BRIEF INTRODUCTION TO MALAYSIA

Land Area: 330,252 sq.km.
Population: 27.7 millions
Population density: 84/sq.km
Annual pop. growth: 2.2%
Economy: Industrial Agriculture
The Malaria Eradication Programme was established in 1967, in order to eradicate malaria in Peninsular Malaysia by the year 1982.

In 1986, the programme was reorganized to include other vector borne diseases namely dengue, filariasis, typhus, JE, yellow fever & Plaque and came to be known as Vector Borne Diseases Control Programme.
FUNCTIONS: MINISTRY LEVEL

- Policy formulation
- Programme planning and development
- Protocols and guidelines developments
- Resource allocation
- Disease surveillance
- Monitoring and evaluation
- Training & research coordination
- Technical advisory service
FUNCTIONS: STATE LEVEL

- Programme planning
- Coordinating the implementation of the control programme
- Resource allocation within state
- Disease surveillance
- Monitoring and evaluation
- Training
- Research
- Technical advisory service
FUNCTIONS: DISTRICT LEVEL

- Implementation of the preventive and control activities
- Disease surveillance
- Monitoring and evaluation
- In-service training
- Operational research
IMPACT OF INTERVENTIONS IN MALARIA CONTROL 1961 - 2005

- Implementation of DBIA '75 throughout Malaysia
- Adoption of Primary Health Care Approach in malaria control
- Implementation of insecticide treated bednets for malaria control
- Implementation of 5 year Action Plan for Malaria Control in Sabah
- Policy change of chemical insecticide from DDT to pyrethroids
- Establishment of international training centre for Transfer of Training Technology Course

Cases


1961: 250,000 cases
1970: 150,000 cases
1980: 100,000 cases
1990: 50,000 cases
2000: 10,000 cases
2008: 5,000 cases
Malaria Vectors in Malaysia

- An. maculatus
- An. epiroiticus
- An. campestris
- An. letifer
- An. dirus
- An. crascens

An. balabacensis
An. sundaicus
An. flavirostris

Peninsular Malaysia

An. latens
An. donaldi
An. letifer

Sabah

Sarawak
### BREEDING HABITATS

<table>
<thead>
<tr>
<th>Species</th>
<th>Habitat Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>An. maculatus</td>
<td>Hilly mountainous areas, foothills, slow moving partly shaded streams, seepages and land clearings.</td>
</tr>
<tr>
<td>An. balabacensis</td>
<td>Forested areas and water pools, foot-print, wheel tracks, forest breeder.</td>
</tr>
<tr>
<td>An. latens (An. leucosphyrus)</td>
<td>Forest breeder similar to An. balabacensis.</td>
</tr>
</tbody>
</table>
An. maculatus

Larvae found in slow moving rivers and exposed to sunlight

Larvae stick onto rock surface
Water pockets / pools form after reforestation for agriculture

An. maculatus

Water pockets
An. balabacensis

Larvae usually found in:
✓ animal footprints, pock-marks.
✓ Stagnant semi-permanent water bodies which fully or partially shaded area.
An. latens Breeding Places

• Breeds almost exclusively in clear spring water in tiny seepages at the source of streams or along a hillfoot in dense jungle
• Normally found in areas which are always under complete shade and likely to be distributed throughout jungle
• Not normally found in streams, swamps, paddy fields and irrigation channels
Characteristics of Breeding Places of *An. latens*

- Prefer slightly acidic water – pH 6.0 – 6.4
- Most commonly found in water which contain dead/decomposed leaves
- Do not prefer polluted and dirty water
- Not exposed to sunlight
- When collected *An. latens* larva remain submerged under water for long time (about 5 minutes)
An. latens

Larvae breeds in clear seepage pools or in swampy areas (inland) and usually fully shaded.
An. *latens* – jungle habitat
Entomological Consideration in P. knowlesi transmission

• Studies in Sarawak showed that:

  *An. latens* is generally a forest species, normally found in the jungle but can be present in farming zones located at forest fringe rather than in villages, and the density decreases in relation to distance away from the jungle.
STRATEGIES IN MALARIA VECTOR CONTROL

1. Selective and effective use of chemical insecticides.

2. Encourage the use of personal protective measures.

3. Promote the use of environmental measures.

4. Promote community participation in vector control.
<table>
<thead>
<tr>
<th></th>
<th>VECTOR CONTROL ACTIVITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Indoor residual spraying (IRS).</td>
</tr>
<tr>
<td>2</td>
<td>Insecticide treated bednets (ITN).</td>
</tr>
<tr>
<td>3</td>
<td>Larviciding.</td>
</tr>
<tr>
<td>4</td>
<td>Environmental management measures.</td>
</tr>
<tr>
<td>5</td>
<td>Personal Protection measures.</td>
</tr>
</tbody>
</table>
Vector control activities

- Traditional current methods:
  - Indoor residual spraying (IRS)
  - Insecticide treated nets (ITN)
INDOOR RESIDUAL SPRAY
INSECTICIDE TREATED NETS ARE GIVEN FREE TO THE COMMUNITY
Vector Control activities

• Community Approach:
  - Personal protection
  - Spraying of farm/garden huts
### Vector Control activities

- **Environmental Approach:**
  - House screening
  - Clearings and sanitation
    - Webster (1941): extensive clearance of jungle in Miri in 1924 resulted in great reduction in malaria
    - McArthur (1945): Spleen rate in Sunsuran, Tambunan reduced from 80% in 1930 when still under jungle to 25% in 1940 when jungle cleared
  - Larval control??
    - Small scale trial in Tambunan (1941) by weekly dusting of paris green managed to reduce for some weeks, but not sustained due to flushing of insecticide after heavy rain.
ENVIRONMENTAL MANAGEMENT

AUTOMATIC SIPHON
STONE PACKING

COCONUT HUSK PACKED DRAINS
AUTOMATIC DRUM SLUICE
ENTOMOLOGICAL SURVEY

Larval Survey
**Pesticides In Malaria Control**

**Indoor Residual Spray**
- DDT 75%WDP: 1961 – 1972
- DDT 25%EC: 1973 – 1999
- Deltamethrin: 1997 – recent
- Lambda-cyhalothrin (in Sabah): 1997 – recent

**Larviciding**
- Abate 500E
- Bti

**Insecticide Treated Nets**
- Permethrin
- Lambda-cyhalothrin
- Deltamethrin

**Fogging (during outbreak)**
- Aqua resigen
- Resigen
- Malathion
MANAGEMENT OF PESTICIDES IN MALAYSIA
SELECTION OF PESTICIDES

- FOLLOW WHO TECHNICAL SPECIFICATIONS
- WHO RECOMMENDED PESTICIDES FOR VECTOR CONTROL
- BASED ON LOCAL FIELD TRIALS STUDIES
- BASED ON WHOPES STUDIES
- REGISTERED BY THE PESTICIDES BOARD
- APPROVED BY TECHNICAL SPECIFICATIONS COMMITTEE
- BASED ON TECHNICAL SELECTION CRITERIA
- OTHER CRITERIA ADMINISTRATIVE AND FINANCIAL FROM PROCUREMENT DIVISION
SELECTION CRITERIA

- Effectiveness in controlling malaria and dengue
- Toxicity — Material safety data sheet
- Residual efficacy - Knockdown and killing capacity
- Frequency of spray - Nos of spray cycles based on dosage/application rates
- Shelf life/half life
- Presence of resistance (agri vs publ. hlth)
- Data on comparative cost studies - Cost per metre square/cost per house sprayed/cost per case
- Staining walls?
- House refusal rate
- Controlling other pests?
- Odour/smell
- Lessons from other end-users