The Vector Control Working Group (VCWG) is one of the 5 working groups of the Roll Back Malaria Partnership to End Malaria.

The purpose of the RBM VCWG is to align RBM partners on best practices to reach and maintain universal coverage with effective vector control interventions. The VCWG disseminates the normative and policy-setting guidelines of the World Health Organization (WHO) by helping to translate these norms and standards to international and country-level partners. It also supports the generation of evidence to inform global policy and guidelines, to protect the efficacy of existing tools and simulate the development of new tools. Aiming at coordinating the support to malaria-affected countries with regard to implementing WHO guidelines, the VCWG provides an essential forum where diverse partners of the vector control community from the public sector, the private sector, research and academia, and civil society, can come together, to reach a common understanding of the threats and opportunities, to learn from each other and to develop the necessary networks and activities to overcome these challenges.

https://rollbackmalaria.com/organizational-structure/working-groups/vcwg/

The VCWG is organized in six work streams.

Indoor Residual Spraying (IRS), Insecticide Resistance Management (IRM) Priorities Work Stream

Insecticide resistance is seen as the major threat to the effective control of the mosquito vectors of malaria. IRS continues to play an important part in the control of mosquito vectors, and has a key role in IRM programs, especially in areas where pyrethroid resistance is potentially compromising control. This work stream spearheads the VCWG’s efforts to support the implementation of the Global plan for insecticide resistance management in malaria vectors (GPIRM), and promotes best practice IRS; both within the wider context of Integrated Vector Management (IVM).
**Long Lasting Insecticidal Nets (LLIN) Priorities Work Stream**
The broad objective of the work stream is to identify and coordinate evidence of how to maintain high levels of ownership and use of serviceable LLINs in endemic countries. The three main focus areas are (i) distribution approaches (evidence and policy aspects), (ii) LLIN durability (coordination evidence and policy aspects) and (iii) new and next generation nets (coordination).

**Larval Source Management Work Stream**
The Larval Source Management (LSM) work stream works to update the evidence base and protocols. It also aims to assess and develop the local capacity (people and infrastructure) to help national programs identify where and how investments in LSM could contribute to malaria control through integration with other interventions.

**New Challenges, New Tools in Vector Control Work Stream**
This work stream primarily examines the limitations of our current approaches to malaria vector control but we also evaluate the potential of various new tools and strategies, which may effectively complement current best practices across different settings. It remains a need to generate local evidence on the magnitude of outdoor/residual transmission. Industry and other partners are encouraged to develop new vector control tools to address residual transmission.

**Integrated Vector Management (IVM), Evidence and Capacity Work Stream**
The overall aim of the work stream is to (i) generate and share evidence on effective and efficient deployment of prior, existing and new vector control interventions and practices, (ii) generate and share evidence on integration of all vector control tools, including lessons learnt from other regions and disease eradication programs and (iii) work with WHO and RBM partners to build entomology and vector control capacity at all levels in endemic countries.

**Housing and Malaria Work Stream**
There is compelling evidence that housing improvements enhance protection of residents from vector-borne diseases. The key objectives of this work stream are to (i) bring together the housing and malaria communities and establish a network of interested parties, (ii) identify the best approaches for reducing house entry and indoor resting by mosquitoes and keeping the home comfortable and healthy for the occupants, and (iii) develop methods for scaling-up housing interventions against malaria and other vector-borne diseases through inter-sectoral collaboration.

Indoor Residual Spraying (IRS), Insecticide Resistance Management (IRM) Priorities Work Stream

A collaborative site for vector control stakeholders

RBM’s IRS/IRM work stream developed the Vector LearningXchange (www.vectorlearningxchange.com), which was launched and promoted at the 66th American Society for Tropical Medicine and Hygiene (ASTMH) meeting in Baltimore on November 5-9, 2017. Managed by the PMI AIRS Project on behalf of RBM, the Vector LearningXchange is a collaborative site where vector control stakeholders from around the world can share best practices, tools, trainings and lessons learned on vector control operations, entomological monitoring and surveillance, environmental compliance, monitoring and evaluation, community mobilization, social behavior change, capacity building, and gender inclusion.

An on-line training on Insecticide Resistance Management coming soon

Progress is being made in the development of the IRM on-line training course (Massive Open Online Course/MOOC). This will be a multimedia course and material will be in the form of written and audio presentations, documentary style presentations in video format, and interactive ‘serious games’. There will also be an opportunity for participants to interact with each other and share their experience, questions and opinions in a moderated online forum. The IRM MOOC will be free for the participant and open to anyone, but will be promoted to and targeted on those involved with practical vector control. It is hoped that by the end of the course, participants will have a good understanding of what insecticide resistance is, what causes it, and how to promote and practically implement best practice IRM. An outline of the course material has been developed with the help of a number of experts, and we are now seeking funding and hope to move into production in early 2018.

