Indoor Residual House Spraying Work Stream

3rd Meeting
29th-30th Jan 2013

Roll Back Malaria Vector Control Working Group
8th Meeting
IRS sub work groups

• IRS Advocacy and financing- Tren/Moonasar

• IRS Evidence and Reporting - Rajendra Maharaj/ Immo Kleinshmidt

• IRS supervision, reviews, evaluation - John Govere/Rwakimari

• IRS Procurement and supply management - Rabindra Abeyasinghe/Gerhard Hesse

• IRS training and country capacity building - Manuel Lluberas
IRS Work Plan 2012-2013

IRS Experience, Evidence and reporting

• Provide guidance on scaling up and scaling down IRS
• Support countries to prepare IRS case studies and publish on impact of IRS
• Conduct a systematic review of published IRS studies on epidemiological/entomological (Cochrane like)
• Support country and regional IRS annual reporting on progress and performance

Advocacy and Financing

• Advocate for IRS at the highest levels of Africa and global policy making
• Advocacy case studies on country IRS programs
• Increase and sustain more domestic financing for IRS in national programs
• Increase and sustain private cooperate support for scaling up IRS

Capacity and Training

• Provide guidance on building structures and system and capacity building for IRS
• Review and developed IRS regional training curriculum and training materials
• Evaluate need and location for regional training centers
• Implement regional training programs
• Review and developed national IRS training curriculum and training materials

IRS Commodities and Procurement and Supply Management

• Development of a PSM plan template for IRS chemicals, spray pumps and protective gear
• Support global quality control monitoring of IRS commodities
• Prepare country and global estimates and models of IRS commodity needs
• Simplify specifications and standardize tender formats for IRS chemicals and hand compression pumps
IRS Reporting

- IRS Policy & Practice
- **Outputs**: Amount of Insecticide used
- Insecticide Resistance testing results
- Quality and bioassays results
- **Outcome**: No of structures-household sprayed & No of people protected
- **Impact**: Prevalence, API, district free of malaria
## IRS Indicators & Reporting

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Numerator</th>
<th>Denominator</th>
<th>Data source</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Percentage of population at risk protected by IRS</td>
<td>No. of persons protected by IRS</td>
<td>No. of persons at risk for malaria</td>
<td>Routine data from national malaria control programme</td>
<td>&gt;80%</td>
</tr>
<tr>
<td>2. Households/structures sprayed with insecticide among those targeted</td>
<td>No. of households/structures sprayed every six months or once a 1 year according to national guidelines</td>
<td>No. of households/structures targeted for IRS once in 6 months or every 12 months according to national guidelines</td>
<td>Routine data from national malaria control programme</td>
<td>&gt;80%</td>
</tr>
<tr>
<td>3. Proportion of households sprayed with IRS in the last 6 months or 12 months.</td>
<td>Number of households that have been sprayed by IRS in the last 6/12 months.</td>
<td>Total number of households surveyed</td>
<td>Household survey</td>
<td></td>
</tr>
</tbody>
</table>

Annual IRS reporting form
IRS Program supervision

• National, Provincial IRS coordinators, disease control officers and entomologists should conduct quarterly scheduled field visits to districts to review status of implementation of the district IRS annual work plan and to review IRS spray operations that may be under way. This is to identify delays in implementation of the annual IRS plan of action and to correct any operational problems in spray operations.

• CHECK LIST
Supervision of field spray operation

• The purpose of supervisor is to solve problems and offer support not to criticize or find fault. (District IRS Coordinators)
• The main objectives are:

  • to ensure that the spray team movement schedule is strictly adhered to and the agreed target numbers of houses to be sprayed per day are being maintained;
  • to take corrective measures, on the spot, on spray application techniques and take note of any equipment deficiencies for remedial action;
  • to stimulate, encourage and advise on good communication with householders and village or community leaders;
  • to ensure good team work for total and complete coverage of areas to be sprayed;
  • to ensure that strict discipline and standard operating procedures are maintained;
  • to assess, evaluate and appreciate the work output of the teams;
  • to make constructive and feasible recommendations to improve quality, coverage and timely implementation of operations.

