30th of January, 2019

4th IRS IRM Priorities Work Stream meeting

NgenIRS Project Update: Building an Evidence Base for 3GIRS

Molly Robertson – Evidence Lead
Presentation Summary

NgenIRS Background and Update 2 – 7
Overcoming market failure
Creating an Evidence Base

Evidence of Impact 7 – 16
Mozambique CRT Design
Mozambique CRT Impact – Ento
Mozambique CRT Impact – ACD
Observational Impact – Mali
Observational Impact – Northern Ghana
MERG Task Force – a problem
MERG Task Force – working to a solution

Future Plans 17 – 18
Project Rationale and Pillars of Catalytic Market Shaping

The Market for 3rd Generation IRS
Underlying Causes of Shortcomings

- High Price
  - Weak evidence of Impact / Cost Effectiveness
- Low Uptake / small market
  - One Supplier
  - No Forecast / Long Lead times

Market Shaping Intervention

- Reduce Price
  - Complete evidence of Impact and Cost Effectiveness
  - Increase Uptake / coverage
- Multiple Suppliers
  - Forecast and underwrite Demand
### Project Goal, Objectives and Strategies

<table>
<thead>
<tr>
<th>Demand</th>
<th>Accelerate uptake of 3GIRS products</th>
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**The NgenIRS project is a 4 year Unitaid-funded market shaping initiative**
- Launched early 2016
- Investment of $65.1 million

**Goal**
- Increased use of 3GIRS products in Insecticide Resistance Management (IRM) programmes

**Outcome**
- A sustainable, growing and competitive market for effective 3GIRS products at affordable prices
### Project Accomplishments (2016 – 2018)

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- **Downward market trend reversed** with over 30 countries procuring 3GIRS with donor and domestic funding.
- Development of global forecasting tool provides manufacturers with the ability to plan better and reduce costs.
- From only 1 product in 2016 to 3 products in 2019, with two more in the pipeline.
- Prices reduced from over $23 per unit to an average about $16 and trending to $15 or less by 2020.
- Compelling evidence showing impact and cost-effectiveness of IRS in combination with LLINs and other interventions.
Impact and Cost-effectiveness of 3GIRS: Developing a Robust Evidence Base

VectorLink synergies: ongoing discussion
Impact and Cost-effectiveness of 3GIRS: Developing a Robust Evidence Base

**Mali:** Observational analysis of impact of IRS (including 3GIRS) from 2011-2014 in Segou
- Analysis of shifting IRS to Mopti
  - Upcoming - costing

**Ghana:** Observational analysis of the impact of 3GIRS in Northern Savanah of Ghana
- Upcoming analysis of previously unsprayed areas and introduction of SumiShield in 2018
  - + costing

**Zambia:** Retrospective evaluation of the effectiveness of IRS with Actellic on malaria transmission
- + costing

**Mozambique:** Prospective CRT to measure the health impact and cost-effectiveness of 3GIRS combined with LLINs
- Upcoming analysis of SumiShield

**Uganda:** Support analysis of the impact of switching active ingredients to a 3GIRS product
- + costing

**Cross-cutting activities:**
- Global Costing Framework & country costing
- Review of IRS indicators
- Topic-based multi-country analyses

**VectorLink** synergies: ongoing discussion
Cluster Randomized Trial in Mozambique: The impact of 3GIRS in addition to standard LLINs

### Study Arm Characteristics

<table>
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<tr>
<th></th>
<th>Non-IRS</th>
<th>IRS</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Population</td>
<td>67,433</td>
<td>60,099</td>
<td>127,532</td>
</tr>
<tr>
<td>Population u5</td>
<td>11,730</td>
<td>10,944</td>
<td>22,674</td>
</tr>
<tr>
<td>Total Number of clusters</td>
<td>43</td>
<td>43</td>
<td>86</td>
</tr>
<tr>
<td>(Cluster Size Large)</td>
<td>(19)</td>
<td>(18)</td>
<td>(37)</td>
</tr>
<tr>
<td>(Cluster Size Medium)</td>
<td>(14)</td>
<td>(15)</td>
<td>(29)</td>
</tr>
<tr>
<td>(Cluster Size Small)</td>
<td>(10)</td>
<td>(10)</td>
<td>(20)</td>
</tr>
<tr>
<td>LLIN Ownership¹</td>
<td>62%</td>
<td>63%</td>
<td>-</td>
</tr>
<tr>
<td>Jan 2017 Prevalence</td>
<td>62%</td>
<td>65%</td>
<td>-</td>
</tr>
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Cluster Randomized Trial in Mozambique: The impact of 3GIRS in addition to standard LLINs