Co-leaders: Mark Hoppé (Syngenta, Switzerland, mark.hoppe@syngenta.com) & Dereje Dengela (Abt Associates, USA, dereje_dengela@abtassoc.com)
Long Lasting Insecticidal Nets (LLIN) Priorities Work Stream

Open dialogue between different stakeholders

Our workplan for 2017/18 consists of five main topics: (i) durability monitoring, (ii) ITN distribution, (iii) next-generation nets, (iv) ITN M&E issues (with Monitoring & Evaluation Reference Group (MERG)) and (v) ITN use issues (with Social and Behavior Change Communication Working Group (SBCCWG) and Alliance for Malaria Prevention (AMP)). We have hosted several conference calls open to all group members. The first call in September introduced the workplan (shared as an open-access Google document) and called for volunteers to take on specific activities. It also encouraged an open dialogue between different stakeholders. We are now hosting a series of themed conference calls; the first of which was in November on durability monitoring. Minutes were shared after the meeting by e-mail.

The following specific activities have so far been completed this year:

1. Define thresholds for durability monitoring data to help interpret interim and final results (produced by VectorWorks project for President’s Malaria Initiative (PMI); shared at ASTMH and via webinar on December 7)
2. Present evidence that population access to ITNs is the ‘best’ indicator of universal coverage (jointly authored paper in draft form with Hannah Koenker from MERG discussions; presented at ASTMH)
3. Multisectoral workshop on mosquito net fishing and its effects on livelihoods and environment (Lena Lorenz participated a meeting in Oxford organised by Zoological Society of London & Oxford Martin School)

Co-leaders: Lena Lorenz (LSHTM, UK, lena.m.lorenz@gmail.com) & Hannah Koenker (JHU CCP, USA, hkoenker@jhu.edu)

Larval Source Management (LSM) Work Stream

Consensus statement in preparation

It was agreed that the current WHO position on LSM needs to be updated to include recent developments in this field. A new draft is being reviewed by core members. A final draft will be presented at the upcoming VCWG meeting and will be adopted and submitted to WHO for consideration.

A gap analysis and change management proposal was conducted to understand the challenges hampering large scale adoption of larviciding as a core intervention by national malaria control programs. The results will be presented at the upcoming VCWG meeting in 2018.

Advocating for environmental management

We are expanding our core membership to other sectors particularly public health engineers. We are trying to reach out to the African Development Bank (AfDB) which has published safeguards for health impact assessments including vector control requirements.
Compile SOPs on: How to test larvicides efficacy and how to test for resistance
With the recent changes from WHOPES to WHO PQ system, the information on recommended larvicides and SOPs for testing for resistance will be updated. IVCC is leading this activity.

Review state of the art technology
A new project (funded by IVCC) is starting in January 2018 in Zanzibar to test the value of integrating new technology (satellite imagery, drones, and mobile apps) to improve larval source management.

Reviewing operational LSM in national malaria control programmes – Evidence of impact, training and support needs
Data is being gathered in sample countries and will be presented at the upcoming VCGW in February 2018.

Develop guidelines for LSM in emergency situations
LSM work stream members are available to advise different partners working in emergency situations as required.

Co-leaders: Ulrike Fillinger (LSHTM, UK & ICIPE, Kenya, ufillinger@icipe.org) & Silas Majambere (IVCC, UK, silas.majambere@ivcc.com)

New Challenges, New Tools in Vector Control Work Stream

Identification of Anopheles vectors
To address the question of morphological and molecular identification of Anopheles mosquitoes, several experts (Smithsonian, NHM (UK), University of Witswatersrand) were contacted for their views on how best to link morphologically and molecularly identified mosquitoes. All agreed that a correct morphological identification of mosquitoes was essential to the determination of the CO1 and ITS2 sequences for that species. Storage of the voucher specimens (with sequencing done from a leg or from other mosquitoes of the same brood) in museums was also considered important. Next steps for the assignment include the determination of a list of the Anopheles species in sub-Saharan Africa (as described in the literature), a list of the CO1/ITS2 sequences from Anopheles species from this region that do not correlate with known species at a 98% or higher rate, and the development of a protocol that researchers can use to ensure that they are correctly associating sequences with mosquito specimens.

The team is currently pursuing additional partnerships, with view of fundraising to carry this project forward. Essential communication channels have been opened and meetings are planned for early 2018.

Definition of Residual Transmission
During the last VCGW meeting, the current WHO definition of Residual Malaria was widely discussed. It was pointed out that the definition assumes maximum coverage of major tools, so remaining transmission can be considered as residual. It says the mosquitoes must be susceptible to those tools, thus the residual malaria concept becomes very difficult to define in areas with high insecticide resistance. It was also pointed out that the main purpose of RMT is to have a practical tool to guide programmes, and that there can be a number of explanations for the transmission remaining after
LLIN/IRS scale up. While insecticide resistance is one explanation, outdoor transmission is another, so it would be desirable to have a definition that did not exclude any possible cause behind RMT.

Workshop on Residual Malaria Transmission
The work stream facilitated a workshop on residual malaria transmission in Tanzania. The Workshop was convened jointly by WHO-TDR, WHO-GMP and Ifakara Health Institute, on November 28-30, 2017 in Dar es Salaam. The workshop brought together more than forty experts on residual malaria transmission, representing research from sub-Saharan Africa, South East Asia, Latin America, and Papua New Guinea. While focusing on residual malaria transmission, the workshop also included projects on insecticide resistance and climate change.

