Spatial intelligence to optimize vector control planning, implementation and impact

Derek Pollard
‘Spatial intelligence’ optimizes service delivery:

- Where are services needed??
- Were services delivered??
- Improve Impact of those services
Simply – we want to ensure COMPLETE SERVICE DELIVERY.

We want to ensure that COMMUNITIES ARE NOT LEFT UNPROTECTED by important health services, including those meant to protect vulnerable populations from malaria transmission.
When it comes to IRS ...

We know coverage is important

In communities with coverage > 80%, both sprayed and unsprayed houses had lower odds of malaria infection.*

WHO guidelines suggest at least 85% coverage is needed to maximize the benefits of IRS, however evidence shows IRS at village level is often under this threshold but reported above this.

http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0019205
Is this a REAL problem in vector control?

Are operations missing houses and leaving communities unprotected?

Are we overestimating coverage?
Typically coverage measures look at the number of structures sprayed related to the number of structures found by spray teams. There is potential that this vastly overestimates coverage when structures are not found.

Spatial data from Zambia suggest as few as 54.5% of structures are found when no spatial aids are used in IRS.¹

Research from Iran, South Africa, and Namibia suggests the challenge of finding and visiting structures.²,³,⁴

Are we overestimating coverage?


Bioko Island example...

- Previous to changing the indicator, using found structures as the denominator grossly overestimated spray coverage (2010-2013).
- **Spray coverage is overestimated unless spatial intelligence is applied**
- The gap between found and actual structures differs by country but unless we can measure it, we don’t know the extent of this problem is.

Phiri W (2015). Improved monitoring of IRS coverage on Bioko Island through the use of GIS based campaign information system (CIMS). Internal report for Malaria Care Development International.
Challenges to effective IRS

- Insecticide resistance
- Behavioral resistance
- Benefit beyond ITNs?
- Overestimation of coverage
How do we address the problem of overestimation of coverage?
1. Rethink the indicator

- IRS Operators visit Spray Area
- 9 structures found
- 8 structures sprayed
- 1 structure refused
- 5 structures NOT FOUND

Normal IRS Reporting: $8/9 = 89\%$
Actual coverage: $8/14 = 57\%$
Real life examples...
2. Map sprayable structures

Use satellite imagery to map structures = accurate denominator

Enumeration: 94%\(^1\) accuracy, aids planning and identifying clusters
3. Guide spray teams with in-field maps & validate coverage

Field verification during IRS: allows accurate measurement of coverage
4. Support decision making in-field
Managers go through decision form guidance while viewing dashboard to decide whether mop-up is necessary to protect this community and to plan accordingly.

To reach 85% spray effectiveness, your team must spray at least 115.6 structures.

69 eligible structures are still remaining. This includes both structures that have not been found and structures that were found but not sprayed. At least 48.6 must still be sprayed to reach 85% spray effectiveness.

What was the main reason for not reaching 85% spray effectiveness? (Not Found or Not Sprayed?)
- Low Found Coverage
- Low Spray Success Rate (Spray coverage)
How often is this happening and what is the impact...
Of 2,057 villages that received IRS, 50% were ‘revisited’

<table>
<thead>
<tr>
<th>Re-visit Success</th>
<th>Before Re-visit</th>
<th>After Re-visit</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>IRS Coverage</td>
<td>53.7%</td>
<td>86.1%</td>
<td>32.4%</td>
</tr>
<tr>
<td>Success Rate</td>
<td>80.2%</td>
<td>95.2%</td>
<td>15.0%</td>
</tr>
<tr>
<td>Found Coverage</td>
<td>65.5%</td>
<td>92.4%</td>
<td>26.9%</td>
</tr>
</tbody>
</table>
In-Field Offline Decision Making
Does spatial intelligence like this improve impact?
Impact (preliminary)

“...mSpray was associated with a significant 15% further reduction in confirmed case incidence...due to better targeting and achieving overall higher household coverage.”

Learning Opportunities

• Cost-effectiveness of using spatial intelligence (analysis Feb 2019, Tulane University)
• Impact of “Layering” interventions and linking to household; i.e. IRS, IRS + mobilization, IRS +MDA
Spatial intelligence & community mobilization

Thanks to PATH-MACEPA

Malaria Awareness by Community
Low awareness (Red); High awareness (Yellow)
Application of spatial intelligence principles to other malaria interventions
• Gates funding under Digital Solutions for Malaria Elimination grant.

• Reveal is a geospatial tool which supports decision makers and intervention managers to guide and track delivery of in-field activities with precision and to hold field teams accountable for action.

• Spatial planning support, precise data collection, dashboarding, protocol guidance
  • Open source
  • IRS, ITN distribution and tracking, larval source management, MDA, RACD, foci Investigations, community engagement, focal IRS response

• Timeline: Complete by mid 2019

• Implementation support in CHAI countries
Digital Solutions for Malaria Elimination
Community of Practice

• 2019 implementation expansion to Thailand, (Namibia, Botswana, Nepal, Mozambique, Zambia).
• Planned deployment to 10+ countries in 2020

https://dsme.community/
Vital Wave serves as the current steward of DSME community. Interested in joining? Read our member commitments and Get Involved!

https://dsme.community/
Thank you.
dpollard@akros.com
Thank you
visit rollbackmalaria.org
@RollBackMalaria

RBM Partnership to End Malaria
3rd floor, TCS Building, Chemin de Blandonnet 2, 1214 Vernier, Geneva, Switzerland. Info@rollbackmalaria.com