

RBM Partnership to End Malaria
Vector Control Working Group (RBM VCWG)
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Hosted Online via Zoom

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Code of Conduct

RBM Partnership to End Malaria Vector Control Working Group

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RBM Partnership to End Malaria Vector Control Working Group, 10 February 2021

Session 2: Updates from the vector control community

Co-Chairs: Justin McBeath, Keziah Malm

Welcome, introductions and meeting objectives – Keziah Malm, NMCP Ghana

One of the main aims of the VCWG is to provide a platform to interact, obtain and share necessary information which may help to inform the work that we do. RBM VCWG has continued to provide this platform over the years and despite the current COVID-19 pandemic, we still need to move forward and continue doing the work we do to save the lives of so many. In this case, we have adapted and moved the VCWG meeting from a physical meeting to five virtual sessions hosted online. This is the second session, where we will hear from our technical partners, financial partners and from the VCWG network. On behalf of the co-chairs and work stream leads, Keziah welcomed all participants, and opened the session.

The slides of all presentations are be available on the Attendee Hub, and all are encouraged to visit for further information and links.

Update on recent, ongoing and future Global Malaria Programme work on malaria entomology and vector - Jan Kolaczinski, WHO GMP

The mission of the WHO GMP is to support optimal resource use for malaria vector control by WHO Member States and by their implementing partners. This mission covers three broad key activity areas; to support the generation and reporting of data, development of guidance and guidelines, and the dissemination of this information which includes the provision of technical support to member states.

Work has been undertaken by a team led by Lucia Fernandez in collaboration with many key partners to develop and roll out entomology modules for malaria vector control and to support their uptake. The team supports the integration of data collection platforms through a number of user-friendly apps.

The 14th VCAG meeting will be held from 19-21st April 2021. The subsequent meeting will take place in October 2021. The 13th VCAG meeting report is now available online. The VCAG website contains updated terms of reference and standard operating procedures. The WHO is currently in the process of moving onto a different website platform. Links to old versions of the site remain active, and new links are provided in the slides.

A new area of work is the generation and use of economic data to guide prioritization in countries. A review process is ongoing with regards to how economic data is obtained, how it is utilized within WHO guidelines in other disease areas, and the implications for malaria vector control guidelines. Ultimately, guidance will be developed on how to prioritize, what the components are, and considerations. WHO GMP are convening around insecticide resistance and the economic aspects associated. The aim is to feed into this with a technical consultant, and this is provisionally planned for the second half of this year.

Two PPCs have been published on new types of ITNs and vector control tools for complex emergencies. Many of the VCWG community have been involved in the lead up to this and the formal public consultation. Three additional PPCs are planned for 2021; new types of IRS, interventions to combat outdoor biting of mosquitoes and a revision of the existing PPC on endectocides. Another publication has recently been released regarding the norms and standards of vector control

evaluation, which effectively replaces the 2017 guidance. This is online now, and in the context of this, the current trial design manual will be looked at and reviewed as there is now a misalignment of information between these documents. A decision is to be made upon review as to whether this will be revised.

Malaria vector control guidelines have been moved to an online platform MAGICapp, which is now consolidated with the former case management guidelines of the WHO and will in due course be supplemented by additional guidelines. A new guidance development group was formed which met at the end of 2020, with another meeting planned in June 2021. For this meeting in June, the group will be focused on pyrethroid-PBO nets, a revised systematic review of the use of IRS in combination with ITNs, as well as the evidence base surrounding vector control tools in complex emergencies.

A position statement on evaluation of genetically modified mosquitoes has been developed and published. WHO GMP worked in collaboration with ethics colleagues to develop guidance on ethics and VBDs. It is also coming to the end of a substantial revision of framework for the evaluation of GMMs which was completed jointly with FNIH and TDR. This should be available online within the next 4-6 weeks. Many other documents are currently under review, including guidance documents for IRS which will contain the WHO's current position on DDT.

Over the course of 2021, there are aims to complete a new version of the IRS manual, a revised version of the 1975 published manual on practical entomology in malaria, as well as updates on insecticide resistance testing manuals and the entomological surveillance section of the overall malaria programme guidance.

Prioritization of interventions is a persistent struggle. With new emerging technologies, this will become more complex. Ongoing work is being done with regards to prioritization guidance in other aspects of public health and how this can lend itself to prioritization in vector control for malaria. This is an emerging area of interest and more communication will be provided as this moves forward.

DHIS 2 has played a key role in dissemination and implementation. Due to COVID-19, it has not been possible to provide in country support, but this has spurred efforts to develop materials to provide remote support and help users on the ground to work effectively for themselves. Further and updated communication materials were developed for the Malaria Threats Map.

Anopheles stephensi invasion remains a threat to global malaria control. WHO GMP host quarterly technical calls to coordinate the global response. Two calls have been hosted thus far. WHO are working closely with Maureen Coetzee, who has developed a new key for the identification of *Anopheles* vectors, to support translation of this key into both Arabic and French to facilitate the identification of *An. stephensi* in the Horn of Africa. Sudan and Ethiopia are starting to develop their own national strategic plans for the control and elimination of *An. stephensi* with support from the WHO. It is hoped that a face to face meeting on this will be held in quarter 4. The Malaria Threats Map is being maintained and up to date as data emerges on how this threat is evolving.

The Joint Action Group (JAG) continues quarterly meetings to ensure coordination across all WHO regions and countries surrounding the GVCR. An online SharePoint hub has been set up for GVCR focal points. The data reporting on this is very important as there will be reporting to the WHA next year. Two case studies are planned for 2021. One has now commenced in Sudan, and based on that experience a second country will be selected.

Global Vector Control Response 2017-2030: An Update - Raman Velayudhan, WHO UCN/NTD

The GVCR was adopted by the WHA in May 2017, and the plan covers 2017-2030. A progress report is due in January 2022 to the exhibiting board (WHA) which is currently being prepared. The GVCR contains four key pillars; to strengthen intersectoral collaboration, engage and mobilize communities, enhance vector surveillance, monitoring & evaluation, as well as to scale up interventions. Additionally, there are two foundations to this; to build up and enhance vector control capacity and capability, and to increase basic and applied research and innovation. Finally, there are three enabling factors; country leadership, advocacy, resource mobilization and partner coordination, and regulatory, policy and normative support.

Key activities have been identified in regional resolutions. Two regions are used as an example; SEARO and PAHO. SEARO have expressed that they wish to improve cross border exchange of information and insecticide resistance data. They also wish to conduct more evidence-based case studies, give more strength to the intersectoral task force, enhance vector surveillance, and scale up and integrate tools and approaches. This will require political support and advocacy.

PAHO on the other hand are focusing more on public health entomology, and carrying out several studies on new tools. The PAHO intersectoral task force is of great importance, as well as enhancing vector surveillance, monitoring and evaluation. Like many other regions, PAHO is concentrated on elimination of disease where possible, and a strong political commitment is required to move towards the goals of eliminating malaria from the region.

All regions have accepted the GVCR, with regional plans developed in line. A progress report was published in September 2020 which contains a comprehensive update of activities so far with input from all three levels of WHO GVCR conference. Evidence based assessments have been conducted; vector control needs assessments in 18 countries, as well as an ongoing global survey of insecticide use and multi-centre insecticide resistance studies. These will be published soon.

Normative guidance has been developed alongside infrastructure support; revision of national IVM strategies, international guidance on SIT, aircraft disinfection and several documents on pesticide management. Finally, an internal GVCR platform has been developed on SharePoint which is intended to be a hub for sharing of resources, news, activities and data and includes dashboard summaries for both HQ and regional offices to assist in analysis and reporting.

Current activities in progress include case studies to highlight GVCR success stories, VCNAs to assess needs and develop national plans, and technical training to promote capacity building in surveillance, IRM and clinical management. A new reporting system is being developed to improve analysis of progress, identify deficiencies and target planning, and regional meetings are being held to promote networks, share challenges and progress.

Due to COVID-19, several challenges have been faced. One of these challenges is resource constraint which is ongoing. Most field staff have been pulled away from vector control activities to work on COVID-19, which has led to a lack of staff and opportunities for field training. In order to fill these gaps, different approaches are required. There is a focus on country ownership to bring in more implementation at the grass-root level. A series of webinars are being run (both regional and country focused) to aid capacity building, and some of these webinars touch on basic bionomics of vectors. There is work being conducted across diseases focusing on integrated surveillance where possible, and working with partners. Having more partners involved is key to progress, particularly at the country level.

The WHO have been working on guidance documents. The community-based interventions guidance for example is very important in the current climate. Because staff have been diverted to work on the COVID-19 response, we are currently reliant on community health workers and other NGOs who can work at the grass-root level to implement vector control and preventative measures. As well as malaria, other VBDs must be taken into consideration.

In 2019 there was a dengue outbreak which continued into 2020 and though it was more or less completely silenced due to COVID-19, work was conducted at the country level to ensure that community level workers could still visit house to house. Both dengue and COVID-19 are viral infections which are difficult to distinguish between in the early stages. This has led to misdiagnosis and incorrect reporting which remains a challenge, particularly in regions where rapid tests for dengue are not available. Differentiation is very important, and some countries have developed guidance for hospitals to manage COVID-19 and dengue. In some places such as India, patients have been co-infected with both dengue and COVID-19. Efforts are being made to strengthen control measures, implement vector control and ensure that communities can work together to implement these measures at a programmatic level. Dengue continues to emerge from over 70 countries, and in 2020 case numbers were very high.

Even during lockdown measures, it is important that communities can mobilize themselves to ensure there are no mosquito breeding sites in the vicinity of households and adaptations must be made in light of COVID-19. Special sessions devoted to raising awareness of COVID-19 and dengue have been implemented in schools including activities to minimise mosquito breeding sites.

In terms of vector surveillance there is a focus on trap-based surveillance, source reduction in families and communities, a focus on major foci of transmission, outbreak management, and clinical care/hospital access. Lack of space and access to hospitals is perhaps the biggest challenge faced to date due to lockdowns and COVID-19. More work is required at the community level and urban centres to bring together control efforts particularly in light of COVID-19. The work force is of paramount importance.

WHO NTD have a new roadmap which has recently been approved by the WHA for 2021-2030. In addition to this roadmap, many companion documents have been/are being developed to support the roadmap on sustainability, monitoring & evaluation, investment case, WASH and NTD, research and development of a blueprint as well as two documents which are particularly important to those involved in vector control; NTD and One Health (which factors in zoonotic diseases), and a document developed in line with GVCR on what those involved in vector borne NTDs can do to implement and consolidate control efforts at the country level. The link for this roadmap is available on the slides, and all inputs are welcome. Country level and primary healthcare are becoming of paramount importance particularly in light of COVID-19.

