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Selected Recent Publications

[Recording central neurophysiological output from mosquito larvae for neuropharmacological and insecticide resistance studies](#)

Journal of Insect Physiology Oct 2021

Better understanding the neurophysiological effects of available and candidate insecticidal molecules is valuable for characterizing the mechanisms of insecticide resistance, as well as the design and study of novel control chemistries. In this paper, we describe a method of recording nerve firing from the central nervous system of *Aedes aegypti* fourth instar larvae. Using this novel method, we report the effects of four neuroactive compounds using this method: octopamine, pilocarpine, nicotine, and γ -aminobutyric acid (GABA). The utility of this recording technique for elucidating target site mechanisms involved in insecticide resistance is demonstrated with DDT and its difluoro analog (DFDT).

[Unlocking the human factor to increase effectiveness and sustainability of malaria vector control](#)

Malaria Journal 16 October 2021

Conclusions

No matter how efficacious, a tool will remain ineffective if communities do not engage with it or use it regularly. Entering the next decade in the fight against malaria there is a critical opportunity to elevate the role of social and behaviour change to increase the impact and sustainability of malaria control and elimination efforts. This includes removing social and structural barriers to use of existing tools at all levels, human-centred and inclusive design and implementation of new tools, and movement toward long-term solutions led by affected communities.

VECTOR BITING



All-night activities



- Livelihood activities e.g. security, fishing
- Socio-cultural events e.g. weddings, funerals, religious ceremonies
- Visiting family and friends (travel)

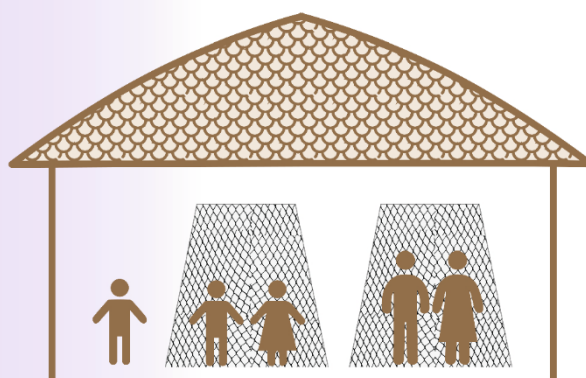


Evening activities

- Household chores
- Socializing
- Children playing
- Entertainment e.g. watching television
- Buying and selling at shops
- Evening prayer
- Preparing and eating dinner



Safe zone - ITN use



Early morning activities

- Household chores
- Prayer
- Farming
- Preparing and eating breakfast
- Small business activities
- Grooming
- Caring for animals



6:00PM

8:00PM

10:00PM

12:00AM

2:00AM

4:00AM

6:00AM

Illustration of gaps in protection that can occur even in the context of high coverage of core vector control tools.

[Evidence supporting deployment of next generation insecticide treated nets in Burkina Faso: bioassays with either chlorfenapyr or piperonyl butoxide increase mortality of pyrethroid-resistant *Anopheles gambiae*](#)

Malaria Journal 18 October 2021

Conclusion

High pyrethroid resistance intensity in *An. gambiae* s.l. is widespread across Burkina Faso and may be a predictor of reduced pyrethroid ITN effectiveness. PBO + deltamethrin ITNs would likely provide greater control than pyrethroid nets. However, since susceptibility in bioassays was not restored in most sites following pre-exposure to PBO, Interceptor G2 may be a better long-term solution as susceptibility was recorded to chlorfenapyr in nearly all sites. This study provides evidence supporting the introduction of both Interceptor G2 nets and PBO nets, which were distributed in Burkina Faso in 2019 as part of a mass campaign.

[Estimating intervention effectiveness in trials of malaria interventions with contamination](#)

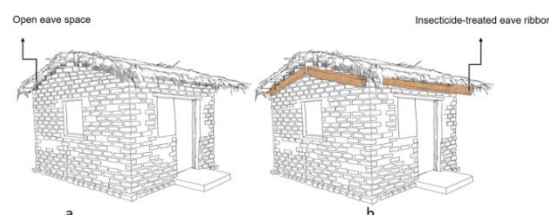
Malaria Journal 20 October 2021

In cluster randomized trials or stepped wedge cluster randomized trials of malaria interventions, mosquito movement leads to contamination between trial arms unless buffer zones separate the clusters. Contamination can be accounted for in the analysis, yielding an estimate of the contamination range, the distance over which contamination measurably biases the effectiveness. An appropriate analysis makes buffer zones unnecessary, enabling the design of more cost-efficient trials. Estimation of the contamination range requires information from the cluster boundary regions and trials should be designed to collect this.

