Malaria surveillance, monitoring and evaluation manual

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Malaria Policy Advisory Committee (MPAC) meeting
22-24 March 2017, Geneva, Switzerland
“Irrespective of where countries are on the path to elimination, surveillance of malaria should be upgraded to a core intervention in national and subnational malaria strategies.”
A framework for malaria elimination
1. Guidance from MPAC
2. Online approval in June or July 2017
What is new?

• the 2012 Control and Elimination operation manuals are combined into one document
• the revised manual is aligned with both the GTS 2016-2030 and the Elimination Framework 2017
• the case and foci investigation forms will be automated and a section on foci mapping is included
What is new?

- new sections on surveillance in the private and community health sectors and migrant and mobile populations
- monitoring and evaluation of:
  - national programmes
  - the GTS
  - surveillance systems
Chapter 1: Surveillance on the pathway to malaria elimination
### Malaria surveillance across the continuum

<table>
<thead>
<tr>
<th>High</th>
<th>Moderate</th>
<th>Low</th>
<th>Very Low</th>
<th>Zero</th>
<th>Maintaining Zero</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥35% PR or ~450 per 1000 API</td>
<td>10 – 35% PR or 250-450 per 1000 API</td>
<td>1-10% PR or 100-250 per 1000 API</td>
<td>&gt;0 but &lt;1% PR or &lt;100 per 1000 API</td>
<td>No transmission</td>
<td></td>
</tr>
</tbody>
</table>

#### Pillar 3 of the GTS 2016-2030

**Transform Malaria Surveillance into a Core Intervention**

<table>
<thead>
<tr>
<th>Case detection</th>
<th>Recording</th>
<th>Reporting frequency</th>
<th>Resolution of reported data</th>
<th>Data use: health facility</th>
<th>Data use: intermediate levels</th>
<th>Data use: national</th>
<th>Response time</th>
<th>Feedback frequency to lower level</th>
<th>Surveillance system monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passive case detection</td>
<td>Passive + Active case detection</td>
<td>Monthly</td>
<td>Aggregate case by age, sex</td>
<td>Data analysed and displayed weekly</td>
<td>Data analysed and displayed monthly</td>
<td>Data analysed and displayed monthly or quarterly</td>
<td>Monthly</td>
<td>Annually</td>
<td>Annually</td>
</tr>
<tr>
<td>Outpatient and inpatient registers</td>
<td>Individual patient forms</td>
<td>Weekly</td>
<td>Aggregate or line listing by age, sex</td>
<td>Data analysed and displayed in real time</td>
<td>Data analysed and displayed monthly</td>
<td>Data analysed and displayed weekly</td>
<td>Weekly</td>
<td>Quarterly</td>
<td>Quarterly</td>
</tr>
<tr>
<td>Real Time</td>
<td>Case reports with case classification</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Monthly</td>
<td>Monthly</td>
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</tbody>
</table>

**Global Malaria Programme**
Core principles of malaria surveillance

1. Integration of surveillance systems with HIS
2. Accurate diagnosis of malaria
3. Alignment of SoPs with WHO recommendation & regulation to make malaria notifiable
4. Stratified surveillance for heterogeneous epidemiology
5. Investments in surveillance prior to transition of epidemiology
6. Near real time reporting during elimination
7. Empowerment of frontline staff
8. Linking surveillance to response
9. Surveillance in all sectors (private, community, MMPs etc)
10. Continued efforts post elimination
11. Surveillance and innovation
12. Monitor the surveillance system’s performance
Chapter 2: Concepts and practice of malaria surveillance systems

1. Case definitions
2. Case detection
3. Case investigation
4. Case classification
5. Foci investigation and mapping
6. Foci classification
7. Foci response
Case classification

- Parasitologically-confirmed malaria infection
  - Due to mosquito-borne transmission
    - Acquired abroad or outside area
      - Imported
        - History of P. vivax or P. ovale infection within past 3 years, no epidemiologically linked cases in vicinity
    - Acquired locally
      - Introduced
        - First-generation local transmission; epidemiologically linked to proven imported case
      - Indigenous
        - All cases without evidence of a direct link to an imported case
      - Induced
        - e.g. due to blood transfusion, congenital malaria
  - Not due to mosquito-borne transmission
  - Relapsing
    - History of P. vivax or P. ovale infection within past 3 years, no epidemiologically linked cases in vicinity
  - Recrudescent
    - Recurrence of asexual parasites of the same genotype(s) that caused the original illness, due to incomplete clearance of asexual parasites after antimalarial treatment
Active case detection process

