Impact of the innovative 1,7- malaria reactive community-based testing and response (1,7-mRCTR) strategy

Victoria James Githu, MSc
Research Scientist – Ifakara Health Institution
Data Science & Mathematical Modelling Team
IDM Symposium, Seattle.
May 2023
Background

- WHO T-3 (Test-Treat-Track) initiative for malaria surveillance.
Background

- WHO T-3 (Test-Treat-Track) initiative for malaria surveillance
- China has made remarkable efforts in eliminating malaria with its 1-3-7 model strategy in their low transmission setting (Sen et al., 2015)

Zhou et al, 2015
Background

- WHO T-3 (Test-Treat-Track) initiative for malaria surveillance

- China has made remarkable efforts in eliminating malaria with its 1-3-7 model strategy in their low transmission setting (Sen et al., 2015).

- Tanzania explored the effectiveness and applicability of this Chinese model and incorporated 1,7 mRCTR Funded by BMGF (Mlacha et al., 2020).
Background cont...

- Pilot study in Rufiji from September 2016 – June 2018
Background cont...

- Pilot study in Rufiji from September 2016 – June 2018
- The effectiveness of the 1,7 mRCTR has been proved statistically by a reduction of malaria prevalence by 81% in this pilot.

**Fig. 3** Schematic diagram of the study design, intervention activities, and the number of participants sampled for baseline and endline cross-sectional household surveys for the 1,7-mRCTR approach evaluation.

Mlachia et al., 2020
Impact of 1,7-mRCTR

Interrupted time series analysis (ITSA)

- The segmented regression analysis is a statistical modelling that helps us draw more formal conclusions about the impact of this strategy whether the change was due to the strategy or other factors.

Why ITSA?

- Allows to control for prior trends in the outcome and to study the dynamics of change of the strategy.
- Checks for immediate and sustained effects of the strategy.

\[ Y = b_0 + b_1 T + b_2 D + b_3 P + e \]

- Where; \( D \) assesses the immediate effect of the strategy and \( P \) assesses the sustained effect of the strategy
Impact of 1,7-mRCTR cont...

- Interrupted time series analysis using routine data from DHIS2
- From year 2013 to 2019
- Ward with moderate transmission

<table>
<thead>
<tr>
<th>WARD</th>
<th>Estimates</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention ward 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>0.8903</td>
<td>0.0898</td>
</tr>
<tr>
<td>Treatment</td>
<td>-34.9085</td>
<td>0.0160 *</td>
</tr>
<tr>
<td>Timespace</td>
<td>-1.3033</td>
<td>0.0381 *</td>
</tr>
</tbody>
</table>
Impact of 1,7-mRCTR cont...

- Interrupted time series analysis using routine data from DHIS2
- From year 2013 to 2019
- Ward with high transmission

<table>
<thead>
<tr>
<th>WARD</th>
<th>ESTIMATES</th>
<th>P-VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention ward 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>0.1360</td>
<td>0.2758</td>
</tr>
<tr>
<td>Treatment</td>
<td>-1.9140</td>
<td>0.5741</td>
</tr>
<tr>
<td>Timespace</td>
<td>-0.1157</td>
<td>0.4362</td>
</tr>
</tbody>
</table>
# Causal Impact

<table>
<thead>
<tr>
<th>Wards</th>
<th>Actual</th>
<th>Predicted [95%CI]</th>
<th>Relative effect [95%CI]</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate trans.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>0.62</td>
<td>0.89 [0.65, 1.1]</td>
<td>-31% [-55%, -4.1%]</td>
<td></td>
</tr>
<tr>
<td>Cumulative</td>
<td>28.36</td>
<td>41.16 [30.03, 51.2]</td>
<td>-31% [-55%, -4.1%]</td>
<td>0.01104*</td>
</tr>
<tr>
<td>High trans.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>0.16</td>
<td>0.19 [0.14, 0.24]</td>
<td>-13% [-39%, 13%]</td>
<td></td>
</tr>
<tr>
<td>Cumulative</td>
<td>7.50</td>
<td>8.59 [6.38, 10.87]</td>
<td>-13% [-39%, 13%]</td>
<td>0.1636</td>
</tr>
</tbody>
</table>
Way Forward

- Scaling up 1.7-mRCTR approach to maximize its impact will require proper planning.
- We are proposing to adapt openMalaria to predict scenarios for successful implementation.
What OpenMalaria will help us answer

1. How many rounds is required to implement 1,7-mRCTR approach based on different baseline malaria prevalence?

2. What are the different coverages (% of the population) for 1,7-mRCTR approach implementation required to reduce malaria to total elimination? If elimination is not achieved, how much is clinical incidence reduced?

3. What are the best optimal malaria interventions to supplement with 1,7-mRCTR approach that can be used to reduce malaria transmission? (using OpenMalaria or VCOM)
Thank you

Acknowledgement

- Dr Samson Kiware
- Dr Nakul Chitnis
- Dr Yeromin Mlacha
- Dr Prosper Chaki