[Insecticide-treated eave ribbons for malaria vector control in low-income communities](#)

Malaria Journal 23 October 2021

This article reviews the evidence for efficacy of insecticide-treated eave ribbons and discusses their potential as supplementary approach for targeted and efficient control of mosquito-borne diseases, particularly malaria.



[A Yeast RNA-Interference Pesticide Targeting the *Irx* Gene Functions as a Broad-Based Mosquito Larvicide and Adulticide](#)

Insects Nov 2021

In this investigation, we describe characterization of a new insecticide that turns off the mosquito *Iroquois* (*Irx*) gene, which is required for mosquito survival. The pesticide is synthesized in yeast, which can be fed to adult mosquitoes in a sugar bait solution or to juvenile mosquitoes that eat the yeast when it is placed in water where mosquitoes breed. Although the yeast kills several different types of mosquitoes, it was not found to affect the survival of other types of arthropods that consumed the yeast. These results indicate that yeast insecticides could one day be used for environmentally friendly mosquito control and disease prevention.

[A colorimetric test for the evaluation of the insecticide content of LLINs used on Bioko Island, Equatorial Guinea](#)

Malaria Journal 10 Nov 2021

A colorimetric "Test Kit" designed for use as a screening tool, able to detect the type II pyrethroids on fabrics and sprayed walls, was used for the first time to detect deltamethrin on long-lasting insecticidal nets (LLINs) deployed on Bioko Island, Equatorial Guinea. This study shows that this colorimetric test was a reliable method to assess the insecticidal content of LLINs under operational conditions. The Test Kit provides immediate results and offers a rapid, inexpensive, field-friendly alternative to the complicated and costly methods such as HPLC and WHO cone bioassays which also need specialist staff. Thus, enabling National Malaria Control Programmes to gain access to effective and affordable monitoring tools for use in situ.

A Comparison of Surface and Total Deltamethrin Levels of Insecticide-Treated Nets and Estimation of the Effective Insecticidal Lifetime

Am J Trop Med Hyg 15 Nov 2021

The ability to anticipate the useful lifetime of an insecticide-treated mosquito net (ITN) would provide a proactive approach for planning net distribution programs. Therefore, we used an exponential decay model of deltamethrin depletion to predict the effective insecticidal lifetime of PermaNet® 2.0 nets used in the Lao PDR. Residual deltamethrin was measured using two nondestructive analytical field methods; X-ray fluorescence (total levels) and a colorimetric field test (surface levels) at 12 and 24 months postdistribution. The model assumes that the 12-month depletion rate can be used to predict future levels. The median total and surface deltamethrin levels for the Lao nets at 12 months were 31.2 and 0.0743 mg/m², respectively. By defining a failed net as having total deltamethrin levels of less than 15 mg/m² or a surface level less than 0.0028 mg/m², it was predicted that 50% of the group of nets will fail at about 27 months after distribution.

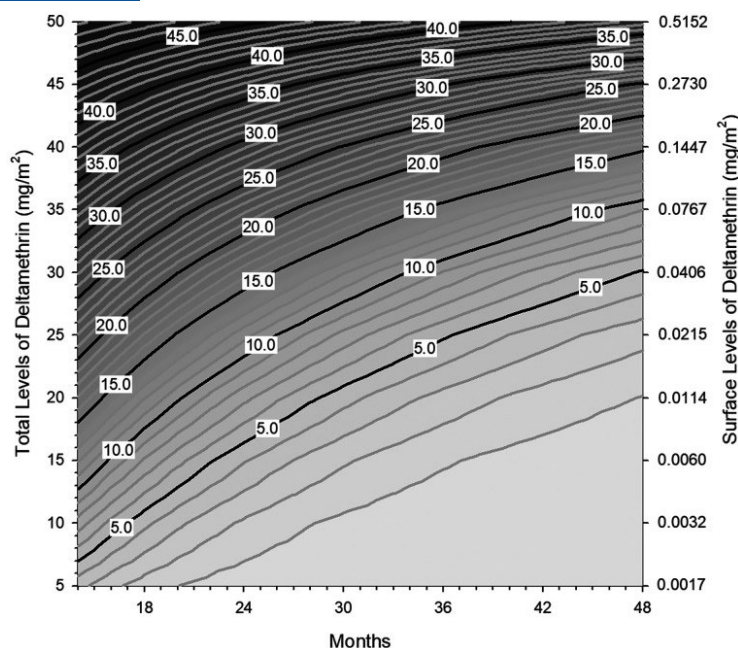
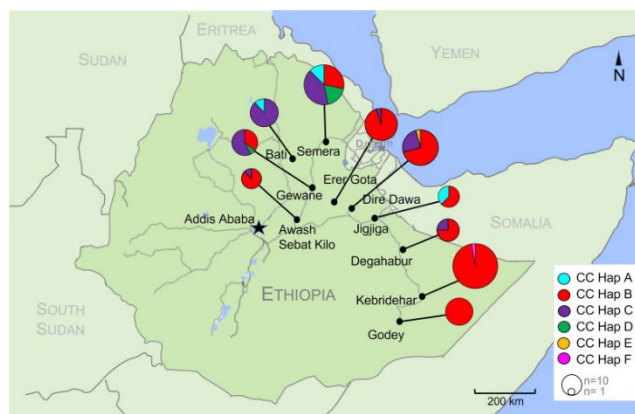


