Vector Control Working Group (RBM VCWG)
17th Annual Meeting, Session 2: Thursday 10th March 2022

Hosted Online via Zoom

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Session 2: Charting the course for the VCWG work streams
Co-Chairs: Corine Ngufor & Justin McBeath

Welcome, introductions and meeting objectives- *Corine Ngufor, LSHTM/CREC & Justin McBeath, Bayer*

Corine begins the session by welcoming everyone and reminding of the three work streams around which the VCWG meeting discussion focuses on:

1) Work stream one is about enhancing the impact of core interventions
2) The second work stream is about expanding the vector control toolbox
3) The third work stream is about implementing the global vector control response

Today's session includes three preliminary talks about key updates on progress conducted to support the above work streams. Then, three breakout rooms will be created to discuss each of those work streams:

1. Break-out group 1: Enhancing the impact of core interventions (WS1)
2. Break-out group 2: Expanding the vector control toolbox (WS2)
3. Break-out group 3: Implementing the Global Vector Control Response (WS3)

This will also serve as preparation to the early May sessions dedicated to those work streams. The discussion is handed over to Mary Kante and Allan Were, who will give updates about work stream 1.

Designing the vision for the Enhancing the Impact of Core Interventions work stream: key updates, data, and opportunities to provide inputs for the annual meeting and task team planning- *Mary Kante, Eau Claire Consulting & Allan Were, PMI VectorLink Project*

Mary starts the discussion thanking everyone. She will be presenting together with Allan. Both of them are co-leads of work stream one for Enhancing the Impact of Core Interventions (EICI), focusing on IRS and ITNs. They have also prepared a parallel session in the breakout room focused on the response to the decline in the indicators observed in last year's World Malaria Report following the calls from Pedro Alonso and others to move away from business-as-usual and embrace a problem-solving approach. It is important to build a global approach for strategic planning and problem solving across sectors. A first step is developing a collective vision for how we can drive gains in IRS and ITNs. This visioning exercise will be the first interactive session in the breakout room. Then Mary and Allan will present task teams and ask for participants inputs, in addition to looking for leaders in those task teams. Following this, Ellie Sherrard-Smith and Thomas Churcher will provide updates on the Malaria INtervention Tool (MINT) model. Christen Fornadel will facilitate a special session of Team 2, during which Jacklin Mosha and Nancy Matowo will provide updates on the Tanzania trial evaluating new generation ITNs.

Effectiveness of three types of dual active ingredient treated nets in Tanzania: a four-arm, cluster-randomised trials- *Jacklin F. Mosha, National Institute for Medical Research Mwanza, Tanzania and Nancy Matowo, London School of Hygiene & Tropical Medicine*

Jacklin clarifies that the study she presents was conducted together with LSHTM, National Institute for Medical Research Tanzania, and Kilimanjaro Christian Medical University College and University of Ottawa. The study design was a four-arm cluster-randomised trial of 21 clusters per arm including communities in Tanzania around Lake Victoria. In these clusters, malaria prevalence was about 46% in school children and pyrethroid resistance mortality around 60%. The reference arm in the study was the pyrethroid-only Interceptor made by BASF with alpha-cypermethrin, and the intervention arms were: (1) Interceptor G2 (BASF) with PY & chlorfenapyr (slow killing effect), (2) Olyset plus (Sumitomo

Chemical) with PY and PBO (synergist enhanced knock down and killing effect), and (3) Royal Guard (Disease Control Technologies) with PY & pyriproxyfen (sterilisation effect). The outcomes of the study were: malaria infection prevalence and malaria case incidence over two years, and vector density and entomological inoculation rate over two years. The results showed that the chlorfenapyr-pyrethroid treated next (Interceptor G2) is more effective than standard pyrethroid only LLINs over two years of use. The trial confirmed the superior effectiveness of PBO-pyrethroid nets (Olyset plus) compared to standard pyrethroid LLINs, but over a limited period (12 months). Pyrethroid treated nets with pyriproxyfen (Royal Guard) did not provide significant additional protection against malaria compared with standard pyrethroid-only LLIN.

