Contents

Selected Scientific Publications (between 1 February and 31 May 2025; preprints not included)

LLINs

Use of a portable field-adapted liquid chromatographic system (C-Vue machine) to estimate the quantity of deltamethrin on insecticide-treated nets paired with WHO cone bioassays to determine ITN bioefficacy as part of three-year durability monitoring in Mali

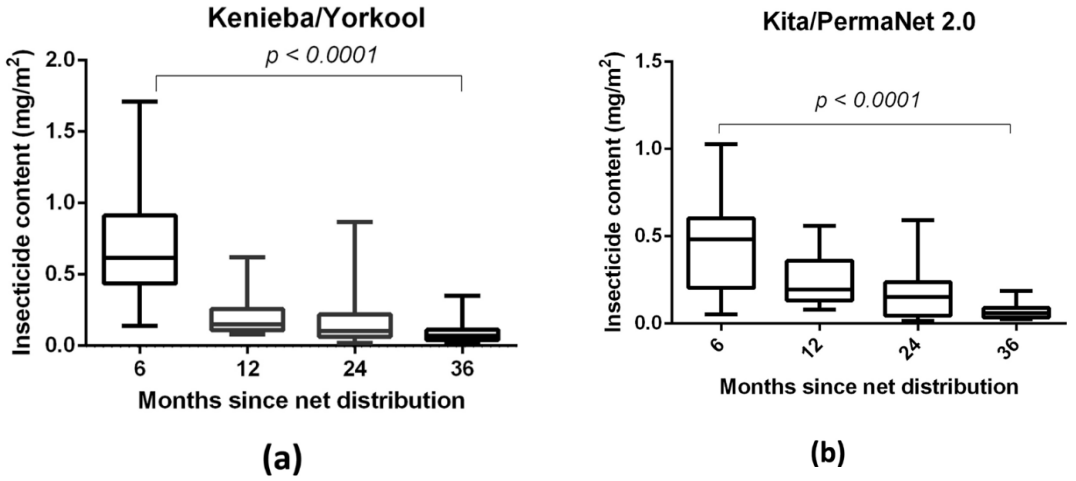
Malaria Journal 20 Feb 2025

Monitoring insecticide levels and physical integrity over time is essential for assessing the durability of insecticide-treated nets (ITNs), which largely depends on the net handling habits of users. This study determined the insecticide content and effectiveness of ITNs (Yorkool and PermaNet 2.0) at 6, 12, 24, and 36 months after a mass distribution campaign in Mali. The residual insecticide content was measured by a nondestructive sampling technique with a portable field-adapted high-performance liquid chromatographic (HPLC) system (C-Vue®).

Conclusion

The WHO standardized cone test and C-Vue evaluation demonstrated that net type effectiveness and insecticide content were consistently lower than expected at 3 years, and users washed nets with local soaps

containing sodium hydroxide, detergent or bleach. The C-Vue portable chromatographic device was used successfully for the first time in Mali to measure the insecticide concentration of ITNs.



PRONet Duo insecticide-treated net incorporated with chlorfenapyr and bifenthrin is superior to Interceptor® G2 nets against pyrethroid-resistant Anopheles gambiae sensu lato: a randomized experimental hut trial in Côte d'Ivoire and Tanzania using non-inferiority design

Frontiers in Malaria 13 March 2025

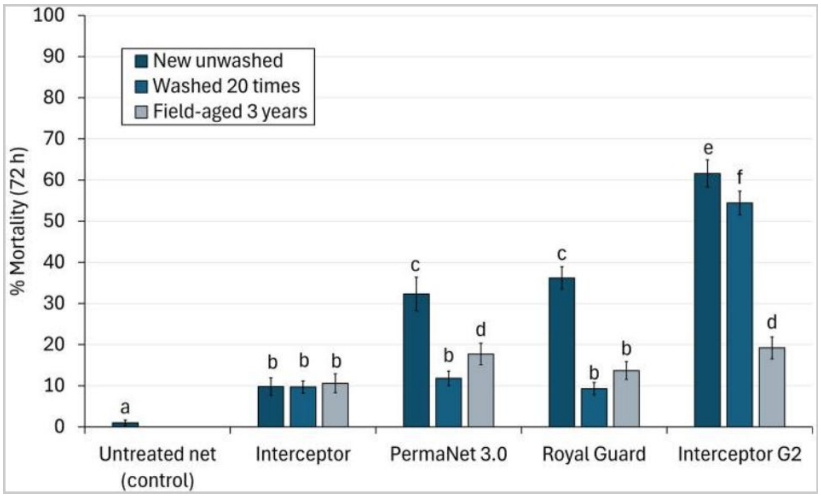
This study tested PRONet Duo, a new ITN with two active ingredients-bifenthrin and chlorfenapyr. Bifenthrin is a fluorinated pyrethroid that is highly stable and more slowly detoxified by pyrethroid-resistant mosquitoes. Chlorfenapyr disrupts cellular energy production. The efficacy of PRONet Duo was compared to Interceptor® G2, an alpha-cypermethrin and chlorfenapyr ITN with proven efficacy in malaria reduction. **Conclusion:** PRONet Duo ITNs are non-inferior and superior to the first-in-class Interceptor® G2 in terms of mosquito mortality and prevention of blood-feeding demonstrating the added benefit of bifenthrin for insecticide resistance management. Both chlorfenapyr nets offered superior mortality compared to the pyrethroid-only ITN. PRONet Duo offers an additional highly effective ITN for control of pyrethroid-resistant mosquitoes in malaria endemic regions.