Figure 1. Contour plot showing the relationship between total levels of deltamethrin (y axis left-hand scale) and surface levels of deltamethrin (y axis right hand scale) with months of use (x axis) after a total deltamethrin threshold level (z axis) has been chosen.

Genetic diversity of Anopheles stephensi in Ethiopia provides insight into patterns of spread

Parasites & Vectors 11 Dec 2021

We investigated the genetic diversity of *An. stephensi* in eastern Ethiopia, where detection suggests a range expansion into this region, in order to understand the history of this invasive population. We show that *An. stephensi* is genetically diverse in Ethiopia and with evidence of geographical structure. Variation in the level of diversity supports the hypothesis for a more recent introduction of *An. stephensi* into southeastern Ethiopia relative to the northeastern region. We also find evidence that supports the hypothesis that HOA *An. stephensi* populations originate from South Asia rather than the Arabian Peninsula. The evidence of both zoophagic and anthropophagic feeding support the need for additional investigation into the potential for livestock movement to play a role in vector spread in this region.

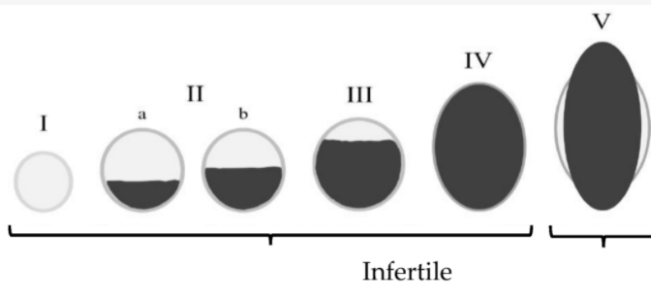


The Automatic Classification of Pyriproxyfen-Affected Mosquito Ovaries

Insects 17 December 2021

Pyriproxyfen (PPF) is an alternative insecticide whose mode of action sterilises adult mosquitoes. Consequently, the efficacy of PPF-based tools can be measured through visual examination of egg development by trained experts. This, however, can be a time-consuming process for which the required expertise can be difficult to train and is not available in many contexts. As such, we propose that an objective machine learning program, which can automatically classify the fertility status of adult mosquito ovaries via a colour image, be developed to improve the speed, accuracy, and consistency of assessment. This study shows that a convolutional neural network, built in Python's TensorFlow library, can quickly classify images of dissected ovaries into either 'fertile' or 'infertile' with a high accuracy rate. Such an application would be a practical and accessible tool available to all researchers studying the efficacy of PPF or other insecticides with a similar mode of action.

Figure 1. Christopher stages of egg development. Mosquitos whose eggs have fully developed to stage V (normal elongated, boat/sausage-shaped eggs with lateral floats) are classified as 'fecund' or 'fertile'. If eggs have not fully developed and remain in stages I–IV (less elongated, round shape, lacking floats), the mosquito is classified as 'non-fecund' or 'infertile'.



[Maplaria: a user friendly web-application for spatio-temporal malaria prevalence mapping](#)

Malaria Journal 20 December 2021

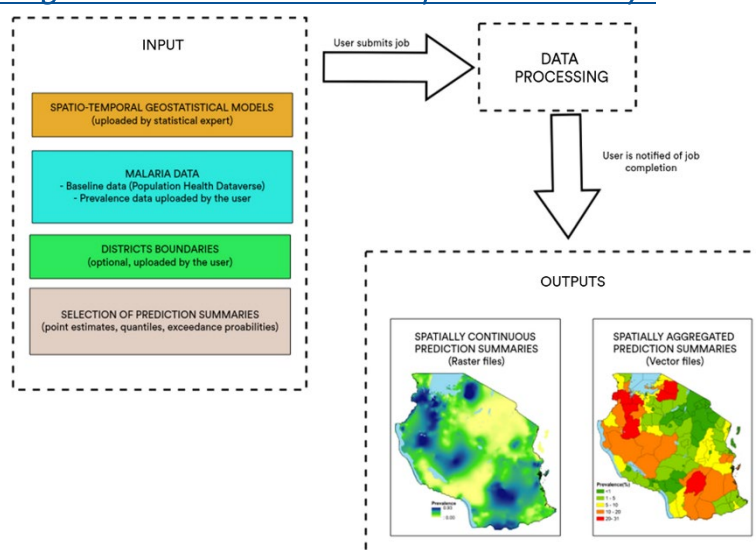
Here, *Maplaria*, an interactive, user-friendly web-application that allows users to upload their own malaria prevalence data and carry out geostatistical prediction of annual malaria prevalence at any desired spatial scale, is introduced.