Within 1 day: At local health facility
- All suspected malaria cases
  - Diagnosis with microscopy or RDT
  - Case notification – Health worker reports case to field team with one day

Within 3 days: Case investigation team
- Imported
- Local
  - Case classification
  - Case investigation

Within 7 days: Focus investigation team
- Focus investigation
  - Active focus
  - Residual non active
  - Cleared up

Response

Global Malaria Programme
World Health Organization
Chapter 3 Establishing surveillance systems
Health information cycle

Recording

Dissemination and Use

Interpretation and Evaluation

Reporting

Analysis

Presentation

Human Resources
(the patients and communities whose details are registered, the health facility staff who gather and/or use the data and decision-makers both inside and outside the health service who use data)
Recording

Human Resources
(the patients and communities whose details are registered, the health facility staff who gather and/or use the data and decision-makers both inside and outside the health service who use data)

- clearly defined essential indicators
- diagnosis
- system for data recording - Patient and laboratory registers/forms/cards, tally sheets, pens, computers, databases software, printers
- training materials and SoPs
Human Resources
(the patients and communities whose details are registered, the health facility staff who gather and/or use the data and decision-makers both inside and outside the health service who use data)

Recording

Reporting

• data compilation
• data quality and completeness verification
• data transmission
• data archiving
• system manuals and SoPs
Health information cycle

- Relevant analytical skills and data quality checks
- Hardware and software
- Standard analytical plan and expected products – e.g. charts, surveillance bulletin etc.

Human Resources
(The patients and communities whose details are registered, the health facility staff who gather and/or use the data and decision-makers both inside and outside the health service who use data.)
Human Resources
(the patients and communities
whose details are registered,
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gather and/or use the data and
decision-makers both inside and
outside the health service who
use data)

- hardware and software for data
display
- agreed format for data
presentation targeted different
audiences
- communication – meetings etc
Human Resources (the patients and communities whose details are registered, the health facility staff who gather and/or use the data and decision-makers both inside and outside the health service who use data)

- completeness of data and reporting frequencies
- data quality checks
- system performance and bottlenecks
- performance of staff tasked with managing the system
- assessment of trends of key indicators
Human Resources
(the patients and communities whose details are registered, the health facility staff who gather and/or use the data and decision-makers both inside and outside the health service who use data)

- develop mechanisms of dissemination of data to stakeholders
- use data for decision making at country level
- use data for quantification and forecasting resource needs
- use data to respond to epidemics and other threats
- tracking progress towards elimination
- supervision and feedback
Surveillance for elimination

Sequence for establishing surveillance in elimination

Develop guidance and capacity:
- Manuals and SOPs
- Case-based database (DHIS2 or similar)
- Consensus on data elements and indicators
- Training of health staff, CHWs
- Infrastructure (tables, PCs, etc)
- Supervision and support

Case-based reporting:
- Notify within 24 hrs
- Line-listing of cases

Case investigation and classification:
- When case load is manageable
- Secure resources
- ACD may be initiated

Foci investigation and classification:
- Secure resources
- ACD may be initiated

Foci response

Global Malaria Programme

World Health Organization
Chapter 4: Use of surveillance, surveys and other data for monitoring and evaluation of national programmes and the GTS
Monitoring and evaluation process

**Inputs**
- Financial, human and other resources mobilized to support activities
- Budgets, staffing, health facilities, medicines and other resources

**Process**
- Actions or work to convert inputs into outputs
- Delivery of supplies, staff training, supervision

**Outputs**
- Services resulting from converting inputs to outputs e.g. RDTs and ACTs in stock, staff trained.
- Goods and services produced and delivered - under the control of the implementing agency

**Outcomes**
- Use of outputs by targeted population e.g. suspected cases receiving a diagnostic test, confirmed cases receiving an ACT
- Not fully under the control of implementing agency

**Impact**
- Reduction in disease e.g. reduction in severe malaria cases
- Multiple influences on impact

**Implementation (supply side)**

**Results (demand + supply)**

**WHO Manuals:**
- Programme monitoring for malaria control
- Disease surveillance for malaria control

Global Malaria Programme
## SME indicators

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Transmission intensity</th>
<th>Geography</th>
<th>Level</th>
<th>Data source</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High transmission</td>
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<tr>
<td></td>
<td>Low transmission</td>
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<tr>
<td></td>
<td>Elimination/prevention of re-establishment</td>
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</tbody>
</table>