Does washing insecticide-treated nets 20 times for experimental hut evaluations provide a suitable proxy for their end-of-life performance under household conditions?

Parasites & Vectors 21 April 2025

Insecticide-treated nets (ITNs) are washed 20 times as part of experimental hut trials to simulate the loss of active ingredient (AI) occurring over their intended 3-year lifespan and estimate insecticidal durability. The ability of the 20-wash method to predict the end-of-life performance of ITNs has not been empirically validated.

We performed an experimental hut trial to compare the efficacy of new ITNs unwashed and washed 20 times to field-aged ITNs withdrawn from households 3 years post-distribution against a pyrethroid-resistant vector population in Covè, Benin.
Conclusions: In this setting, the 20-wash method provided a suitable proxy for the end-of-life killing and sterilising performance of Interceptor®, PermaNet® 3.0 and Royal Guard® in experimental huts. In contrast, washing overestimated the end-of-life performance of Interceptor® G2 for mortality and underestimated the personal protection of all field-aged ITNs.



Sublethal insecticide exposure of larvae affects the blood-feeding behaviour of adult mosquitoes

Parasites & Vectors 24 May 2025

Using an insecticide-sensitive and a resistant strain of *Anopheles gambiae*, an important malaria vector, we evaluated the effects of sublethal exposure to permethrin throughout larval development on the resistance to the insecticide in adults, on host-seeking behaviour, on the motivation to blood-feed and on egg-laying behaviour.
Exposure to sublethal doses of insecticide did not affect knock-down or mortality rates. However, it decreased the avoidance of permethrin-treated nets, and it increased the motivation of females to seek blood meals through permethrin-treated nets, regardless of their sensitivity to the insecticide. It also increased the blood-meal size in particular of the sensitive mosquitoes. Finally, exposed females were more likely than unexposed ones to lay their eggs into several sites.

IRS

Determination of the residual efficacy of broflanilide (VECTRON™ T500) insecticide for indoor residual spraying in a semi-field setting in Ethiopia

Malaria Journal 13 Feb 2025

This study evaluated the efficacy of VECTRON™ T500 on various wall surfaces (mud, dung, paint, and cement) and assessed its decay rates over time in Ethiopia.
VECTRON™ T500 induced over 80% mortality across all wall surface types throughout the entire nine-month study period. In contrast, Actellic® 300CS achieved over 80% mortality for six months, except on dung wall surfaces, after which its efficacy declined sharply below 80%. This could make VECTRON™ T500 a promising candidate insecticide formulation for use in IRS in malaria-endemic countries such as Ethiopia.

Reconsidering indoor residual spraying coverage targets: A retrospective analysis of high-resolution programmatic malaria control data

PNAS 14 April 2025

Indoor residual spraying (IRS), which kills mosquitos by applying insecticide on the interior walls of structures, is an important malaria prevention method. Global guidance recommends that very high spray coverage (at least 80 to 85% of structures sprayed) is necessary to ensure protection, but there is little evidence about the relationship between coverage and impact. **This study suggests that much lower coverage levels (30 to 60%) may provide a similar level of protection as the recommended minimum of 80 to 85%.** Given the high implementation cost of IRS, a reduction in required coverage could significantly impact decision-making in malaria control programs, either to expand the areas protected by IRS, or to redistribute resources to support complementary activities.

A noninferiority cluster randomised evaluation of a broflanilide indoor residual spraying insecticide, VECTRON T500, for malaria vector control in Tanzania

Scientific Reports 29 April 2025

VECTRON T500, a new indoor residual spraying (IRS) product containing the active ingredient broflanilide as a 50% wettable powder (WP), was previously shown to be efficacious in experimental hut trials.

Here, to inform the evaluation of VECTRON™ T500 by WHO PQT/VCP, this IRS product was evaluated for non-inferiority compared to the WHO PQT/VCP listed IRS product Fludora® Fusion (Envu™) in a community-level trial with entomological endpoints.

The residual efficacy was > 80% mortality for VECTRON T500 and Fludora Fusion, on both mud and concrete walls, 12 months post spraying. VECTRON T500 was non-inferior to Fludora Fusion in terms of its ability to reduce vector density, sporozoite rate and EIR, providing an additional vector control tool with a new mode of action for malaria prevention and insecticide resistance management.

Impact of indoor residual spraying on malaria incidence in Ugandan prisons: an interrupted time series analysis

Malaria Journal 25 May 2025

Uganda Prison Services routinely implements IRS for malaria control in main prison facilities; however, no assessment of its impact had been performed. This study assessed the general malaria incidence trends for 5 years and determined the impact of IRS on malaria incidence in the main prison facilities in Uganda.

The average monthly malaria incidence rate for the study period was much lower among the intervention facilities (7.1 and 13.3 cases per 1000 population per month for the central and northern regions, respectively) than among the comparison facilities (177.0 and 170.6 cases per 1000 population per month for the central and northern regions, respectively).