[Incidence and consequences of damage to insecticide-treated mosquito nets in Kenya](#)

Malaria Journal 20 December 2021

The model presented here extends the framework of earlier analyses of bed net population dynamics by considering physical integrity. This paper introduces models of the demography of nets incorporating the dynamic impacts of use and damage. These models are parameterized using the same net cohort data from Kenya as analysed by Briet and colleagues, which include survey rounds at 6-month intervals over 4 years, where both net use and physical integrity of nets were assessed. The life histories of these nets are analysed using a system of ordinary differential

equations (ODEs) to model changes in status of nets during these intervals. The analysis provides estimates of the effects of physical damage to the LLINs on the probability that a net will be used, on the rate at which nets are discarded, and hence on the full lifetime impact on vectorial capacity. Comparisons with counterfactuals also provide estimates of how much use of nets contributes to decay in physical integrity and effectiveness. These quantities are estimated separately for the different net products in the Kenyan LLIN cohort.



[Charting the evidence for climate change impacts on the global spread of malaria and dengue and adaptive responses: a scoping review of reviews](#)

Global health 3 Jan 2021

To investigate the types of evidence for impacts of climate change on two major mosquito-borne diseases of global health importance, malaria and dengue, and to identify the range of relevant policy responses and adaptation strategies that have been devised, we performed a scoping review of published review literature.

A total of 32 reviews met the inclusion criteria. Evidence for the impacts of climate change (including climate variability) on dengue was greatest in the Southeast Asian region, while evidence for the impacts of climate change on malaria was greatest in the African region, particularly in highland areas.

[Historical samples reveal a combined role of agriculture and public-health applications in vector resistance to insecticides](#)

Pest Manag Sci 4 Jan 2021

Because almost all insecticides used against insect vectors are or have been used in agriculture, a connection between agricultural insecticide use and resistance in insect vectors has been hypothesized. However, it is challenging to find a causal link between past agricultural use of insecticides and current resistance in vector populations without historical data series. Here we investigated the relative contribution across time of agricultural and public-health insecticide applications in selecting for diflubenzuron (DFB) resistance in *Culex pipiens* populations. In the samples collected before the introduction of DFB in vector control, we found the resistant mutation I1043M in rural regions but not any of the neighboring urban and natural areas, indicating that the selection pressure was derived by agriculture. However, after the introduction of DFB for vector control, the resistant mutations were found across all study areas showing that the initial selection from agriculture was further boosted by the selection pressure imposed by the mosquito control applications in the 2000s.

Our findings support a combined role of agricultural and public-health use of insecticides in vector resistance across time and call for specific actions in integrated resistance management, including increased communication between agriculture and health practitioners.

[Characterization of *Anopheles gambiae* D7 salivary proteins as markers of human–mosquito bite contact](#)

Parasit Vectors. 8 Jan 2022

Malaria is transmitted when infected *Anopheles* mosquitoes take a blood meal. During this process, the mosquitoes inject a cocktail of bioactive proteins that elicit antibody responses in humans and could be used as biomarkers of exposure to mosquito bites. This study evaluated the utility of IgG responses to members of the *Anopheles gambiae* D7 protein family as serological markers of human–vector contact.

Conclusions

This study reveals that D7L2 salivary antigen has great potential as a biomarker of exposure to mosquito bites and as a tool for assessing the efficacy of vector control strategies such as bednet use.

[Comparative efficacy of two pyrethroid-piperonyl butoxide nets \(Olyset Plus and PermaNet 3.0\) against pyrethroid resistant malaria vectors: a non-inferiority assessment](#)

Malaria Journal 11 Jan 2022

Olyset Plus outperformed PermaNet 3.0 in terms of its ability to cause greater margins of improved mosquito mortality compared to a standard pyrethroid net, after multiple standardized washes. However, using a margin of non-inferiority defined by the WHO, PermaNet 3.0 was non-inferior to Olyset Plus in inducing mosquito mortality. Considering the low levels of mortality observed and increasing pyrethroid-resistance in West Africa, it is unclear whether either of these nets would demonstrate the same epidemiological impact observed in community trials in East Africa.