Monthly trends in total *An. funestus* specimens collected in CDCLTs

63% reduction in 2017 (year 1)*
85% reduction in 2018 (year 2)*

(* p<0.001)
Cluster Randomized Trial in Mozambique: The impact of 3GIRS in addition to standard LLINs

Monthly trends in Cohort incidence (1,536 Children u5 tested monthly)

17% Protective Efficacy of IRS on top of LLINs (CI_{95} = 9% - 35%)
Observational evidence of impact – Mali

An observational analysis of the impact of indoor residual spraying with non-pyrethroid insecticides on the incidence of malaria in Ségou Region, Mali: 2012–2015

Joseph Wagman¹*, Christelle Gogue¹, Kenzie Tynuv¹, Jules Mihigo², Elie Bankineza³, Mamadou Bah³, Diadier Diallo⁴, Andrew Saibu⁵, Jason H. Richardson⁶, Diakalkia Kone⁷, Seydou Fomba⁷, Jeff Bernson⁸, Richard Steketee⁹, Laurence Slutsker⁹ and Molly Robertson¹

Wagman et al. Malar J (2018) 17:19
https://doi.org/10.1186/s12936-017-2168-2
Observational evidence of impact – Mali

- 29% fewer cases
  - $31.55 per case averted
  - $6.08 per person covered

- 30% fewer cases
  - $42.59 per case averted
  - $7.40 per person covered

- 35% fewer cases
  - $23.33 per case averted
  - $6.88 per person covered

Duration of IRS campaigns
Non-IRS
IRS
Difference

Average RDT+ Incidence per 10,000 person-months
Observational evidence of impact – Mali

2017 PMI AIRS IRS operations were shifted from Ségou region to Mopti Region
Observational (non-randomized) evidence of impact – Mali

2017 PMI AIRS IRS operations were shifted from Ségou Region to Mopti Region

Percent Change in Health Facility Malaria Incidence by IRS Status: 2016 to 2017

<table>
<thead>
<tr>
<th>IRS Status</th>
<th>% Increase</th>
<th>% Decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td>No IRS</td>
<td>-21%</td>
<td>-51%</td>
</tr>
<tr>
<td>IRS Introduced</td>
<td>133%</td>
<td></td>
</tr>
<tr>
<td>IRS Suspended</td>
<td></td>
<td></td>
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</tbody>
</table>

Percent change in cumulative malaria incidence at health facilities: 2016 - 2017
Observational (non-randomized) evidence of impact – Northern Region of Ghana

During peak transmission months (JUN – SEP)
Case incidence rates were more than 75% higher in non-IRS districts than in IRS districts
Future Country Specific Work

Additional Publications and Analyses Pending

Mali – Effect of shifting operations to new districts & combining IRS with SMC

Ghana – Observational evaluation of SumiShield & Effect of introducing IRS to previously unsprayed districts

Zambia – Combined impact of IRS and MDA & Impact of coverage methods

Mozambique – SumiShield Analysis in Mopeia study area
Cross-Cutting Activities and Analysis
MERG Task Force – Harmonizing IRS Indicators

The ability to cross-analyze vector control interventions across different countries, implementing partners, and implementation strategies is hampered by a multiplicity of measurement methods and indicator definitions. Small changes in definitions can greatly impact the interpretation and analysis of the effectiveness of vector control programs.

Costing and Cost-effectiveness

Harmonization of costing frameworks was conducted. Visits to Mali and Ghana were completed. Visits to Zambia, Mozambique and Uganda are pending.

Dissemination

Discussion & Engagement on IRS impact and role in the vector control toolbox

Transition and Sustainability

New Nets Project
PMI/VectorLINK
Thank you.