Outdoor Malaria Transmission
Work Stream

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Outdoor malaria transmission, 8th February 2012
Introduction

Scaling up ITNs and IRS have contributed significantly to a worldwide decrease of malaria, but:

- IRS has little impact on outdoor resting vectors
- ITNs do not affect outdoor and/or early biting vectors

RESIDUAL TRANSMISSION
Most of the infected *Anopheles* are observed before 10 pm in Ninh Thuan Province, Vietnam (Van Bortel et al. Malaria Journal 2010, 9:373)
Not only outdoor transmission, but also indoor transmission before sleeping time (Uganda)

<table>
<thead>
<tr>
<th>Site</th>
<th>HLC</th>
<th>AEIR BST</th>
<th>Total indoor AEIR</th>
<th>% AEIR BST of total indoor AEIR</th>
<th>Species contribution to AEIR%</th>
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<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>An. funestus</td>
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<tr>
<td>Arua</td>
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<td>48.68</td>
<td>397</td>
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<td>1586</td>
<td>5.91</td>
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<tr>
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<td>562</td>
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<tr>
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<td>5.63</td>
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<td>6</td>
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<td>61.2</td>
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<tr>
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<td>6</td>
<td>0.00</td>
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<td>1.81</td>
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</table>

BST: Before Sleeping Time

Tools to address residual transmission

- Topical Repellents (DEET, Picaridin (KBR3023), P-Mentane-3,8-diol, IR3535)
- Spatio-repellents (metofluthrin fan vaporizer)
- Insecticide treated hammocks, nets,
- Insecticide treated clothing
- Treated Plastic sheeting
- Mosquito Coils/ vaporizers
- Others?

Efficacy studies (entomological-epidemiological)?
Acceptability & feasibility studies?

Figure 1: A portable battery-powered blower that holds 0.6%transpose or 0.6% metofluthrin granules in a cartridge 44 mm in diameter. KV Vapor outlet, @)cartridge.

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Preamble

Novel PHPs may include new active ingredients as well as new application technologies.

These may include approaches that may fit within existing WHOPES guidelines for evaluation.

However, some of these new approaches (e.g. spatial or even topical repellents for transmission control) will require as proof of principle, epidemiological studies to demonstrate efficacy in reducing malaria transmission and/or disease, and the development of new evaluation guidelines and criteria.
To study the added value of repellents to ITNs for the control/elimination of malaria in Cambodia

**Epidemiology study**
1. Assess impact of additional use of repellent on the prevalence of malaria carriers and malaria incidence
2. Assess other parameters important for elimination of malaria and arboviroses

**Entomology study**
1. Perform an entomological evaluation of the mass effect of repellents on residual malaria transmission in the communities
2. Estimate the individual protective efficacy of the used repellent on wild mosquito populations in controlled studies

**Social science study**
Assess the acceptability, adherence and adequacy of topical repellents
Timeline Epidemiology Study

Stratification based on PCR analysis of a sample in each cluster

Comparison 1
Intervention vs. Control

Comparison 2
Intervention vs. Control

Base line Y1
Base line Y2

Y0 Protocols, Selection clusters + Census (update)

April
Oct
Year 1

April
Oct
Year 2
Epidemiology Study: algorithm for diagnostic testing and treatment

Blood sample collection by finger prick
20 µl in 96-well plate + 20 µl onto filter paper

PCR screening for Plasmodium and species identification (Mobile lab)

Store at -20°C for virus detection & Gametocyte detection (Pf) & Serological markers & Genetic diversity for Pf and Pv (at IPC in Phnom Penh)

Negative

Positive

Treatment
Pf = DHA/PIP 3 days
Non-Pf = CQ 3 days

D0

D1