[The Use of Automated Traps to Assess the Efficacy of Insecticide Barrier Treatments Against Abundant Mosquitoes in Remote Environments](#)

J Med Entomology 12 Jan 2022

Commercially available 'smart' trap technology has not yet been widely used to evaluate interventions against mosquitoes despite potential benefits. These benefits include the ability to capture data continuously at fine temporal scales without the human resources usually required for conventional trap deployment. Here, we used a commercially available smart trap (BG-Counter, Biogents) to assess the efficacy of an insecticide barrier treatment (BiFlex AquaMax) in reducing mosquito nuisance in a logistically challenging coastal environment in Queensland, Australia. Adoption of smart trap technology permitted us to conduct a uniquely detailed assessment of barrier treatments, ultimately allowing us to demonstrate significant reductions in mosquito collections from treated properties over all temporal scales. Despite limitations related to trap costs and

replication, the results demonstrate that smart traps offer new precision tools for the assessment of barrier treatments and other mosquito control interventions

Reversing insecticide resistance with allelic-drive in *Drosophila melanogaster*

Nature communications 12 January 2022

A recurring target-site mutation identified in various pests and disease vectors alters the *voltage gated sodium channel (vgsc)* gene (often referred to as *knockdown resistance* or *kdr*) to confer resistance to commonly used insecticides, pyrethroids and DDT. The ubiquity of *kdr* mutations poses a major global threat to the continued use of insecticides as a means for vector control. In this study, we generate common *kdr* mutations in isogenic laboratory *Drosophila* strains using CRISPR/Cas9 editing. We identify differential sensitivities to permethrin and DDT versus deltamethrin among these mutants as well as contrasting physiological consequences of two different *kdr* mutations. Importantly, we apply a CRISPR-based allelic-drive to replace a resistant *kdr* mutation with a susceptible wild-type counterpart in population cages. This successful proof-of-principle opens-up numerous possibilities including targeted reversion of insecticide-resistant populations to a native susceptible state or replacement of malaria transmitting mosquitoes with those bearing naturally occurring parasite resistant alleles.

Indoor residual spraying for preventing malaria in communities using insecticide-treated nets

Cochrane Database Syst Rev 17 Jan 2022

Objectives: To summarize the effect on malaria of additionally implementing IRS, using non-pyrethroid-like or pyrethroid-like insecticides, in communities currently using ITNs.

Authors' conclusions: in communities using ITNs, the addition of IRS with 'non-pyrethroid-like' insecticides was associated with reduced malaria prevalence. Malaria incidence may also be reduced on average, but there was unexplained qualitative heterogeneity, and the effect may therefore not be observed in all settings.

Optimising the deployment of vector control tools against malaria: a data-informed modelling study

The Lancet Planetary Health 20 Jan 2022

The study aimed at producing a framework to easily compare the public health impact and cost-effectiveness of different malaria prevention measures currently in widespread use. We extrapolated model simulations for a series of potential scenarios likely across the sub-Saharan African region and include results in an online tool (Malaria Intervention Tool [MINT]) that aims to identify optimum vector control intervention packages for scenarios with varying budget, price, entomological and epidemiological factors.

The most cost-effective vector control package will vary locally. Models able to recreate results of RCTs can be used to extrapolate outcomes elsewhere to support evidence-based decision making for investment in vector control. MINT is applicable to regions of sub-Saharan Africa with endemic malaria and provides users with a method of designing intervention packages given their setting and budget.