The Global Fund's Support to Vector Control – Kate Kolaczinski & Patrick Okello, The Global Fund

All should be aware of the new funding model for TGF, which is currently on the third two-year cycle of funding. Previously in 2014-2016 and 2017-2019, approximately \$4 billion of funding for malaria was secured. So far for 2020-2022 \$3.6 billion has been secured, but this number will increase as approximately 7-10 more grants are outstanding to be approved. Most of this funding is spent on vector control and case management, which reflects priorities and in absolute terms where most of the funding is going. It is interesting to note that the funding allocation for SMC has grown significantly over the years which is reflective of where efforts will be focused.

Through the three funding cycles approximately \$1.8 billion has been assigned to vector control, and \$1.6 billion so far in 2020-2022. Typically, around 75% of this has been allocated to ITNs, and little change is observed in proportion between ITN and IRS. The financing which has gone into entomological monitoring has almost doubled (whilst still a small proportion) between the last two funding cycles. A small proportion of funding is allocated to 'other vector control' which includes cross cutting activities and limited activities linked to LSM/assessment of LSM feasibility.

One of the main focus areas is ITNs, primarily pyrethroid only or pyrethroid-PBO nets, in line with WHO guidance. Recently with funding from the strategic initiative, TGF has deployed pre-qualified dual AI nets. The other main focus area is IRS, and work has been undertaken to ensure that IRS coverage is maintained. These focus areas are underpinned by country strategies in relation to entomological and epidemiological data as well as insecticide resistance and entomological monitoring. There is a focus on SBCC, and there is some limited funding support available for LSM.

This period in time is an opportunity for external TRPs to discuss with country teams and NMCPs about what has been put into the Global Malaria Fund grants. Grants are linked to national malaria control strategies, brought in line with WHO guidance and underpinned by recent data. However, there must be decision-making regarding what from the national malaria control strategic plan gets put into the grants, and that tends to be a process of prioritization.

Some of the main issues that the TRP raises when looking at these grants are prioritization and vector control, how data is planned, generated and used for decision-making. Within this, which net types are planning to be financed, what is the balance between IRS and ITNs, and what data is underpinning these decisions.

Looking at maximising impact, there are three issues to focus on. The first is where to prioritise for ITN coverage and which net type to use. This is becoming a much more detailed process with many questions asked at the grant making stage, particularly surrounding emerging work on urban centres and microstratification within urban centres. TGF aims to maximise the use of pyrethroid-PBO nets where appropriate. The grant making process sees a lot of work around how to make savings. It is not always possible to find any, but sometimes it is possible to free up funding to allow for scale up of more effective but more expensive tools.

On IRS, the main issues that arise are surrounding scaling up, and how to get the scale correct. Financing can only be used to scale up IRS if there is a plan on how this can be sustained, and scale down is not supported. TGF is working with partners to conduct evaluation work under the new strategic initiative to look at what kind of evidence building can be done to help resolve the issue of whether or not we can scale IRS up or down, and understanding alternatives better.

If all nets that are currently budgeted as pyrethroid-only/unknown nets were converted to pyrethroid-PBO nets, this would cost around \$253 million for the upcoming three years, which is just under 20% of the total amount of money allocated to vector control through the Global Fund at this present time. It is difficult to ascertain if this is an insurmountable figure, but this additional 20% is not something which has been acquired over the last three grant cycles, so it is clear that prioritization within country programmes will continue to be challenging.

Quality of nets is a major area of concern. Over the last year, many reports have been received of nets performing poorly in bio-efficacy testing on arrival (and/or after 12-24 months of use). It is vital to follow up on this as countries would expect these nets to last longer. There are questions surrounding consistency of test methodology, or testing between multiple centres where contradictory results are presented. TGF has been working on an independent landscaping review which will look at a range of

the issues. Discussions across the partnership have been held to determine what should be included in this, and the firm conducting the review will be reaching out to stakeholders as early as this week. In parallel to this, there is some internal work ongoing with TGF quality team to review data around procurements.

Data shows considerable dips in ITN coverage in the second-third year after a campaign, and modelling suggests that improving this coverage would be one of the most cost-effective ways to improve impact. TGF have emphasised that going into this current grant cycle that countries are certainly supported to use their own local durability data to inform their replacement plans. Net life span and attrition is seen as a continuing urgent issue.

As countries move forward, more tailored distribution and implementation plans will become of greater importance. Almost every malaria endemic country is now reporting pyrethroid, and in recognitions of this, TGF has injected \$33 million (matched by Unitaid) in the last cycle for dual AI nets, and up to \$50 million will be invested in the Net Transition Initiative (NTI) in the current cycle.

There was a policy change for pyrethroid-PBO nets in 2017, but uptake remained slow as this shift occurred between grant cycles. TGF hopes that the new initiative will improve uptake and bridge the gap, providing means for countries to progress quickly when policies are updated.

TGF thanked NMCP of Cameroon for allowing a multiple net type case study. The budget did not allow PBO nets everywhere, so decision-making processes were undertaken by looking at IRM data and PBO nets were deployed in areas with appropriate entomological context. TGF was able to support Cameroon with some funding for dual AI nets. It is hoped that this example may be used to inform other countries going forward.

The NTI will support the scale up of dual AI nets. Research over the next three years will focus on building more evidence for decision-making for tools which are intended for use in areas of pyrethroid resistance. This will extend beyond nets to also look at comparisons with IRS. It is hoped that the design of studies around this will help clarify whether a highly effective net that works well against resistant mosquitoes would be as effective as a non-pyrethroid IRS, and how to facilitate scaling down IRS in order for it to be replaced by an equally effective control measure.

TGF has launched a new independent financing channel - the C19RM (COVID-19 Response Mechanism). Funds can be used on COVID-19 specific activities, but more importantly for activities that are needed to mitigate the impact of COVID-19 on malaria, for example making adaptations to campaigns, changing the way data are collected, or ensuring that community treatment and diagnostics are available. This is a considerable opportunity for countries that already have Global Fund grants to gain additional funding for COVID-19.

Discussion

- It was commented that a need exists to identify locally adapted actions due to vast geographical and seasonal variations. It should also include reorienting relevant government programs to control new and emerging threats. There appears to have need for establishment of national research agenda to support evidence-based vector control and for developing new tools. Jan agreed with this comment and acknowledged that we are in alignment here, there is no 'one size fits all' approach. We do expect that countries do actually work out for themselves (with support where required) what the appropriate actions, intervention pages etc. are. WHO guidance only goes as far as assimilating the evidence base, providing guidance but the limitations of this are that it doesn't tell you what to do in each and every context,

therefore that translation at the local level is always required, and the more that can be informed by the local data the better it will be.

- There discussion regarding to the need for capacity building on vector control, especially on entomological data. It was asked to the Global Fund whether within all these strategic initiatives if there is anything specific about training entomologists and building capacity to fill in the entomology gap. Kate responded that this is not so much in the strategic initiatives as that is actually a core component of the grants themselves. The country grants include a number of different aspects surrounding capacity building (i.e. training, additional infrastructure etc.). There is less support for things like PhDs for example but more support for peer-to-peer practical training, visiting nearby countries, and infrastructure. The TRP are very supportive of seeing these aspects and there is a specific inclusion of entomological monitoring and capacity in this current grant cycle.
- It was asked to the Global Fund if there is a possibility of funding topical repellents within the operational research budget. Kate responded that topical repellents are not currently financed as a core tool due to the status of the policy recommendation on them, but TGF are funding some research around topical repellents under their regional artemisinin initiative. There is a slight issue in that there are no topical repellents which are currently WHO prequalified, so the research that is being funded is funding the research costs but not the commodities themselves, the commodities are supplied by another partner. TGF only can finance products which are WHO prequalified so there are challenges when it comes to research and evaluation.
- It was asked what evidence there is for increased death from COVID-19 in people who have dengue or malaria? Raman responded that in terms of dengue, data is still being collected but the most reliable data collected thus far from Singapore is that there were more dengue deaths than COVID-19 deaths in 2020, but this figure might have changed due to the new wave. In other countries data is still being collected. Due to COVID-19, data reporting has been affected in many countries because of diversion of human resources to COVID-19 from VBDs. This is a challenge which is being worked on. Jan added that some analytics were provided on this in the World Malaria Report, but it is a difficult topic and that report itself is not fully designed for this purpose. Keziah commented that from a country level, it is quite difficult to get data evidence that more people are dying due to malaria than COVID-19. The risk of misdiagnosis is high, and differentiating between malaria and COVID-19 is a challenge especially when you consider that symptoms present similarly, particularly in early stages of infection.
- It was asked that on the survey on global insecticide use (in terms of quantity) for vector control, how do you collect the data? From manufacturer sales? Raman responded that data is collected from member countries, so the questionnaires are sent to member countries every year and data is collated from this. On the most recent survey, approximately 80 countries responded. Full insecticide usage data was provided by government agencies and world authorities and that data has been collected mainly from national programmes. This can be for any VBD including malaria.
- There was much discussion on the acknowledgment of the Global Fund on durability duration issues with regards to ITNs vis a vis the funding cycle. It was asked to the Global Fund that when funding specific nets, do you consider end-user preference to ensure that countries are distributing nets that people actually want to use and not just efficacy against mosquitoes? Patrick responded that the decisions around which net to buy are initially guided by each countries NMCP, but also guidance from WHO on what is recommended and prequalified. When this question arises, it is often accompanied by a question on whether we have solid

data on user preferences to guide decision making. Kate added that yes, countries are supported to make decisions that they think are appropriate to ensure as much use as possible of the nets that are provided, but that needs to come with data showing effect of different criteria on use, not just preference. If a country programme says they would like to procure nets that are a certain size for example, then that needs to come alongside data which shows that this is important in terms of uptake of net use, but it is required to have evidence on improvement of usage, not only preference.

- It was commented that we should not be focusing exclusively on "entomological capacity" - remember that vector control decision making is what we are trying to do, and that needs a wide range of skills (epidemiology, modelling, health economics), not just entomology. Kate responded that it is important that the entomological data is only part of what underpins the whole national decision-making process. Epidemiology must underpin vector control decisions, but all decisions need to be underpinned by the entire programme design, far beyond vector control. So yes, the support and the principles of the country grants provided by the Global Fund is to include capacity building. There are some limitations in terms of PhD and MSc student activities, but TGF is absolutely focused on the bigger picture as opposed to just entomological capacity.

Partnering in the fight to end malaria: what's new on PMI's agenda? – Rick Steketee, U.S. President's Malaria Initiative

PMI is celebrating its 15th anniversary this year. In 2006 PMI began by working with three countries, progressing to 15 countries within 2 years and is now up to 27 countries in total. Funding increased steadily in the initial years, and has stabilized but with a boost in 2017. PMI is focused on helping countries to deliver proven interventions including ITNs, IRS, case management, intermittent preventative treatment for pregnant women and SMC. This is supported by PMI's investments in cross-cutting issues and health systems, and work on social and behavioural changes in communities with a particular focus on surveillance, monitoring and evaluation as well as data and progress tracking. Some investments are made into operational research. PMI has thus far helped countries to distribute 375 million nets, supported the treatment of 80 million homes with IRS, and been involved in supporting countries' mosquito surveillance systems.

