Session 1. Welcome and objectives
Chairs: Prof. Gao Qi & Dr. Roly Gosling, Co-chairs of the APMEN SRWG
[See presentation]¹

- **Objective 1.** To introduce the forthcoming WHO Operational Manual on Malaria Elimination with a particular focus on major updates to surveillance and response recommendations.
- **Objective 2.** To review malaria transmission foci identification and response best practices and learn to map foci using open source software and mobile technology.
- **Objective 3.** To examine rapid reporting technologies for malaria elimination including the roles, responsibilities, and process; the tools and systems available; the necessary architecture with a focus on how to get begin to implement rapid reporting systems for malaria elimination.

Chair: Dr James Kelley, WHO Western Pacific Regional Office
Presenter: Dr. Allan Schapira, Independent Consultant
[See presentation]¹

- The new WHO Operational Manual² has several key updates:
  - There is no longer a separation between countries that can and cannot eliminate. Malaria elimination is feasible and all malaria-endemic countries are considered and addressed in the new manual (not just moderate and low endemic countries);
  - The emphasis on phases of elimination (and corresponding prevalence thresholds) has lessened and there is an increase in the importance of iterative planning for across the continuum of malaria transmission;
  - Surveillance as an intervention is highlighted and the critical role of information systems is examined;
  - New tools and strategies are considered (e.g. point of care diagnostics, mass drug administration);
  - The WHO Certification of Elimination process has been simplified;
  - The importance of subnational elimination and regional initiatives is stressed.

¹ Presentations are available at: www.APMEN.org.
² Please note that at the time of this meeting the WHO Operational Manual on Malaria Elimination had not yet been finalized.
• Elimination will be demonstrated through a sensitive national surveillance system and while there is no single intervention or package of interventions that will achieve elimination, excellent surveillance and response systems and procedures are critical.
• Elimination guidelines cannot specify strategies. Instead national malaria control programs (NMCPs) must use their knowledge of the local context to apply the best set of strategies and interventions.
• Foci classifications in the new manual are simplified into three categories (vs. six categories in the previous focus classification system): active focus, residual non-active focus, and potential focus.

**Discussion:**
• In the Asia Pacific where formally trained entomologists are scarce, especially at the district and sub-district level, it is important to develop SOPs and pragmatic guidance for non-entomologist professionals to carry out vector control strategies in particular foci.
• A major update in this iteration of the manual includes reviewing and analyzing indicators by foci.
• Local expertise, within the national program, must be used to adopt and modify the new WHO manual.

**Session 3. Foci identification and response: Step by Step**
**Chair:** Dr. Garib Das Thakur, Nepal
**Presenter:** Prof. Gao Qi, Co-chair APMEN SRWG
[See presentation]¹

• Three key steps for case-based surveillance:
  o Case finding and reporting;
  o Case investigation and classification;
  o Foci investigation, classification and response: the key to blocking local transmission (the primary focus of this presentation)
• The aim of the foci investigation is to obtain epidemiological and entomological evidence of local malaria transmission to inform an appropriate and effective response.
• The foci investigation consists of data analysis of parasitological and entomological surveys to assess the malaria situation and potential malaria vectors.
• Methods for parasitological surveys could include reactive case detection and or active case detection using PCR, RDT, and/or microscopy. The sensitivity of the testing method must be considered.
• Tools for entomological surveys could include light traps, mosquito catching tube, and/or larva catching. Vector behaviors and insecticide sensitivity must be considered in the analysis. Foci with entomological data from within the past three years do not require a new entomological survey.
• The new WHO foci classifications can be tailored to fit the local situation. China adapted the classification system to fit its context.
• The purpose of foci response is to block onward transmission within the focus area. Mapping foci is a useful strategy to implement a focused response.
Discussion:
• The majority of the discussion focused on the ideal size of one malaria transmission foci. The size will be dependent on several local factors including the results from the case investigation, endemicity of the focus area, and the staff available for foci response activities.
• Countries or areas with large populations should consider their available resources and the local malaria situation when developing protocols.