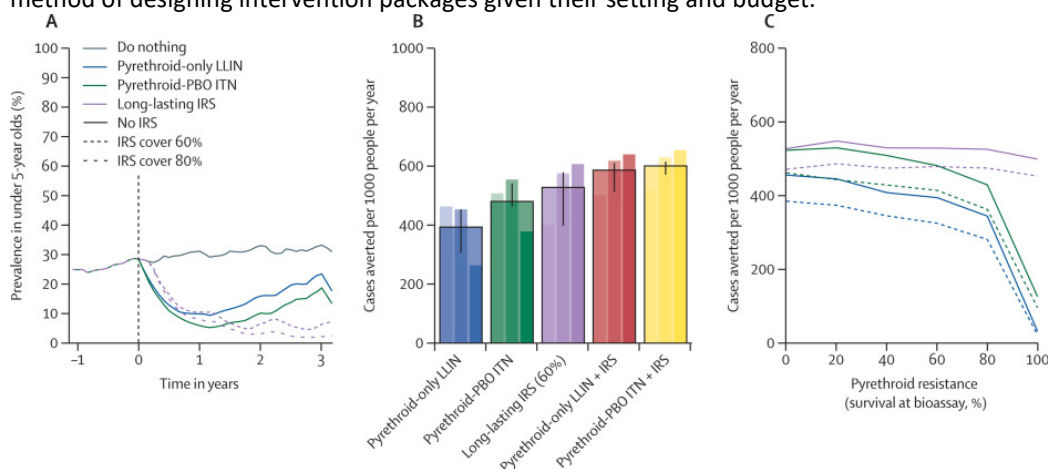


Figure 3. Efficacy of different intervention packages for vector control as estimated for a scenario with moderate perennial transmission (30% prevalence in children younger than 5 years), and highly anthropophilic (92% human biting) and endophilic (97% indoor-biting in the absence of interventions) mosquitoes with 60% pyrethroid resistance.

[Expression of pyrethroid metabolizing P450 enzymes characterizes highly resistant *Anopheles* vector species targeted by successful deployment of PBO-treated bednets in Tanzania](#)

PLoS One 24 Jan 2022

A previous study that was conducted in Muleba district, Tanzania indicated possible involvement of cytochrome P450 monooxygenases in pyrethroid resistance in *An. gambiae* population where pre-exposure to piperonyl butoxide (PBO) followed by permethrin exposure in CDC bottle bioassays led to partial restoration of susceptibility. PBO is a synergist that can block pyrethroid-metabolizing enzymes in a mosquito. Insecticide resistance profiles and underlying mechanisms were investigated in *Anopheles gambiae* and *An. funestus* from Muleba during a cluster randomized trial. Diagnostic dose bioassays using permethrin, together with intensity assays, suggest pyrethroid resistance that is both strong and very common, but not extreme. The findings give insight into factors that may correlate with pyrethroid PBO LLIN success, broadly supporting model predictions, but revision to guidelines previously issued by the World Health Organization is warranted.

[Multi-insecticide resistant malaria vectors in the field remain susceptible to malathion, despite the presence of *Ace1* point mutations](#)

PLoS Genetics 10 Feb 2022

Here, we investigated the molecular mechanisms of insecticide resistance in three *Anopheles coluzzii* field populations from southern Côte d'Ivoire, including Agboville, Dabou and Tiassalé. All three populations were resistant to bendiocarb, deltamethrin and DDT, but not or only very weakly resistant to malathion. The absence of malathion resistance is an unexpected result because we found the acetylcholinesterase mutation *Ace1*-G280S at high frequencies, which would typically confer cross-resistance to carbamates and organophosphates, including malathion. Notably, Tiassalé was the most susceptible population to malathion while being the most resistant one to the pyrethroid deltamethrin. This could be an indication for negative cross-resistance caused by overexpression of pyrethroid-detoxifying cytochrome P450s that may activate pro-insecticides, thereby increasing malathion susceptibility.

[Modelling spatiotemporal trends in the frequency of genetic mutations conferring insecticide target-site resistance in African mosquito malaria vector species](#)

BMC Biology 15 Feb 2022

Understanding the geographic distribution of target-site resistance, and temporal trends across different vector species, can inform strategic deployment of vector control tools. Our predictive maps show how spatiotemporal trends in insecticide target-site resistance mechanisms in African *An. gambiae* vary across individual vector species and geographic regions. Molecular surveillance of resistance mechanisms will help to predict resistance phenotypes and track their spread.

[Standardised bioassays reveal that mosquitoes learn to avoid compounds used in chemical vector control after a single sub-lethal exposure](#)

Nature Scientific Reports 17 Feb 2022

Despite research focused on vectorial capacity determinants in pathogen transmitting mosquitoes, their behavioural plasticity remains poorly understood. Memory and associative learning have been linked to behavioural changes in several insect species, but their relevance in behavioural responses to pesticide vector control has been largely overlooked. In this study, female *Aedes aegypti* and *Culex quinquefasciatus* were exposed to sub-lethal doses of 5 pesticide compounds using modified World Health Organization (WHO) tube bioassays. Conditioned females, subsequently exposed to the same pesticides in WHO tunnel assays, exhibited behavioural avoidance by forgoing blood-feeding to ensure survival. Standardized resting site choice tests showed that pre-exposed females avoided the pesticides smell and choose to rest in a pesticide-free compartment. These results showed that, following a single exposure, mosquitoes can associate the olfactory stimulus of pesticides with their detrimental effects and subsequently avoid pesticide contact. Findings highlight the importance of mosquito cognition as determinants of pesticide resistance in mosquito populations targeted by chemical control.

