Steering Committee 23-24 January 2018 – Phnom Penh

Mosquito Control in a Vaccine Site

Richard Paul (Institut Pasteur)

Ferdinand Salazar (Research Institute for Tropical Medicine)

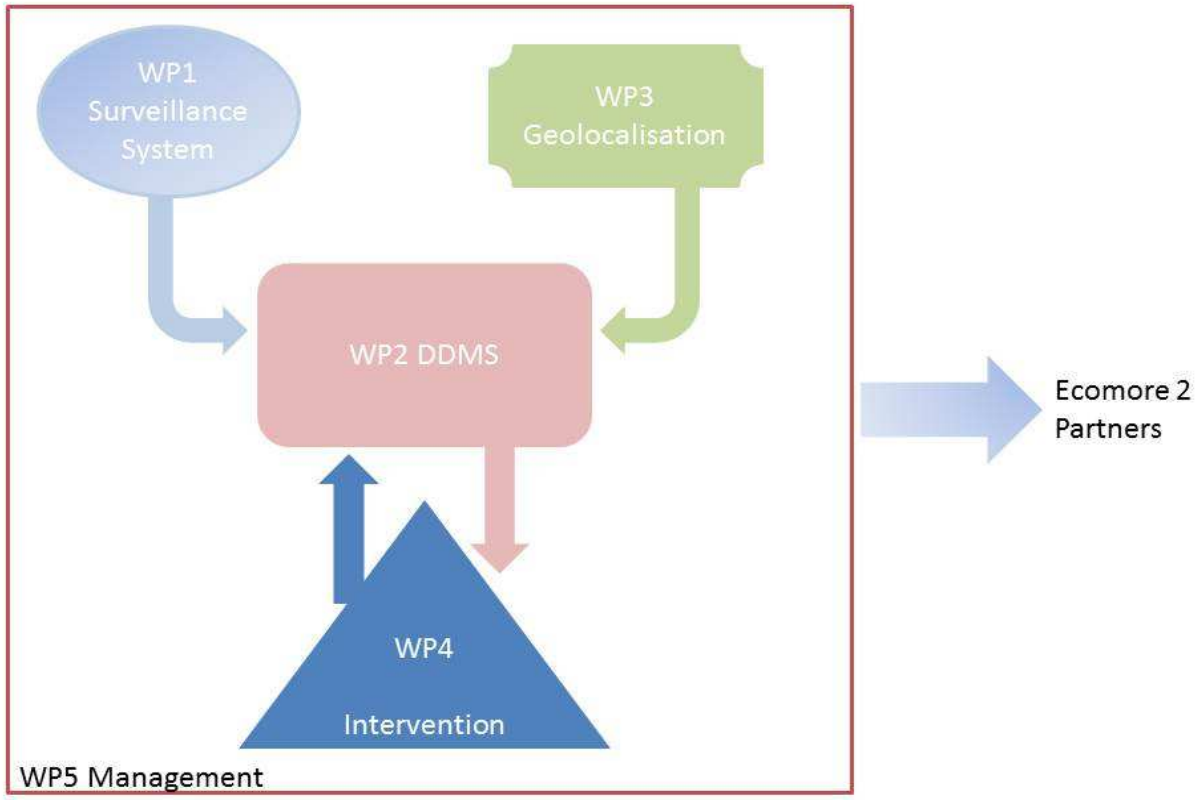
Edward Thomsen (Liverpool School of Tropical Medicine)

ECOMORE II

AFD

WP PHILIPPINES

Philippines project structure



Process of initiation of the project

- Primary objective of the project

Assess the extent to which a novel mosquito control program can reduce the extent of dengue

transmission in children under 15 years of age in the context of a vaccination program

Relevance at the National level

Department of Health set up a Dengue Prevention and Control Program (within the Philippines Integrated Disease Surveillance and Response System (PIDSSR)) to reduce incidence of dengue and the risk of human exposure to Aedes bites

- Involvement of Authorities

Project discussion with Disease Prevention and Control Bureau and Bureau of Epidemiology, responsible for PIDSSR