Expanding the Vector Control Toolbox work stream update- ***Sheila Ogoma, CHAI and Allison Tatarsky, University of California.***

This work stream has four focus areas: (1) LSM task team led by Prosper Chaki and Jen Armistead, (2) HCD and human behaviour in VC task team led by April Monroe and Lina Finda, (3) a TBD task team(s) on paradigm roadmap tracking to include attractive toxic sugar baits and genetically-modified mosquitoes, and (4) other inputs from MESA Track, VCAG, and VCWG members. The meeting will be an opportunity to determine if the third task team needed.

The focus on the themes are: larval source management, innovations in control and surveillance, and human behaviour in vector control and human centred designs. The focus outputs are to identify tool gaps or capacity needs and steer research priorities (including review technology for LSM, inventory of new vector control tool), policy clarification and evaluation pathways (including evidence on LSM, roadmaps, and tracking updates and evidence in VCAG), and implementation/operational scale-up support/ training and capacity building initiatives (including review of operational LSM, elevating operation research questions, and anthropological methods and incorporation of human behaviour into the development, evaluation, and scale-up of vector control tools.

Allison summaries the activities of 2021 and early 2022, which will be presented in the breakout rooms. These include (1) launching a task team on human centred design in vector control, (2) launching a task team on LSM, (3) tracked and cross-fertilising PMI Insights for Malaria landscaping of vector control operational research priorities, including from NMCPs, (4) launching a survey to VCWG members about access to information on vector control tools and whether a global inventory is useful, and finally (5) a paradigm roadmap and 'closing the gap' discussion in breakout ad further updates planned for the session on 4th May.

Allison will be stepping aside after several years in this role, and is looking for a new work stream co-lead. This position would be voluntary for 2-4 years. Geographical diversity and gender balance is appreciated. Those interested should contact Sheila, Allison and Konstantina via email.

Implementing the Global Vector Control Response- ***Mark Hoppé, Syngenta, and Chadwick Sikaala, Elimination 8***

In the breakout rooms, they will be first discussing the optimum ways of working, specifically to uptake a more team work approach and be more collaborative and supportive with task teams. The task areas of work stream 3, co-lead by Mark and Chadwick, include: (1) Integrated vector management (IVM): identification of activities conducted and gaps. Where can task team (TT) support implementation? (2) Capacity and collaboration assessment review: better understanding of training and education opportunities and need to increase capacities to use molecular tool techniques for vector control research and application as use in the field now is limited. Finally, (3), *Anopheles stephensi* response.

This task team has not yet been set up but it is important to define its scope. Mark calls for suggestions of presentation topics for the 4th May meeting.

Breakout room 1: Enhancing the impact of core interventions (WS1) - *Mary Kante & Allan Were*

Welcome and Session Overview– Allan Were
Allan Were opened the session by welcoming and thanking all for attending on behalf of himself and co-chair Mary Kante. The core interventions discussed in this session are ITNs and IRS.

The objectives of the session are: (1) Gather VCWG member inputs to develop a common vision of success for optimal selection, deployment, quality, and use of ITNs and IRS, (2) identify key action items to achieve the vision of success for core interventions, and (3) gather inputs for the updated work stream 1 workplan matrix, and four task forces as well as the WS1 meetings in May.

Vision of success Exercise- Mary Kante
WHO and the global malaria community envision a world free of malaria. A question was posed to the participants: What does success look, sound, and feel like? What will have happened to 'shift the needle' driving vector control gains to support the achievement of the 2025 and 2030 milestones?