Below are the main discussion areas from the workshop:

- The workshop discussions revealed a lack of agreement around the definition of residual malaria transmission.
- It is important to go beyond measuring indoor and outdoor biting to actually measure transmission.
- Presentations across settings highlighted commonality in categories of human activities that can occur outside of the protection of core interventions. These may include chores in the peri-domestic setting, staying up late to watch football/socialize, large-scale social events, occupations such as hunting and fishing, multiple residences for farming, travel, and outdoor sleeping. It is important to look at the relative importance of these activities and the exact nature in different contexts; and most importantly, we must look at strategies for protecting people when they are not currently being protected.
- Similarities and differences seen in approaches to measuring and characterizing residual transmission. The studies all included a vector and human component; however few presented the results in an integrated way. Approaches and methods to link human and vector aspects should be evaluated and standardized.
- There are factors beyond residual transmission, including the quality of implementation of vector control tools (i.e. sub-optimal access and/or use of LLINs), which also need to be addressed in some contexts.
- Strong community engagement is essential for successful research and interventions.
- There is a clear and urgent need for context-specific strategies and interventions for addressing ‘residual’ malaria transmission.
- The workshop played an important role in laying the groundwork for additional research and interventions. Ongoing coordination and opportunities for collaboration, across research groups will be essential.
- The meeting highlighted the need to establish a new program of work focusing on appropriate strategies for tackling malaria transmission in the different settings; one example could be to identify and implement low-cost comprehensive packages for malaria prevention and control at household level.

Co-leaders: Mike Reddy (BMGF, USA, Michael.Reddy@gatesfoundation.org) & Fredros Okumu (IHI, Tanzania, fredros@ihi.or.tz)
Integrated Vector Management (IVM), Evidence and Capacity Work Stream

Support the Mekong Outdoor Malaria Transmission Network

The work stream co-organized a workshop on entomology and vector control. This two-part, four-day regional workshop was convened at Kasetsart University, Thailand, on November 7-10, 2016. The second part of the meeting comprised the ‘Mekong Outdoor Malaria Transmission Network’ workshop, with participants expanded to include partners from industry and private sector vector control services, academic and research institutions. Discussions began with **entomological aspects of outdoor transmission** in the region. Country updates were provided and the **evidence and driving forces** of residual and outdoor transmission were discussed. Sessions covered the **anthropological aspects** of outdoor transmission, including human spatial ecology and available tools, including use of GPS tools, spatial and topical repellents and treated clothing. A panel discussion with the private sector explored the **development and market entry of new tools**, including needs from the public sector in terms of product testing, market projections, and regulatory issues. The final sessions and group work further explored new tool development, the role of large private employers, the WHO framework for moving from proof of concept to implementation; and **review of regional and national regulatory processes**.

Vector Control in Humanitarian Emergencies

The work stream convened a two-day meeting focused on vector control in Humanitarian Emergencies on September 14-15, 2017 in Basel, Switzerland. The first day was devoted to the development and drafting of a Mission Statement, objectives and **modus operandi** for the group by representatives of major emergency relief agencies (MSF, UNICEF, The MENTOR Initiative, the London School of Hygiene and Tropical Medicine and RBM) as a small **Steering Group**. Representatives from WHO, UNHCR and the Global Fund were invited on the second day to discuss specific ongoing humanitarian emergencies and cross-cutting issues in relation to vector control in humanitarian emergencies as well as the proposed objectives and **modus operandi** of the initiative and to outline specific activities to meet these objectives.

**Co-leaders: Josiane Etang** (OCEAC, Cameroon, josyet2@gmail.com) & **Michael Macdonald** (Consultant, USA, macdonaldm@macito.net)

Housing and Malaria Work Stream

Strengthen links with the housing sector

The work stream was successful in getting substantial funding from the UK’s Grand Challenges Research Fund to develop a network bringing together those working on vector-borne diseases and the built environment, with a focus on malaria and *Aedes*-borne disease control in sub-Saharan Africa. The Network is called BOVA and stands for Building Out Vector-borne diseases across sub-Saharan Africa.
Support the development of housing and vector-borne disease (VBD) recommendations
Members of the work stream are actively engaged with developing policy guidelines that include housing as an intervention. Our two major successes this year include (i) improved housing as part of the World Health Organization’s (WHO) Global Vector Control Response:


(ii) WHO’s new advocacy document; Keeping the vector out. Housing improvements for vector control and sustainable development.


Encourage basic and applied research on VBD & the built environment
Through BOVA we had a call to fund basic and applied research on VBDs and the built environment sufficient to fund 8-10 projects upto £100,000 each. We had 52 letters of intent which are currently under review.

Information exchange
BOVA acts as an information exchange platform and those who are interested in knowing more about our work are encouraged to sign up and join our Network. We are also active on Twitter.
https://twitter.com/BovaNetwork

Co-leaders: Steve Lindsay (Durham University, UK, s.w.lindsay@durham.ac.uk) & Lucy Tusting (University of Oxford, UK, lucy.tusting@well.ox.ac.uk)