Preliminary discussions with health officials from Lipa City concluded with their highly favourable agreement to work with us on this study of mosquito control

- Experts who have participated in the design of the study

Dr Michael Bangs, entomological expertise

Sept 2017 Workshop on mosquito control techniques with IP Laos, IP Cambodia, IP Paris, RITM & external experts Pr. T. Chareonviriyaphap, Kasetsart University & Ms. Harmke Klunder In2care Company

Specific Objective #1: Establish the burden of dengue in Lipa City over the last 5 years and the state of the health surveillance system (Nov 2017 – April 2018)

To Barangay level, retrieval of:

- Distribution and density of public and private clinics
- Number of suspected, probable & confirmed dengue cases
- Demographics

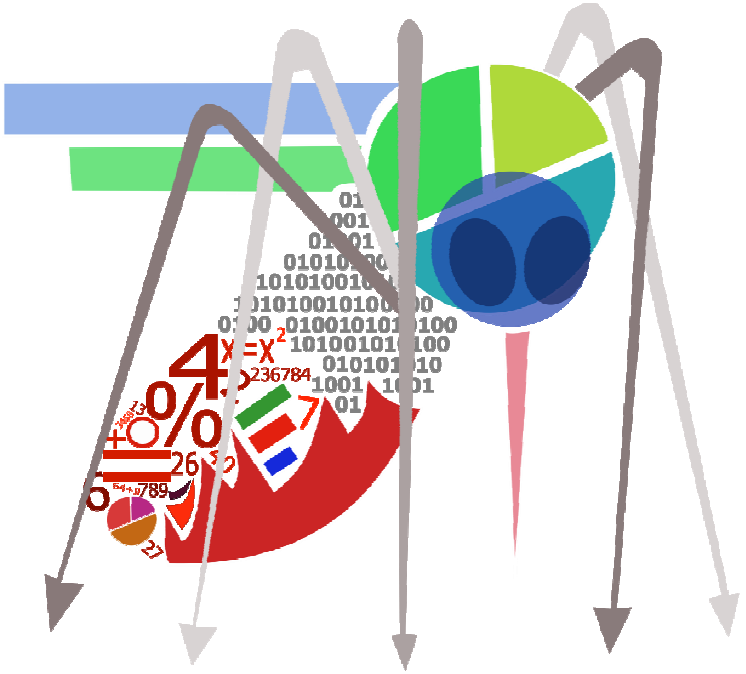
Detailed report on current surveillance system and burden of dengue

Lipa City houses 330,000 people over 209 km^2 (av. density 1600/km^2), divided into 72 Barangays (administrative units)