Chair: Dr. Wasif Ali Khan, icddr,b
Panel: Dr. Rose Nani Mudin, Malaysia | Dr. Rinzin Namgay, Bhutan | Dr. Elvieda Sariwati, Indonesia | Dr. Prayuth Sudathip, Thailand
[See presentations]¹

• Malaysia is currently rolling out a new foci identification system, which has taken several years to organize and implement; this system will be based on the old WHO foci classifications. Malaysia uses a detailed “myfoci” tool to differentiate foci and standardize the response.
• Bhutan bases its foci identification and response strategies on case-based surveillance and utilizes community action groups in foci identification and response activities.
• Indonesia uses subnational elimination efforts to inform their national strategies, including foci identification and response. At the moment most reporting is completed at the village-level but the goal is to achieve sub-village reporting.
• Thailand has a functioning foci system that uses 4 classifications at both the village and district levels. Thailand is utilizing a “1-3-7” strategy (based on China’s strategy); responses are based on the foci classification.

Discussion:
• Countries that base foci investigation and response activities off of testing only fever patients run the risk of missing asymptomatic infections (a potential source of residual transmission). The use of sensitive diagnostic tools and/or more expansive testing and/or use of focal MDA in foci may help to shrink these sources of transmission.
• Malaysia updates their foci registry on a yearly basis by collecting data from the state-level.
• In Bhutan, keeping the community action group engaged and properly trained has been a challenge. These groups are involved in other health programs such as HIV/AIDS and TB.
• In Malaysia where *P. knowlesi* is an increasing challenge, there were questions on whether foci identification and response strategies are the same for *P. knowlesi* transmission. Largely the activities remain the same, there is no difference for case investigation and treatment, but for vector control it is recommended that clothes be treated with insecticide for forest goers.
• For Thailand, there were questions as to the effectiveness of the “1-3-7” surveillance strategy among forest goers. It was acknowledged there are no known effective tools for these groups. The Thai NMCP identifies groups and provides insecticide treated hammocks; migrants are able to seek
treatment at border posts; and for confirmed diagnosis there should be case investigation which could include focal spraying, but staff capacity is often limited. Outbreaks in the past have resulted in the reclassification of foci in Thailand.

**Session 5: Breakout group discussions: Implementing foci identification and response within country programs**

**Chairs:** Prof. Gao Qi & Dr. Roly Gosling, Co-chairs APMEN SRWG

[See presentation]¹

- In this session the Working Group sought to better understand what national programs are currently doing for foci identification and response, what can be improved, the gaps/challenges and practical solutions to these challenges, to be implemented by APMEN and/or malaria programs. To achieve this, small groups were created by asking Country Partners to self-identify as one of the following:
  - **Category 1:** Countries that do not yet have foci identification response in their National Strategic Plan/action plans and are not yet implementing it.
  - **Category 2:** Countries that include foci identification and response in their National Strategic Plans (and may have SOPs or action plans) but are not yet implementing it.
  - **Category 3:** Countries that are currently implementing foci identification and response

**Discussion:**

- Challenges and gaps identified by those countries that are not yet implementing foci identification and response activities:
  - **Technical challenges and gaps**
    - Case investigation and SOPs to trigger and implement an appropriate response
    - QA and QC of data collection and management
    - Limited M&E for case management and of community groups
    - Mapping case data and foci
  - **Operational challenges and gaps**
    - Adequate and trained human resources
      - Especially at sub-district level
      - Shortage of entomologists in region
      - Lack of incentives for field and clinic staff
    - Limited guidance on how to integrate this work into strategic plans and SOPs
      - TA for strategic plan development
      - Clear SOPs and training on SOPs
  - **Financial challenges and gaps**
    - Inadequate financing at district and sub-district level for prompt response

