Challenges of Malaria Vector Control and the Roles of Government and Academic Partners

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Overview of presentation

- Challenges of malaria entomology in the region
- The landscape of vector control & research
- Roles of government and academic partners & good practices
- Accelerate academic/government partnership in responding to malaria elimination
Challenges of vector control (1)

• Malaria elimination (P. falciparum) in Mekong subregion – to meet the target set (by 2030).
• Increase of other vector borne disease outbreaks (dengue, Zika etc.)
• Other innovative vector control tools are under developing, but few can be used under the field operational scale – need more epidemiological and entomological evidences
• Lack of quality and well designed field interventional research (selection of sample sites, randomized control trials, cluster randomized etc.)
Challenges in vector control (2)

- Insecticide resistance monitoring – methods (WHO test tube/CDC bottle assays), limited sampling sizes, standardization of reporting, data ownership etc.
- Low level of malaria transmission (extremely low vector density, EIR to quantifying transmission risk)
- Capacity of entomologists in malaria elimination (vector surveillance and vector control in elimination setting)
- Need multidisciplinary approach – required advocacy and support from all relevant government (health and non-health) sectors
Malaria Vector Control Research landscape

- Discovery Research – basic research and mainly laboratory base, usually responsible by the university and the research institutions
  - New drugs, vaccines, new diagnostic tools, new surveillance tools
  - Development of new intervention tools–new formulations, new trapping devices, baits etc.
- Implementation Research – community based, in disease affected countries (required other government sectors)
  - To make sure that new interventions can be speedily move forward for effective and safe use
  - Required multidisciplinary, broad base approach (academic researchers, disease control programmes of MoH, other sectors)
What are the situations on entomological research in the region

- Scarcity of solid implementation research evidence at the operational level (e.g. topical repellents, protective clothing, space spraying, mosquito trapping devices etc.) under different ecological settings
- Need to increase coordination – Health sector of government/universities/research institutions/other Government Sectors/industries/communities
- Insufficient capacity to conduct quality field research (research designs, use of appropriate entomological techniques, data interpretation, dissemination of results)
General roles of academia in malaria entomology and vector control

- Coordination and collaboration with stakeholders especially the national control programmes and Gov. research institutions on entomology and vector control research
- Identify the research needs and gaps in entomology and vector control
- Entomological capacity building- entomological methodologies (mosquito taxonomic, entomological surveillance, sporozoite/oocyst detection for vector incrimination of secondary vector, GIS mapping spatial distribution)
- Research students and post – doctoral fellowship
- On job training and joint research projects with other stakeholders
- Be the network of communication and provide mutual technical support among the stakeholders including NGOs
- Supplementing the research gaps/technical deficiencies identified by the national programmes
Some good practices in Malaysia

- **Universities- MoH partnership**
  - P. knowlesi parasite and vector studies in Borneo
  - Arbovirus studies – dengue virus sequencing, diagnostic tools, sero-epidemiology, vector-ecological and epidemiological studies - DEN 5
  - Hospital based clinical data involving hospital clinicians on case definitions and criteria of reporting
  - Team up with vector borne disease control in vector surveillance, vector identification and virus/parasites detection using real time PCR
  - As a reference laboratory for parasite and vector identification/confirmation of infection, quality assurance and documentation
  - Training of Master and Ph.D students on Medical entomology (research) and public health (course work)
Roles of Government (health & non health sectors) in malaria control and elimination

- Legislative policy development and implementation
  - create enable vector control policy/regulatory process – sound management of pesticides, approval of new intervention products/formulations, environmental impact assessment on new development schemes

- Advocacy & enhance intersectoral collaboration - using LLIN/ITN success story, environmental modification in early 1950’s in Peninsular Malaysia, private/government partnership in malaria control/elimination

- Resource mobilization especially under emergency situation
  - established inter-governmental committee (e.g. recent Zika outbreak) – but should be sustainable and greater partner commitments

- Empower community in vector control- bed net usage, larval source management, use of personal protective devices etc.
Specific roles of selected government (non-health sectors) responding to malaria elimination

- **Land Development**: diminish potential breeding sites in project development, breeding sites mitigations
- **Rural Development**: improved housing, screened houses in development project areas, mosquito proof water tanks
- **Forestry and Agricultural Sectors**: Collaboration with MOH/Academia on forest malaria vector and epidemiological studies, use of pesticides, enhance personal protective measures, improved aqua-culture practices
- **Ministry of Environment**: Environment modifications, waste management, recycle of waste, disposal of unused LLIN
- **Local Government**: drainage clearing, community mobilization, health promotion and enforce of anti mosquito law, support local volunteers
Examples of man-made breeding sites

Aqua-culture - An sudaci/eptioticus

Man made Well –An dirus in Myanmar
Accelerate entomological/vector control research in the region – Academic/government partnership

• Operational research on potential new intervention as well as combinations of existing intervention in multi center field trials: use of local repellents extracts, long lasting attractants, combination of nets in area where pyrethroid resistant is proven

• Epidemiological risk assessment and stratification involving collection of good entomological information including remote sensing and GIS mapping

• Working on entomological assessment methodologies for monitoring and evaluation of outdoor malaria transmission – vector surveillance and data interpretation
Accelerate entomological/Vector control research in the region – Academic/Government partnership

- Remapping of malaria vectors- collaborative among universities and MoH and other government agencies (land & geographical agencies)
- Behavioural and ecological studies including secondary vectors, species complex and sibling species identification using molecular techniques
- Elucidate the impact of climate change on vectorial capacity of the malaria vectors – survival rate, reproduction rate and feeding frequency
- Involving social scientists of local university to study: how to scale up community based interventions and prevention: use of repellents, LLINs, and use of hammock nets among the forest workers and protective clothing (material/colour, safety issue etc.).
VECTOR DISTRIBUTION IN MALAYSIA –

- An. leucosphyrus
- An. maculatus
- An. letifer
- An. barbirostris
- An. umbrosus
- An. sundaicus

Environments:
- Sea
- Mangrove
- Paddy Field
- Village, Coconut, Rubber Tree
- Forest

Geographic Zones:
- Tidal belt
- Coastal plain
- Foothills
- Mountains
Thank you!