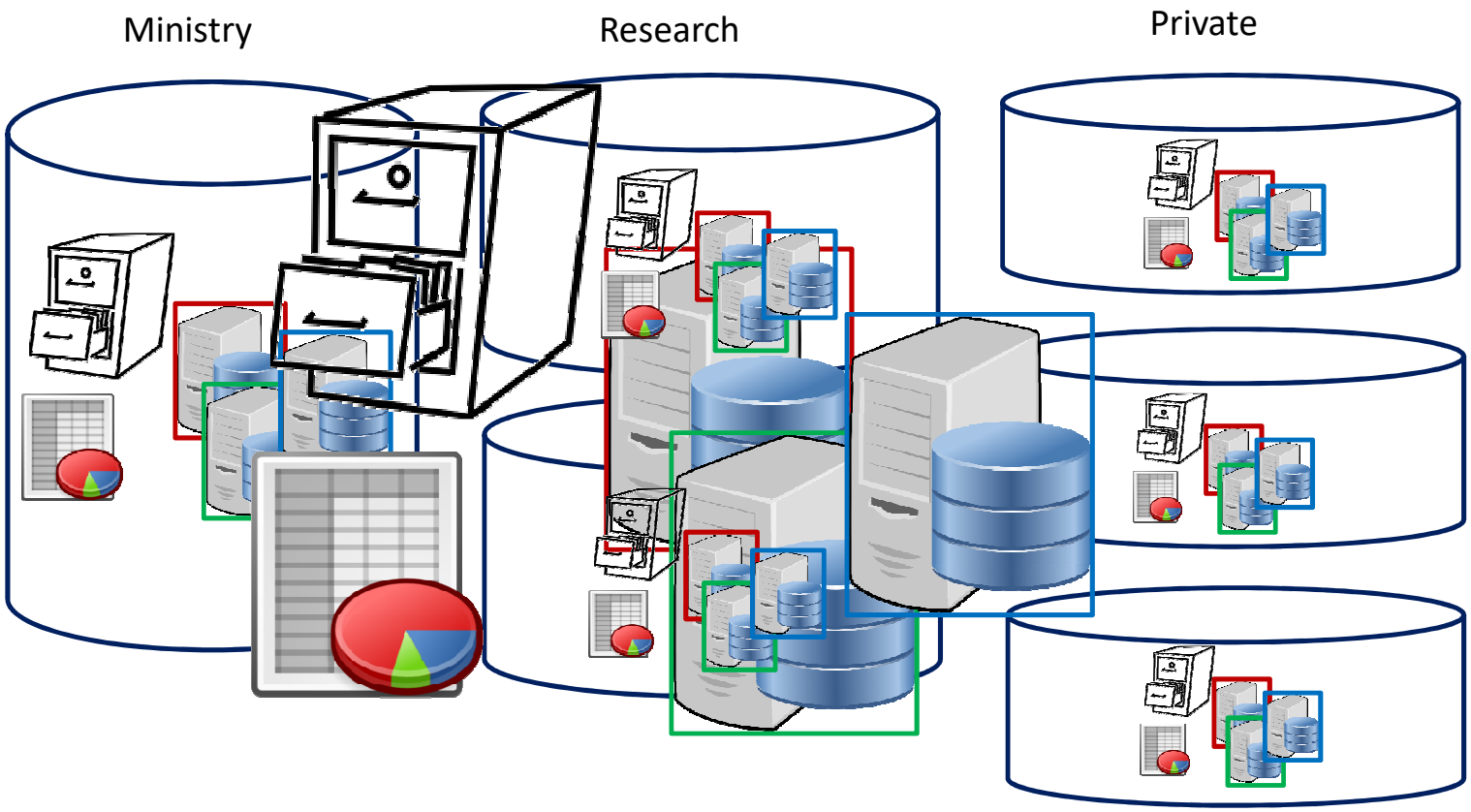
Specific Objective #2: Enhancing decision-support for dengue control