• CHECK LIST
IRS Program Performance review

- The specific objectives of a comprehensive IRS programme review are:
  - to review the IRS policy regards why, where and when IRS is done
  - to review the impact of IRS on entomology and epidemiology of malaria
  - to review the IRS program structure, organization, and management within the national malaria and vector borne disease control programs and the national health system.
  - to assess progress towards achievement of national, regional and global IRS and vector control targets;
  - Review the current performance of IRS within the vector control intervention thematic areas and by service delivery levels.
  - to define the next steps for improving IRS programme performance and/or redefining the strategic direction and focus, including revising the policies and plans and IRS program change/reform.

Draft IRS Assessment tool.
## IRS Policy & Practice

<table>
<thead>
<tr>
<th>Policy</th>
<th>Practice 2010</th>
<th>Practice 2011</th>
<th>Practice 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of malaria endemic countries</td>
<td>106</td>
<td>106</td>
<td>99</td>
</tr>
<tr>
<td>IRS is recommended by malaria control program</td>
<td>64</td>
<td>73</td>
<td>80</td>
</tr>
<tr>
<td>IRS is the primary vector control intervention</td>
<td>51</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>IRS is used for prevention and control of epidemics</td>
<td>56</td>
<td>51</td>
<td>42</td>
</tr>
<tr>
<td>IRS and ITNs used together for malaria control in at least some areas</td>
<td>66</td>
<td>62</td>
<td>58</td>
</tr>
<tr>
<td>DDT is used for IRS</td>
<td>19</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>Insecticide resistance monitoring is undertaken</td>
<td>74</td>
<td>78</td>
<td>77</td>
</tr>
</tbody>
</table>

Source: World Malaria Reports

Source: Malaria Endemic Countries
## IRS Policies by WHO regions

Table 4.2 Adoption of policies for IRS programmes by WHO Region, 2011

<table>
<thead>
<tr>
<th>Policy</th>
<th>AFR</th>
<th>AMR</th>
<th>EMR</th>
<th>EUR</th>
<th>SEAR</th>
<th>WPR</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>IRS is recommended by malaria control programme</td>
<td>38</td>
<td>17</td>
<td>6</td>
<td>5</td>
<td>8</td>
<td>6</td>
<td>80</td>
</tr>
<tr>
<td>IRS is used for the prevention and control of epidemics</td>
<td>19</td>
<td>9</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>7</td>
<td>42</td>
</tr>
<tr>
<td>IRS and ITNs used together for malaria control in at least some areas</td>
<td>30</td>
<td>14</td>
<td>3</td>
<td>5</td>
<td>5</td>
<td>6</td>
<td>58</td>
</tr>
<tr>
<td>DDT is used for IRS</td>
<td>10</td>
<td>2</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td>13</td>
</tr>
<tr>
<td>Insecticide resistance monitoring is undertaken</td>
<td>34</td>
<td>11</td>
<td>8</td>
<td>5</td>
<td>9</td>
<td>10</td>
<td>77</td>
</tr>
<tr>
<td>Number of countries/areas with ongoing malaria transmission</td>
<td>44</td>
<td>21</td>
<td>9</td>
<td>5</td>
<td>10</td>
<td>10</td>
<td>99</td>
</tr>
<tr>
<td>Number of countries/areas with ongoing <em>P. falciparum</em> transmission</td>
<td>43</td>
<td>18</td>
<td>9</td>
<td>0</td>
<td>9</td>
<td>9</td>
<td>88</td>
</tr>
</tbody>
</table>
Proportion of population at risk protected by IRS

Figure 4.5 Proportion of population at malaria risk protected by IRS by WHO Region, 2002–2011

- Western Pacific
- Eastern Mediterranean
- South-East Asia
- Americas
- Africa

Source: NMCP reports
Strategic Issues

- IRS scaling up in high transmission countries for impact
- IRS combined with LLIN for impact
- IRS being targeted and scaled down in low transmission to malaria foci for malaria elimination
- IRS being combined with LSM
IRS Scaling Up Countries- Impact

- IRS protected globally 153 (185) million people representing 5% of the population at risk in malaria endemic countries

- WHO African Region. IRS and vector control is a regional priority. Total of 77 (78) million people protected 11% of population

- Ethiopia, Tanzania, Uganda, Mozambique, Zambia, Zimbabwe, Rwanda, Malawi, Equatorial Guinea, Sao Tome, DRC
- Gambia, Benin, Senegal, Ghana, Liberia, Mali, Nigeria