### Data source
- Routine reporting system
- Health facility survey
- Household survey

<table>
<thead>
<tr>
<th>Indicator</th>
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</thead>
<tbody>
<tr>
<td>Indicator highly relevant to setting</td>
<td>Indicator potentially relevant to setting</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Indicator</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financing</td>
<td>Indicator</td>
<td>Indicator</td>
</tr>
<tr>
<td>1.1 Malaria expenditure per capita for malaria control and elimination</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>1.2 Funding for malaria relevant research</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>1.3 Number of top-10 registered corporations that invest in malaria</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Indicator</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vector control</td>
<td>2.1 Proportion of population at risk sleeping under an insecticide-treated net (ITN) or living in house sprayed by IRS in the previous 12 months</td>
<td>●</td>
</tr>
<tr>
<td></td>
<td>2.2 Proportion of population at risk that slept under an ITN the previous night</td>
<td>●</td>
</tr>
<tr>
<td></td>
<td>2.3 Proportion of population with access to an ITN within their household</td>
<td>●</td>
</tr>
<tr>
<td></td>
<td>2.4 Proportion of households with at least one ITN for every two people</td>
<td>●</td>
</tr>
<tr>
<td></td>
<td>2.5 Proportion of households with at least one ITN</td>
<td>●</td>
</tr>
<tr>
<td></td>
<td>2.6 Proportion of available ITNs used the previous night</td>
<td>●</td>
</tr>
<tr>
<td></td>
<td>2.7 Proportion of population at risk potentially covered by ITNs distributed</td>
<td>●</td>
</tr>
<tr>
<td></td>
<td>2.8 Proportion of targeted risk group receiving ITNs</td>
<td>●</td>
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<tr>
<td></td>
<td>2.9 Proportion of population at risk protected by indoor residual spraying</td>
<td>●</td>
</tr>
<tr>
<td></td>
<td>2.10 Proportion of targeted risk group receiving IRS</td>
<td>●</td>
</tr>
</tbody>
</table>

© Requires data from both routine systems and household survey
## SME indicators

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Indicator</th>
<th>Applicability of Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inputs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemoprevention</td>
<td>3.1 Proportion of pregnant women who received ≥3 doses of intermittent preventive therapy (IPTp)</td>
<td>●</td>
</tr>
<tr>
<td></td>
<td>3.2 Proportion of pregnant women who received 2 doses of IPTp</td>
<td>●</td>
</tr>
<tr>
<td></td>
<td>3.3 Proportion of pregnant women who received 1 dose of IPTp</td>
<td>●</td>
</tr>
<tr>
<td></td>
<td>3.4 Proportion of pregnant women who attended antenatal care (ANC) at least once</td>
<td>●</td>
</tr>
<tr>
<td></td>
<td>3.5 Proportion of children aged 3–59 months who received the full number of courses of SMC per transmission season</td>
<td>●</td>
</tr>
<tr>
<td><strong>Case detection</strong></td>
<td>4.1 Proportion of children under 5 with fever in the previous 2 weeks for whom advice or treatment was sought</td>
<td>●</td>
</tr>
<tr>
<td></td>
<td>4.2 Proportion of detected cases contacting health services within 48 hours of developing symptoms</td>
<td>●</td>
</tr>
<tr>
<td><strong>Diagnostic testing</strong></td>
<td>5.1 Proportion of patients with suspected malaria who received a parasitological test</td>
<td>●</td>
</tr>
<tr>
<td></td>
<td>5.2 Proportion of children under 5 with fever in the previous 2 weeks who had a finger or heel stick</td>
<td>●</td>
</tr>
<tr>
<td></td>
<td>5.3 Proportion of health facilities without stockouts of key commodities for diagnostic testing</td>
<td>●</td>
</tr>
<tr>
<td><strong>Treatment</strong></td>
<td>6.1 Proportion of patients with confirmed malaria who received first-line antimalarial treatment according to national policy</td>
<td>●</td>
</tr>
<tr>
<td></td>
<td>6.2 Proportion of treatments with ACTs (or other appropriate treatment according to national policy) among febrile children &lt;5</td>
<td>●</td>
</tr>
<tr>
<td></td>
<td>6.3 Proportion of <em>P. vivax</em> and <em>P. ovale</em> patients who received radical cure treatment</td>
<td>●</td>
</tr>
<tr>
<td></td>
<td>6.4 Proportion of health facility months without stockouts of first-line treatments</td>
<td>●</td>
</tr>
</tbody>
</table>
### Surveillance