The Disease Data Management System

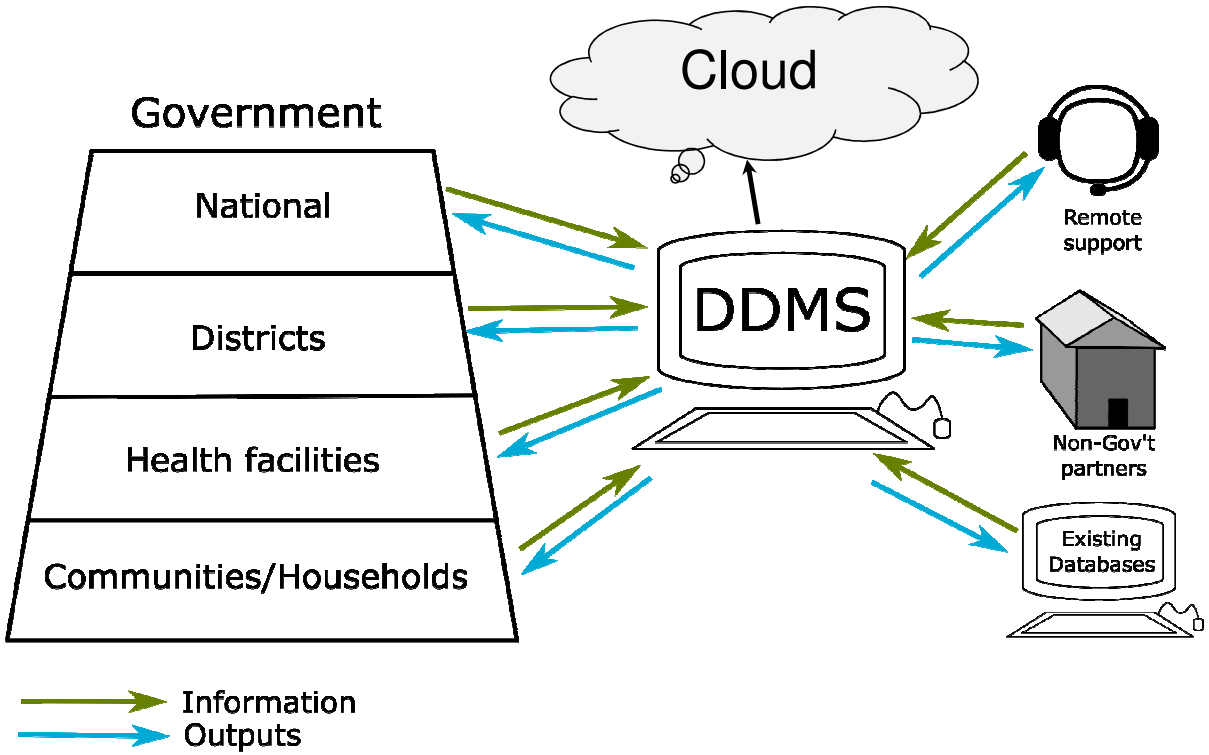
- The DDMS is a tool designed to meet the *data management* and *decision-support* needs of vector-borne disease control programs.



Why is it useful?

