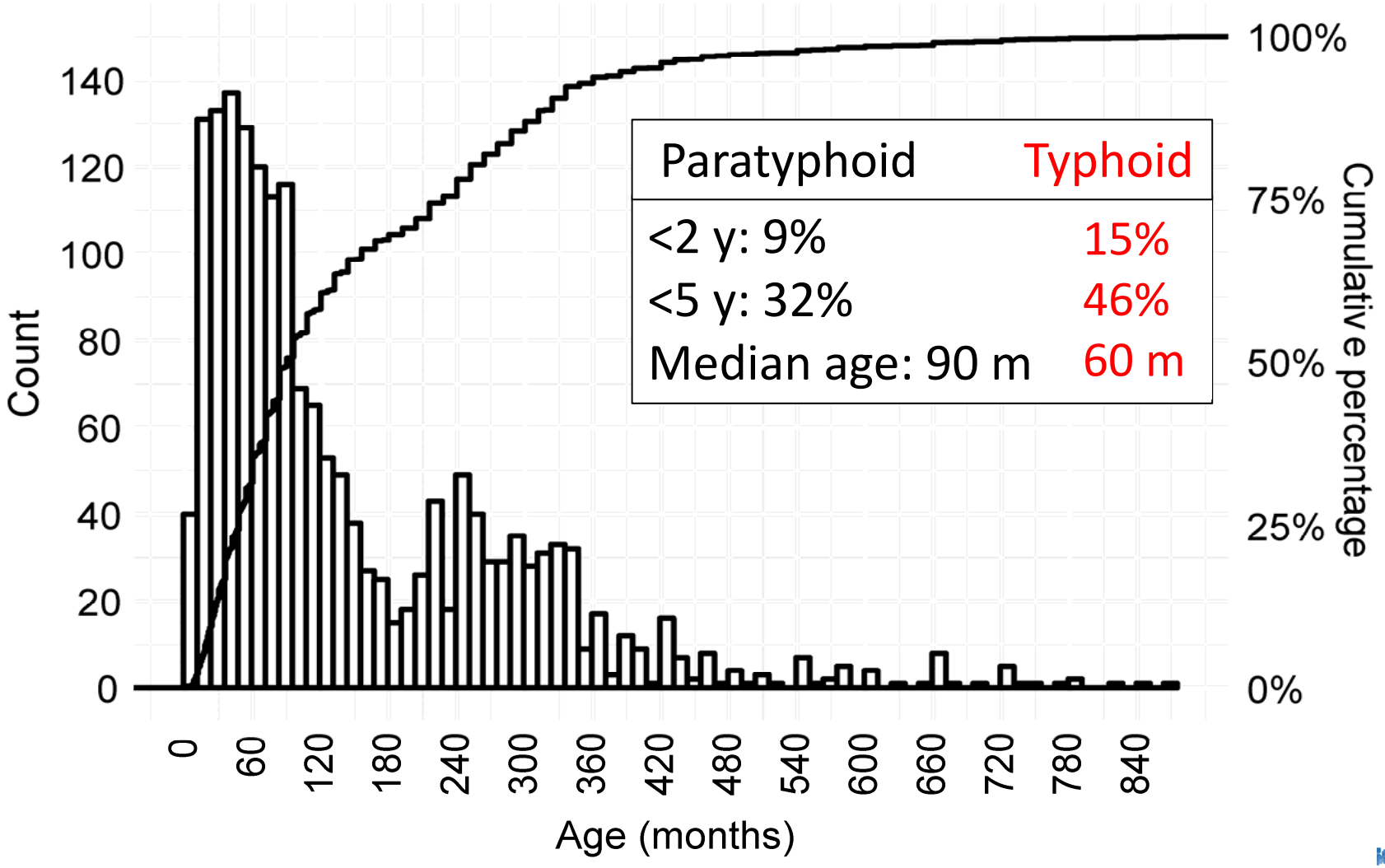
Age distribution of paratyphoid cases



Saha et al, 2019, Clin Infect Dis

Some questions we ask to guide treatment and prevention policies

- Have the proportions of typhoid and paratyphoid changed over the past 13 years?
- What are the age distributions of these two diseases?
- **How severe are these diseases, specifically in young children?**

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Assessing severity: small numbers of severe outcomes

Typhoid, n = 1,188

Outcome	%
Discharged	97% (n = 1146)
Died	0.2% (n = 2)
Referred	0.3% (n = 4)
LAMA	3.0% (n = 36)

Paratyphoid, n = 164

Outcome	%
Discharged	96% (n = 157)
Died	0% (n = 0)
Referred	0% (n = 0)
LAMA	4.0% (n = 7)