With a new coordinator, PMI have been working to try to understand the best way to build on the progress they have already made. PMI have four priorities moving forward:

1. The first priority is to reach the unreached. There are still many households which need ITNs and IRS, and we must determine where these are and how to facilitate this.
2. The second priority surrounds the improvement of community health systems.
3. The third priority is to keep malaria services safe and resilient.
4. The final priority is investing in people and partners closest to those which PMI serves is a priority. Vector control is a household event and a critical issue is to look into how we can support these households.

A major part of PMI's agenda is to improve access to timely, quality data in the vector control space. PMI has been working with their primary implementing partner VectorLink to support a DHIS 2 based VectorLink Collect information system which tracks progress of IRS and ITN distribution. These are linked country by country as well as across countries and with WHO in particular to ensure that this is working across the global partnership. PMI has been tracking the durability of IRS across multiple sites i.e. type of wall and the effect of IRS over time, as well as cumulative IRS on tight timeframes and ensuring that progress is being made.

PMI have been working with the national programme and partners in Burkina Faso to determine where to place standard nets, dual insecticide nets, overlay standard nets and IRS, or PBO nets. Countries are already segmenting their interventions according to their data. Although this may be far from perfect, this is an incredible effort to work across the partnership and make decisions.

Another area of focus for PMI is looking forward for innovation for existing and new vector control tools. In addition to ITNs, IRS, vector surveillance and bionomics, PMI are investing in a modest amount in housing modifications, how these might be implemented, the effect of these interventions, their cost, and what is needed to mobilize. PMI are also investing in ATSBs and the outdoor and indoor potential of these. Lastly, around LSM and to what extent we can change LSM in different places based on local needs.

PMI are working closely with colleagues in the Ethiopian NMCP who have documented influx of *Anopheles stephensi* to support the effort to engage in Ethiopia and bordering countries. There has also been concerns regarding HRP2 deletions and the value of rapid diagnostic tests, particularly in the Horn of Africa. This is an example that there is trouble both in vector control and diagnostics, and may lead to underreporting of cases caused by *An. stephensi*.

Delivering a toolbox of disruptive vector control innovations for malaria eradication – Nick Hamon, IVCC

A slide from Pedro Alonso's update to the global technical strategy was presented. This shows the current trajectory of malaria incidence and actuals compared to goals, where there is a large gap. IVCC's role as a PDP is to 'shift the curve' as quickly as possible with novel vector control tools. Questions have been raised over what we can learn from COVID-19, other disease outbreaks and IVCC's experience which can help facilitate shifting this curve faster.

A modelling exercise was conducted in 2018 by the team at Imperial College to answer the question of what is critical to focus on in terms of vector control considering limited financial resources. It is considered that in actuality we are sitting between Scenario 2 and 3, which is the introduction of PBO nets, as well as IRS increase (although coverage is still low). We do not currently have a major intervention which is appropriate to address outdoor biting/transmission, but this model also includes SMC and further down the pipeline, vaccinations. We need effective tools, to manage them through sensible basic principles around IRM to keep them effective, and to maximise impact. Removing barriers is critical. Ultimately, this comes down to having the right tools in the vector control toolbox, and the right layering by geography as well as the concept of smart coverage; reduced intervention costs, market shaping, formulation chemistry, modelling, surveillance, monitoring, IRM etc.

'Mind the gap' tools are also important. In addition to looking at ATSBs, IVCC are also involved with looking into how to protect forest and mobile workers. This is ongoing in Asia. Over time, this will lend to learning more about topical repellents. A lesson learnt thus far from this work is that maximising coverage is probably of the highest importance.

IVCC's purpose is to create and deliver the vector control toolbox by developing new products to combat insecticide resistance, develop the 'mind the gap' tools and develop solutions to expand and optimise vector control coverage. That coverage could be achieved by way of application and/or formulation technology, but it is also other initiatives such as partially treated nets/partial IRS to reduce costs.

Product development is relatively manageable and predictable but there are other equally important aspects. Building and supporting laboratory and field capabilities in countries is an important work stream although there has been some delay getting sites GLP certified due to COVID-19, but

nevertheless most of these sites are up and running and productive. IVCC are co-sponsoring a new site in Papua New Guinea that will be up and running within 2021, and able to test some of these interventions.

A priority for IVCC is to drive access and market shaping in order to accelerate procurement and impact at scale. There is no question that new technologies today are going to be more expensive, and concerns as to how to manage that with a limited budget. IVCC want to ensure public health value, and return on investment. Another priority is to capitalise on work that has been done in malaria vector control, particularly in Africa and how these interventions can impact other VBDs, as well as malaria outside of Sub-Saharan Africa.

IVCC aims to complete the development of novel AIs for established product classes, develop and bring to market LLINs and IRS with these that are effective against insecticide resistant mosquitoes, evaluate mixtures for dual insecticide LLINs to support IRM principles and best practices, and to screen existing and newly developed insecticides for potential public health use. It is important that these novel active ingredients last the test of time from now to eradication, so that there is not a need for the constant development of new products.

IVCC currently has an initiative with Aviont in China currently which allows for the development and testing of dual active ingredient nets with unregistered chemistries. It is important to keep the pipeline open as a compound could be lost at any point.

IVCC is focused on ATSBs. Data generated thus far is promising but additional solutions to address outdoor and residual malaria transmission are needed. Ultimately, ATSBs are expected to be successful and we will know this within the next 1-2 years.

There is a need to increase the impact of IRS and LLINs by reducing costs and improving performance as we begin to understand more about these technologies. For example, how much active is wasted in IRS? Can we extend ATSB use beyond outdoor transmission prevention? There is also need to support surveillance and monitoring to enhance data-driven decision-making.

There has been a sustained focus on IRS. Currently, we have SumiShield, Fludora Fusion, and Actellic. It is hoped that Sylando will be approved by PQ within the year. Broflanilide is hoped to be tested in full trials this year, and have some availability in the market next year. This should give a wide range of chemistries to rotate.

In terms of LLINs, Interceptor G2 is currently available on the market, as well two other active ingredients and a third which is owned by IVCC called 'Sherlock'. Mixture nets will be developed with these chemistries as all the information which is available today suggests that if we can have dual AI nets in the market that there is a real opportunity to keep these effective up to the point of eradication.

IVCC's work on repurposed and novel chemistries is moving along fast. There are also other activities in focus including larviciding (which is not necessarily a case of a need for new chemistries but rather of where to target current chemistries), as well as new application technology to replace older methods which are many decades old.

In terms of key risks, concerns and focus, perhaps the biggest risk faced is from a regulatory perspective, and ensuring that these chemistries go through a risk assessment and become available. Additionally, the success of ATSBs which has been an investment of approximately \$45 million over several years. There has been some delay due to COVID-19 but a lot of progress has been made. The understanding of whether we can broaden the application of ATSBs to include different species,

diseases and indoor transmission is critical. Partial IRS, application formulation technology and partially treated nets are all a focus of being able to reduce costs to be able to deal with some of the challenges that TGF have outlined today.

The consolidation of the industry is ongoing, causing a shrinking number of industry partners and lack of confidence in the market for innovation. It is important to work very hard with the limited remaining partners to ensure that they get a return on their investments, and work together to share technologies where appropriate. We must ensure that product specific and holistic approaches to market shaping are in place to ensure the uptake of new tools, working with Global Fund, PMI and other partners.

There are two major IVCC initiatives; project BITE (Cambodia/Thailand) which deals with forest packs, and NATNAT which is looking at larvicides, spatial repellents and IRS in Papua New Guinea. Funding is always a key area of concern, and there are concerns on funding stability during the current pandemic, as many funders have diverted their resources to address this.

There are lessons to be learned from COVID-19. The average time to develop and deliver a vaccine has historically been 12-15 years, and 10-12 years for a novel insecticide. Timelines may not be able to be compressed in the same way but there are things that can be done. If 400,000 malaria deaths could be considered to be a Public Health Emergency as COVID-19 has, could we see such progress? There have been unprecedented efforts by the scientific community to support COVID-19, along with almost unlimited global funding. Pre-purchase agreements are ongoing with manufacturers in the vaccine space, and that is also ongoing in vector control which has a big impact on bringing innovators forward and reducing the costs of these chemistries. Comparisons can be made between COVAX and PMI/Unitaid, Global Fund and others. Can countries and private sector take more of a lead? The idea that vaccines have been able to be pushed through within a year is not novel to vector control. On some of the chemistries IVCC is working on, they are well known chemistries with well known toxicology properties, which can give an advantage when taking a reduced animal use approach for these chemistries, and bridging with other studies.

A lot of help and support has been given by WHO and others on conducting entomology and epidemiology studies in parallel, scale-up and collection of data at scale, and entomological indicators. Can regulatory review be expedited; can we start now? Can chemistries or interventions be introduced to the market earlier whilst recognising that they can be tweaked and improved over time? Waiting for the perfect solution may be the wrong approach. There needs to be innovation in the delivery space as well as in chemistry and interventions i.e. 'pick and mix' of different nets by geography or indeed random distribution of nets. Could this be done in future?

The IVCC website contains more in-depth information about all was discussed, and IVCC encourage discussion and feedback with their team.

Maintaining malaria vector surveillance in the context of COVID-19 mitigation; adapting current recommendations and best practices to the unique challenges of mosquito surveillance – *Joseph Wagman, PATH*

Feedback was invited on a draft document entitled 'Maintaining malaria vector surveillance in the context of COVID-19 mitigation' particularly from anyone with experience of keeping their team safe in the field and the communities safe in the face of COVID-19. The link is available on the RBM/VCWG website. This is envisioned as a living document and an ongoing conversation, to provide a pragmatic approach. PATH have conducted advocacy with their Ethics committees as well as the IRBs with which they work when it became time to reinstate activities to explain how they were developing COVID-19

mitigation plans to keep malaria vector surveillance teams safe. This is a foreign concept to many, as to whether malaria vector surveillance teams work is considered to be critical, and how to keep them and the houses in which they work safe. Therefore, PATH distilled guidance that was already existing and continuing to change and grow to an outline of a strategy on how to apply these best practices to the unique circumstances of mosquito surveillance.

Many of these concepts are common knowledge in many localities. Mosquito surveillance workers must; wear a mask, maintain physical distance, avoid indoor, crowded and poorly ventilated situations wherever possible, practice frequent and consistent hand hygiene, frequent and consistent cleaning of supplies and equipment and conduct regular health monitoring.

Whenever a mosquito surveillance worker enters the field and engages with the public, they have the opportunity to deliver confident and consistent messages about not only COVID-19, but also malaria. This includes reinforcing, demonstrating and encouraging all best practices for COVID-19 mitigation and to ensure that medical care is sought wherever symptoms are observed.