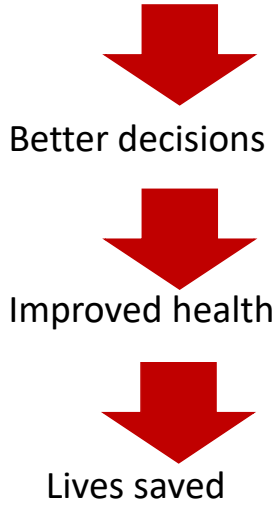


How does it work

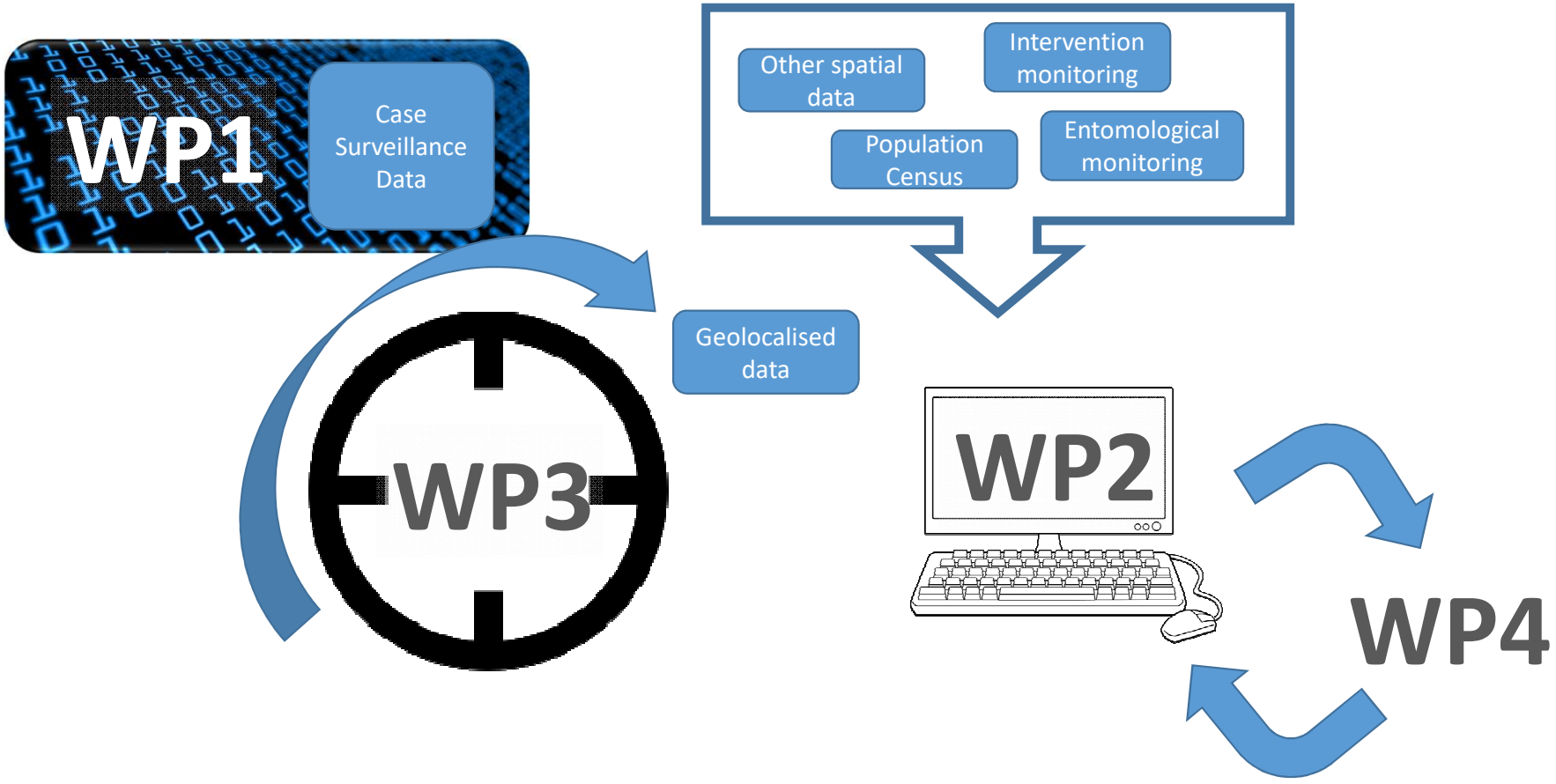


What does it do?

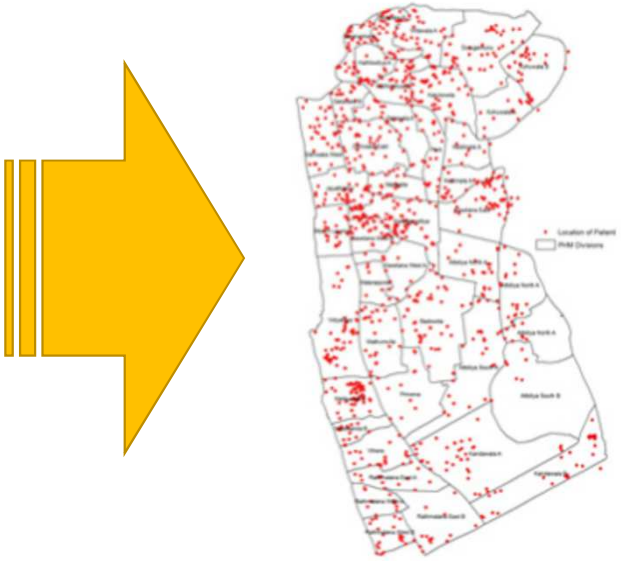
- Integrates data from multiple aspects of a control programme
- Provides decision support tools to change that data into actionable information
  - Reporting tools
  - Maps
  - Alert system