Not possible to perform robust statistical analyses to compare severity by age

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Assessing severity: hospitalization and hospital duration as proxies

- Fierce competition for beds, so physicians only admit when absolutely necessary, and release ASAP
- Caregivers pay our of pocket and only agree to admit children when absolutely necessary, and leave ASAP

Proxies of severity:

1. Hospitalization
2. Duration of hospitalization

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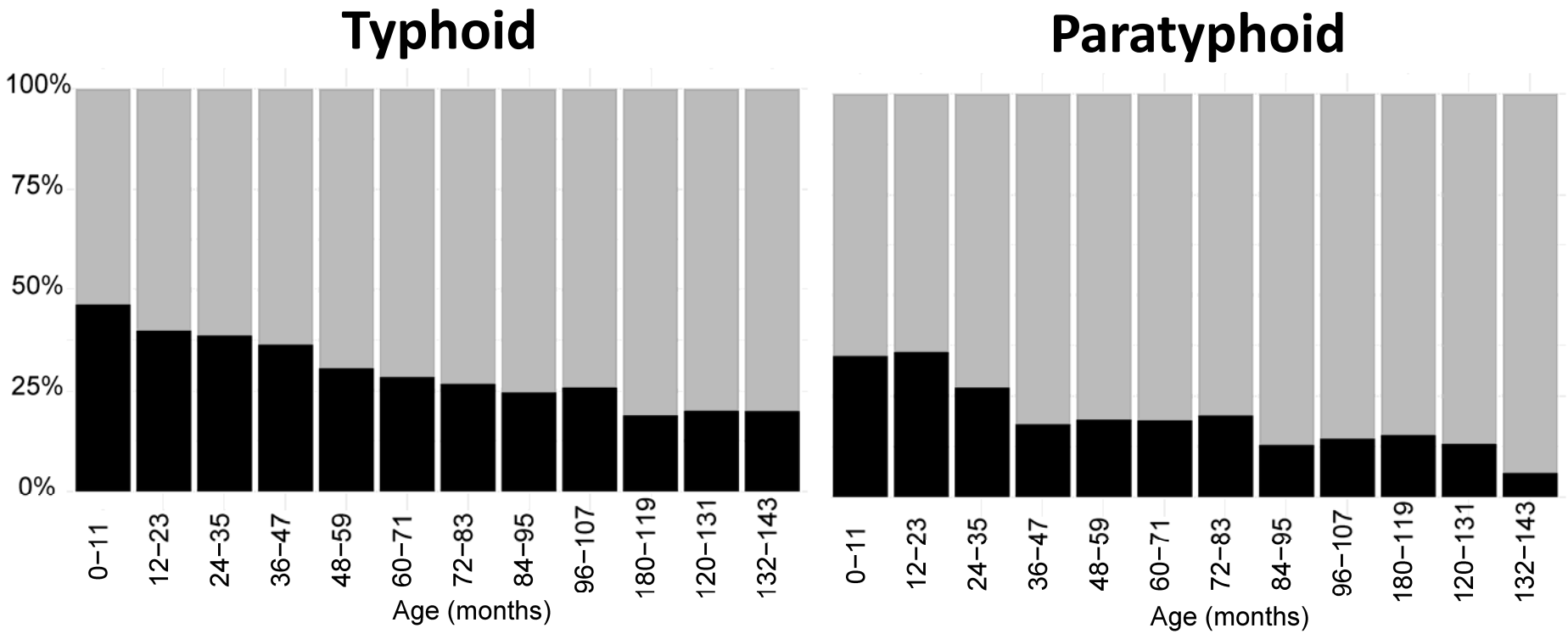
Assessing severity: younger children are at least as likely to be hospitalized as older children



IPD: n = 1,806 (32%)
OPD: n = 3,851 (68%)

IPD: n = 238 (21%)**
OPD: n = 917 (79%)