Inputs from the participants included:

- Consumer focused products based on human centered design and co-funded by global funders through private sector market channels.
- Sustainability - closed loops on manufacturing for nets and sprays manufactured and recycled locally enabling high access to protection, local enterprise, and eliminating plastic/chemical waste simultaneously.
- There is a demand for dual-AI ITNs in most countries.
- A need for inter-sectoral collaboration with other non-malaria sectors.
- Supply chain providing products in time for campaigns and continuous distribution in time (also from local production sources).
- Increased domestic funding for both IRS and LLIN.
- Standardization of methods used to collect data, use of the right methods for the right questions, giving the ability to interpret and use data to make robust decisions on product choice.
- Better integrated vector management, improved housing.

Mary Kante and Allan Were will capture all the inputs and develop a draft 2030 vision of success to share back before the WS1 meeting scheduled for 3rd May.

Workplan and task team planning: Identifying and prioritizing action items to achieve the vision - Mary Kante and Allan Were.

WS1 Task Team One: Using data to inform optimal selection and deployment of core interventions (ITNs, IRS)
Objective: Support members in their efforts to identify and support use of key tools and resources for country-led decision-making for ITN and IRS selection and deployment, and anticipate policy shifts for the selection and deployment of ITNs and IRS, supporting the adaptation and use of new tools and resources. In order to support NMP to navigate an increasingly complex decision-making process, several tools and resources are available.

Several valuable tools and recent presentations include two ASTMH symposia in 2021 - one organized by Molly Robertson on Developing a multi-perspective approach to VC decision-making and one organized by Richard Oxborough and Matthew Kirby on Entomological data to guide strategic deployment of new types of insecticide treated nets for control of pyrethroid resistant malaria vectors; WHO country stratification tools and TA; Malaria INtervention Tool MINT model – Ellie Sherrard-Smith and Tom Churcher presenting during the meeting; GRID3 (spatial and population data), used by the Zambia NMEP with health districts to determine where ITNs and IRS will be deployed; REVEAL – also used in Zambia with support from Akros to verify field data to confirm structures and track teams' progress in the field; Entomological Surveillance Planning Tool: Tool developed by UCSF/MEI (Question-based, data used in decision-making for Ento surveillance planning); Tropical Health, Hannah, ITN quantification, PMI Insights OR prioritization initiative

Presenters: - Ellie Sherrard-Smith, Thomas Churcher
One tool for IRS or ITN selection, under development, was presented: Malaria INtervention Tool MINT v1: A very flexible framework tool to explore the potential of nets and spray interventions in different ecological settings. Malaria INtervention Tool MINT v2: A tool to explore the potential of nets and spray interventions in different ecological settings and strategize the interventions across settings depending on the most cost effective options. The programme is currently looking for two NMPs who would be interested to trial the tool and work together in April to see what is and is not useful and present at the May meeting.

WS1 Task Team Four: Addressing non-biological threats, Edward Thomsen.
Objective: Support members in their efforts to evaluate and reinforce effective ITN quality, ITN access and use, and ITN durability/replacement. An overview of the December 2021 convening was provided. The objective was to identify challenges to improving net quality and solutions to resolve these challenges during the pre-shipment stage (manufacturing and procurement). Major themes covered included communication, the need to align specifications with performance, and to incentivize quality as well as price. The ssecond convening in May 2022 will focus on post-shipment quality issues (stewardship, data and power).

WS1 Task Team Two: Special Session Addressing biological threats - new insecticides for vector control.
Facilitator: Christen Fornadel
Objectives: (1) Keep the membership apprised of new IRS or ITNs that are currently under evaluation and any related evidence, (2) share SOPs for monitoring of both resistance to any new insecticides (in preparation of deployment when approved), as well as monitoring of the products themselves, and (3) seek inputs from members on key topics or emerging issues to consider for discussion. The results of two studies were presented:

Results of the Tanzania cluster-randomized trial evaluating new generation ITNs - Jacklin F. Mosha, Nancy Matowo
Results were presented on the effectiveness and cost effectiveness of three types of dual-AI treated nets (Interceptor G2, Olyset plus, Royal Guard) compared to pyrethroid LLINs through a four-arm cluster-randomized trial. Chlorfenapyr-pyrethroid treated net were found to be the most cost-effective LLINs over a 2-year period