Special consideration in terms of mosquito vector surveillance teams is given, such as aspiration of mosquitoes, pyrethrum spray collections, light trap collections, mosquito resting collections, bioassays and LLIN durability monitoring. It is proposed to have trained human landing capture workers who collect mosquitoes only in and near their own households, with brief supervision visits by surveillance technicians and/or entomologists.

It is important to note that carrying out mosquito surveillance safely amid COVID-19 incurs additional costs and is logistically challenging. It is important that VCWG as a community is honest about these challenges. Mosquito surveillance is critical but must be safe.

Discussion

- It was asked that in addition to knowledge on increased costs amid COVID-19 if there have been any major lessons learned in the collection and collation of data from partners over the last year? Joe responded that from the limited number of teams which have been worked with thus far, that there has been an initial reluctance in the community to allow people from central locations/laboratories into their homes and to visit during the night for human landing collections due to concerns over their household safety. Training people to conduct these collections in their own families has alleviated this.
- Joe added that there was a time in which it was very difficult and challenging to procure face masks and hand sanitizer, and many vector control teams partnered with broader Ministry of Health or NMCPs to bulk order these items.
- Rick was asked could you describe the decision process for PMI to support those 3 innovative tools and not others in the VCAG pipeline? First and foremost, PMI is not a big research funder in this space, PMI have some modest resources. When working with country programmes and investigators at the local level, PMI can answer questions with hopefully the maximal programmatic impact. PMI invest in a few areas that are a part of the bigger picture, but do have smaller studies on topical repellents and other areas. PMI have a large focus on monitoring and evaluation, IRM and vector bionomics, in addition to housing modifications, ATSBs and LSM. Decision making is conducted with country and research partners, as well as vector control specialists as USAID and CDC.
- There was an ongoing dialogue in the chat box surrounding net durability. Nick was asked what is IVCC's position in LLIN durability? And are we trying to make the next generation of nets more long-lasting? This is not a big investment area for IVCC, although monitoring of the

data is conducted. Historically, in improving the durability and longevity of nets, additional costs are incurred which people and organisations may be reluctant or unable to pay for. It may be possible to make a 5-year net in which both the active ingredient and base material lasts for that time period but this work is very much ongoing. It is not unlikely that it could be possible to formulate a chemistry that would last over 3 years, but as others have said it is important to ensure that currently available nets last the 3-year period which is expected. It is important to note that you can load a net or a wall with insecticide but is that material biologically available? We now have technologies and techniques that allow for us to visualise what is happening in real time on the surface, and to link bioavailability with physical characteristics and chemistries. There are possibilities to make longer lasting nets but these would be likely to cost more and would require a need/customer for them.

- Nick was asked to comment on the environmental impact of ATSBs against non-target insects for example honeybees. It is a significant part of the programme to ensure that there are no off-target effects or that off-target effects are minimal. The biggest challenge to ATSBs is that whilst we know they work in a small selection of geographies where they have been tested, it is unknown how broadly they will work and what the competition will be from other sugar sources and there have been challenges in manufacturing and scale up. It is a new technology with biological components, must survive transit without damage to the delicate membrane etc. It has been a challenge to scale up and supply enough to conduct not online work on outdoor use as a primary target but also to see if they may be adapted for indoor use. There is a significant database for off-target work in development.
- Rick was asked how feasible it is to calculate price based on nets per protective year as opposed to initial purchase price? It has been challenging to discern the best method for measuring net durability and the return on investment as well as to justify price differences. Ideally, a net would last as long as the insecticide lasts on them but this is a challenge on the measurement front, as well as challenges as to how low is possible to price nets. For example, PBO nets cost more and are selected where resistance is present and a single insecticide is not sufficient. Decisions are being made, but merits further work and data generation. The issue of net preference has been addressed in many situations where net use is critical. This will be an ongoing discussion.
- Rick was asked to elaborate on the new PMI inclusion of a focus on humanitarian emergencies. PMI have had a lot of discussion regarding reached the unreached, and have been working with USAID regarding humanitarian assistance, and developing policy and guidance. Rick gave the analogy of the 'no dose child' – what happens to the child who does not receive any vaccines in the first year of life? Most of these children are in rural and remote areas. There is an emphasis on rural and remote localities, as similar issues may be seen in both vaccines and in vector control terms. Many considerations must be made and there are many things which can be focused on when it comes to these communities i.e. how to identify those in need. This is a growing problem, particularly in light of COVID-19 as well as other core issues such as logging. It is important to consider how to train and deploy community-based healthcare workers to reach these populations.
- Nick was asked if it is considered to focus on 'Close the Gap' next to "Mind the Gap"? Thinking of community-based house-improvement - eave screening etc. and whether spatial repellents are considered as part of the IVCC innovation pipeline? IVCC are not actively working on spatial repellents except with respect to last-mile interventions for forest and agricultural workers (those who spend a lot of time outdoors) and the provision of packs for these workers which may include treated clothing, spatial and topical repellents. Semi-field and field trials are being conducted alongside epidemiologists to see whether the value is. This work is not

focused on new innovations but more providing the capacity to evaluate treatments to protect these workers. Capacity building is a key focus of IVCC, for example at IMR lab in Madang, funding has been allocated to increase capability and many technologies (both IVCC and other) will be able to be assessed at this site. IVCC do not claim themselves to be experts in spatial repellents. In terms of ‘mind the gap’, this is somewhat of a play on words, but closing the gap is really what we are trying to do. With ATSBs for example, if you pull these out of the model and not protecting outdoor populations, you see an enormous loss in overall potential to get to zero malaria in a short period of time. There are so many eggs in one basket when it comes to closing the gap, but there is good evidence to suggest that ATSBs might be worth putting all efforts in to, and within the next two years we will know more clearly if we have the breadth of use across a broad range of geographies and different malaria situations in Africa. The other close the gap is what is being done in Asia around testing clothing and repellents, to learn and feed back into the situation in Africa where last-mile technologies will be absolutely critical to get to zero malaria. It will be a challenge to go from low case numbers to zero. IVCC is happy to discuss further with anyone who may be interested in engaging in discussion with their team.

Round table discussion with regional networks – Elizabeth Juma, WHO Regional Office for Africa

Justin McBeath handed over moderation to Elizabeth from the WHO Regional Office for Africa. Elizabeth thanked all colleagues, attendees and speakers, and opened the round table discussion. This discussion was to begin with briefs from the regional networks, who work in coordination and collaboration (particularly cross border) in regions and groups of countries to work towards malaria eradication goals. Five regional networks are present in today’s session; APMEN, Elimination 8, MOSASWA, SaME and PAMCA. Representatives of this group were asked to introduce themselves and their initiatives prior to a discussion.

APMEN (Asia Pacific Malaria Elimination Network) – Leo Braack & Htin Kyaw Thu

Htin Kyaw Thu opened, and introduced himself as the program coordinator for APMEN, and employed by the Malaria Consortium, based in Bangkok, Thailand. APMEN is a multi-sectoral regional network which is comprised of 21 member states (covering three WHO regions) and includes some of the largest, most densely populated countries in the world.

APMEN is guided by four main principles to achieve their regional elimination goal by 2030; country ownership/leadership supported by partner institutions including research and academia, supporting collaboration and responsiveness to diverse elimination context in the region where high burden countries are located, and harnessing the strengths, facilitating knowledge and data sharing, as well as regional healthcare against mosquito borne diseases.

APMEN has recently adopted a sub-regional approach to country support. These are identified as Melanesia, South Asia, Greater Mekong, and the Malay Archipelago. This approach helps APMEN to support countries which are along the elimination continuum, with three high priority bordering countries in mind – India, Indonesia and Papua New Guinea. APMEN has three working groups specifically designed to address regional issues which include managing drug resistance to malaria, Vivax elimination, effective vector control strategies in different transmission settings, and transforming surveillance as a core intervention to accelerate response activities to achieve elimination and to maintain the status.

APMEN’s motto has been leaving no country behind, so the region will work together as one, and their mindset is that no one is safe until everyone is safe. APMEN’s approach to malaria elimination has two

major arms; the Asia Pacific Leaders Malaria Alliance (APLMA) which concerns advocacy at the state level, and APMEN being the implementation arm which works in conjunction with NMCPs and research institutions at the country level to evaluate technical evidence for impact. All are encouraged to visit the APMEN and APLMA websites for more information.

Elimination 8 (E8) – *Chadwick Sikaala*

Chadwick Sikaala provides technical support and is a vector control specialist and entomologist for E8. He presented today on behalf of John Chimumbwa who was unable to attend this session.

Elimination 8 is a coalition of 8 countries that have come together with the realisation that no one country can eliminate by itself, and countries must work together to reach these goals. Four of the countries in E8 are close to elimination; South Africa, Eswatini, Botswana and Namibia. The remaining countries in this coalition are Angola, Mozambique, Zambia and Zimbabwe which all have a high transmission rate. Where these countries with high transmission border with those which are near to elimination, transmission is significantly lower, and the goal of E8 is to ensure that whilst the forefront countries can achieve elimination, the others can use these to inform their own efforts to elimination.

The overall vision is to have a malaria free E8 region and focus on 5 strategic objectives to ensure that the mandate of the initiative is achieved. These are focused on a coordinated approach where gains and momentum are maintained and to advocate to ensure that malaria is always kept at a high level of priority at the political level. Additionally, to ensure that there is harmonisation in terms of policy, and how activities are conducted with synchronicity. E8 aim to ensure that best practices are communicated and shared and that all countries work together.

Additionally, E8 aims to engage with communities and sustain the gains which have been made. In terms of the details, all are encouraged to visit the website. Within the initiative itself, there are working groups based on different malaria thematic areas.

Cross Border Initiative MOSASWA (Mozambique, South Africa and Swaziland) – *Francois Maartens*

Francois is the co-CEO of MOSASWA and the operations manager for the IRS component in Mozambique. MOSASWA is a cross border malaria initiative and was established to accelerate malaria control in the region, to support malaria elimination efforts, and to achieve pre-elimination phase in Southern Mozambique. MOSASWA is supported by Global Fund grants. The cross-border initiative aims to create a malaria transmission buffer area by implementing IRS and reducing the importation of malaria from Mozambique into South Africa and Eswatini.

MOSASWA is governed by an RCM which comprises of members of different sectors including the private sector, international organisation for migration and government entities which report to the MOSASWA health ministers, the Global Fund and all other partners.