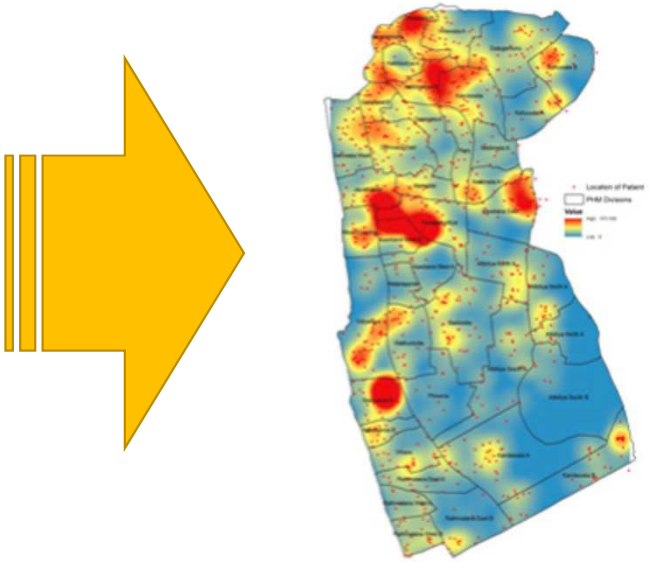


Integration with other WPs



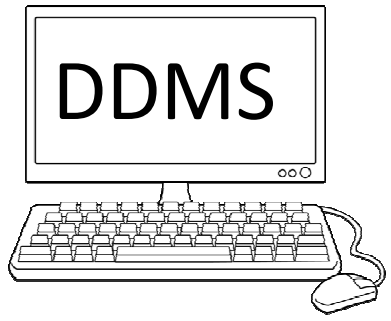
Integration with other WPs





Site selection for WP4

Intervention, Case, and Ento data



Overlay with vaccine coverage, mosquito abundance, insecticide resistance, etc.

Monitoring of objective #2

- Indicators

Improvement of quality of surveillance data collected and analysis of these data

Development of maps correlated with spatial analysis in DDMS to reveal whether there are any permanent dengue hot spots or cold spots

Development of capacity within the Philippines Department of Health to monitor their dengue control program

- Means of verification

Maps of Lipa City dengue and health care distribution

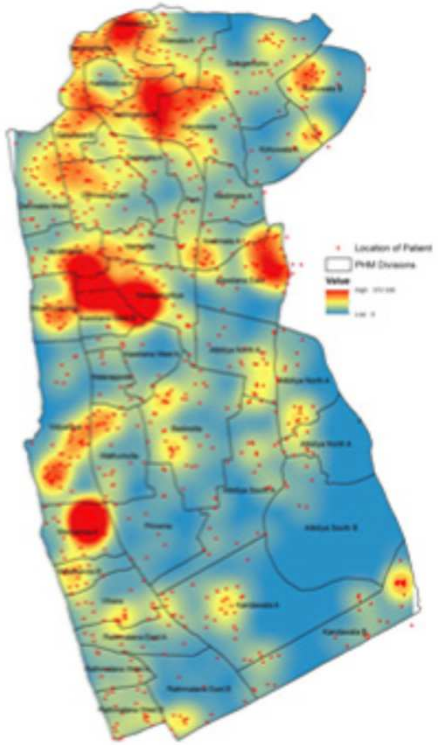
Maps of dengue hot and cold spots

Identified individuals trained in DDMS

Specific Objective #3: Geolocalisation of dengue cases (Nov 2017 – April 2018)

To sub-Barangay level:

- Geolocalisation and mapping of dengue cases
- Importing into DDMS
- Spatial analyses



Dengue hotspot / coldspot site characterization for intervention study site selection

Specific Objective #4: Implementation of community based mosquito control program and assess epidemiological & entomoloigcal efficacy(May 2018 – May 2020)

- Engagement with the community
- School-based recruitment
- Community-based implementation of mosquito insecticide dissemination device – In2Care® mosquito trap

In2Care® Mosquito Trap

Autodissemination of pyriproxyfen dust

Pyriproxyfen is an Insect Growth Regulator – a fly juvenile growth hormone analogue. Its presence keeps juvenile mosquito (larvae) from becoming adult