- Challenges and gaps identified by those countries that are currently implementing foci identification and response activities:
  - **Technical challenges and gaps**
- Tracking imported cases that have traveled through various foci. Understanding where transmission occurred.
  - **Operational challenges and gaps**
    - Delayed case notifications and subsequent response
    - The need to update SOPs
    - Populations are away from homes and communities during daytime work hours
    - Quality control and assurance of data case classification and investigation
    - Need a long term plan for recruitment of quality and trained entomologists
    - Lack of trained entomologists
    - More information shared on entomological sampling, especially alternatives to human landing
  - **Financial challenges and gaps**
    - Funding at sub-district level for a prompt response

- Possible solutions include:
  - The development of strong SOPs as a solution to QA and QC of data and case classification
  - The SRWG to engage more with the APMEN Vector Control Working Group (VCWG) on issues related to vector control and entomology.
  - Increase community involvement by training community-based entomologists
  - Share information across countries on entomological sampling methods, in particular baited traps
  - Earmarked funding as a solution to financial gaps, especially to address gaps at the sub-district level

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**Session 6: Update on the minimal essential indicators for malaria elimination**

**Chair:** Dr. Arantxa Roca-Feltrer, Malaria Consortium

**Presenters:** Dr. Adam Bennett, UCSF Global Health Group | Dr. James Kelley, WHO Western Pacific Regional Office

[See presentation]¹

**Updates for Malaria Elimination Programs | Adam Bennett:**

- Updates to global guidance for malaria elimination programs (i.e. WHO Operational Manual on Malaria Elimination) presented an opportune time to revisit indicators used for malaria elimination.
- The 2015 SRWG Annual Meeting in Phuket focused on consensus building and prioritization of indicators and activities for malaria elimination. The results from this meeting were shared with WHO Surveillance, M&E Technical Expert Group (WHO SME-TEG) members, and the minimum set of elimination indicators was developed and shared with APMEN SRWG.
- Better metrics for vector control are needed because the current indicators are not relevant for an elimination context.
- Next steps: detailed reference guide for essential indicators will be completed and shared.
The Regional Action Framework (RAF) for the Western Pacific was endorsed last week.

The Pillars are synchronized with the Global Technical Strategy.

The outcome indicators included here are the closest to NMCP work.

WPRO is planning to work with NMCPs in the region to establish 2015 baselines for the proposed indicators.

To provide feedback, suggestions for improvement or information on next stages you may contact Dr. James Kelley (WHO WPRO) at kelleyj@who.int.

Discussion:

There were questions related to the RAF presentation, specifically on what the criteria for “elimination capable” surveillance systems are. WPRO is currently leaving that to countries to define, but there was an overall consensus that some guidelines would be helpful. It was suggested that these guidelines be lifted from the new WHO Operational Manual, which defines elimination surveillance relatively well. There was also a discussion on how this pertains to subnational elimination efforts – if a country is successfully eliminating at the subnational level, then the surveillance system has proved its capability.

Session 7. APMEN Surveillance and response WG business meeting

Chairs: Prof. Gao Qi & Dr. Roly Gosling, Co-chairs APMEN SRWG

[See presentation]¹

- Working Group Objectives were discussed:
  - Facilitate sharing of information and experiences across APMEN countries on surveillance and response;
  - Support program decision making;
  - Identify strategies and best practices;
  - Undertake catalytic research for addressing gaps;
  - Develop and disseminate information.
- Progress on the 2015-2016 APMEN SRWG Workplan was reviewed.
- Work streams for the 2016-2017 APMEN SRWG Workplan were discussed with a critical focus on the limited funding expected for 2017 and beyond. Themes were then prioritized by working group participants. The next steps are for the SRWG Coordinating Team to review the priorities discussed during this meeting and to draft the 2017 APMEN SRWG workplan. The workplan will be circulated to the SRWG for review and comment.