SaME (Sahel Malaria Elimination Initiative) – *William Bosu*

SaME is the newest elimination initiative, launched in 2018. It is an initiative which brings together eight countries; Burkina Faso, Cabo Verde, Chad, Mali, Mauritania, Niger, Senegal and Gambia. SaME's objectives are very similar to that of E8, with the overall goal to have a malaria-free Sahel region. The activities since the launch have been geared towards establishing of governance, strategies and the secretariat (which is hosted by the West Africa Health Organization) and developing strategic documents. SaME does not yet have a website or even a logo but these are items which are being considered. SaME hold regular meetings with their technical committee on a monthly basis, as well as an annual forum. The region contains 2.5% of the global population considered to be at risk of malaria,

yet accounts for 12% of global malaria cases, which is a disproportionate burden. The World Malaria Report estimates that there were approximately 27 million cases of malaria in this region in 2019.

There are four countries that account for 96% of malaria cases in the Sahel Region; Burkina Faso, Mali, Niger and Chad. The other countries account for the remaining 4% of cases. Cabo Verde and the Gambia has already achieved the Global Technical Strategy milestones for 2020. Cabo Verde is aiming to eliminate malaria by 2023, and there are areas of very low incidence in parts of both Senegal and Gambia. The main priority for this year has been to develop the strategic plan for 2021-2025 and SaME are in the process of locating funds to roll out these activities.

PAMCA (Pan African Mosquito Control Association) – *Silas Majambere*

PAMCA is a member-based organisation which work to provide an African led platform for scientists, public health professionals and vector control specialists as well as affected communities and other stakeholders to set and drive the agenda for control and elimination of VBDs. This is an overarching mission. PAMCA started around 10 years ago, and have three areas of work; capacity building for vector borne disease surveillance and elimination, to build collaboration and partnerships with people working on VBDs in Africa, and knowledge management in terms of establishing regional centres of excellence in vector control as well as data management and enhancing communication and information sharing within the network. PAMCA is member based and so anyone can be part of this, and many attendees today are. The annual conference is being held in September 2021 which all members are invited to attend. Those who are not current members of PAMCA are encouraged to consider becoming a member.

Round Table Discussion

Elizabeth Juma's first question is posed to APMEN. Considering the restructuring of the VCWG work streams and some of the transmission challenges faced in the Asia Pacific region – what kind of areas of focus would you like to see in the work stream 'Expanding the vector control toolbox' and how do you think this could complement the existing activities of APMEN VCWG?

Leo Braack responded to this question. Leo and Htin are both employed by the Malaria Consortium, who are the implementing agent to drive the VCWG for APMEN. Leo expressed that it is a great privilege to be in that position. The Asia Pacific region has done a good job in reducing its malaria burden over the past two decades, and great reductions were seen during that timeframe. Many countries in the region have malaria elimination on the horizon, and hope to have at least *falciparum* elimination by 2025, particularly in the Greater Mekong subregion. However, these countries face the problem which every country across the globe faces when moving from low transmission to elimination which is persistent residual malaria, and much of this of course is caused by outdoor biting.

With this in mind, APMEN look for support from groups including RBM VCWG for new tools such as time-limited and targeted application of cattle ivermectin for residual malaria in places like the Greater Mekong subregion where zoophilic outdoor biting vectors are found and where cattle are a common feature of the landscape. Many if not most households in this region have cattle associated with them. IRS should also receive more attention for focal application in residual transmission settings, as well as stronger and more appropriate community engagement to achieve community participation and support for the development and uptake of new tools. These are all big areas which need discussion.

The APMEN VCWG develops training opportunities for improving vector surveillance capacity in NMCPs, and provides a platform for information sharing and joint learning. We can all learn from each

other, and APMEN look forward to engaging with RBM VCWG and other regional network colleagues present here today. APMEN want to take on board new insights and new strategic approaches but also importantly, new ways to do old things, as it is the old tools which have brought us to elimination in country after country, when used wisely and effectively.

Elizabeth Juma posed the next question to E8. Reflecting on the new VCWG structure, for the E8 coalition of countries there is a strong focus on improved surveillance – how is the region intending to strengthen entomological surveillance capacity? What is the future focus in line with the GVCRC?

Firstly, we have to look at what we have been doing in terms of best practices within countries and ensuring that we sustain these practices and do not lose the gains which have been achieved. Local vector control technical working groups which incorporate research institutions and academia are commendable and highly important and we must support these. We must also thank partners such as PMI who implement core interventions and provide evidence by providing surveillance data and shared capacity. What is already working must be sustained and support must be provided to do this.

At a regional level, E8 focuses on vector control technical groups and meet up to three times a year to share knowledge and best practices. Countries should encourage and support one another. E8 looks at indicators of WHO guidelines and ensure that all countries in the region have IRM plans. All countries in E8 have either a functional plan or one in draft form currently but we can see that they are using these documents and best practices to learn from other countries to develop strategic plans and policies across the region. Moving forward the focus would now be to ensure that the resources within the region are used optimally to ensure that countries are benefitting from them.

Some inadequate linkages have been observed and we must be innovative to combat this, and open borders so that countries can help one another and to facilitate this and to sustain the pool of expertise in the region. It is also important to ensure that we are imparting these skills within the programme officers who are working on the front line and train and mentor them to do entomological surveillance to inform policy decisions. Training is of utmost importance.

Elizabeth Juma posed the next question to MOSASWA. We have heard from Joe Wagman earlier about maintaining surveillance under the current pandemic; in the face of COVID-19, how would you say that your activities have had to adapt in order to ensure that your cross-border strategies are maintained and optimised?

The COVID-19 pandemic has caused disruptions to disease control programmes on a global scale, and MOSASWA has been no different. It has made planning of malaria control activities much more complicated. One of the successes is that MOSASWA adopted a practical approach and updated this based on the conditions on the ground and adapted well to what was a fluid situation. In South Africa MOSASWA have 8 mobile testing units which adapted from working almost exclusively at border posts to finding other innovative ways to test and treat. The key to this was to address mobile migrant populations, and the team noticed that border closures led to mobile populations finding alternative entry points to the country as opposed to using well known legal and illegal entry points. Using knowledge of local movement and seasonal work forces on farms etc., mobile populations were targeted by working with transit ducts such as taxi ranks, moving into villages, markets and areas surrounding border areas to test and treat, whilst building strong relationships with taxi owners, farm managers and health facilities. The mobile testing units undertook case surveillance and provided mobile COVID-19 screening as well as malaria test and treatment which was a key support to the government.

In Eswatini, IRS activities were conducted alongside country IRS programmes. Unfortunately, meetings with community leaders were only able to be conducted in quarter four due to the pandemic, but revised materials were released and work was conducted to assimilate malaria control information and messaging.

The bulk of activities of MOSASWA are focused in Mozambique on surveillance, but IRS and field workers are included. Due to the pandemic, several aspects of the IRS programme in Mozambique had to be adapted to reach goals. In March 2020, an SOP was developed with regards to health and safety of COVID-19 for field staff i.e. hand hygiene, temperature screening and social distancing. Messaging material had to be adapted not only in content but also in visual aspects, so that the communities could be provided with COVID-19 messaging as well as malaria messaging. A big success was completing orders in March to combat the border closures that were expected. District level training was introduced as opposed to centralised training, and training facility capacity became limited due to distancing measures. Additionally, moving trainees between districts was not possible and this district level training was employed in all 18 districts of MOSASWA.

A major innovation was the introduction of mobile training walls which were developed with a partner in Johannesburg, who constructed 1.3km of mobile training walls delivered to all districts to train IRS operators to target over 6000 houses. This proved that district training is possible and this method will be likely to be utilized going forward. Many spray operators were recruited who had previous spraying experience which shortened training time whilst retaining capacity. Staff members over 60 years of age or with co-morbidities were kept away from the front line for their own safety. Only 17 COVID-19 cases were reported with no fatalities.

On the entomological surveillance side, human landing catch volunteers were required to come from the same household and no outside collectors were allowed. COVID-19 regulations were implemented and upheld for entomological surveillance teams. Mouth aspirators were assigned to individual users and surveillance teams were sent for COVID-19 testing frequently. Community focal gatherings were limited to ten people in order to successfully social distancing. MOSASWA have a video which summarises who they are and what they are doing, and Francois encouraged all to visit this.

Elizabeth Juma posed the next question to SaME. When SaME was established with the Dakar Declaration in 2018, one of the pledges was to fast track the introduction of innovative technologies to combat malaria – could you comment on some examples of that, how that has been achieved and what impact, if any COVID has had on the fast-track ambition? Are there any learnings that can be shared with the VCWG here today?

SaME have a strategic plan which was endorsed in December 2020, and there are a number of innovative technologies which are happening in the region, although SaME cannot take credit for this as they are a new initiative and still developing strategic plans. All these technologies that are ongoing are aiming to be sustained within the strategic plan. Burkina Faso are using mobile phone technology to improve prenatal consultation through regular reminders which increased prenatal appointment attendance, which helps to improve intermittent preventative treatment uptake.

Digitalisation of IRS, malaria prophylaxis and ITN distribution is being conducted across the Sahel region, and the principle is to remove the burden of manual work and improve data sharing to better understanding distribution of service delivery and use that information to guide planning and decision making. Burkina and Mali are two countries where Interceptor G2 nets are being evaluated. Several of these projects are being funded by Global Fund, PMI and USAID. An ATSB trial is currently being undertaken in Mali.

In terms of larviciding, Cabo Verde started its pre-elimination strategy of larviciding, sponsored by the government. Burkina Faso and Mali have been sites for the malaria vaccine trial coordinated by the LSHTM. Burkina Faso has also been a site for gene drive technology and genetic manipulation of the vector. This is in initial stages but there has been a release of sterile mosquitoes (non-GMO) to compare their behaviour with non-sterile mosquitoes. The initial report on this has been published on the target malaria website.

SaME aims to bring together researchers and all of these projects to inform the region and reflect on lessons learned.

Elizabeth Juma posed a question to PAMCA – looking at African solutions for implementations of interventions, what is new? What can we learn that is different about malaria transmission in the region, what can we do differently and how can we expand the toolbox to strengthen vector control in the region and improve the stalling of progress?

We are doing what we can, and have core tools which are there, i.e. IRS and ITNs. LSM is no longer considered a core tool. There are new tools to implement, most of which have their own challenges. If we could give a voice to the communities that are suffering from this disease, they might know better what they need and what they would like to see happen. In PAMCA, that is one critical focus. This is not only advocacy but also aims to empower people on the ground and those suffering from malaria to gain more knowledge, and consider where they think tools will work best. This is why training is focused down to the district level, where people can identify where interventions are not working effectively. There is a focus on training to make informed decisions.

New tools such as ATSBs, GMO mosquitoes etc. should look beyond money to implement and rather having people on the ground who understand these tools and how to utilize them and monitor. People need to know what they need, when and how. This is a gap PAMCA is trying to fill as a member-based organization. Shift will be seen in decision-making and agenda drivers as new tools emerge.

Elizabeth Juma thanked all the regional networks for their time and discussions, and expressed that there is a lot of progress and good work being done to strengthen old tools and ensuring efficient implementation and operationalisation of new tools and assessing impact.