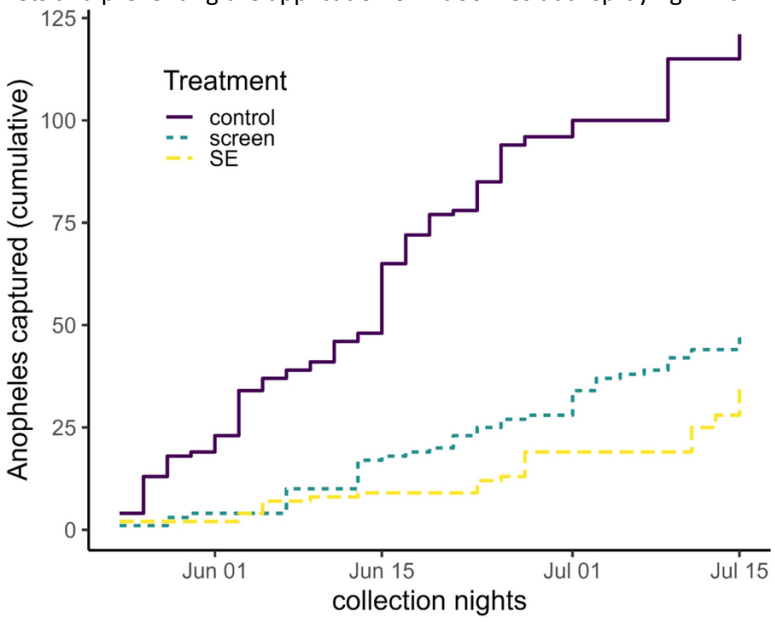
Spatial emanators

Effectiveness of a transfluthrin emanator and insecticide-treated barrier screen in reducing Anopheles biting in a temporary shelter in Sumatra, Indonesia

Malaria Journal 7 April 2025

In Jambi Province, Sumatra, Indonesia, local indigenous populations sleep under temporary tarpaulin-roofed shelters, complicating the use of bed nets and preventing the application of indoor residual spraying. Two pyrethroid-based interventions were tested alongside a no-intervention control in the field using a Latin-square design. A volatile pyrethroid spatial emanator (SE) offers an easily deployable, simple to use intervention utilizing transfluthrin, while deltamethrin-impregnated barrier screens represents a more permanent intervention.

Anopheles host-seeking activity was reduced in the presence of the SE (RR: 0.30 [0.21–0.43], $p < 0.001$) and barrier screen (RR: 0.39 [0.28–0.54], $p < 0.001$) interventions compared to control shelters over the course of the study.



Longitudinal field evaluation of outdoor Anopheles and non-Anopheles host-seeking in response to a volatile pyrethroid spatial emanator (SE) product among forest-dwelling indigenous residents of Sumatra, Indonesia

Malaria Journal 10 April 2025

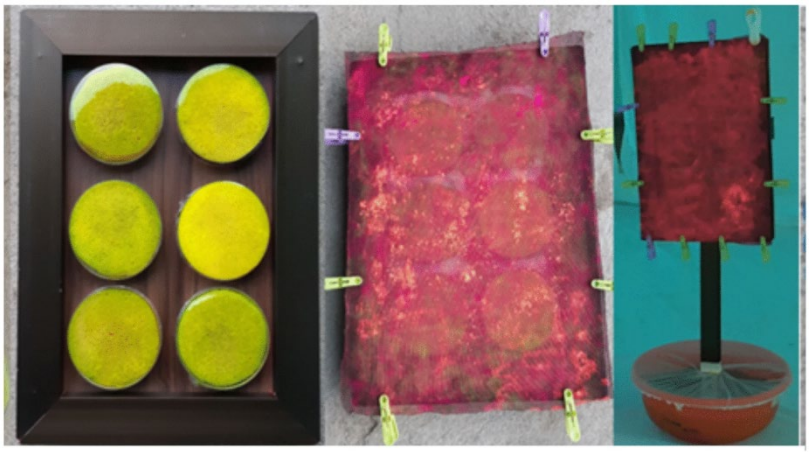
A volatile pyrethroid spatial emanator (SE), a prototype of the PIC® BITEBARRIER® containing transfluthrin was tested in open-walled households of the forest-dwelling Orang Rimba people in Sumatra, Indonesia, over the course of sixteen weekly entomological visits. The SE device evaluated in this field trial was effective in reducing outdoor human exposure to *Anopheles* and non-*Anopheles* mosquito host-seeking activity. The intervention was attributed to an approximately 70% reduction in nightly *Anopheles* host seeking activity compared to placebo devices. The effect was not found to depend upon the age of the device, suggesting that the protection was persistent over the 4-week replacement period during this study.

New vector control tools and approaches

Bioassays for the evaluation of the attractiveness of attractive targeted sugar bait (ATSB) against Anopheles mosquitoes in controlled semi-field systems

Parasites & Vectors 4 Feb 2025

This study aimed to assess the attractiveness and feeding success of *Anopheles* mosquitoes exposed to attractive sugar baits (ASBs). Both male and female *An. gambiae* and *An. funestus* mosquitoes were attracted to the ASBs, with no significant difference between the sexes for each of the experiments conducted. Older mosquitoes (3–5 days) were more attracted to the ASBs (OR = 8.3) than younger mosquitoes (0–1 day). Similarly, older mosquitoes responded more to 20% sucrose (OR = 4.6) than newly emerged *Anopheles*. Of the four prototypes tested, the latest iteration, ASB prototype v1.2.1, showed the highest intrinsic attraction of both *Anopheles* species, attracting 91.2%.