- South East Asia region IRS and vector control is a priority intervention. 4% of Population at risk

- India, East Timor, Myanmar,

- Eastern Mediterranean region IRS and vector control is a priority intervention. 2 % of Population at risk

- Sudan, Yemen, Pakistan
- South Sudan
Countries Scaling Down Targeting IRS at Malaria Foci

- **WHO African Region** - Reducing and Targeting IRS
  - Botswana, South Africa, Namibia, Zanzibar, Eritrea, Cape Verde

- **South East Asia region** - Reducing and Targeting IRS
  - Nepal, Sri Lanka, Bhutan, DPRK, Thailand

- **European region** - IRS is the primary vector control strategy to support accelerated elimination and prevention of re-introduction
  - Tajikistan & Azerbaijan
  - Turkey, Kyrgyzstan, Uzbekistan.

- **Eastern Mediterranean region** IRS and vector control is a priority intervention. 2 % of Population at risk
  - Saudi Arabia & Iran
  - South Sudan

- **Western Pacific region** IRS and vector control is a priority intervention
  - China, Vietnam, Philippines
  - Malaysia, Solomon Islands
  - Laos is trying to re-introduce IRS

- **Americas** malaria transmission is currently low and IRS and vector control regionally is not a priority. IRS is limited to few focal areas
  - Brazil, Venezuela, Columbia, Nicaragua, Guatemala, Honduras
  - Suriname, Costa Rica, Panama, Argentina, Paraguay
Operational Issues

- Country IRS data base and annual reporting
- Country IRS program capacity strengthening
- Low WHO capacity in entomology and vector control
- Private cooperate sector for IRS and malaria control is consistent with expanding CSR and CSI (Anglo Gold, Ilovo, Rio-Tinto Verdanta etc-Exxon ?
- PSM and USAID contractors change and team work with national programs and support country capacity building and team work with other partners.(RTI and Abbt ? Chemonics ) - *Old dependency Paradigm*
- Private malaria commodity providers uncertain of the IRS chemical and pumps market. (Arysta-Syngenta- Hudson-HIL, Gozper etc)
Conclusion

• Work stream recruit new members and expand network

• Advocacy for RBM- ALMA support for IRS domestic and international financing

• Country IRS annual reporting and program reviews

• Country IRS capacity assessment and support and training

• IRS in malaria emergency

• *P. vivax* and IRS and vector control
Plenary & Group Work Session
Poster Sessions

IRS Work Plan for 2013-2014
Purpose

• Show what countries are doing

• Show what partners are doing to support national programs

• **Rolling out stronger national IRS programs**

• **High lighting Innovation, new tools and technology**

• Testing, validating and rolling out new tools

• New members for the IRS network
Method

• Chair and Rapporteurs

• **Group work – Power Point- Work Plan 2013-2014**
• National Institutional Capacity Building & Training
• Advocacy and financing
• Rolling out new tools
  – Key issues
  – Objectives, activities, responsible team, Expected product, estimated cost
IRS Work Plan 2012-2013

• **IRS Experience, Evidence and reporting**
  
  - Provide guidance on scaling up and scaling down IRS
  - Support countries to prepare IRS case studies and publish on impact of IRS
  - Conduct a systematic review of published IRS studies on epidemiological/entomological (Cochrane like)
  - Support country and regional IRS annual reporting on progress and performance

• **Advocacy and Financing**
  
  - Advocate for IRS at the highest levels of Africa and global policy making
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  - Provide guidance on building structures and system and capacity building for IRS
  - Review and developed IRS regional training curriculum and training materials
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  - Implement regional training programs
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• **IRS Commodities and Procurement and Supply Management**
  
  - Development of a PSM plan template for IRS chemicals, spray pumps and protective gear
  - Support global quality control monitoring of IRS commodities
  - Prepare country and global estimates and models of IRS commodity needs
  - Simplify specifications and standardize tender formats for IRS chemicals and hand compression pumps
# Plenary Session