Wrap up and close – Keziah Malm, NMCP Ghana, Justin McBeath, Bayer & Konstantina Boutsika, Swiss TPH

Justin McBeath thanked all attendees and speakers, and particularly Silas for grounding us in his comments as it is fundamental for us all to remember who we are striving to protect. Ultimately, we have covered a huge range of topics today from funding to innovation. Justin closed by saying on behalf of himself, Keziah and Konstantina a thank you to the Swiss TPH for hosting the VCWG virtual sessions, and financial support provided by the Swiss Agency for Development and Cooperation. Justin provided a reminder for session 3 of this year's VCWG meeting on Tuesday 20th April, which will be focused on the first work stream 'enhancing the impact of core interventions' and urged all to join. Justin thanked all for their time.

List of acronyms

AI	Active ingredient
APMEN	Asia Pacific Malaria Elimination Network
ATSBs	Attractive Targeted Sugar Baits
C19RM	COVID-19 Response Mechanism
CDC	Centers for Disease Control
DDT	Dichlorodiphenyltrichloroethane
DHIS	District Health Information Software
E8	Elimination 8
FNIH	Foundation for the National Institutes of Health
GMM	Genetically Modified Mosquitoes
GMO	Genetically Modified Organism
GMP	Global Malaria Programme
GVCR	Global Vector Control Response
IRS	Indoor residual spraying
ITN	Insecticide-treated net
IVCC	Innovative Vector Control Consortium
IVM	Integrated vector management
JAG	Joint Action Group
LLIN	Long-lasting insecticidal net
LSHTM	London School of Hygiene and Tropical Medicine
LSM	Larval source management
MOSASWA	Mozambique, South Africa and Swaziland
NMCP	National Malaria Control Programme
NTD	Neglected Tropical Disease
NTI	Net Transition Initiative
PAHO	Pan American Health Organization
PAMCA	Pan African Mosquito Control Association
PATH	Program for Appropriate Technology in Health
PBO	Piperonyl butoxide
PDP	Product Development Partnership
PMI	President's Malaria Initiative
PPC	Preferred Product Characteristics
PQ	Prequalification Programme
RBM	Roll Back Malaria
SaME	Sahel Malaria Elimination Initiative
SBCC	Social and Behaviour Change Communication
SEARO	South-East Asia Region
SIT	Sterile Insect Technique
SMC	Seasonal Malaria Chemoprevention
TDR	Special Programme for Research and Training in Tropical Diseases
TGF	The Global Fund
TRP	Technical Review Panel
USAID	United States Agency for International Development
VBD	Vector borne disease
VCAg	Vector Control Advisory Group
VCNA	Vector Control Needs Assessment
VCWG	Vector Control Working Group
WASH	Water, Sanitation and Hygiene
WHA	World Health Assembly
WHO	World Health Organization

Disclaimer

The views and opinions expressed in the Chat are those of the individual presenter and do not necessarily reflect the official policy or position of the Vector Control Working Group of the RBM Partnership to End Malaria or any of its co-chairs, co-leads, coordinator.

Chat from VCWG session 2

Updates from vector control community

15 April 2021, 3:00 PM – 6:00 PM CET

15:00:08 Von nick.hamon an Alle : Good morning from Chapel Hill, North Carolina

15:02:17 Von Konstantina Boutsika an Alle : Welcome to the session 2 of VCWG virtual event!

15:04:36 Von Konstantina Boutsika an Alle : Please submit your questions via the Chat box!

15:08:16 Von Mohan Rao Arasada an Alle : Can we rename as End vector borne diseases strategic objective?

15:09:17 Von Angus Spiers an Alle : Can we make sure those links are available after the presentation?

15:11:08 Von Konstantina Boutsika an Alle : All presentations are uploaded on the Attendees Hub.

15:12:37 Von Mohan Rao Arasada an Alle : Like WHO considered Neglected tropical diseases, can similar consideration be made by RBG VCWG to develop suitable regional n country specific technology including capacity building?

15:12:57 Von jo lines an Alle : Already there, Konstantina?

15:15:34 Von Anne Wilson an Alle : Is there planned to be more flexibility on evidence criteria for development interventions which are often very ecology specific and need to be implemented on a large scale e.g. LSM?

15:16:10 Von Konstantina Boutsika an Alle : Yes, all presentations of session 2 are already uploaded on the Attendees Hub. Kindly check out under the Tab 'Thursday 15 April'.

15:16:51 Von Muhammad Mukhtar an Alle : Thank you for upload

15:17:09 Von Mohan Rao Arasada an Alle : There is need for integrated comprehensive approach for vector control to achieve sustainable development goals. A sub group may be identified for this purpose to develop such an approach.

15:19:09 Von Konstantina Boutsika an Alle : <https://www.globalmalariaevents.org/>

15:19:13 Von Mohan Rao Arasada an Alle : The VCWG may identify areas that require restructuring n re orientation for effective vector control.

15:20:09 Von Jackline an Alle : Thank you. Got it

15:21:21 Von Ole Skovmand an Alle : a bit more about the slide we see

15:21:24 Von Grace Wong - WHO an Alle : Would be good to see the pooled demand of LLINs, insecticide and pesticide used by UN agencies that can be established with UN LTA and made available to all agencies for use.

15:22:21 Von Mohan Rao Arasada an Alle : Need exists for Cooperstown to detect, prevent, report n respond to outbreaks of VBDsto avoid public health emergencies under IHRs

15:22:41 Von Michael Macdonald an Alle : Will GMP be e engaged with capacity-building for public health entomologists, especially at the sub-national level?

15:27:24 Von Mohan Rao Arasada an Alle : Need exists to identify locally adapted actions due to vast geographical and seasonal variations. It should also include reorienting relevant govt programs to control new and emerging threats.

15:31:42 Von Mohan Rao Arasada an Alle : There appears to have need for establishment of national research agenda to support evidence based vector control and for developing new tools.

15:32:29 Von Sian Clarke an Alle : What were the common regional priorities in AFRO region?

15:33:54 Von Mohan Rao Arasada an Alle : Efforts on increasing capacity building and enhancement need special attention by this group in a mechanism could be identified.

15:35:21 Von Konstantina Boutsika an Alle : Please submit your questions via the Chat box!

15:35:47 Von Manuel Lluberas an Alle : Capacity building on vector control for mid level management positions must be conducted. Let me know how I can help. Glad to hear Dengue mentioned.

15:37:14 Von Grace Wong - WHO an Alle : Is the IVCC initiative to influence global supply market prices for IRS related products especially for African and Eastern Mediterranean region still on-going?

15:38:14 Von Mohan Rao Arasada an Alle : This meeting may identify volunteers who can work on different vectors, their surveillance n outbreak management.

15:38:20 Von Olivier Briet an Alle : One the survey on global insecticide use (in terms of quantity) for vector control. How do you collect the data? From manufacturer sales?

15:38:46 Von John Lucas an Alle : What evidence is there for increased deaths from Covid in people who have dengue or malaria ?

15:40:44 Von Anne Wilson an Alle : Great to hear renewed focus on PHC

15:44:58 Von jo lines an Alle : Where can read more about the “SI” and evidence needed for dual a.i.?

15:45:55 Von Birkinesh Ameneshewa an Alle : A sustained training (capacity building) at the implementation level is critical as a cross cutting program for addressing vector borne diseases control. Capacity building need to be part of program implementation plan not a one time activity.

15:46:29 Von Nakul Chitnis an Alle : Are there any considerations for funding topical repellents as a tool against forest malaria in Southeast Asia?

15:46:50 Von jo lines an Alle : Patrick’s data on \$\$ spending on each type of vector control: I assume that comes with data on number of people nominally protected?

15:47:21 Von Ole Skovmand an Alle : GF program for funds has a 3 year cycle and bed net Survival has a 2 year mean value, what is GF suggesting for filling that gap ? and does anything work ?

15:48:07 Von Sheila Barasa an Alle : Is there a possibility of funding topical repellents within the operational research bucket?

15:50:12 Von jo lines an Alle : Ole: The GF plan for this discrepancy is to deny that it exists. They have been in denial about this issue since 2009 when I was in GVA!

15:50:23 Von Ole Skovmand an Alle : reviewing size etc for reduce cost is a total Failure of understanding. PBO does not cost a lot, it is not the Reason for the high price, it. Simply is that bednets company make no profit on standard nets and try to catch up on PBO nets etc

15:52:07 Von Kara McCarthy an Alle : when funding specific nets, do you consider end-user preference to ensure that countries are distributing nets that people actually want to use and not just efficacy against mosquitoes?

15:56:10 Von jo lines an Alle : Oh look! Here is GF acknowledging the problem! I take it back! Well done Kate!

15:59:05 Von Nakul Chitnis an Alle : In addition to PBO and additional active ingredients, are there thoughts on incentivizing increased durability of the nets so that they are more likely to last for 3 years?

15:59:26 Von jo lines an Alle : I recall that WHOPES phase 3 tests of durability in the field excluded loss from attrition, and therefore over-estimated true durability. Does the PQ method of testing include attrition now?

16:05:48 Von Kate Kolaczinski an Alle : @Kara - yes, if NMCPs have data that shows that a certain attribute is important to ensure/improve use (i.e. use not just preference).

16:08:08 Von Silas Majambere an Alle : If GF gives us money we (PAMCA) will know how to address the ento capacity issue-

16:08:14 Von Jose Saettone an Alle : any long term data on chemical PBO durability, it has a lower pression that pyrethroids.....

16:09:38 Von Kate Kolaczinski an Alle : @Jo - yes big concern, we welcome the recent Karl et al paper- all scrutiny is good! We are open to whatever recommendations come out of the independent review.

16:09:38 Von Michael Macdonald an Alle : Second Silas on his suggestion for PAMCA and capacity-building: no people, no program

16:10:56 Von Kate Kolaczinski an Alle : @ole. The 3y grant cycle is incidental and not linked to the idea of nets having a 3y life span. Countries are free to make prioritization decisions as to which tools they want to procure and when within that 3y cycle. The issue is the absolute amount of money available (not enough) rather than financing period per se.

16:12:44 Von Seth Irish an Alle : I don't think that we should be focusing exclusively on "ento capacity" - remember that vector control decision making is what we are trying to do, and that needs a wide range of skills (epidemiology, modelling, health economics), not just entomology

16:13:05 Von Sian Clarke an Alle : Relevant question about PBO durability - could become a future issue. Would be interested to hear more about any evidence in relation to that

16:13:55 Von jacobwilliams an Alle : I concur with Seth's comment

16:14:01 Von jo lines an Alle : Thanks Kate. I'm very encouraged by this, and by the comments on choosing nets according to local resistance situation. But most of all encouraged by the strengthening of the teams in GF and in GMP. Still not enough, I know, but better than when you got there!