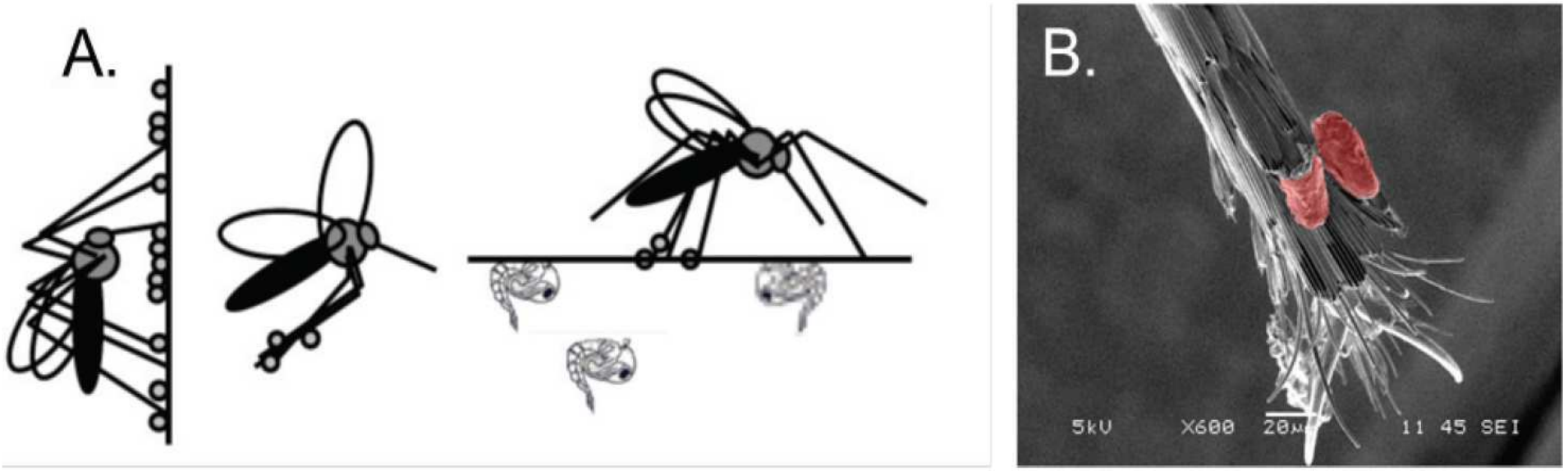


Figure 1. A. Mosquitoes resting on PPF-dusted surfaces can carry particles of that dust to their aquatic habitats. B. The scales and processes of a mosquito leg form an ideal surface for picking up PPF dust particles (depicted here in red).