New Nets Project interim results from pilots in Burkina Faso, Rwanda, and Mozambique - Joseph Wagman
Preliminary results were presented of the enhanced surveillance activities to evaluate the impact of piloting different ITN types in a more operational context: IG2, RG, PBO, standard nets (2020 – 2022):
Key takeaways from these pilots included: Mass ITN distributions (universal coverage campaigns) are strongly associated with increased ITN use and decreases in malaria transmission regardless of ITN

type; in areas of moderate-to-high transmission with pyrethroid-resistant vectors, the distribution of any of the new net types (IG2, PBO, and RG ITNs) seem more effective at controlling malaria than campaigns distributing standard, pyrethroid-only ITNs. This may be less pronounced in West African settings with complex resistance profiles. Finally, more complete and nuanced analyses will consider access, impact, and durability of ITNs after more than one year, as well as ITN use patterns and climate patterns

The WS1 co-chairs made a call for volunteers willing to take on the leadership of the task teams.

Breakout room 2: Expanding the vector control toolbox (WS2) - *Sheila Ogoma & Allison Tatarsky*

IVCC and VCWG jointly presented on closing the gap for malaria transmission. This highlighted the gaps left by core vector control interventions , including displaced populations, climate change, and urban malaria, with *Anopheles stephensi* being invasive in endemic urban areas. A prioritisation process of interventions in the pipeline including topical repellents, spatial repellents, ATSBs, and improved IRS, to see if and how some of these can be prioritised to integrated into the current vector control strategy.

Task team 1: Larval Source Management –Prosper Chaki & Jen Armistead
The outcomes of the kick-off meeting held earlier in the year were presented, which was intended to determine the priorities for 2022 and the objectives and outputs of the team. The prioritisation list of 2022 was presented, and included (1) consolidation of knowledge and gaps pertaining to LSM implementation at the NMCPs. This would focus on how larvicide should be delivered, the technology used (such as drones), coverage, guidelines on monitoring and evaluation, and an implementation framework. (2) The team has also prioritised a landscape analysis that will focus on assessing LSM programs currently being implemented in some countries such as Madagascar and Rwanda etc., with the aim of documenting challenges, success stories, and the use of technology being used at the programme level. Other plans include having a webinar during PAMCA and ASTMH.

Task team 2: Human Behavior and Human-Centered Design in Vector Control - April Monroe & Lina Finda
April highlighted the workshop on putting together the task team members and acknowledged the interest they have had in their upcoming workshop. They are thinking about ways of encouraging dialogue around the topic, such as through webinars. She encouraged new members to reach out if they are interested in joining the team.

This was followed by discussion of the other vector control paradigms, including ATSB, topical and spatial repellents, SIT, gene drives, genetically-modified mosquitoes, endectocides. There was a discussion of whether there should be a specific team to focus on these tools and how best to capture the groups that are working on these interventions. Having a task team for each would be excessive and might promote unhealthy competitions between these different paradigms. Instead, it was proposed that a work stream has an objective of how these interventions can be used in a mix or in specific settings. There were proposals and recommendations from the participants to WS2 to provide guidance and communication on potential use case scenarios in which these innovative vector control interventions could be used to reduce vector borne disease transmission in different transmission settings.
Outputs are on LSM, human centred design, and other vector control paradigms. A poll was held on whether the right topics are being captured, and whether there is a need to raise other topics.