Session 8. Rapid reporting technologies: The roles, responsibilities and process

Chairs: Dr. Leo Sora Makita, Papua New Guinea | Mr. Esau Naket, Vanuatu

Presenter: Dr. Gerard Kelly, Independent Consultant

[See presentation]¹
Surveillance is no longer a one-way process of routinely reporting indicators. It should be considered “information for effective action.”

Roles of rapid reporting for malaria elimination include:
- Enhance decision-making and guide action;
- Locate and eliminate infection reservoirs, manage transmission foci, identify and treat imported infections;
- Ensure delivery of malaria services at optimum levels of coverage.

Discussion:
- Select countries around the room were selected to briefly report on their programs’ current reporting systems including how malaria cases are currently reported, who reports, who receives case reports and when, who acts on this information, and how are intervention data recorded. Country partners were also asked to share how rapid reporting could be improved.
- China utilizes the “1-3-7” strategy. Malaria is a notifiable disease and is reported online within 1 day of diagnosis. Even the lowest level clinic can diagnosis and treat malaria. The case data is sent to the county CDC, where information is checked daily. Cases are confirmed either through microscopy or PCR, confirmed cases are investigated. Case data is analyzed and classified weekly and entered into the infectious disease reporting system. Case and foci identification is recorded in separate public health systems at the county CDC.
- In the Solomon Islands, case reporting is completed on a monthly basis. The reporting system is still primarily paper-based. Malaria cases are pulled out from outpatient registrar at the provincial level and entered into the malaria information system. The current health information system uses DHIS2. Reports are often delayed and incomplete. Ideally internet access and wireless coverage would need to be improved to roll-out a rapid reporting system nation-wide. It was discussed that the program could start improving the malaria reporting system in areas with coverage and try to expand as coverage improves in Solomon Islands.
- Indonesia’s reporting primarily occurs from the provincial level; it is completed manually at monthly intervals. This data is then collated and sent electronically, if internet is available. Indonesia does have an early warning and response system but this is used to detect outbreaks. Outbreak thresholds depend on elimination phase of the province. Indonesia currently reports using a range of IT for case data reporting.
- In Vanuatu, health facility level reports are paper-based and provided to the provincial level on a monthly basis. The province is responsible for providing feedback to the lower levels and for sending data to the national level. Microsoft Access is used to collect case data. Case notification is supposed to be conducted within 24-48 hours, followed by case investigation within three days. Vanuatu wishes to slowly roll-out mobile technology.
- Lao PDR is trying to roll-out DHIS2 but is having issues with incomplete and inaccurate data collection.
- Sri Lanka uses a web-based information system but surveys are still paper-based and phones are still used for reporting cases. A serious challenge is that there is no back-up support for their web-based
system. Sri Lanka is currently developing a new, integrated health information system with DHIS2 with Global Fund support. The national program is maintaining the paper-based system and the two systems are used in tandem.

- Bangladesh uses a mixed-reporting system; while it is paper-based in most all areas of the country, a web-based system is currently being piloted in select districts. This mobile-based reporting system collects case classification and treatment information in real-time.
- AccessBio currently offers a cloud-based information system that is free of charge.
- The discussion revealed a huge array of challenges in the region. It was agreed that flexibility and adaptability are important aspects of surveillance systems.
- The presenter reminded the room that technology often enhances an already well-established rapid reporting system and to be sure to always consider and support the lowest level in reporting systems.
- Similarly the quality of data is paramount and routine feedback is key to surveillance as an intervention.