<table>
<thead>
<tr>
<th>Time</th>
<th>Agenda Item</th>
<th>Presenter</th>
</tr>
</thead>
</table>
| 8:30 – 9:00 | Coffee and tea
  *Poster viewing*                           |                          |
| **Session 1** | **Scaling up IRS in 2012**                          |                          |
| 9:00 – 9:10 | Introductions to day sessions                      | Shiva & Manuel           |
| 9:10 – 9:20 | IRS for Malaria elimination                       | WHO-AFRO                 |
| 9:20 – 9:30 | Scaling up IRS in Tanzania                        | NMCP-Tanzania            |
| 9:30 – 9:50 | Discussion                                          |                          |
| 9:50 – 10:00 | Scaling up IRS                                      | RTI                      |
| 10:00 – 10:10 | Scaling up IRS                                     | Abt Associates           |
| 10:10 – 10:20 | Malaria private and public partnership            | GBC Health               |
| 10:20 – 10:30 | Scaling up IRS in Uganda                          | NMCP Uganda              |
| 10:30 – 10:50 | Discussion                                          |                          |
| 10:50 – 11:00 | IRS for Cross Border Malaria Control and Elimination | NMCP South Africa       |
| 11:00 – 11:30 | Morning break / coffee and tea
  *Poster viewing*                           |                          |
## Plenary Session

<table>
<thead>
<tr>
<th>Session 2</th>
<th>Tools for IRS</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:30 – 11:40</td>
<td>Global Fund Support for IRS</td>
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<tr>
<td>11:40 – 12:00</td>
<td>Discussion</td>
</tr>
<tr>
<td>12:00 – 12:10</td>
<td>IRS quality testing Kit</td>
</tr>
<tr>
<td>12:10 – 12:20</td>
<td>IRS commodity Planning Tool</td>
</tr>
<tr>
<td>12:20 – 12:30</td>
<td>New technology for IRS</td>
</tr>
<tr>
<td>12:30 – 13:00</td>
<td>Discussion</td>
</tr>
<tr>
<td>13:00 – 14:00</td>
<td>Lunch</td>
</tr>
<tr>
<td></td>
<td><strong>Poster viewing</strong></td>
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</table>
# Group Work- Session

<table>
<thead>
<tr>
<th>Session 3</th>
<th>Group Work 2013 IRS plans and products</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Group.1 Regional IRS Training and Support Centers &amp; Curriculum and materials for IRS: Africa: West, East, Southern; Asia?; Americas?</strong>&lt;br&gt;<strong>Group.2 IRS advocacy</strong>&lt;br&gt;<strong>Group.3 IRS new tools and technology</strong></td>
</tr>
<tr>
<td>14:00 – 14:40</td>
<td>Discussion &amp; Summary of group work &amp; plans participation at the 2014 American Mosquito Association Meeting</td>
</tr>
<tr>
<td>15:00 – 15:30</td>
<td>Afternoon break / coffee and tea&lt;br&gt;<strong>Poster viewing</strong></td>
</tr>
</tbody>
</table>
Reduction of Malaria Prevalence by Indoor Residual Spraying: A Meta-Regression Analysis

Dohyeong Kim1, Kristen Fedak2, Randall Kramer3
1 Department of Public Administration, North Carolina Central University, Durham, NC 27707
2 ICF International, 2222 East NC-54, Durham, NC 27713
3 Duke Global Health Institute, Duke University, Durham, NC 27708

INTRODUCTION

A number of field studies have reported the effectiveness of IRS in reducing malaria prevalence, but it is hard to generalize from any single study how effective IRS is at reducing malaria prevalence, as various studies have shown conflicting results. Few researchers have attempted to quantify the effects of IRS even on a small scale, and fewer have addressed what factors might be major versus minor contributors to the relative success or failure of IRS programs around the world. Additionally, although there are many reviews arguing that IRS is safe, toxicity data from animal studies and recent epidemiological studies suggest that there may be previously unrecognized long-term negative health consequences for those exposed to insecticides, particularly DDt, even at the low levels seen with IRS.

The goal of this study is to determine the overall effectiveness of IRS in reducing malaria prevalence, and to gain information on the different factors that may contribute to the relative strength or weakness of the effect of IRS in different scenarios. A systematic literature review is performed to synthesize information from a collection of published studies and identify a range of potential outcomes and key factors that are different among these studies. We expand upon the findings of the Cochrane Collaboration literature review by widening the criteria for inclusion and used meta-regression analysis techniques to synthesize and statistically analyze the results while controlling differences across the included studies. We limited our literature search to only papers published in 2000 or later in order to minimize a confounding effect by the papers that might represent IRS effectiveness before insecticide resistance was a concern.