Battery of sugar solution-filled Petri dishes. **A** Standardised control 20% sucrose-filled Petri dishes labelled with uranine and covered with clingfilm on an aluminium tray. **B** Petri dishes overlaid with electrostatic black gauze/netting (EN) dusted with fluorescent powder. **C** Sugar delivery system (either a tray of Petri dishes or bait station covered with EN) and erected within a net-covered dish

The findings indicate that future bioassays to evaluate ATSBs should use mosquitoes of both sexes, aged 3–5 days, include multiple species in the same cage or chamber, and utilize both non-choice and choice tests with a standard comparator.

Time to loss of physical integrity of attractive targeted sugar bait (ATSB) stations in Western Province, Zambia: a survival analysis

Malaria Journal 15 March 2025

This study measured the duration of physical integrity of the ATSB Sarabi v1.2 stations used in Western Zambia, as part of a Phase III cluster RCT.

Including replacements, a total of 1107 ATSBs were installed across 304 sleeping structures in 206 households, and 5696 ATSB-visits were made. Common types of damage observed were holes/tears, mold, and leakage of bait. While the median survival time for the devices was 5 months (149 days) for all stations in the study, the median survival time was longer than the transmission season for stations installed in locations well protected by the roof (> 218 days). ATSB station survival was longer when installed on structures with thatched roofs compared to iron-sheet roofs (HR 0.37, 95% CI 0.26–0.47, $p < 0.001$), and where there was “excellent protection” (HR = 0.36, 95% CI 0.25–0.49, $p < 0.001$), compared to “no protection”.

Study results suggest that the majority of ATSB stations deployed in this setting will remain intact for a 7-month seasonal deployment period if stations are installed in locations protected from weather elements, such as underneath the overhang of thatched roof.

Larval control

Elevating larval source management as a key strategy for controlling malaria and other vector-borne diseases in Africa

Parasites & Vectors 7 Feb 2025

This letter is the result of a global, cross disciplinary collaboration comprising: (a) detailed online expert discussions, (b) a narrative review of countries that have eliminated local malaria transmission, and (c) a mathematical modeling exercise using two different approaches. Together, these efforts culminated in seven key recommendations for elevating larval source management (LSM) as a strategy for controlling malaria and other mosquito-borne diseases in Africa (Box 1).

In this paper, we argue that the heavy reliance on large-scale cluster-randomized controlled trials (CRTs) to generate evidence on epidemiological endpoints restricts the recommendation of approaches to only those interventions that can be measured by functional units and deliver relatively uniform impact and, therefore, are more likely to receive financial support for conducting these trials. The explicit impacts of LSM may be better captured by using alternative evaluation approaches, especially high-quality operational data and a recognition of locally distinct outcomes and tailored strategies. LSM contributions are also evidenced by the widespread use of LSM strategies in nearly all countries that have successfully achieved malaria elimination.

Two modelling approaches demonstrate that a multifaceted strategy, which incorporates LSM as a central intervention alongside other vector control methods, can effectively mitigate key biological threats such as insecticide resistance and outdoor biting, leading to substantial reductions in malaria cases in representative African settings. This argument is extended to show that the available evidence is sufficient to establish the link between LSM approaches and reduced disease transmission of mosquito-borne illnesses. What is needed now is a significant boost in the financial resources and public health administration structures necessary to train, employ and deploy local-level workforces tasked with suppressing mosquito populations in scientifically driven and ecologically sensitive ways. In conclusion, having WHO guidelines that recognize LSM as a key intervention to be delivered in multiple contextualized forms would open the door to increased flexibility for funding and aid countries in implementing the strategies that they deem appropriate. Financially supporting the scale-up of LSM with high-quality operations monitoring for vector control in combination with other core tools can facilitate better health. The global health community should reconsider how evidence and funding are used to support LSM initiatives.

Box 1: Key recommendations for elevating larval source management as a key strategy for controlling malaria and other mosquito-borne diseases in Africa

1. LSM is proven effective and should be considered as a key intervention for mosquito control in Africa.
2. A consensus evaluation framework that recognises the multiple actions available and that can be tailored to each setting should be developed for LSM, including process monitoring and impact evaluation metrics.
3. LSM should be considered as a multi-sectoral and multi-ministerial-effort, drawing on complementary expertise and capabilities
4. Strong community engagement—including the employment of the local workforce, fostering ownership and leadership—along with knowledge, trust and acceptance are key to sustain LSM implementation.
5. Technological advancements (such as satellite imagery, drones, mobile technologies and GIS-based approaches) should be embraced and strategically deployed to augment not replace community-driven initiatives.
6. Long-term investments and context-specific strategies are required to realise the full impact of LSM.
7. Update LSM guidelines to capture high quality operational evidence, recognize the advantages that advancements in technologies and our understanding of disease vector bionomics provide.

Anopheles stephensi

Urban malaria in sub-Saharan Africa: a scoping review of epidemiologic studies

Malaria Journal 19 April 2025

Urbanization is changing malaria dynamics, driven by environmental changes and population growth, with nearly 70% of people projected to live in urban areas by 2050. This scoping review maps the epidemiology of urban malaria in sub-Saharan Africa, identifying research gaps and guiding strategies for control and elimination.