16:15:16 Von Manuel Lluberas an Alle : We need mid-level and field managers who can manage the daily operations of vector control programs.

16:15:34 Von Angus Spiers an Alle : Also agree with Seth, but go further into less scientific positions that focus on data management, logistics and planning

16:16:10 Von Leo Braack an Alle : The most critical skills gaps are in ento

16:27:42 Von Kate Kolaczinski an Alle : @Sian and @Jose - durability of PBO nets. This is beyond TGF - data should be coming out of Uganda trial I assume that will be very useful as presumably will allow comparision to a range of net types across similar settings. Other data will come from the large amount of work Vector Link (PMI) finance on durability studies. We (TGF) also fund durability studies in some countries - as well as under the New Nets Project (a Unitaaid - global fund partnership led by IVCC). So, briefly, soon we should all have considerably more data on lifespan of PBO nets. Fully agree it is important to understand so that governments are better able to know what they are paying for.

16:29:15 Von Kate Kolaczinski an Alle : On the capacity building issues - would be keen to hear people's thoughts on what works in that area. Money has been used to support capacity building in some shape or form for a long time, is it working? and what approaches work?

16:31:31 Von jacquesderekcharlwood an Alle : Get people out into the field is cheap and helps build awareness and capacity

16:33:58 Von jacquesderekcharlwood an Alle : Has stephensi been recorded in Eritrea?

16:35:17 Von Seth Irish an Alle : I've been following it pretty closely and don't know of any collection records from Eritrea. But it definitely seems likely due to the collections in Ethiopia, Sudan, and Djibouti and Marianne Sinka's predictions

16:35:58 Von Basil Brooke NICD an Alle : Capacity building is often hampered by high rates of attrition. Well qualified entomologists are often diverted into administrative roles. This problem is

also driven by poor salaries for entomologists, and lack of career development pathways within the job.

16:36:33 Von Oliver Wood an Alle : Good point Basil

16:36:47 Von Eunice Misiani an Alle : @Kate, at the field level, capacity building works best when there is follow through on implementation and not just a once off events/training

16:36:48 Von Mojca Kristan an Alle : Could combine mosquito collections with surveillance for HRP2 deletions in malaria parasites (by looking at parasites in mosquito blood meal).

16:37:09 Von Basiliansa an Alle : Very true @Basil

16:37:11 Von Tom Mascari an Alle : Could you describe the decision process for PMI to support those 3 innovative tools and not others in the VCAG pipeline?

16:39:53 Von Catia MARQUES VLAO an Alle : In some countries there isn't a career path for entomologist and most of time to study entomology you need to go to Europe . In terms of capacity building, in our context normally two days in classroom for info about basics and then field to certify basics were understood. Depending, on technicians' ability to learn they start topping-up and advancing by stages

16:46:49 Von Jeroen Spitzen an Alle : Is it considered to focus on 'Close the Gap' next to "Mind the Gap"? - Thinking of community based house-improvement - eave screening etc.

16:47:46 Von Leo Braack an Alle : Could you say something about environmental impact of ATSBs against non-target insects...honeybees for example

16:52:45 Von Jessica Rockwood an Alle : Could you give a bit more detail on your work in China?

16:52:58 Von Kara McCarthy an Alle : nick, seems like SRs are not being considered part of IVCC's innovation pipeline but access to LLINs and implementation of IRS are key. Those seems to be strategies of decades past - do you think excluding other indoor tools will get us to zero by 40?

16:53:02 Von jo lines an Alle : Could we ask Nick: what is IVCC's position in LLIN durability? Are we trying to make the next generation of nets more long-lasting? The current testing and procurement system encourages manufacturers to make nets that JUST pass the minimum standards imposed by WHO tests, but are otherwise as cheap per unit as possible. We need to move to a system that encourages manufacturers to make nets that minimise cost per year of coverage. What can IVCC do? This is much more effective than making nets smaller!

16:53:14 Von jacquesderekcharlwood an Alle : Best way to prevent malaria in forest is to stop people going there to chop the trees down - this is what they do. Seems crazy to not address the proper problem.

16:55:05 Von John Invest - Sumitomo - UK an Alle : To Jo - When people only want to pay \$2 a net where is the money to manufacture more durable nets

16:56:20 Von Fredros Okumu (Ifakara Health Institute) an Alle : Thank you Nick; great progress, great summary. Lots of room for improvement- and lots of "rethinking" to do

16:56:27 Von Tom Mascari an Alle : Derek - Malaria risk also is very high among communities living in protected areas not participating in illegal logging and poaching, as well as rangers supporting forest / wildlife conservation.

16:56:48 Von Torben Holm Larsen an Alle : John - that is exactly what Jo is saying. Btw when is the last time you managed to get \$2 for a net?

16:57:07 Von jo lines an Alle : @John: just so. If a \$2 net has a 2y life, would the life of a \$3 net be 4y? If so then better VFM in cost per year of coverage

16:57:49 Von jo lines an Alle : WHO already recommends this as a criterion. But GF do not implement.

16:57:56 Von jacquesderekcharlwood an Alle : There is surely a repurposed possibility of retreating nets again. Have someone who goes around with a needle and thread to repair holes (people leave holes in their nets because they don't know how to sew or have the appropriate needles) Set up

people who can also help cover the eaves/gables with old nets. A small user fee would help a win-win.

16:58:41 Von John Invest - Sumitomo - UK an Alle : Jo - People only look at baseline price hence recent problems with Global fund buying a load of poor quality nets. Cheap is not good and good is not cheap

17:00:40 Von John Invest - Sumitomo - UK an Alle : Derek makes a good point, what ever happened to repairing nets?

17:01:13 Von Kate Kolaczinski an Alle : @Jo, John. Yes certainly cost per year of life super sensible. BUT how to implement that ? We don't (yet!) have anything that predicts the life span of a net at time of purchase, and the idea of paying later once you see how long the last...unsurprising wasn't a goer. The work on resistance to damage criteria and scores is helpful and possibly will end up with something that is predictive, if that holds.

17:01:19 Von Ole Skovmand an Alle : hi John, field data show people don't repair and if they do, too late and too little

17:02:48 Von John Invest - Sumitomo - UK an Alle : Yes Ole, I have said at several meetings that there should be social education on repairing nets. There are many good seamstresses in Africa

17:03:36 Von Lina Heltsche an Alle : All presentation slides are uploaded to the Attendee Hub!

17:04:41 Von jo lines an Alle : Yes @Kate: Hence we should be doing that post-distribution monitoring, so as to feedback info on observed net-lifespan to the next procurement cycle. In 2014 (?) your colleagues at GF promised to fund this kind of comparative field monitoring, to validate the work on testing methods by Albert K and R4D. But they failed to support the fieldwork, only the lab work which showed that lab tests on new nets cannot predict durability.

17:06:37 Von michael.coleman an Alle : Could you move away from HLC?

17:07:14 Von Garth Drury an Alle : Actual % coverage/use in a population over time is of course critical, so 'comfort' and ease of correct deployment/use (by design) is equally crucial as such factors as durability of net material (particularly taking into account local reparability) assuming impregnated/long-lasting insecticide?

17:08:39 Von Kate Kolaczinski an Alle : We support durability monitoring (as to PMI) but fully acknowledge there is a big gap in understanding how to interpret those data as they are not often clean or clear (I like attrition!). But think field work specifically to link to the RDscores - I think it was Gates who took that forward. There has been progress there hence the recent papers. Those folks (and Angus?) can add.

17:08:57 Von Kate Kolaczinski an Alle : Above was @Jo.

17:12:04 Von jo lines an Alle : To compare durability performance in the field, a useful, basic method is just to measure attrition: whether or not the net is still there. Yes we know that there are nets with holes and reduced insecticide, and they give less protection. But a bigger problem is that people discard nets with a few holes, and use nothing, even though an LLIN with insecticide but a few holes still gives good protection.

17:12:14 Von Ole Skovmand an Alle : to make durability a real subject, PMI and especially GF has to accept to calculate price per protected year instead of purchase price only!

17:12:39 Von jo lines an Alle : Thank you Nick. The onus is with TGF.

17:12:54 Von Angus Spiers an Alle : Agreed Kate, there is way more to durability and attrition than I can fit into a chat here, but I do think some advances in characterising physical and chemical durability are in the works. I can talk to this a little more in my presentation next week. However, the interpretation of data across countries and time is a significant issue which we are looking into.

17:12:56 Von Kate Kolaczinski an Alle : Yes Nick. Stronger nets: It's been done before, it was expensive, no one bought them. Price is not trivial, double the cost of a net means half the number of people protected. The innovation we need is how to a) improve lifespan of nets with only

marginal price increases. b) understand what is the CE payoff - there is one but we don't know what it is yet - what is the right quality/price/coverage pay off.

17:12:59 Von jo lines an Alle : @OleL yes exactamente.

17:13:40 Von Ole Skovmand an Alle : merci

17:15:45 Von jo lines an Alle : GF's position may have changed (has it?) but it used to be that they consider unit price (not price per year of coverage) because WHO calls all LLINs "3-year nets".

They said "When WHO tells us 'this is a 2.5y net, while that is a 2.2y net',

17:16:14 Von jo lines an Alle : GF's position may have changed (has it?) but it used to be that they consider unit price (not price per year of coverage) because WHO calls all LLINs "3-year nets".

They said "When WHO tells us 'this is a 2.5y net, while that is a 2.2y net, then we will take that into account".

17:16:22 Von Hannah Koenker an Alle : As with many things, prevention (tying nets up during the day and taking steps to keep kids etc away) of holes is more effective than repair once the holes are formed. We have a lot more room for improvement in hole prevention (and retention) behaviors than in repair behaviors. Note that attrition is also driven by availability of other nets in the household or community.

17:16:29 Von Jose Saettone an Alle : knitting pattern and hole density, weight affect the price and weight and this affect the durability

17:16:39 Von Michael Macdonald an Alle : @Rick. On Tuesday Dr. Raj mentioned the new PMI inclusion of a focus on humanitarian emergencies. can you elaborate?

17:16:52 Von Francois Maartens an Alle : Is there an official disposal

17:17:00 Von Mohan Rao Arasada an Alle : Rick, Nick and joe, Thanks for this wonderful session

17:17:19 Von Jose Saettone an Alle : denier bursting strength are related to durability and this brings up the cost.....for increased durability.

17:17:45 Von jacquesderekcharlwood an Alle : Much innovation in business is driven by the high end - phones or cars etc Only a few people can afford them but everyone wants one. Making a really fancy net that is a desirable product that can be sold (locally) - price in the present discussion is irrelevant - maybe just persuade Jeff Bezos to spend something and it goes away.

