Expanding vector control for Humanitarian Emergencies

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Notice the two torn LLINs on this shelter.
RBM Vector Control in Humanitarian Emergency Initiative

Mission Statement

To reduce human suffering and death from vector-borne diseases in Humanitarian Emergencies by:

a) improving delivery, uptake, integration and evaluation of existing vector surveillance and control tools;

b) facilitating the development of an evidence-base and uptake of supplementary and emerging tools.

https://endmalaria.org/vector-control-humanitarian-emergencies
Selected tools with high potential

- Passive emanators
- Targeted IRS
- Larval control
- ATSBs
- Treated textiles

Operational Research

Ready for Deployment
Passive Emanators (spatial repellents)

• Strong evidence of community impact beyond “repellency”
• Reduction in vectorial capacity even in temporary shelters

Temporary shelter use-case
Linking tool development for outdoor transmission to Humanitarian Emergencies

Photo UNHCR

Photo MSF/Cambodia

Outdoor transmission Mekong

Humanitarian Emergency
Field assessment in Northern Nigeria

(MENTOR Initiative)
IVCC/UCSF Field trial with topical and passive emanator, etofenprox treated clothing

Passive Emanator Packaging: 2,000 units in a 35 liter case weighing 12 kg
IRS in temporary and emergency shelters

- Expanding sprayable structures to include IDP/refugee temporary shelters and tents
- Practical guidance needed for emergencies.
- **Not all formulations have same residual efficacy on tents and tarpaulins**

MENTOR Initiative South Sudan

MENTOR Initiative Northern Mozambique
Larvicide: improved targeting and delivery

- Multiple country programs, Goodbye Malaria, AGAMal, PMI and others are implementing or piloting larvicide programs plus dozens of others
- Improved targeting technologies (ZZAPP information management)
- Improved wide-area delivery application equipment

<table>
<thead>
<tr>
<th>Obstacle</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Product choice is limited in Africa (but not elsewhere)</td>
<td>• Improve access to all PQ-listed products</td>
</tr>
<tr>
<td>• A general lack of expertise to deliver → risk of wasted resources &amp; perception of low cost-effectiveness</td>
<td>• Platform to share knowledge on products best practice delivery (PAMCA)</td>
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<tr>
<td></td>
<td>• Update technical manuals and build capacity and experience (including targeting and monitoring methods)</td>
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ATSB: Opening a new product class

Potential in camp settings where vegetation and alternate nectar sources are reduced

**RCTs are running in Zambia, Kenya and Mali targeting a submission to VCAG & PQ by end of 2024**

<table>
<thead>
<tr>
<th>Updates to VCAG and PQ</th>
<th>Start of Kenya and Mali RCTs</th>
<th>Zambia RCT interim analysis</th>
<th>Kenya and Mali interim analyses</th>
<th>Update to VCAG spring meeting</th>
<th>Zambia RCT final analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1 22</td>
<td>Q2 22</td>
<td>Q3 22</td>
<td>Q4 22</td>
<td>Q1 23</td>
<td>Q2 23</td>
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Access planning and country engagement

Efficacy determinants research

**Bait station installation, Zambia. Credit: PATH/MRC**

**Bait station monitoring, Kenya. Credit: KEMRI**

**Bait station distribution, Mali. Credit: USTT-B**
Etofenprox treated textiles: IVCC/UCSF Semi-field testing Thailand

Much less dermal absorption/ greater wash resistance than permethrin

Discussions with Mitsui Chemicals Crop & Life Solutions, MCCLS (manufacturer), WarmKraft (EPA registrant), for treatment of other textiles, blankets?
Etofenprox versus permethrin

Superior wash resistance compared to permethrin

- The following chart shows the difference between etofenprox (blue) and permethrin (green) bite protection after extended washes.

After 75 washes, etofenprox-treated textiles retain 39 percent of their original coating.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Permethrin</th>
<th>Etofenprox</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Oral Toxicity LD50</td>
<td>$&gt;2,700 \text{ mg/kg}$</td>
<td>$&gt;5,000 \text{ mg/kg}$</td>
</tr>
<tr>
<td>Acute Dermal Toxicity LD50</td>
<td>$&gt;2,000 \text{ mg/kg}$</td>
<td>$&gt;5,000 \text{ mg/kg}$</td>
</tr>
<tr>
<td>Acute Inhalation Toxicity LC50</td>
<td>$&gt;2.6 \text{ mg/L}$</td>
<td>$&gt;2.1 \text{ mg/L}$</td>
</tr>
<tr>
<td>Sub-chronic Dermal Toxicity</td>
<td>500 mg/kg/day (rat)</td>
<td>No systemic toxicity</td>
</tr>
<tr>
<td>Subchronic Inhalation Toxicity NOAEL (rats)</td>
<td>11 mg/kg/day</td>
<td>10.6 mg/kg/day</td>
</tr>
<tr>
<td>Acute neurotoxicity NOAEL (rats)</td>
<td>25 mg/kg/day</td>
<td>2,000 mg/kg</td>
</tr>
<tr>
<td>Carcinogenicity</td>
<td>Likely to be carcinogenic to humans (according to the U.S. EPA)</td>
<td>Not Likely to be carcinogenic</td>
</tr>
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</table>
Expanded toolbox for Vector Control in Humanitarian Emergencies

- Passive Emanators (Spatial Repellents)
- IRS on Temporary Shelters
- Improved targeting and delivery of larvicides
- Attractive Targeted Sugar Baits
- Etofenprox Treated Textiles