This review highlights the high burden of urban malaria infections in sub-Saharan African countries, examining its prevalence and incidence

Odds & Ends

Recombinant venom proteins in insect seminal fluid reduce female lifespan

Nature Communications 7 Feb 2025

The emergence of insecticide resistance has increased the need for alternative pest management tools. Numerous genetic biocontrol approaches, which involve the release of genetically modified organisms to control pest populations, are in various stages of development to provide highly targeted pest control.

However, all current mating-based genetic biocontrol technologies function by releasing engineered males which skew sex-ratios or reduce offspring viability in subsequent generations which leaves mated females to continue to cause harm (e.g. transmit disease). Here, we demonstrate intragenerational genetic biocontrol, wherein mating with engineered males reduces female lifespan. The toxic male technique (TMT) involves the heterologous expression of insecticidal proteins within the male reproductive tract that are transferred to females via mating. TMT is a promising approach for combatting outbreaks of disease vectors and agricultural pests.

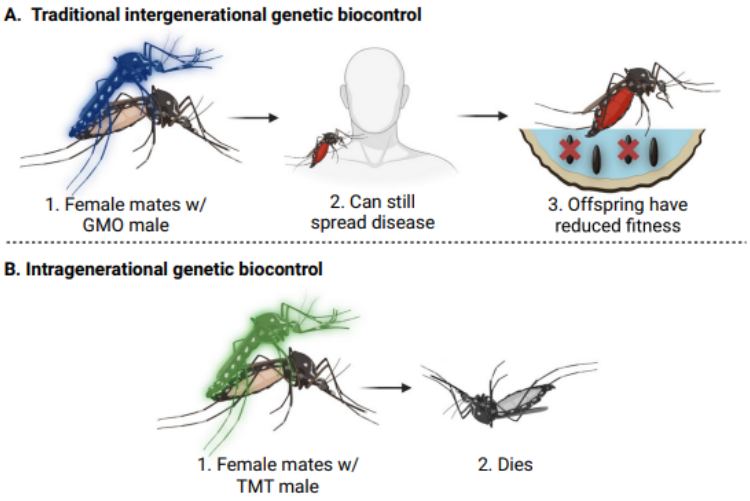


Fig. 1 | Intergenerational vs intragenerational genetic biocontrol of pest insects. Current mating-based methods of genetic biocontrol (**A**) function by affecting the viability or sex ratio of the offspring of subsequent generations. However, mated females persist in the target area and can continue to cause harm (e.g. spread disease). Intragenerational biocontrol (**B**), such as TMT, directly affects the fitness of mated females, thereby rapidly reducing the harm caused by the target population. Created in BioRender. Maselko, M. (2024) https://BioRender.com/r25q201.

The impact of insecticide decay on the rate of insecticide resistance evolution for monotherapies and mixtures

Malaria Journal 18 Feb 2025

Background: The problem of insecticide decay following their deployment in public health applications is frequently highlighted as an issue for sustained disease control. There are additional concerns that it also increases selection for insecticide resistance. Despite these concerns insecticide decay is largely absent from models evaluating insecticide resistance management strategies.

Methodology: The impact of insecticide decay is investigated using a model which assumes a polygenic basis of insecticide resistance. Single generation evaluations are conducted that cover the insecticide efficacy and insecticide resistance space for insecticides when deployed as monotherapies or mixtures to mechanistically investigate how insecticide decay impacts selection for resistance. The outcome is the between generation change in bioassay survival to the insecticides. The monotherapy sequence and mixture strategies were compared in multi-generation simulations incorporating insecticide decay, with the outcome being the difference in strategy lifespan.

Results: The results demonstrate that as insecticides decay, they can apply a much greater selection pressure than that imposed by newly deployed, non-decayed insecticides; this applies to both monotherapies and mixtures. For mixtures, selection for resistance is highest when both insecticides have reduced decayed efficacies; this also occurs if reduced dosages are deliberately used in mixtures. Insecticide decay was found to reduce the benefit of mixtures compared to sequential monotherapies, especially when reduced-dose mixtures are used.

Conclusions: Insecticide decay is often highlighted as an important consideration for mixtures and these results indicate its absence in previous modelling studies may be over-inflating the performance of full-dose mixtures.

Daytime and public space exposure to Anopheles funestus bites in Western Province, Zambia: implications for malaria surveillance and control

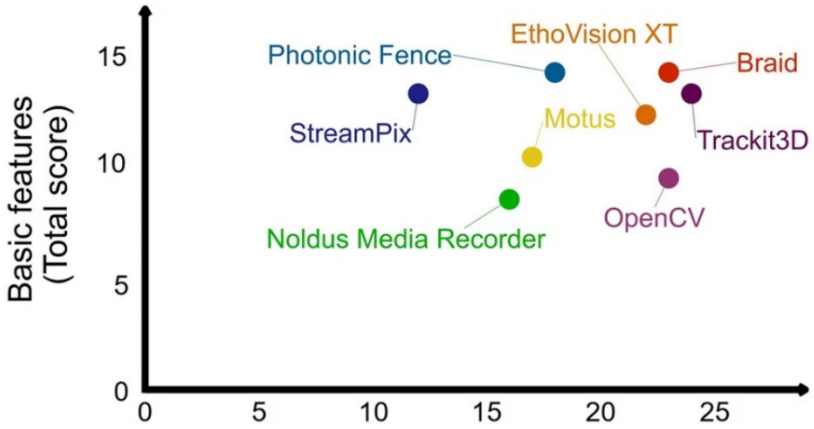
Malaria Journal 18 Feb 2025

This study piloted an expanded vector surveillance approach to capture 24 -hour biting patterns at households and in public spaces, including schools and markets, where core interventions offer limited protection. Results document significant exposure to *An. funestus* bites both indoors and outdoors, at home as well as in public spaces such as schools and markets, and late in the morning until 11:00 h in Western Province, Zambia.