Breakout room 3: Implementing the Global Vector Control Response (WS3) - *Chadwick Sikaala & Mark Hoppé*

Feedback from attendees regarding the improvement of the three taskforces included in work stream 3 was gathered. These were: (1) suggestion of how to identify activities to conduct IVM and the most important gaps in such activities. The discussion was focused on the impact of agriculture on IVM and how this affects the epidemiology of malaria and other vector-borne diseases. The main uptakes from this discussion were:

- More evidence is needed to identify the interrelation between agriculture and impact in IVM, mainly with rice fields (as more common in malaria endemic countries and more water used which could act as mosquito breeding sites). In order to achieve this. A systematic review to identify the gaps and recommend future task teams should be conducted. This can be complemented with case studies and documented examples of the impact of agriculture in IVM.
- Once evidence is gathered and it is clear the impact of agriculture in vector density and malaria transmission. This information should be disseminated to address gaps in agriculture.
- Institutions with expertise in IVM, agriculture, mosquito ecology etc. which could assist agriculture particulars and entities in their understanding of the environmental and ecological impact that agricultural practices (use of insecticides, breeding sites etc) could have on VBD transmission
- All IVM activities should be clearer. For instance, a broad example of IVM programs (local and national) do not include insecticide resistance management in their agenda, probably because of a lack of guidance or lack of understanding of the need for those. A positive reinforcement approach could be conducted to detect best government practices of IVM programmes and insecticide application, which can be used as case studies to guide other operational IVM programmes.
- For IVM programmes, in addition to clear objectives, these should be realistic to ensure they can be accomplished during the expected time frame. Moving forward, Mark and Chadwick will refine the IVM objectives to ensure practicality and feasibility, which will be eventually shared with members.
- Key organisations, institutions, individuals, etc. with multidisciplinary expertise will be detected to support the establishment of the above objectives.

IN the next part of the discussion (2) capacity and collaboration assessment review, key points raised included:

- In last year's meeting, it was concluded that a key area to build capacity was the use of molecular tools and techniques to support vector control programmes.
- Organisations to support this should be detected to offer molecular expertise to any IVM programmes, VC programmes, surveillance, etc. and provide with capacity (kits, protocols, etc.) of molecular tools which can be used in the field.
- Additionally, protocols, techniques and training materials used (by, e.g. MR4) should be updated since a centre of excellence should be key in providing high standard information and keeping up with latest research in optimization and use of more cost effective molecular tools.
- Data analysis methods, statistics, etc. should also be more standardised and optimised. Importantly, the focus should not be uniquely on the analysis of data but also on knowing how can that data be used before proceeding with analysis (e.g. what is the significance of the data, what following steps should be taken depending on results?)
- A landscape exercise was conducted to identify how to increase molecular capacity. The discussion concluded that we should build a community of practitioners which continuously share expertise, updates, entomological and molecular data and technical information to

benefit activities from one to other parts of the globe. An example of this could be The Online Resource Exchange for Entomology.

Finally, discussion of (3) the *Anopheles Stephensi* task force included:

- VCWG consensus statement for the control of *Anopheles stephensi* needs to be more specific in which activities will be conducted. Perhaps it could state which are the funding needs, research needs etc. before proceeding so that VCWG members could perhaps contribute to this.
- It needs to be identified which are the research needs, the data used etc. to decide how to proceed with the invasion of *An. stephensi* in the Horn of Africa and set up objectives.
- Need to identify activities that are already being conducted to control *An. stephensi*. This should be easy to identify and would provide information of effective and less effective practices, methodologies, etc.
- Joint efforts are important to control this invasive species. For example, a forum to keep awareness and make sure *An. stephensi* is in everyone's agenda could be implemented. One of strengths of VCGW is the multidisciplinary membership representing the vector control community. This could be taken advantage of to organise workshops and webinars to discuss these topics with potentially other groups which are not part of VCWG and brainstorm ideas to set up objectives.

General discussion and wrap-up

Justin McBeath encouraged members to provide feedback. It is noted that vector control in humanitarian emergencies needs to be brought up in future sessions.

All work stream sessions will be summarised by work stream members and posted in the attendee hub. It is noted that the previous week, in the first session, they missed the opportunity to acknowledge that they have a new co-chair: Corine Ngufor who has been part of VCWG for 3 months. Corine thanked all members and looks forward to working with Justin. She thanks the work stream leads for how they have summarised different sessions and the key updates provided.