A Challenge of Residual Transmission in GMS

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Context: Early biting and transmission

In Central of Vietnam:
⇒ 60% of the vectors bite before sleeping time
⇒ All infective bites occur before 22h and after 4h.

Van Bortel et al MJ 2010,9:373
Early biting (before 22H) in Cambodia (collection in 2006)

Proportion early biting vs Districts and Regions (error bars are 95% CI)

Adapted from Durnez et al. 2013, MJ 12:329

Vary according to species and locality
Vector Ecology

An. dirus

An. maculatus

An. minimus
The knowledge gap of residual transmission in GMS

• Even recently achieved reductions of malaria transmission and burden with LLINs is of enormous public **health** value.

• The vector ecology of Animal-feeding and outdoor-feeding (which are usually mutually associated) that allow mosquitoes to minimize contact with insecticides targeted at humans.

• Insecticide contact avoidance and early-exit behaviors that minimize exposure hazard of vectors that feed indoor.

• Vectors related to Artemisinin Resistance parasites (research?).
Example of output - Pf cases per month showing the effect of LLIN interventions in Cambodia

LLIN Interventions in Zones 1 and 2

- Zone 1
- Zone 2
- Zone 3
The current Challenge Strategy (1)

To go beyond the current limitations of impact that can be achieved with effective IRS and/or LLINs

• Enhance indoor control measures for adult vectors that often enter houses:
  – Improve LLIN usage (net preference)
  – Be under LLIN while resting, chatting inside the house.

• Extend coverage of vector control measures to target adult mosquitoes beyond houses or even people:
  – Use Repellence
  – Use LLIHNs for outdoor sleeping such as forest workers.
  – Provide forest package to forest worker (LLIHN, Repellence, standby treatment?)
  – Use net, fire to protect livestocks
  – Use treated materials (only military)
  – Apply insecticidal sugar baits (research)
MalaResT project: evaluation of repellents

**Conclusion:** no significant difference in PCR Plasmodium prevalence between control and intervention arm after one year (2012) and after two years (2013). => No **community** protection could be demonstrated.
MalaResT project:
- Repellent used (Picaridin) was effective during 5 hours (>95% protection against vector bites) = **personal protection** against malaria can be expected

- Despite a high acceptance in the community (>90%) and high reported use, 47 to 76% => low observed daily and consistent use (7 to 15%) (high alternative use)

- **This explain the low community protection against malaria.**
The current Challenge Strategy (2)

To go beyond the current limitations of impact that can be achieved with effective IRS and/or LLINs

• Target source reduction efforts towards the immature stages of mosquitoes in their aquatic habitats:
  – Environmental management (limitation in some species)
  – Lava control (limit to dengue vector only)

• Reduce the survivorship of vectors:
  – Use Ivermectin (research).

• Block gametocyte transmission:
  – Apply additional primaquine single dose for *P. falciparum* treatment.
The current Challenge Strategy (3)
To go beyond the current limitations of impact that can be achieved with effective IRS and/or LLINs

• House improvement:
  – No evidence on that

• Funding resistance.
The current attempt in the GMS

- To develop/design the effective tools for P. falciparum malaria elimination in order to eliminate malaria parasite resistant- GMS country initiative through ERAR.
- ERAR/RAI initiative: provide intense vector control where the artemisinisin resistant evidence (Tier 1).
- Need more initiative beyond these- lacking the coordination/guidance → regional and global networks
Thank you for your attention