Revealing complex mosquito behaviour: a review of current automated video tracking systems suitable for tracking mosquitoes in the field

Parasites & Vectors 21 Feb 2025

To study complex mosquito behaviour, automated video tracking of mosquito flight paths has proven to be a comprehensive approach, and several video tracking approaches have emerged in recent years, making the choice for a suitable system challenging. Here, we conducted a literature review and we identified 66 publications focusing on mosquito video tracking, which made use of eight different systems. We then compared and scored those video tracking systems by assessing their performance in the laboratory as well as their potential suitability for tracking mosquito behaviour in a field setting. While all eight systems have produced valuable information on mosquito behaviour, for tracking mosquitoes in the field, 'Braid', 'EthoVision XT' and 'Trackit3D' appear to be the most suitable systems as they need small disk capacity and are well adaptable to different settings. However, the optimal choice will ultimately depend on the specifications required to answer a given research question, the financial resources available and user preferences.



Suitability of automated video tracking systems to track mosquitoes in the field. Each point shows the results for one of eight automated video tracking systems to record mosquito flight behaviour in the field context, comparing the total score for its basic features against its total score for field deployability. The total scores are the sum of individual scores for different parameters. An ideal system has a high total score for both the basic features and its field deployability (i.e. features in the top right corner of the graph)

Early evening outdoor biting by malaria-infected Anopheles arabiensis vectors threatens malaria elimination efforts in Zanzibar

Malaria Journal 20 March 2025

Here, entomological investigations were conducted to identify the malaria vector species composition, mosquito biting behaviours, and risk of human indoor and outdoor exposure to infectious bites throughout nighttime hours to inform selection and aid optimization of vector control strategies.

Adult malaria vectors were collected monthly for two consecutive nights at ten sentinel sites from October 2022 to September 2023. Hourly indoor and outdoor human landing catch method was used for collecting mosquitoes from 18:00 to 06:00 h.

Results

Anopheles arabiensis was the predominant malaria vector species across all the sentinel sites, except in the urban district of Unguja, where *Anopheles gambiae* sensu stricto was predominant. Malaria parasite-infected *An. arabiensis* bites were distributed disproportionately between indoors (n = 4), 22:00 to 02:00 h, and outdoors (n = 10) earlier in the evenings, 1800 to 2100 h.

Conclusion

The outdoor catches of malaria-parasite infected mosquitoes before typical sleeping hours highlight the potential risk of human exposure to outdoor transmission.

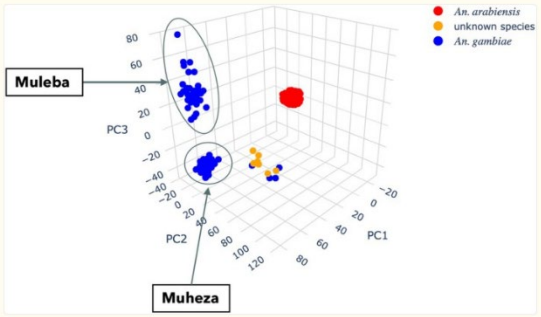
Genomic Analysis Reveals a New Cryptic Taxon Within the Anopheles gambiae Complex With a Distinct Insecticide Resistance Profile in the Coast of East Africa

Molecular Ecology 16 April 2025

This study investigated the genetic structure and insecticide resistance profiles of *Anopheles gambiae* complex mosquitoes in Tanzania. We analysed whole-genome sequence data of 300 mosquitoes collected between 2012 and 2015 across four regions in northern Tanzania and identified *An. gambiae* s.s., *An. arabiensis* and a distinct taxonomic group that was previously unknown. This distinct taxon has a unique profile of genetic diversity and appears restricted to the coastal region, and we refer to it as the *Pwani* molecular form.

Our analysis also revealed a pattern of geographical isolation in the *An. gambiae* s.s. populations, with samples from the north-western site (Muleba) clustering separately from those collected in the north-eastern site (Muheza). These geographically isolated subpopulations also had differing resistance and selection profiles, with *An. gambiae* s.s. from the north-western site showing genomic evidence of higher resistance to pyrethroids compared with the north-eastern population. Conversely, *An. arabiensis* showed no geographical population structuring, with a similar insecticide resistance profile across all sampling locations, suggesting unrestricted gene flow.

FIGURE 2.



Open in a new tab

Principal component analysis (PCA) plot showing the population structure of *Anopheles gambiae* complex mosquitoes from Tanzania as provisionally assigned by AIMs, computed using SNPs from chromosome arm 3L.