[Large-scale \(Phase III\) evaluation of broflanilide 50WP \(VECTRON™ T500\) for indoor residual spraying for malaria vector control in Northeast Tanzania: study protocol for a two-arm, non-inferiority, cluster-randomised community trial](#)

BMC Infectious Disease 21 Feb 2022

There is major investment in development of new insecticides for IRS that possess novel modes of action, long residual activity, low mammalian toxicity and minimal cross-resistance. VECTRON™ T500, a new IRS product containing the active ingredient broflanilide as a 50% wettable powder (WP), has been shown to be efficacious against pyrethroid susceptible and resistant vector species on mud and concrete substrates in experimental hut (Phase II) trials. This protocol describes a large-scale non-inferiority evaluation of a novel IRS product to reduce the density and EIR of pyrethroid-resistant *Anopheles* vectors. If VECTRON™ T500 proves non-inferior to Fludora® Fusion, it will be considered as an additional vector control product for malaria prevention and insecticide resistance management

Webinars, websites and other resources

[Ifakara Master Classes in Public Health & Medical Entomology](#)

Hosted by Fredros Okumu (Ifakara Health Institute) and Sheila Ogoma (Clinton Health Access Initiative), the recorded Q and A sessions with experts in the field on various topics are available on YouTube and well worth viewing. Recent topics include:

- ❑ 15 Dec - [Reviewing the 2021 World Malaria Report](#): a MasterClass with Pedro Alonso, Jennifer Gardy, Corine Karema, Nana Aba Williams and Richard Steketee
- ❑ 28 Oct - [Infected But Not Sick](#): a MasterClass with Profs. Chris Drakeley & Teun Bousema



[Vector Learning Xchange webinars](#)

Vector LearningXchange

- 14 Oct 2021 – Data drives decision-making in Vector Control
- 15 Dec 2021 – Community based entomological surveillance for vector control
- 17 Feb 2022 – Sustainability in IRS

[APMEN Webinar YouTube channel](#)

APMEN has launched a webinar series to provide a platform for discussing a variety of topics of interest and sharing information related to malaria elimination. Recorded sessions are available on their YouTube channel. Recent topics include:

- 9 Feb 2022 – [More discussions on mosquito repellents and attractants](#)



[Technical consultation on the use of economics in insecticide resistance management for malaria vector control](#)

Global Malaria Programme Report of a virtual meeting, 14–16 September 2021

The consultation's objectives were to provide an overview of the current status of insecticide resistance and resistance management practices, as well as of the ways in which economic principles can be applied to value

insecticide susceptibility. This technical consultation brought together experts in vector control, economics and malaria management to identify key challenges and suggest next steps. Questions raised before this technical consultation included:

(i) Is it worthwhile investing resources into maintaining vector susceptibility and delaying resistance in vectors, given limited budgets, and uncertainties in the available data?

(ii) Is it a good idea to spend more on new, more expensive tools/strategies now (assuming they can also delay the development of resistance), or is it better to delay their use until the efficacy of the existing tools has been exhausted, without much regard for insecticide resistance?

(iii) Is preventative IRM always preferable to reactive IRM in malaria vector control?

(iv) How will such solutions account for the trade-offs in malaria management that exist due to limited budgets, such as reductions in programmatic and geographic coverage?

The following key next steps were discussed, with WHO Member States in mind as the ultimate target audience.

1. Prepare a paper that explains the role and value of economics in informing the need for IRM in malaria
2. Create guidance on the economic evaluation of vector control interventions, including consideration of the value of delaying insecticide resistance (IR) and IRM costs
3. Collect more and better data, including standardized accounting of economic benefits and costs
4. Consider using behavioural economics and incentives in economic models
5. Evaluate adaptive management and monitoring
6. Investigate option-value analysis
7. Develop a budget impact model for procurement decisions



[15th meeting of the Vector Control Advisory Group \(VCAG\)](#)

16 December 2021 | Meeting report

Products discussed:

- ITNs designed to sterilize and/or reduce the fecundity of host-seeking insecticideresistant mosquitoes: Royal Guard (DCT) and Interceptor G2 (BASF)
- Lethal house lures: Eave tubes (In2Care)

This report includes interesting results from a cluster-randomized trial evaluating Interceptor G2 and Royal Guard® ITNs in Tanzania over a 24-month intervention period. Final assessments of net durability and sustainability of efficacy are due to be completed in January 2022 (three-year total trial duration). A second trial is ongoing in Benin and results after two years of intervention are anticipated for WHO review in mid-2022.