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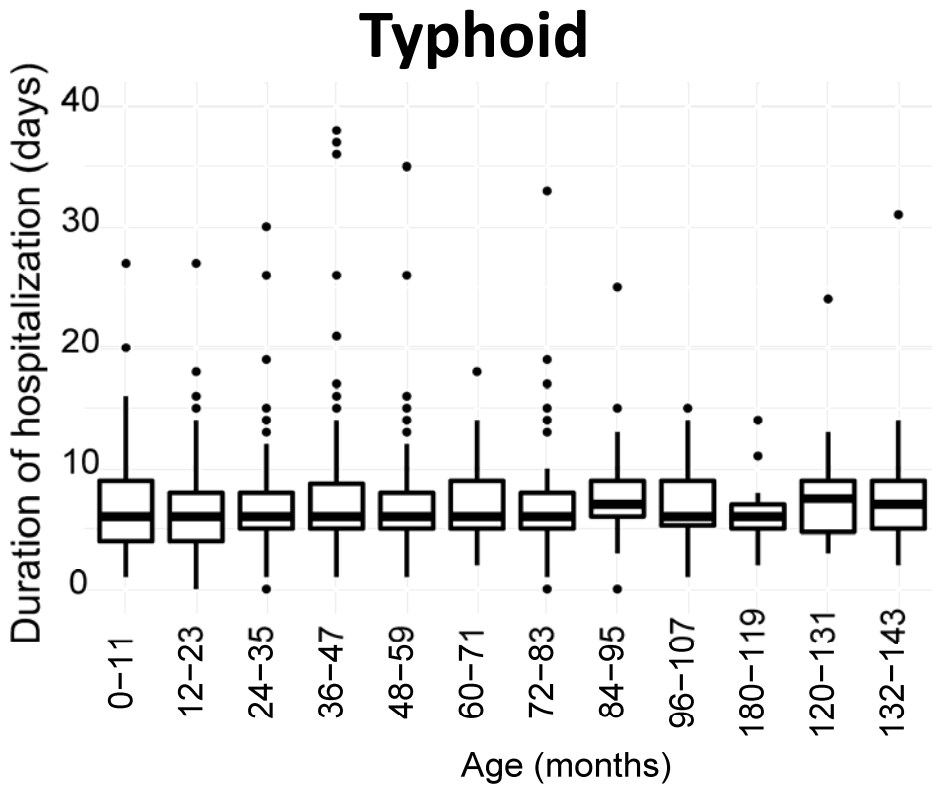
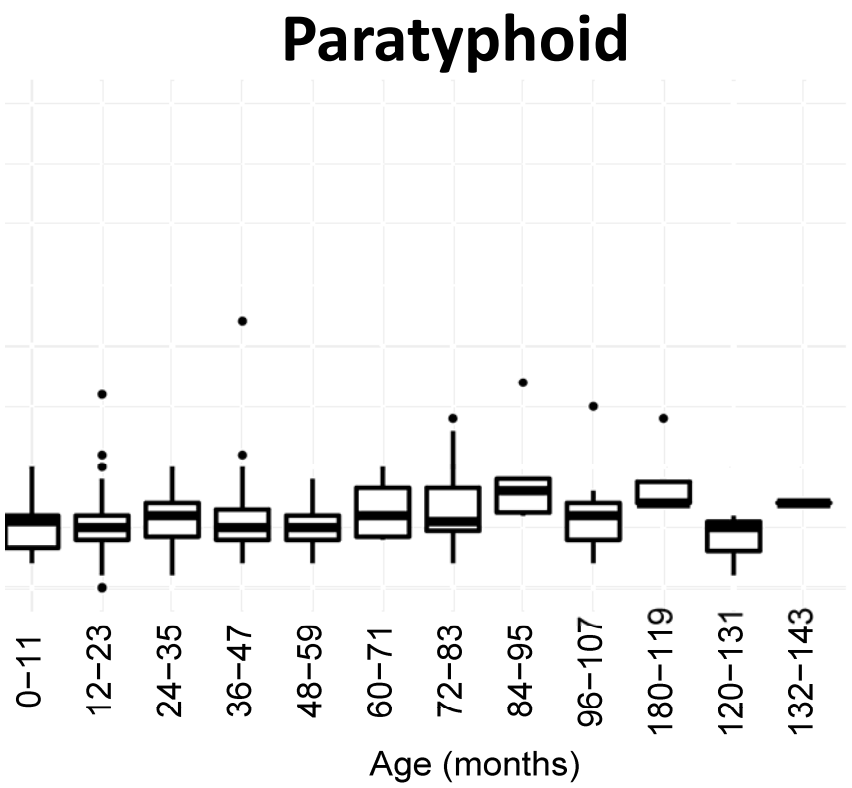
Assessing severity: younger children are hospitalized for as long as older children



n = 1,806



n = 238

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Take-home messages from Bangladesh

- Typhoid is common in young children
- Early immunization with TCVs could avert substantial morbidity
  - 1.5% cases occur in children <9 m
  - 15% of typhoid cases occur in children <2 y with equivalent disease severity as seen in older children
- Paratyphoid is also common - 1 in 5 enteric fever cases
- Efforts to reduce exposure to contaminated water and food, as well as developing vaccines against paratyphoid, are important

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Thank you.

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