Simulating dynamic insecticide selection pressures for resistance management in mosquitoes assuming polygenic resistance

PLOS Computational Biology 28 April 2025

Insecticide resistance poses a threat to the continued control of vector-borne diseases. The use of insecticide resistance management strategies is recommended to slow the spread of insecticide resistance and limit its impact on disease transmission. However, what insecticide resistance management strategies work in specific circumstances is under debate. Simulation modelling is frequently used to evaluate insecticide resistance management strategies, as evaluating strategies in the field is inhibited by the need for long trial durations, replicated across settings. Previous models have generally assumed resistance is encoded by a single gene (monogenic), and evaluated a limited set of strategies. Here we consider insecticide resistance when encoded by many genes (polygenic) and use a dynamic quantitative genetics approach. We present a novel mathematical methodology for the simulation of insecticide resistance management strategies, which includes the key parameters of insecticide dosing, insecticide decay and cross resistance. These are generally absent in previous models, despite being considered important for strategy evaluation. Extending our computational model to allow for multiple blood-feeding cycles (and hence multiple rounds of selection) allows for more complex strategies to be evaluated which include household level deployments of different insecticides. In simple scenarios evaluating rotations, sequences and mixtures we generate further support for the results from other recent modelling studies. We further demonstrate that this computational model will have value for evaluating more specific insecticide resistance management scenarios, which can help inform and guide insecticide deployments.

Comprehensive Mosquito Wing Image Repository for Advancing Research on Geometric Morphometric- and AI-Based Identification

Nature Scientific Data 29 April 2025

Accurate identification of mosquito species is essential for effective vector control and mitigation of mosquito-borne disease outbreaks. Traditional morphological identification requires highly specialized personnel and is time-consuming, while molecular techniques can be cost-effective and dependent on comprehensive genetic information. Wing geometric morphometry has emerged as a promising alternative, leveraging detailed geometric measurements of wing shapes and vein patterns to distinguish between species and detect

intraspecies variations. This paper presents a curated dataset of 18,104 mosquito wing images, collected from 10,500 mosquito specimens, annotated with extensive meta-information, designed to support research in wing geometric morphometry and the development of machine learning models, ultimately supporting efforts in vector surveillance and research.

Example wing images of different projects of Ae. aegypti from the dataset. Images 2a, 2 d, 2e and 2 f were captured using the Olympus SZ61, 2b was captured using Leica M205c and 2c was captured using an iPhone SE with an attached micro-lens.

Age structure and parity status determination of Afrotropical malaria vectors using MALDI-TOF MS

Sci Reports 6 May 2025

This study aimed to investigate the use of Matrix-Assisted Laser Desorption/Ionization Time-of-Flight Mass Spectrometry (MALDI-TOF MS) for malaria vector age-grading using insectary-reared and wild-caught mosquitoes. *Anopheles gambiae s.s.* mosquitoes were reared in the insectary to different known physiological and chronological ages to evaluate if MALDI-TOF MS could be used to distinguish between different age groups. Wild mosquitoes were collected from Mozambique and Kenya and dissected to determine their parity status. Reference spectra were obtained from mosquito's cephalothorax and used to create predictive databases which were validated using independent samples. MALDI-TOF MS identified the physiological and chronological age of insectary-reared mosquitoes with 94.52% and 77% accuracy respectively. Field-collected mosquitoes were primarily *An. funestus s.s.* and *An. gambiae* s.s. Parity prediction accuracy was between 81% and 87%. MALDI-TOF MS was able to distinguish and differentiate mosquitoes based on their age structure (chronological and physiological) and parity status.

Effectiveness of integrated vector management on the incidence of dengue in urban Malaysia: a cluster-randomised controlled trial

The Lancet Infectious Diseases 12 May 2025

In this cluster-randomised controlled trial we enrolled low-cost and medium-cost residential housing blocks in the Federal Territory of Kuala Lumpur and Putrajaya Malaysia with recurrent dengue outbreaks. Of the 329 eligible sites, 139 were randomly allocated to receive IVM measures (community engagement, targeted outdoor residual spraying using K-Othrine Polyzone, and deployment of autodissemination devices to target both larval and adult mosquitoes) and 141 received routine vector control activities. 903,834 individuals were living in the study areas.

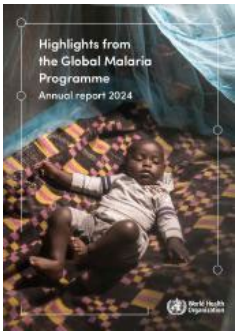
Our study did not show an effect on the primary endpoint of the overall dengue incidence. Several factors such as substantial decrease in dengue incidence during the COVID-19 pandemic could have reduced the statistical power to detect significant differences between the two groups.

A post-hoc analysis showed a statistically significant reduction in the mean number of dengue cases in the number of outbreaks (29% [95% CI 0·51–0·98]) and hotspots (43% [0·35–0·93]) in the intervention group in comparison to the control group.

WHO News and Publications

Highlights from the Global Malaria Programme: annual report 2024

28 March 2025



Overview

In April 2024, the Global Malaria Programme unveiled a new operational strategy describing its technical direction for the period 2024–2030. The strategy focuses on four key levers to accelerate malaria responses worldwide: technical leadership, norms and standards, new tools and innovation, and strategic information for impact. This report documents the Programme's progress in implementing the strategy in its first year.

