Introduction

The Asia Pacific Malaria Elimination Network (APMEN) undertook a comprehensive literature review and survey amongst its Country Partners in 2010/11 to identify vector control capacities, needs and activities. This work was conducted by APMEN and focused on eight Country Partners which identified malaria elimination as a national or sub-national objective. Respondents were Vector control managers/malaria managers at district, provincial and national levels in these countries.

To assist the sharing of knowledge between Country Partners, the APMEN Vector Control Working Group posed the following questions:

- What vector control tools are currently being used and how were these tools selected for eliminating malaria by APMEN countries?
- What else is needed to go from the remaining low-levels of malaria transmission to interruption of transmission?
- What data are available to determine what methods are and are not working?
- What are the technical / operational challenges regarding the use of vector control interventions for eliminating malaria in the Asia-Pacific region?

FINDINGS

VECTOR DIVERSITY

A challenge for the Asia Pacific region is the unique diversity of vectors.

- The literature review identified that the Asia Pacific region hosts 22 species of Anopheles incriminated as primary or secondary vectors.
- Recently published Global map of Dominant Malaria Vectors Parasites & Vectors 2011 notes that 19 different Anopheline species or species complexes that are considered dominant malaria-transmitting vectors.
- In comparison Sub-Saharan Africa has 7 dominant malaria vectors and the Americas host 9.
- The APMEN Survey respondents identified 11 of these 19 (2).
- There are differences between what literature notes as major vectors and what APMEN Country Partners are responding to within Nationals Malaria programs.

VECTOR CONTROL TOOLS

A range of malaria vector control tools are used in the Asia Pacific. Tools do not substantially differ between control and elimination settings except for the targeting of some intervention sites in only a few countries.

Bed Nets
- All 8 countries use long life impregnated net (LLIN) or Insecticide treated bed net (ITN) in both control and elimination areas.
- 7 of 8 countries have guidelines for bed net use.
- Universal net coverage is the target recommended for malaria elimination.
- Bed net coverage achieved or targeted was reported higher (85-100%) in elimination areas than in control areas.
- Biggest challenges in efforts to achieve universal net coverage are maintaining adequate net supplies (n=7) and achieving desirable levels of net use (n=5).

Indoor Residual Spraying (IRS)
- IRS is used by all 8 respondent countries for elimination, 6 of 8 have IRS guidelines or Standard Operating Procedures (SOPs).
- Countries use different strategies for control settings as compared to approaches used for elimination areas including focial spraying, spraying in high-risk areas, application during seasonal transmission and in response to outbreaks.

Environmental management
- 7 of 8 countries use environmental management and 3 have guidelines for environmental management.
- Environmental management activities included stream cleaning and cutting of grasses and environmental modification activities include permanent draining, the filling of, or changing water flow/salinity in breeding sites and village/household cleaning.
- Most countries used multiple methods.
- Only 1 of the 7 countries had environmental management SOPs.

Others
- 2 of 8 countries use larviciding and have guidelines for use.
- Gambusia affinis was the larvicidous fish placed in breeding areas in the 2 countries.
- 2 of 8 countries use personal repellents, no country had guidelines.

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CHALLENGES IDENTIFIED BY RESPONDENTS

Universal coverage of bed nets
- Maintaining adequate supplies
- Achieving desired high coverage levels
- Difficulty in distribution
- Not sure need universal coverage in elimination areas

IRS
- Concern about insecticide resistance
- Availability of insecticide
- Acceptability by community
- Cost of spraying program
- Vector behaviour changes

Respondents
- Availability
- Affordability

Larval Control
- Lack of materials and supplies
- Difficulty in identifying, managing all breeding sites
- Lack of trained staff in use
- Lack of evidence of effectiveness in their settings
- Lack of community involvement

Environment management
- Cost
- Evidence of effectiveness
- Lack of trained staff
- Community acceptability

DISCONNECT BETWEEN VECTOR AND VECTOR CONTROL INTERVENTIONS

There were differences between the most recommended methods for vector control activities used by the countries based on the vector/feeding habits, resting and biting behaviours, and the methods the respondent countries actually used for corresponding vectors. Such variation included indoor- to outdoor feeding and resting behaviours.

As outside-biting and outdoor-resting behaviours are more common in the Asia Pacific vectors, this potentially renders domicile-based control interventions - such as insecticide-treated nets and indoor residual spraying - less protective against malaria transmission. In some settings in the region.

HUMAN RESOURCES FOR VECTOR CONTROL IN ELIMINATION SETTINGS

Four of the countries reported lacking capacity in training programmes for at least one of the following subjects: field entomologist, epidemiologist, laboratory and management. Training needs identified:
- At central level: information and data analysis at programme level; introduction to malaria cases and breeding sites GIS mapping; international coordination with the agricultural sector and initiation of VRI; management and interpretation of international evidence including research, vector surveillance, vector identification, equipment use, vector control maintenance and advanced entomology.
- At provincial management level: management and organisation of staff, analysis of data and reporting.
- At all lower levels: integrated vector management, quality assurance for vector control activities, indoor residual spraying; field entomology/monitoring of vector surveillance, equipment use and vector control maintenance.

DISCUSSION

The Asia Pacific region faces several challenges in scaling up use of vector control in elimination settings. More specifically, more data are needed to understand the operational effectiveness of using one method over another, as well as given combinations of vector control interventions. In addition, the evidence base is and access to the evidence that exists – is scant for the less commonly used vector control methods, especially for elimination settings, in the Asia Pacific region.

A major set of challenges concern health system capacities; respondent countries commonly mention that human resources, logistics management and health information systems (including monitoring and evaluation mechanisms) pose significant hurdles. Common concerns for any vector control method also included the broader community engagement with other sectors in vector management (i.e., areas where respondents from health sectors and governments felt inadequately experienced and equipped to implement vector management programmes).

APMEN actions as a response to the survey

The Vector Control Working Group is involved with APMEN partners to:
- Assist in updating existing guidelines and standard operating procedures on various vector control methods and adding modules/adaptation specifically for elimination settings
- Assist in the development of simple taxonomic guides to support improved field diagnosis
- Work with training providers to develop modules focused on elimination settings

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