Enhancing surveillance for malaria elimination in Indonesia and the Philippines

(OPSIN and ENSURE)

Supargiyono

APMEN 2018
WHO Surveillance Guidelines, 2018
Study sites: Indonesia and Philippines

- 3 sites in the Philippines with different transmission levels (high, low, elimination)
- Kulon Progo Regency in Yogyakarta, Indonesia (low transmission)
Integrated surveillance tools for malaria elimination

Rolling cross-sectional surveys of patients and companions at health facilities

<table>
<thead>
<tr>
<th>Objective</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SEROSURVEILLANCE:</strong> Determine residual malaria</td>
<td>ELISA, age-specific prevalence of species-specific antimalaria antibodies</td>
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<tr>
<td>infection through seropositivity in different age groups</td>
<td></td>
</tr>
<tr>
<td><strong>MOLECULAR SURVEILLANCE:</strong> Identify asymptomatic and submicroscopic infections</td>
<td>Multiplex PCR of patients and companions</td>
</tr>
<tr>
<td><strong>SPATIAL EPIDEMIOLOGY:</strong> Identify where infected and exposed individuals reside and generate real-time risk maps</td>
<td>Iteratively defined maps using a tablet-based geolocation application</td>
</tr>
</tbody>
</table>
Survey methodology

- Rolling cross sectional surveys conducted for one week at 1 – 3 month intervals

- Health facility workers trained to use RDTs, prepare blood smears and collect blood spots

- Demographic data recorded using tablet-based applications
Household geo-location

- Comparison of tablet-based applications to identify where participants live and work
- Maps using GPS points of known landmarks and satellite data to identify households

https://doi.org/10.1186/s12942-018-0141-0

International Journal of Health Geographics

Use of mobile technology-based participatory mapping approaches to geolocate health facility attendees for disease surveillance in low resource settings

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Serosurveillance

- Serology can provide further evidence of elimination
- Exposure in younger individuals indicates recent exposure
- Identification of high transmission areas by combining with geographical data

![Map of Indonesia with a legend indicating Pf seropositive households, Central Java Province, and Yogyakarta Province. The map is labeled with "Hindia Ocean." ]

**Serological responses for falciparum**

- **Seroprevalence:** Pf.SEA = 5.0%, ETRAMP5 = 0.8%, GEXP18 = 0.7%
  - **Sample size:** n = 2,241

![Graph showing age distribution of participants vs population with expected population distribution and sample distribution.](image)

- **Age distribution of participants vs population**
  - **Expected population distribution**
  - **Sample distribution**

![Graph showing antibody responses (MFI) with different colors for Pf.SEA, ETRAMP5, and GEXP18.](image)
Molecular surveillance

Malaria microscopy vs. RDT results of patients and companions visiting the Rizal, Palawan health facilities, 2016-2017

<table>
<thead>
<tr>
<th>YEAR 1 – 28 health facilities</th>
<th>Microscopy</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Negative</td>
<td>Positive</td>
</tr>
<tr>
<td>JUNE 2016 - 2017 (All patients)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RDT Negative</td>
<td>3798</td>
<td>55</td>
</tr>
<tr>
<td>RDT Positive</td>
<td>47</td>
<td>200</td>
</tr>
<tr>
<td>TOTAL</td>
<td>3845</td>
<td>255</td>
</tr>
<tr>
<td>SPR</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>JUNE 2016 - 2017 (All companions)</th>
<th>Microscopy</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Negative</td>
<td>Positive</td>
</tr>
<tr>
<td>RDT Negative</td>
<td>1245</td>
<td>14</td>
</tr>
<tr>
<td>RDT Positive</td>
<td>13</td>
<td>31</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1258</td>
<td>45</td>
</tr>
<tr>
<td>SPR</td>
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</tbody>
</table>

*SPR: slide positivity rate; MISSED: % of positive companions

47% sub-patent infections (positive by PCR and negative by RDT and microscopy)
Freedom from Infection (FFI): Tools for Malaria Elimination

FFI used widely in veterinary epidemiology to confirm absence of infection

LSHTM leading new project to adapt FFI tools for malaria elimination

Partners:
• WHO Global Malaria Programme
• Clinton Health Access Initiative (CHAI)
• NMCPs / country institutions expressing interest

Data includes:
• Passive surveillance data from health facilities
• Active surveillance data from community-based surveys

For more information contact: LINDSEY WU
lindsey.wu@lshtm.ac.uk
1. HEALTH FACILITY DATA (passive case detection)

Health facility based PCD
• Catchment population
• Out-patient attendees

Community based ACD
• Catchment population
• Survey / test criteria (e.g., RACD, MSAT)

2. COMMUNITY SURVEYS (active case detection)

Number of individuals:
• Suspected for malaria
• Tested for malaria
• Malaria test positive
• Diagnostic test used
• Imported cases

Risk-based surveillance (e.g., forest workers)

Village surveys

Easy access groups (e.g., school surveys)
Kulon Progo Regency, Indonesia

2016 Malaria cases by health facility - Kulon Progo District

Freedom from Infection after 1 year of monthly malaria case reporting

Surveillance, month (2016)
Thank you to:

LSHTM team:
Kimberly, Lindsay, Effie, Henry, Chris JD