Quality of conduct and interpretation of insecticide susceptibility in bioassays using new insecticides for vector control: meeting report, 24 September 2024

28 March 2025

Overview

This meeting report outlines the outcomes of a technical consultation to consider the quality of conduct and interpretation of insecticide susceptibility of mosquitoes to new insecticides for vector control. A provisional definition of susceptibility to chlorfenapyr was developed and questions about bioassay sample size and use of adjuvants were discussed. Finally, requirements for developing discriminating concentrations were determined, and a protocol will be prepared.

World Malaria Day 2025

25 April 2025

WHO calls for revitalized efforts to end malaria

Strong global collaboration has been critical in saving nearly 13 million lives since 2000

WHO recently warned that the 2025 funding cuts could further derail progress in many endemic countries, putting millions of additional lives at risk. Of the 64 WHO Country Offices in malaria-endemic countries that took part in a recent WHO stock take assessment, more than half reported moderate or severe disruptions to malaria services.

Twenty-first meeting of the WHO Vector Control Advisory Group

8 May 2025

Overview

Experts from the WHO Vector Control Advisory Group (VCAG) met with product developers, innovators and researchers from 21 to 25 October 2024 for the 21st VCAG meeting. This report details the proceedings and outcomes of the meeting, including advice provided to applicants working on interventions in the following intervention types:

- systemic endectocide treatment,
- reduction of pathogen transmission induced by gene drive;
- topical repellents;
- spatial repellents;
- sterilization of male mosquitoes;
- bait stations; and
- eave tubes.

Webinars, websites and other resources

RAFT TechTalk Series: ***Rice and malaria in Africa: part of the problem or part of the solution?***

11 May 2025

In many African countries, the Ministry of Health is planning the pathway to malaria elimination, and meanwhile the Ministry of Agriculture is planning a massive expansion of irrigated rice. These are both desirable goals, and many international donors, including FCDO, are supporting both. Unfortunately, the agricultural goal is likely to interfere with the public heath goal: irrigated rice in Africa tends to "build-in" the malaria problem.

Speakers:

- Jo Lines (LSHTM): The role of environmental development in malaria elimination
- Kallista Chan (Costello Medical): The rise and fall of the Paddies Paradox
- Abdelbagi Ismail (International Rice Research Institute): Trends in rice development in Africa, and how the issues of Methane Emission and climate adaptation are being addressed
- Pauline Chivenge (International Rice Research Institute): Our plans for collaborative research

APMEN Webinar YouTube channel

APMEN hosts 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 and upcoming topics include:

- ❑ 8 May 2025 –***Multiple Hazards from Climate and Environmental Change and Malaria***

  Speakers/Panellists
  - Dr. Kimberly Fornace, Natl Univ of Singapore
  - Dr. Tung Nguyen-Duy, Oxford Clinical Research Unit, Viet Nam
  - Dr. Alex Eapen, NIMR, India
  - Dr. Stephan Karl, James Cook University, Australia

In the news and social media

SC Johnson Launches High-Speed Manufacturing of Malaria-Prevention Tool, Helps Meet Critical Health Need and Creates Local Jobs

4 Feb 2025

SC Johnson, makers of household brands such as OFF!®, Fuyí® and Raid®, announced the opening of high-speed manufacturing lines at its Nairobi, Kenya plant to produce SC Johnson Guardian™, one of the company's spatial repellents designed to significantly reduce the presence of mosquitos.

The Kenyan Ministry of Health has already taken steps to incorporate spatial repellents into the national malaria control strategy. The Ministry has developed Guidelines for the National Scale-Up of Spatial Repellents to prepare for the introduction of this tool as part of its broader malaria prevention strategy.

Watch an ***interview with Dr. Eric Ochomo*** describing the trial of the SC Johnson Shield in Busia, Kenya.

IVCC congratulates ***BASF*** on the news of the prequalification of Sylando® 240 SC by the World Health Organization (WHO) in December 2024. Sylando® 240 SC is a welcome new mode of action in the indoor residual spraying (IRS) toolbox. The full story is **available on our website**.

Oxitec Breaks Ground on World's Largest Wolbachia Mosquito Production Facility in Brazil Capable of Protecting Up To 100 Million People Threatened by Dengue

- Oxitec's new state-of-the-art production facility will make Wolbachia Replacement Technology (WRT), which is a safe, sustainable solution proven to reduce mosquitoes' ability to transmit dengue, available to millions more people in Brazil and globally.
- Adding WRT to Oxitec's world-first dengue mosquito-specific suppression technology Aedes do Bem™ establishes an unprecedented suite of solutions appropriate for communities, governments, businesses, and homeowners.

My new deadline: 20 years to give away virtually all my wealth

Gates Foundation 8 May 2025

During the first 25 years of the Gates Foundation, we gave away more than $100 billion. Over the next two decades, we will double our giving.

When I first began thinking about how to give away my wealth, I did what I always do when I start a new project: I read a lot of books. I read books about great philanthropists and their foundations to inform my decisions about how exactly to give back. And I read books about global health to help me better understand the problems I wanted to solve.

One of the best things I read was an 1889 essay by Andrew Carnegie called *The Gospel of Wealth*. It makes the case that the wealthy have a responsibility to return their resources to society, a radical idea at the time that laid the groundwork for philanthropy as we know it today.

In the essay's most famous line, Carnegie argues that "the man who dies thus rich dies disgraced."