Devine and Killeen 2010 Malaria Journal

Mosquito breeding sites – where the larvae are



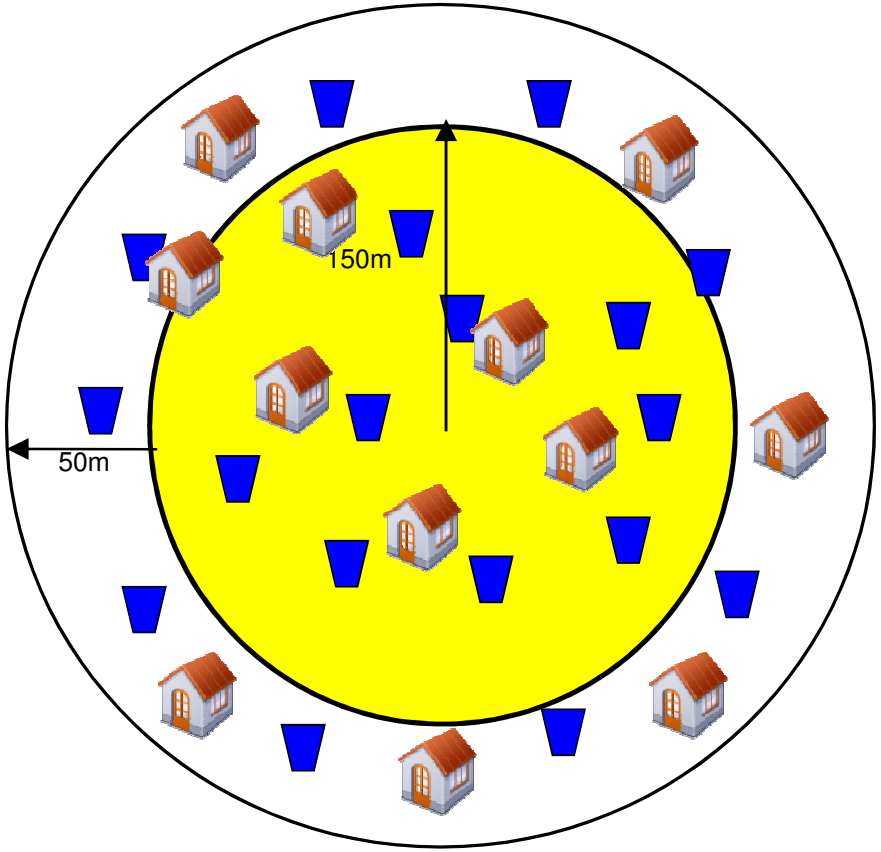








Study design - Parallel two-armed cluster randomised trial over 2 years



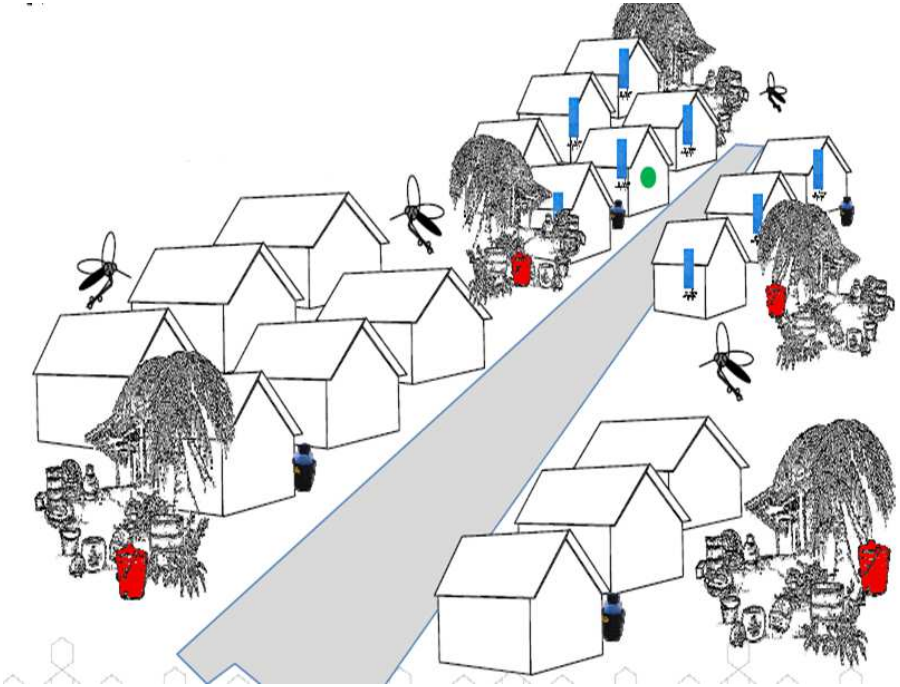
Sample size:
46 clusters of 100 children (<15y)
Randomly assigned to control vs treatment
Matched for historical dengue incidence (based on WP3)

In2Care trap density (in treated sites)
286 traps (1/400m^2) per site
Treatment for 4 months per year

Epidemiological read-out – sero-conversion

- Saliva samples pre, during and post intervention each year
- Increase in anti-dengue virus IgG titre
- ELISA method IP Cambodia

Entomological read-out – adult mosquito densities



Gravid Aedes Mosquito Trap

Measuring adult mosquito densities in sites with and without In2Care® Mosquito Trap

Monitoring of objective #4

- Indicators

Improvement of vector control in the treated sites

The correlation between vaccination campaign and vector control by auto-dissemination system is documented (the added value of vector control)

- Means of verification

Serological and mosquito density result graphics and statistics

Acknowledgements

- Medical Entomology Laboratory, RITM, in particular:
- Ariza AGUILA (co-PI Surveillance and epidemiology)
- Richard MALIJAN (co-PI Entomology)
- Rommuel GUTIERREZ (DDMS)

- Mike BANGS for entomological advice & expertise