METHODS

In the second step, titles and abstracts were scanned for articles that fit three broad inclusion criteria: (1) observational or experimental study designs, (2) reported change in measurable human health outcome due to IRS interventions, and (3) a study design that allowed for measurement of effect of IRS alone. In the third step, these studies were retrieved in full and reviewed in order to confirm they actually met the criteria stated above. We collected and recorded detailed information on the study location, study population, the intervention, and finally the health measurements and effects. In the fourth step, we recorded actual data points from the selected studies associated with the numerical information for the selected covariates. As a result, the final sample for the meta-regression model includes 45 data points from the 13 studies. Finally, several covariates were reclassified and calculated such as relative risk (RR). Data were organized using Excel (Microsoft 2007) and statistical analysis was performed using STATA 10 software (StataCorp, Texas, USA).

RESULTS

Table 1 provides a summary of the final 13 publications included in the meta-regression analysis.

- **Study location**: Equatorial Guinea (1), Kenya (2), Madagascar (2), Mozambique (2), Democratic Republic of Sao Tome and Principe (1), Ethiopia (1), Sudan (1), Uganda (1), Zanzibar (1)
- **Study type**: Cohort (7), cross-sectional (6), randomized control trials (2)
- **Malaria species**: Plasmodium falciparum (16), P. vivax (3), P. falciparum/vivax (3)
- **Insecticide type**: chemical class (organophosphate, carbamate, pyrethroid)

Figure 2 is a forest plot which illustrates the contribution of each study to the random effects meta-regression analysis. Relative weight of each study is shown by the area of a bow whose midpoint represents the size of the relative risk estimated from each study. The plot shows not only the summary relative risks for each of the 13 studies, but also the combined relative risk of 0.38, indicating a reduction in malaria prevalence of 62% due to IRS implementation (95% CI = 0.31 – 0.46).

DISCUSSION

The results from the meta-regression analysis provide some interesting information that can help governments and NGOs direct their strategic plans. First, the relationship between IRS effectiveness and starting prevalence shows that programs in communities with higher initial malaria rates might benefit more from IRS. Second, DDt is indeed more effective at reducing malaria prevalence than pyrethroids or other insecticides, which could serve to change the cost-benefit analysis of DDt use on a local or regional scale. Third, IRS is more effective when multiple rounds of spraying are administered in a community where falciparum/vivax malaria is more prevalent, which could inform the malaria control program officials on the efficient allocation of limited resources for maximum impact. Finally, the magnitude of IRS effectiveness appears to be significantly different among study design types, with RTC studies the largest effects and cross-sectional studies the smallest effects. All these information can serve as a guide to health policy makers and malaria control program officials for a better interpretation and utilization of various results of IRS effectiveness.

ACKNOWLEDGEMENTS

This work was supported by Award Number R01AI088600 from the National Institute Of Allergy And Infectious Diseases. This work also received financial support from the World Health Organization.

CONTACTS

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Please contact dkim@nccu.edu or 919-530-5004
Poster

Reduction of Malaria Prevalence by Indoor Residual Spraying: A Meta-Regression Analysis

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\textsuperscript{1} Department of Public Administration, North Carolina Central University, Durham, NC 27707
\textsuperscript{2} ICF International, 2222 East NC-54, Durham, NC 27713
\textsuperscript{3} Duke Global Health Institute, Duke University, Durham, NC 27708
## Studies

<table>
<thead>
<tr>
<th>Variable</th>
<th>All responses (no.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study location</td>
<td>Equatorial Guinea (3), Kenya (2), Madagascar (2), Mozambique (2), Democratic Republic of Sao Tome and Principle (1), Eritrea (1), Sudan (1), Uganda (1), Zambia (1)</td>
</tr>
<tr>
<td>Study type</td>
<td>Cohort (7), cross-sectional (4), randomized control trials (2)</td>
</tr>
<tr>
<td>Malaria species</td>
<td>Plasmodium falciparum (10), P. falciparum/vivax (3)</td>
</tr>
<tr>
<td>Insecticide type, chemical class</td>
<td>Pyrethroid (6), organochlorine: DDT (4), carbamate–bendiocarb (2), organophosphate: malathion (1)</td>
</tr>
</tbody>
</table>
## Table 2

