Impact of the COVID-19 pandemic and national TCV introduction on enteric fever diagnosis in Nepal

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Introduction

- Over 9 million typhoid fever cases and 110,000 deaths globally

- Incidence rates of typhoid infection were 330 (95%CI: 230-480) and 268 (95%CI: 202-362) per 100,000 person-years in Kathmandu and Kavre respectively.

- Surveillance of Enteric Asia Project (SEAP) is hospital based surveillance of enteric fever ongoing since Oct 2016 in Nepal

SEAP Study sites (Phase III)
Epidemiological curve of PCR confirmed SARS-CoV-2 in Nepal

- 24 mar-07 jul 2020: 1st lockdown
- 29 mar-14 Jun 2021: 2nd lockdown
- 08 Apr-01 May 2022: TCV introduction
TCV introduction

- Nepal introduced a typhoid conjugate vaccine (TyphiBeV) in April 2022
- Catchup campaign: 15m-15 years child
- Has introduce in EPI at 15 m of age
Objectives

- To evaluate the impact of the COVID 19 pandemic and national TCV introduction on diagnosis of enteric fever in Nepal
- To determine whether TCV introduction among children under age of 15 years has shifted the age distribution of typhoid fever in Nepal
Methods

- Collected data on total blood cultures, cases of typhoidal *Salmonella* and other than typhoidal *Salmonella* pathogens from October 2016 to October 2023 at five SEAP sites

- Analyzed the trend of blood culture numbers, typhoidal *Salmonella* positivity rates, and rates of positivity for pathogens other than typhoidal *Salmonella* during three different periods
  - Before COVID 19 pandemic: October 2016 to March 2020
  - During pandemic, prior to TCV introduction: April 2020 to April 2022
  - Post TCV introduction: May 2022 to October 2023

- Used multivariable logistic regression assessing Typhi positivity with fixed effects for month, study site and study period

- Compared the age distribution of typhoidal *Salmonella* cases pre-TCV vaccine introduction (Jan 2018-Apr 2022) and post-TCV introduction (May 2022-Oct 2023) periods
Trends in blood cultures performed and typhoidal Salmonella recovered
Salmonella positivity rate by study period

- Pre-COVID (2016-2020): 1350/68724 (2.0%)
- COVID, Pre-TCV (2020-2022): 71/16688 (0.4%)
- Post-TCV (2022-2023): 147/23764 (0.6%)

Odd Ratios:
- OR 0.23, P<0.0001
- OR 0.31, P<0.0001
- OR 1.36, P=0.114
In the post-TCV era, an even higher proportion of typhoid cases identified among >15 year olds.

### Negative cultures

<table>
<thead>
<tr>
<th>Age</th>
<th>pre-TCV</th>
<th>post-TCV</th>
</tr>
</thead>
<tbody>
<tr>
<td>over 15 years</td>
<td>82%</td>
<td>79%</td>
</tr>
<tr>
<td>15 months to 15 years</td>
<td>13%</td>
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</tr>
<tr>
<td>under 15 months</td>
<td>18%</td>
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*p=0.004*

### S. Typhi cases

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*p=0.004*
Conclusions

- Blood culture positivity for typhoidal *Salmonella* was substantially lower following onset of COVID-19 pandemic and remained low following TCV introduction

- Potential explanations for these changes include:
  - changes in healthcare seeking patterns
  - reductions in typhoid transmission due to
    - movement restrictions
    - increased emphasis on hygiene practices
    - reductions in eating outside the household

- Adolescents and young adults continue to have substantial burden of typhoid in Nepal, and policies should consider inclusion of this age group for TCV receipt
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