Practical checklist for using routine data to measure VC impact

VCWG Task Teams:
Christen Fornadel, Julia Mwesigwa, Sarah Burnett, Sam Asiedu
Background

• Progress in the fight against malaria has slowed in recent years, particularly in high burden countries
• Factors include funding gaps, leading to gaps in intervention coverage, & increasing insecticide resistance
• To combat resistance, national malaria programs & partners are deploying new vector control interventions:
  • Next generation ITNs, with pyrethroid plus a synergist or another insecticide
  • Long-lasting, non-pyrethroid IRS formulations
• Monitoring the impact of vector control interventions can support tailoring of vector control programs
• In some cases, reviewing trends in routine malaria case data may lead to unexpected findings, such as increases in cases in the period after an intervention
• Systematically compiling and analyzing all available data can help to properly investigate and identify possible reasons for observed trends in malaria cases
• A checklist of key questions, indicators and data sources can guide these investigations
## Vector Control Impact Monitoring Checklist

<table>
<thead>
<tr>
<th>Checklist area</th>
<th>Specific questions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Location &amp; context</strong></td>
<td>a. What specific administrative areas (and level) are you interested in analyzing?</td>
</tr>
<tr>
<td></td>
<td>b. What time period are you interested in analyzing? (i.e. including before/after intervention?)</td>
</tr>
<tr>
<td></td>
<td>c. What are the climate trends in the area? What are any other geological markers that may impact malaria burden?</td>
</tr>
<tr>
<td></td>
<td>d. What do we know about population-based factors, such as migration, industry, etc., that may contribute to differences in malaria burden?</td>
</tr>
<tr>
<td><strong>2. Malaria case burden trends</strong></td>
<td>a. What are the trends in malaria cases or malaria case incidence?</td>
</tr>
<tr>
<td></td>
<td>b. What threats exist to interpreting case data, such as missing values, outliers or inconsistencies?</td>
</tr>
<tr>
<td><strong>3. Entomological trends</strong></td>
<td>a. What are the primary vectors in the areas of interest?</td>
</tr>
<tr>
<td></td>
<td>b. What are the trends in vector density indicators?</td>
</tr>
<tr>
<td></td>
<td>c. What are trends in sporozoite rate, EIR and parity?</td>
</tr>
<tr>
<td></td>
<td>d. What are trends in insecticide resistance?</td>
</tr>
<tr>
<td><strong>4. Vector control Interventions</strong></td>
<td>a. What intervention was implemented?</td>
</tr>
<tr>
<td></td>
<td>b. When were the interventions implemented?</td>
</tr>
<tr>
<td></td>
<td>c. What was the coverage of the intervention?</td>
</tr>
<tr>
<td></td>
<td>d. What is individuals’ exposure to the intervention? Including ITN use, time spent indoors and under ITNs, mosquito locations Intervention exposure</td>
</tr>
<tr>
<td></td>
<td>e. How long do we expect the vector control intervention to be effective?</td>
</tr>
<tr>
<td><strong>5. Other interventions</strong></td>
<td>a. What other interventions may also impact trends in malaria case burden, outside of vector control interventions?</td>
</tr>
</tbody>
</table>
Fictional Example:
Why are cases going up after vector control campaigns?

Example includes simulated data, not actual country data
Investigating the increase: Location & Context & Malaria Case Burden Trends

**Findings:** Increase in 3 districts, decrease in 1 district (District B, IRS)

**Location & context:**
- Show cases by Intervention & District
- Rainfall (some ↑ 2021)
- Not shown: no major population movement

**Malaria Case Burden:**
- Include health facilities with complete data
- Remove outliers
- Present annual & monthly trends
- Not shown: Reviewed trends in outpatients (stable), CHW diagnoses (stable), RDT stock (no major stockouts)

Example includes simulated data, not actual country data
<table>
<thead>
<tr>
<th>Checklist area</th>
<th>Specific questions</th>
<th>Results</th>
</tr>
</thead>
</table>
| 3. Entomological trends            | d. What are trends in insecticide resistance?           | IRS: Clothianidin, 100% mortality  
PBO ITN: Deltamethrin + PBO, 98% -> 54% mortality at 12 months                      |
| 4. Vector control Interventions    | a. What intervention was implemented?                   | IRS with clothianidin (2 districts)  
PBO ITNs (2 districts)                                                                  |
|                                    | b. When were the interventions implemented?             | June 2017: pyrethroid ITNs, all districts  
June 2021: IRS  
August 2021: PBO ITNs                                                             |
|                                    | c. What was the coverage of the intervention?           | IRS: District A: 60%; District B: 90%  
PBO ITN: District C: 92%, District D: 90%                                               |
|                                    | d. What is individuals’ exposure to the intervention?   | No information available on individual exposure, this could be an area for future data collection |
|                                    | e. How long do we expect the vector control intervention to be effective? | IRS: 10 months above 90% mortality, each year  
PBO ITNs: Baseline: 92% mortality, 12 months: 53%                                      |
Investigation Summary

- Overall increase in malaria case incidence;
- Increase in 3 districts (1 IRS + 2 PBO ITN), decrease in 1 (District B, IRS)
- Lack of control area that did not receive any intervention

Possible explanations:

- **PBO ITN**: waning durability, Increase in insecticide resistance (PBO not synergizing fully)
- **IRS**: Higher intervention coverage in District B when compared to District A

Other areas to investigate:

- **Location & Context**:
  - Geological markers that may impact District B compared to other districts?
  - Longer time period: what are trends over multiple intervention years?
- **Vector Control interventions**:
  - Why coverage low in District A? Refusals, challenges in reaching population?
  - Can we collect information on individual exposure to PBO ITNs and IRS?
- **Entomological trends**: do we see similar trends in density, sporozoite, EIR, & parity?
- **Other interventions**: Are there other interventions, especially in District B, that may impact trends?
Conclusion, Discussion, & Next Steps

Conclusion
• Triangulation & examination of routine data can help monitor impact of vector control interventions & guide intervention tailoring
• Important to systematically compile and analyze all available data for full investigation
• Reviewing routine data may not always result in clear answers around impact, analyses are still observational; formal statistical analyses or research studies may help

Discussion
• Is this a useful checklist?
• How could this checklist be strengthened?
• If useful, who would like to contribute to further checklist and guidance development?

Next Steps:
• Create full examples of integrated impact monitoring analyses for sharing
THANK YOU!