Meta-regression results (n = 45) of reduction of malaria prevalence by indoor residual spraying*  

<table>
<thead>
<tr>
<th>Covariate (dependent variable = log RR)</th>
<th>Coefficient (95% confidence interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log of initial prevalence (proportion of study population with malaria before intervention)</td>
<td>−0.447 (−0.736 to −0.158)†</td>
</tr>
<tr>
<td>Multiple rounds of spraying (1 = yes, 0 = no)</td>
<td>−1.911 (−2.632 to −1.191)†</td>
</tr>
<tr>
<td>Total sample size</td>
<td>0.000003 (−0.0000037 to 0.0000043)</td>
</tr>
<tr>
<td>Use of organochlorine class insecticide</td>
<td>−0.918 (−1.843 to 0.006)‡</td>
</tr>
<tr>
<td>Use of organophosphate class insecticide</td>
<td>2.610 (0.041 to 5.179)§</td>
</tr>
<tr>
<td>Use of carbamate class insecticide</td>
<td>1.426 (0.589 to 2.263)†</td>
</tr>
<tr>
<td>Child less than 15 years of age</td>
<td>−0.487 (−1.307 to 0.333)</td>
</tr>
<tr>
<td><em>Plasmodium falciparum</em> only</td>
<td>1.052 (0.412 to 1.691)†</td>
</tr>
<tr>
<td>Cross-sectional study design</td>
<td>2.269 (1.275 to 3.264)†</td>
</tr>
<tr>
<td>Cohort study design</td>
<td>1.404 (0.260 to 2.547)§</td>
</tr>
<tr>
<td>Constant</td>
<td>−3.076 (−4.182 to −1.969)†</td>
</tr>
</tbody>
</table>

*Adjusted $R^2 = 0.786$; $\tau^2 = 0.2255$. RR = relative risk.  
†$P < 0.01$.  
‡$P < 0.1$.  
§$P < 0.05$.  

**Roll Back Malaria**
Conclusion

• First, the relationship between IRS effectiveness and starting prevalence shows that programs in communities with higher initial malaria rates might benefit more from IRS.

• Second, DDT is indeed more effective at reducing malaria prevalence than pyrethroids or other insecticides, which could serve to change the cost-benefit analysis of DDT use on a local or regional scale.

• Third, IRS is more effective when multiple rounds of spraying are administered in a community where falciparum/vivax malaria is more prevalent.

• Finally, the magnitude of IRS effectiveness appears to be significantly different among study design types, with RCT studies the largest effects and cross-sectional studies the smallest effects.

• All these information can serve as a guide to health policy makers and malaria control program officials for a better interpretation and utilization of various results of IRS effectiveness.
The DDT Expert Group recognizes that there is a continued need for DDT in specific settings for disease vector control where effective or safer alternatives are still lacking. Where DDT use is continued, mechanisms should be in place to effectively ensure that DDT is used strictly within the WHO recommendations and guidelines for disease vector control. The use of DDT in IRS should be limited only to the most appropriate situations based on operational feasibility, epidemiological impact of disease transmission, entomological data and insecticide resistance management. Countries and partners should be encouraged to evaluate new insecticide formulations as suitable alternatives to DDT in IRS. Countries should undertake further research and implementation of non-chemical methods and strategies for disease vector control to supplement reduced reliance on DDT. Funding should be made available to support countries to transition away from the reliance on DDT for disease vector control, with the highest priority to assure that adequate systems and institutional capacity are in place to train and support skilled staff for entomological monitoring, operational research, evidence-based decision making and to monitor program performance. Funding should be made available to increase the national policy and management capacity for translating international best practices on disease vector control and implementing quality assurance systems to assess programme performance and impact. The Secretariat of the Stockholm Convention should continue to facilitate activities on strengthening capacity to transition away from the reliance on DDT for disease vector control.
Africa Fighting Malaria (AFM) is an independent non-profit organization that since 2000 has been a singular voice for better global malaria control. AFM’s research and strategic advocacy and policy analysis has resulted in substantial reforms to donor supported malaria control programs, increasing transparency and accountability, thereby saving lives.
How AFM Works