<table>
<thead>
<tr>
<th>7.1 Proportion of malaria cases detected by surveillance systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.2 Proportion of expected health facility reports received</td>
</tr>
<tr>
<td>7.3 Annual blood examination rate</td>
</tr>
<tr>
<td>7.4 Proportion of cases investigated and classified</td>
</tr>
<tr>
<td>7.5 Proportion of foci investigated and classified</td>
</tr>
<tr>
<td>7.6 Percentage of case reports received &lt;24 hours after detection</td>
</tr>
</tbody>
</table>

### Impact

<table>
<thead>
<tr>
<th>Prevalence</th>
<th>8.1 Parasite prevalence: proportion of population with evidence of infection with malaria parasites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incidence</td>
<td>9.1 Malaria case incidence: number of confirmed malaria cases per 1000 persons per year</td>
</tr>
<tr>
<td></td>
<td>9.2 Malaria admission rate: number of malaria admissions per 10 000 persons per year</td>
</tr>
<tr>
<td></td>
<td>9.3 Malaria test positivity rate</td>
</tr>
<tr>
<td></td>
<td>9.4 Proportion of admissions due to malaria</td>
</tr>
<tr>
<td></td>
<td>9.5 Number of foci by classification</td>
</tr>
<tr>
<td>Mortality</td>
<td>10.1 Malaria mortality rate: number of malaria deaths per 100 000 persons per year</td>
</tr>
<tr>
<td></td>
<td>10.2 Proportion of inpatient deaths due to malaria</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Elimination</th>
<th>11.1 Number of areas/countries that have newly eliminated malaria since 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevention of reestablishment</td>
<td>12.1 Number of areas/countries that were malaria-free in 2015 in which malaria has been re-established</td>
</tr>
</tbody>
</table>

- **●** Indicator highly relevant to setting
- **○** Indicator potentially relevant to setting
- **©** Requires data from both routine systems and household survey

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**Global Malaria Programme**

**World Health Organization**
1. Malaria incidence rates

2. Proportional malaria incidence

3. General patient attendance

4. Diagnostic effort

5. Quality of diagnosis and reporting

6. % Cases due to P. falciparum
1. Surveillance of *Plasmodium vivax*
2. Entomological surveillance in burden reduction and elimination
3. Routine information systems high burden countries
4. Improved approaches to data use – electronic tutorials, forms, annexes
5. Mapped examples for foci mapping
6. Surveillance systems assessments - electronic check lists and a sample questionnaire
7. Accompanying DHIS 2 modules (burden reduction and elimination)
8. Expanded section on epidemics
<table>
<thead>
<tr>
<th>Name</th>
<th>Nationality</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Adam Bennett</td>
<td>USA</td>
</tr>
<tr>
<td>2. Arantxa Roca-Feltrer (Chair)</td>
<td>Spain</td>
</tr>
<tr>
<td>3. Arnaud Le Manech</td>
<td>France</td>
</tr>
<tr>
<td>4. Chris Drakeley (co-Chair)</td>
<td>UK</td>
</tr>
<tr>
<td>5. Erin Eckert</td>
<td>USA</td>
</tr>
<tr>
<td>6. Jian-wei Xu</td>
<td>China</td>
</tr>
<tr>
<td>7. John A. Painter</td>
<td>USA</td>
</tr>
<tr>
<td>8. Kes Herdiana</td>
<td>Indonesia</td>
</tr>
<tr>
<td>9. Khalid Abdelmutalab Elmardi</td>
<td>Sudan</td>
</tr>
<tr>
<td>10. Laurence Slutsker - MPAC</td>
<td>USA</td>
</tr>
<tr>
<td>11. Ndiop Medoune</td>
<td>Senegal</td>
</tr>
<tr>
<td>12. Paola Marchesini</td>
<td>Brazil</td>
</tr>
<tr>
<td>13. Saute Franscisco</td>
<td>Mozambique</td>
</tr>
</tbody>
</table>
SME Manual revision - process

Selection of SME-TEG members

Draft 1 - First SME-TEG meeting to discuss SME manual

Draft 2 - Presentation to MPAC and circulation of SME manual to TEG and Regional Advisors

Draft 3 of SME Manual - circulation to SME-TEG, GMP, Regional Advisors

Draft 4 of SME manual - circulation to regions and selected countries NMCPs, MPAC chair and selected MPAC members

Final version of SME manual and online approval by MPAC

Dec 2016  →  Feb 2017  →  Mar 2017  →  April 2017  →  May 2017  →  June 2017