[17th VCWG Annual Meeting](#)

The registration of the 17th VCWG Annual Meeting is now open!

After the success of the virtual sessions last year and keeping in mind the equal participation for all, it was decided to continue with the virtual sessions in 2022. The focus of the sessions are:

Session 1 on March 3rd - Updates from vector control community

Session 2 on March 10th - Charting the course for the VCWG work streams

Session 3 on May 3rd - Work stream 1: Enhancing the impact of core interventions

Session 4 on May 4th - Work stream 2: Expanding the vector control toolbox

Session 5 on May 5th - Work stream 3: Implementing the Global Vector Control Response

Each session will last three hours, same time slot (below is the information in different time zones).

6:00 AM-9:00 AM PDT (e.g. San Francisco)

9:00 AM-12:00 PM EDT (e.g. Washington DC)

2:00 PM-5:00 PM GMT-UTC (e.g. Accra/London)
3:00 PM-6:00 PM CET (e.g. Geneva)
5:00 PM-8:00 PM EAT (e.g. Dar es Salaam/Nairobi)

[New BloodMealMap platform released on WRBUs VectorMap](#)

BloodMealMap is a novel, freely accessible web resource designed to visually map the distribution of - and interactions between- host, vectors and pathogens for the first time. Using molecularly confirmed mosquito blood meal data from the literature, this new VectorMap product (co-developed by WRBU and NCSU, and funded by NSF), empowers determination of “hot vector taxa” that may facilitate or accelerate zoonotic spill-over.



An important resource was launched a few days ago by WHO EMRO office. The YouTube channel found at the link below includes a playlist of filmed presentations given at a seminar organised by WHO-EMRO in 2021 as part of a [Regional Online Training of Trainers on Vector Surveillance and Control](#). The training covers surveillance and control of major disease vectors including the invasive *Anopheles stephensi* in the Horn of Africa.

Regional Online Training of Trainers on Vector Surveillance and Control

Session 1:

Aedes-borne disease Control Strategy



[Envisioning insecticide resistance management and integrated vector management a ZERO by 40 perspective](#)

[Full](#) and [summary reports](#) have been posted on the IVCC / ZERO by 40 website.

“The ZERO by 40 partners (BASF, Bayer, Mitsui Chemicals Agro, Sumitomo Chemical and Syngenta) are committed to a comprehensive and collaborative Insecticide Resistance Management (IRM) strategy, both through the continued development and stewardship of an expanded vector control toolbox, and by engaging with partners to implement IRM through the five elements of the Integrated Vector Management (IVM) framework”.

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
IRS	Actellic 300CS																								
	Sumishield																								
	Fludora Fusion																								
	Sylando																								
LLIN	Pyrethroid only																								
	Pyrethroid + PBO (Olyset Plus, Permanent 3)																								
	Pyrethroid + repurposed active ingredient (interceptor G2)																								
	Pyrethroid + IGB (Royal Guard)																								
ATSB	Next generation LLINs (new active ingredient)																								
	ATSB (active ingredient 1)																								
	ATSB (active ingredient 2)																								
	ATSB (active ingredient 3)																								
GAP	Larvicides																								
	Vector Traps (In2Trap)																								
	Lethal House Lures (Eave tubes)																								
	Spatial repellents (passive emanators)																								
	Genetic control (gene drive/population suppression)																								

A roadmap for IRM with the expected delivery dates of new products (time-lines for new products are estimates)

Malaria: Aberystwyth University drone system used in Zanzibar

Drone and smartphone technology developed at Aberystwyth University is being used to fight malaria in Tanzania's semi-autonomous islands of Zanzibar. The new approach has been welcomed in Zanzibar with the deputy programme manager of the Malaria Elimination Programme, Faiza Abbas, seeing it as an important step towards eliminating malaria.

"This project has been really helpful in terms of reaching and identifying the breeding sites, but also in terms of expenses," she said. "We as a programme are determined to use this technology to make sure we are capturing almost all the breeding sites because when you talk about malaria, there is no way you can leave behind the breeding sites..."It's a really, really important technology."



Note: This issue covers the period from 15 October – 21 Feb 2022

Disclaimer: Given the breadth of vector control related literature, we are unable to include all relevant work. This update is intended to focus primarily *Anopheles* vectors and a subset of control topics with global relevance. Any views expressed in this update do not necessarily reflect the views or opinions of IVCC. In many cases we directly quote abstracts and other sections of published work. Mention of trade names or commercial products in this publication is solely for the purpose of providing specific information and does not imply recommendation or endorsement by IVCC or its funders. Readers may view copyrighted publications shared here provided that the information is only for their personal, non-commercial use.