- We work with scientists from numerous different organizations, institutes and governments to understand & communicate the latest & most effective technologies & research on malaria control.
How AFM Works

• We write in the popular media and peer reviewed journals and have built up a strong relationship with journals such as the New York Times, The Lancet, The Washington Post, and The Wall Street Journal.
How AFM works

- We work with think tanks and public policy research organizations to influence policy and effect change
How AFM Works

• We collaborate with other NGOs, faith based organizations, pressure groups and malaria control donors to keep the pressure up and demand change.
House Spray Rates, 1965-92, and Cumulative Malaria Cases, pre- vs. post-1979
(Brazil, Colombia, Ecuador, Peru, Venezuela)

Cumulative Numbers of Cases (x 1000)

Sprayed houses per 1000 population (HSR)

Background

- Uganda one of the highest burden countries for malaria
- Year round stable transmission > 95% of the population at risk
- 2 peak transmission seasons, Oct-Dec, May-July

Main malaria vectors:
Anopheles gambiae s.s., An. funestus, An. arabiensis

Sentinel sites:
- Susceptibility surveillance sites: 6 (once every 2 years)
- PSC and CDC light trap collections done pre/post IRS

Insecticide resistance patterns (courtesy of PMI)

Background

- IRS scaling up: performance, progress and partnerships
- Republic of Uganda
- National Malaria Control Program, Ministry of Health

IRS for reducing transmission in high prevalence areas, and for preventing epidemics

- IRS on-going since 2006, changing priorities from highland areas in South-West (districts in grey on map) to high transmission areas in the Northern and Eastern part of the country
- IRS is implemented with support from PMI (RTI: 2006-2009, Abt Associates: 2009-ongoing) in Northern Districts with two spraying rounds per year. NMCP supports IRS in Kumi district in the East
- Consistently high coverage in sprayed districts (>95%)
- IRS protected approximately 8% of total at risk population in 2012

<table>
<thead>
<tr>
<th>Year</th>
<th>Districts targeted</th>
<th>IRS</th>
<th>Malaria risk population protected</th>
<th>No of RRH protected (percentage)</th>
<th>Insecticide used</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>1 District South</td>
<td></td>
<td>468,552</td>
<td>103,329 (96%)</td>
<td>Lambda-cyhalothrin</td>
</tr>
<tr>
<td>2007</td>
<td>2 Districts South, 3 Districts North</td>
<td>1,865,956</td>
<td>446,117 (98%)</td>
<td>Lambda-cyhalothrin</td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td>5 Districts North</td>
<td>1,555,261</td>
<td>579,913 (39%)</td>
<td>DDT, Alpha-cypermethrin</td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>5 Districts North</td>
<td>2,262,578</td>
<td>568,995 (96%)</td>
<td>Alpha-cypermethrin</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>10 Districts North</td>
<td>2,794,839</td>
<td>879,326</td>
<td>Alpha-cypermethrin, Bendiocarb</td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td>10 Districts North</td>
<td>2,839,173</td>
<td>908,627</td>
<td>Bendiocarb</td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td>10 Districts North</td>
<td></td>
<td>910,000 (95%)</td>
<td>Bendiocarb</td>
<td></td>
</tr>
</tbody>
</table>

* In 2010, large districts underwent district subdivision, see map

Outcome

- Data from Aduku HCIV (Apac), an area with an estimated EIR of 1600 in 2005

IRS Challenges and Plans 2013

Challenge
- Mobilizing funds to scale up activities.

Support required
- Financial support to sustain and scale up IRS
- Support for vector control work to determine resistance mechanisms/ increase monitoring insecticide resistance

Plans for 2013
- Sustain IRS in the 11 districts with 2 rounds of spraying with bendiocarb or longer acting organophosphate
- LLINs will be distributed in IRS covered districts (target Universal Coverage)
- Evaluate future after 3 years spraying in the North
- Discuss resistance-management strategies, use of rotations

Main malaria vectors:
Anopheles gambiae s.s., An. funestus, An. arabiensis

Sentinel sites:
- Susceptibility surveillance sites: 6 (once every 2 years)
- PSC and CDC light trap collections done pre/post IRS