The Impact of a TCV Mass Campaign on Typhoid Fever Cases and Antimicrobial Use in Harare, Zimbabwe

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5 December 2023
Typhoid fever in Harare

• Seasonal typhoid fever outbreaks in Harare
• Main causes:
  • inappropriate disposal of sewage
  • contaminated communal boreholes
  • water shortages

Davis et al. MMWR 2018
## TCV campaign in Zimbabwe

Mass vaccination campaign of children <15 years with the typhoid conjugate vaccine (TCV) in 9 suburbs in Harare

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**Table: Number of people vaccinated and administrative coverage by age group and suburb during the TCV campaign—Harare, Zimbabwe, 2019.**

<table>
<thead>
<tr>
<th>Age group</th>
<th>Target population</th>
<th>Number vaccinated</th>
<th>Administrative coverage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 mo.–4 yrs.</td>
<td>114,388</td>
<td>82,768</td>
<td>72.4</td>
</tr>
<tr>
<td>5–15 yrs.</td>
<td>208,429</td>
<td>202,457</td>
<td>97.1</td>
</tr>
<tr>
<td>16–45 yrs.</td>
<td>50,210</td>
<td>33,473</td>
<td>66.7</td>
</tr>
<tr>
<td>All</td>
<td>373,027</td>
<td>318,698</td>
<td>85.4</td>
</tr>
<tr>
<td>6 mo–15 yrs. by suburb</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Budiriro</td>
<td>46,876</td>
<td>37,322</td>
<td>79.6</td>
</tr>
<tr>
<td>Dzivarasekwa</td>
<td>27,399</td>
<td>27,944</td>
<td>102.0</td>
</tr>
<tr>
<td>Glen Norah</td>
<td>28,251</td>
<td>28,436</td>
<td>100.7</td>
</tr>
<tr>
<td>Glen View</td>
<td>43,961</td>
<td>38,756</td>
<td>88.2</td>
</tr>
<tr>
<td>Hatchfield</td>
<td>17,533</td>
<td>14,879</td>
<td>84.9</td>
</tr>
<tr>
<td>Hopley</td>
<td>43,924</td>
<td>34,182</td>
<td>77.8</td>
</tr>
<tr>
<td>Kuwadzana</td>
<td>62,288</td>
<td>56,453</td>
<td>90.7</td>
</tr>
<tr>
<td>Mbare</td>
<td>31,159</td>
<td>24,760</td>
<td>79.5</td>
</tr>
<tr>
<td>Mufakose</td>
<td>21,446</td>
<td>22,493</td>
<td>104.9</td>
</tr>
<tr>
<td>All Suburbs</td>
<td>322,817</td>
<td>285,225</td>
<td>88.4</td>
</tr>
</tbody>
</table>

* Vaccination among this age group took place in Mbare suburb only.

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* Poncin et al. Vaccine X 2022
FIEBRE Study

Febrile Illness Evaluation in a Broad Range of Endemicities (FIEBRE)

Recruiting adults and children ≥2 months presenting with fever at primary care clinics and hospitals in Harare

Broad range of diagnostic tests for bacteria, viruses, fungi and parasites
FIEBRE study clinics

Jul 2018 – Sep 2020:
1924 participants with fever recruited
• 801 from 3 hospitals
• 1123 from primary care clinics
• 1 single blood culture collected
Positive blood cultures for S. Typhi

• 562 patients from one community with before & after data available
• Vaccination conducted only in children at coverage ~80%
• 132 (23.5%) positive blood cultures for *Salmonella* Typhi
  • Median age 21 years and 56% female
  • 37 in children & 95 in adults
  • 49 in the pre-vaccination period & 83 in the post-vaccination period
• Blood culture positivity for *Salmonella* Typhi
  • 17.9% in children
  • 26.8% in adults
Impact of TCV vaccination

Vaccine status among those with typhoid in the post-vaccine period

- 0-4 year-olds: 3/4 not vaccinated
- 5-14 year-olds: 3/4 not vaccinated & 1/4 unknown status

Vaccination period
- Pre-vaccine
- Post-vaccine

Proportion with S. Typhi

Age group
- 0-4 yrs
- 5-14 yrs
- ≥ 15 yrs
Antimicrobial susceptibility testing

No S. Typhi isolates were resistant to ceftriaxone or azithromycin

MDR = resistance to amoxicillin + chloramphenicol + co-trimoxazole
Decreased ciprofloxacin susceptibility according to age

DCS: decreased ciprofloxacin susceptibility

129 with MICs for ciprofloxacin determined
- 45 susceptible
- 76 DCS
- 8 ciprofloxacin MIC >1
Antimicrobial prescriptions in primary care

Setting: Primary healthcare clinics in Harare

Approach: data from clinic registries on acute outpatient consultations

Period of data collection: Jan 2016 – Dec 2021

Data collected

• Demographics: age, sex
• Diagnosis
• Treatment prescribed
• Hospital referral
Presentations to primary care – clinic registers

- 130,629 attendances to clinics from vaccination areas
- 52.5% female
- 53% under 15 years
- Antibiotic prescriptions
  - 64% of children
  - 53% of adults
Antimicrobial prescriptions in primary care
Antimicrobial prescriptions in children from vaccinated communities

Any antimicrobials

Antimicrobials used for typhoid

Circles represent fitted values from a multivariable model (time, seasonality, vaccination)

Olaru et al. Lancet Global Health, 2023
Conclusions

• Vaccination led to a reduction of typhoid fever cases among children presenting to primary healthcare

• High number of cases identified post-vaccination campaign (mostly adults)

• Vaccination with TCV did not influence antimicrobial prescriptions overall or of those used for typhoid

• Lack of effect on prescribing likely due to factors such as access to safe water, appropriate sewage disposal, health care and diagnostic availability
In May 2021 Zimbabwe was the second country to introduce TCV in the national immunization programme for children at 9 months.

Typhoid conjugate vaccine arrives in Zimbabwe

Posted on May 25, 2021 by Elayna Oberman, PATH

www.coalitionagainsttyphoid.org
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NMRL