17:18:10 Von JMiller an Alle : Just coming to the DM discussion-and as Justin says there will be more discussion in other VCWG EIC eg BUT- PMI VectorLink supports durability monitoring of ITNs to provide in-country and global stakeholders with updated evidence on ITN survivorship, physical durability, and insecticide effectiveness in the field. The project collects data on attrition, physical integrity, bio-efficacy, use, and care and repair behaviors of ITNs and triangulates with durability monitoring data of standard ITNs , piperonyl-butoxide (PBO) INTs, and next-generation ITNs to inform procurement and programmatic decisions and develop effective, evidence-based integrated vector management strategies. PMI VectorLink uses World Health Organization-endorsed ITN durability monitoring resources,-see durabilitymonitoring.org.

17:18:28 Von jo lines an Alle : @Jose: actually the conclusion of Albert Killian's project was that bursting strength is a poor predicted of durability.

17:19:09 Von jacquesderekcharlwood an Alle : Old nets can be used to cover gaps in the eaves. This significantly reduces entry rates of malaria vectors.

17:19:28 Von Mark Hoppé an Alle : Is there perhaps a correlation between the concern about the 'quality' of some nets, as mentioned in an earlier presentation, and the downward price trend over the last decade?

17:19:38 Von Angus Spiers an Alle : NIRI have published a comprehensive assessment of net durability; causes, recommended testing criteria and scoring. It is more complicated than just denier or weight but a combination of factors which are outlined in the process.

17:19:51 Von Ole Skovmand an Alle : of course, Mark !

17:19:53 Von Kate Kolaczinski an Alle : @Jo. No the position hasn't changed. (But that isn't quite correct reflection of that position (WHO doesn't "call nets '3 year nets'")), but yes we/manufactures have no way - be it a PQ listing or clear field data (the latter would obviously also be needed to inform the former) - of defining what the 'life' of their net is. Therefore no way of judging cost per year of life. Yet. I hope the NIRI work will help.

17:21:25 Von Jose Saettone an Alle : It is a combination, of weight, knitting holes density and bursting strength.....all this effect the durability. In conclusion more polymer and higher denier the higher the durability. Indeed bursting alone is not sufficient to predict durability. PBO nets have lower bursting strength for same denier.

17:21:55 Von jacquesderekcharlwood an Alle : Net durability is also very much user dependent. Some people will keep a net in good condition for many years others may make a hole first time they come home drunk at night!

17:22:13 Von Konstantina Boutsika an Alle : Thanks a lot Jan, Raman, Kate, Patrick, Rick, Nick, Joe for the excellent talks and joint discussion.

17:23:01 Von Jose Saettone an Alle : true durability depends on the user care.....this is very true.....

17:23:42 Von John Invest - Sumitomo - UK an Alle : With regards to durability many of the holes are made by rats or sparks from cooking fires etc. Unless you make the net out of steel nothing will prevent this damage

17:23:47 Von Mohan Rao Arasada an Alle : Thanks Konstantina for coordinating this session.

17:25:06 Von jacquesderekcharlwood an Alle : I spent time in Cambodia - no way would it have been possible to go into the forest. The loggers would have quite probably got rid of me - they are there illegally and do not like outsiders. One needs to get real!

17:25:46 Von Jose Saettone an Alle : true, nets are not indestructible , but will depend on end user care. That is a misuse of the product, candle, eating under the net and so on.....end user has to be instructed on what not to do.

17:27:08 Von Leo Braack an Alle : Fully agree Derek. It is like saying you will stop theft by threatening with jail...it is near-impossible to stop wildlife poaching or illegal logging...if your child is starving, you will log illegally, simple as that.

17:27:17 Von John Invest - Sumitomo - UK an Alle : There is the age old conundrum that a free net is less well cared for than one purchased

17:27:22 Von Jose Saettone an Alle : tear, hole expansion are the main damage mechanisms. Burnt and rodents and candle burnt are also lower % mode of damage of LLLIN.

17:27:46 Von jo lines an Alle : Yes @Kate, but there is a difference between setting standards (WHO's job) and measuring the observed lifespan of the nets you just bought! This is simply the act of a responsible buyer, it is essentially performance based funding'. If you turn a blind eye to these performance differentials, is that really good stewardship pf your taxpayers money?

17:27:59 Von Silas Majambere an Alle : Is it not interesting that people who can make a waterproof house out of grass would not know how to use a net??? People need to think differently about what we assume.

17:28:09 Von Sian Clarke an Alle : Can GF elaborate more on issue of declining quality in last year? Was this insecticide on net or physical quality? Any evidence of infiltration of supply chain by sub-standard products (pandemic disruption can increase opportunity for the corrupt)?

17:28:12 Von jo lines an Alle : Thank you Silas.

17:28:14 Von Leo Braack an Alle : Easy-come, easy-go...free nets do not encourage good care...I think.

17:28:14 Von Hannah Koenker an Alle : Thank you Silas

17:28:29 Von Neil Lobo an Alle : agree with Silas!!!

- 17:28:32 Von Gabrielle Hunter an Alle : Agree with Silas. We need to give people credit.
- 17:29:30 Von Lina Heltsche an Alle : Here is the link to Joe's document „Maintaining malaria vector surveillance in the context of COVID-19 mitigation“
<https://endmalaria.org/sites/default/files/COVID-19-Malaria%20Vector%20Surveillance-v1.1.pdf>
- 17:31:49 Von Joe Wagman an Alle : Absolutely, Silas - thank you
- 17:33:43 Von nick.hamon an Alle : Joe, Many organizations provided funders a regular update on the impact of Covid on its people and programs. We would be open to sharing those....they were issues every 3-4 weeks and often look at in-country programs as well as delays in trials programs
- 17:37:13 Von Lina Heltsche an Alle : Please check out the Attendee Hub for further information about the regional networks (powerpoint slides and recorded presentations)
- 17:38:13 Von Joe Wagman an Alle : Thanks @Nick - yes, happy to incorporate any of those experiences. The lessons learned in the trials and pilots can be super useful to the more "routine" surveillance programs.
- 17:39:33 Von jacquesderekcharlwood an Alle : There is actually quite a lot of specialisation in some African societies - fundis who build houses as well as people who make clothes etc.
- 17:46:33 Von Fredros Okumu (Ifakara Health Institute) an Alle : Great work everyone. Thank you. I think the regional African teams should consider forming some kind of a federation to directly share experiences and learnings. :)
- 17:47:14 Von Michael Macdonald an Alle : @Htin, can you elaborate on <https://orene.org/>
- 17:49:42 Von jo lines an Alle : Fredros, that would be a really good step. Could it really happen?
- 17:51:02 Von Justin (Video) an Alle : Well said Leo
- 17:51:14 Von APMEN VCWG-Htin an Alle : Thanks, Micheal! APMEN VCWG develops an online platform called Online Resource Exchange Network for Entomology (ORENE), to address capacity shortfall for entomologists in the region. The website cater update technical resources and also a Community of Practice for Entomologists to network and exchange knowledge ,promote career oppurtunities.
- 17:51:58 Von Eunice Misiani an Alle : @Fredros, I think Pamca is a good forum for sharing these experiences
- 17:52:07 Von APMEN VCWG-Htin an Alle : We also organize regular webinars, we called them TechTalk, <https://orene.org/tech-talks/> we also encourage colleagues to visit the past webinars - which cover most of the issues we discussed today and also welcome suggestion/feedback on future topics.
- 17:52:31 Von Muhammad Mukhtar an Alle : of course well coordinated approach can achieve the ambitious goal of elimination in Asia Pacific region and also in other regions
- 17:53:03 Von Fredros Okumu (Ifakara Health Institute) an Alle : Jo! there are people who argue that Malaria control has too many partners. And that we would achieve greater efficiency if everyone else became a chapter/partner/sub-team of PAMCA
- 17:53:42 Von Allison Tatarsky an Alle : From the Expanding the Vector Control Toolbox work stream, @elizabeth we have indeed heard loud and clear. Thank you Leo and Htin for your insights and we look forward to your presentation on community engagement in our session on Apr 29.
- 17:54:08 Von Muhammad Mukhtar an Alle : Agree with Fredros
- 18:00:58 Von jo lines an Alle : Ha! My understanding is that PAMCA is a group of technical experts: it has a key role. NMCP staff have a different perspective, must speak for themselves, that's the point. We need both, but they are not the same! The interesting thing about groups like APMEN is that they bring together not only between countries but also between disciplines. Wait a minute - wasn't that why we invented Roll Back Malaria, 20 years ago?

- 18:05:12 Von jacquesderekcharlwood an Alle : In training IRS staff are dyes used to indicate even coverage?
- 18:06:00 Von Silas Majambere an Alle : @Jo Maybe I was fast when I tried to explain what PAMCA is trying to achieve, and its members... but anyone with questions please reach out
- 18:06:32 Von Manuel Lluberas an Alle : @Jacques: dyes are use only in the training. I don't recommend their use on a house.
- 18:06:33 Von jacobwilliams an Alle : I agree with Jo: PAMCA, by its definition, is a mosquito control association. some of the other partners groupings cover aspects beyond mosquito (e.g. elimination). So it is structurally incompatible to have these as sub-groups of PAMCA. Perhaps what is needed is a formal coordination mechanism to ensure synergies/complementarity in studies and other activities conducted by the partner groups.
- 18:07:14 Von Joe Wagman an Alle : @ Elizabeth - Agreed! Thank you, and job well done Francois and team.
- 18:12:21 Von Fredros Okumu (Ifakara Health Institute) an Alle : Agreed with Jacob & all: Coordination is better than merger.
- 18:12:56 Von Muhammad Mukhtar an Alle : Thank you very much for excellent session. Great job Konstantina and team.
- 18:17:23 Von Joe Wagman an Alle : Another thank you @ Silas; well said
- 18:17:58 Von Catia MARQUES VLAO an Alle : Thanks for this very informative and pleasant afternoon
- 18:18:05 Von Erin Foley an Alle : Thank you to all for an excellent session
- 18:18:25 Von Lina Heltsche an Alle : Our next session will be on Tuesday 20th April, 3PM Geneva time/CET
- 18:18:31 Von Oliver Wood an Alle : Thank you everybody and the presenters
- 18:18:42 Von Catia MARQUES VLAO an Alle : Keen for next one have a pleasant rest of week all
- 18:19:14 Von Amelie Wamba an Alle : Thank you to all the presenters. Had a very nice time.
- 18:19:15 Von Fredros Okumu (Ifakara Health Institute) an Alle : Excellent discussions. Thanks Konstantina, and thanks to the panelists
- 18:19:45 Von Larry Norton an Alle : thank you speakers
- 18:20:01 Von Vasanthan Paul John an Alle : Thank you everyone.
- 18:20:10 Von Gagik Karapetyan an Alle : Thanks for great session!!
- 18:20:31 Von Konstantina Boutsika an Alle : Thanks a lot for attending session 2!
- 18:20:32 Von Dulcisaria an Alle : Thank you every one
- 18:20:33 Von Willy an Alle : Thanks to you all and looking forward to next time.