Session 9. Rapid reporting technologies: The tools and systems available
Chair: Mr. Leonard Boaz, Solomon Islands
Public Health Sector: Village level. An example from Mozambique. Presenter: Dr. Arantxa Roca-Feltrer
Public Health Sector in Malaysia: District and national level. Presenter: Dr. Rose Nani Mudin
Private Sector: An application for private sector reporting in the Lao PDR. Co-Presenters: Mr. Eric Steastedt and Dr. Simone Nambanya [See presentations]1

**UpSCALE | Arantxa Roca-Feltrer:**

- upSCALE is a mHealth project currently conducted in Mozambique funded by the Bill & Melinda Gates Foundation and led by Malaria Consortium.
- In Mozambique, community health workers (CHWs) are trained to provide basic healthcare to remote areas including diagnosis and treatment for all age groups for malaria, among several other services.
- UpSCALE uses a mobile app to implement an mHealth system in certain provinces to Mozambique
- The CHWs submit data in real time to the DHIS2 health system platform. Government stakeholders are able to view data in a user-friendly format which assists data-driven decision-making on program investments, surveillance and response of infectious diseases, including malaria, and early detection of outbreaks.
- Malaria Consortium is looking to expand the project within Mozambique and also to other countries.

**Public Health Sector in Malaysia: District and national level | Rose Nani Mudin:**

- Malaria is a notifiable disease with all levels reporting confirmed malaria cases, and a web-based and real time system is used to report malaria cases.
Malaysia uses a combination of telephone, SMS/texting using smart devices and computers in their rapid reporting system. This information is fed into a custom database/MIS for malaria.

Data is held on a local server due to government mandate. The Malaysian program recommends having an IT team and ensuring that your vendor is reachable at all times for technical support.

Malaysia also recently developed a “MyFoci” system which was created to help standardize foci classification and response. This is currently a parallel system. The system is updated manually with epidemiological and vector surveillance information.

Malaysia also has a well-functioning “eDengue system” which is publicly available to view online: [http://idengue.remotesensing.gov.my/idengue/index.php](http://idengue.remotesensing.gov.my/idengue/index.php)

**Malaria Case Surveillance App: Lao PDR | Eric Seasteadt and Simone Nambanya:**

- Public-Private Mix (PPM) local pharmacies in Laos PDR were trained on national guidelines that provide testing and first-line treatment and report data monthly to the government.
- Gaps and challenges were identified in the reporting system including long lag-time between data collection and availability for decision making, manual aggregation jeopardizing data quality, data aggregated at the district level was losing granularity to identify endemic health centers or villages.
- A malaria case surveillance app has been developed, which is android-based, open-source app which links with the DHIS2 MIS system. The app is meant to improve quality of care, data quality and timeliness. Next steps include a field pilot, evaluation and scale-up.

**Discussion:**

- Regarding the Malaria Case Surveillance App: PSI and CMPE are currently piloting this app with PPMs and there are plans to roll-out the app with village health volunteers.
- Regarding upSCALE: commcare is an open source software that is user friendly and can be adapted. Malaria Consortium contracted with the IT company Dimagi to support development of a relatively complex app and to make sure that the tech support was available.

**Session 10. Rapid reporting technologies: the architecture and getting started**

**Chairs:** Mr. Johnny Nausien & Mr. Wesley Donald, Vanuatu

**Presenter:** Dr. Olivier Celhay, Mahidol-Oxford Research Unit

[See presentation]¹

- Rolling out rapid reporting technologies will requiring preparation:
  - Review existing research and grey literature: Talk to your network to fill knowledge for evidence gaps.
  - Document existing information system: use standards already promoted by the MoH and NMCP; use the same administrative units and coding.
  - Develop partnerships with the private sector: There may be potential interest from mining companies, pharmacies and clinics, telecom operations etc.
  - Understand the human resources needed: You will need a new set of skills within the NMCP/MoH.
- Think critically about what data? Where geographically? What levels and what frequency?
- All data collected should be useful, think about the minimum data required to get the most information, when possible be comprehensive with what levels are included in rapid reporting.

- Getting started:
  - Choose a technology → Choose a platform → Select an implementing partner to provide technical or logistical support → choose a solution for devices and servers → design a workflow → design SOPs → conduct trainings