Selected Scientific Publications (between 1 June and 31 September 2024)

LLINs

Physical and insecticidal durability of Interceptor®, Interceptor® G2, and PermaNet® 3.0 insecticide-treated nets in Burkina Faso: results of durability monitoring in three sites from 2019 to 2022

Malaria Journal 4 June 2024

Pyrethroid-only ITN (Interceptor®) and dual AI (Interceptor® G2, and PermaNet® 3.0) ITNs were assessed across three health districts over 36 months in southern Burkina Faso to estimate median ITN survival, insecticidal efficacy, and to identify factors contributing to field ITN longevity.

At endline, the median useful life was 3.2 (95% CI 2.5–4.0) years for PermaNet® 3.0 ITNs in Orodara, 2.6 (95% CI 1.9–3.2) years for Interceptor® G2 ITNs in Banfora and 2.4 (95% CI 1.9–2.9) years for Interceptor® ITNs in Gaoua. At endline, PermaNet® 3.0 ITN recorded 24-h mortality of 26% against resistant mosquitos on roof panels, with an 84% reduction in PBO content. Interceptor® G2 ITN 72-h mortality was 51%, with a 67% reduction in chlorfenapyr content. Interceptor® ITN 24-h mortality was 71%, with an 84% reduction in alpha-cypermethrin content.

Conclusion: Only PermaNet® 3.0 ITNs surpassed the standard three-year survival threshold. Identified protective factors should inform SBC messaging. Significant decreases in chemical content and resulting impact on bioefficacy warrant more research in other countries to better understand dual AI ITN insecticidal performance.

LLIN Evaluation in Uganda Project (LLINEUP)–effects of a vector control trial on Plasmodium infection prevalence and genotypic markers of insecticide resistance in Anopheles vectors from 48 districts of Uganda

Scientific Reports 24 June 2024

In 2017–2019, we conducted a large-scale, cluster-randomised trial (LLINEUP) to evaluate long-lasting insecticidal nets (LLINs) treated with a pyrethroid insecticide plus PBO, as compared to conventional, pyrethroid-only LLINs across 104 health sub-districts in Uganda. In the LLINEUP trial, we conducted cross-sectional household entomological surveys at baseline and then every 6 months for two years, which we use here to investigate longitudinal changes in mosquito infection rate and genetic markers of resistance. The frequency of genetic markers associated with pyrethroid resistance increased significantly over time, but the rate of change was not different between the two LLIN types. The increased frequency of markers of

pyrethroid resistance indicates that LLIN distribution favoured the evolution of resistance within local vectors and highlights the potential benefits of resistance management strategies.

Will a lack of fabric durability be their downfall? Impact of textile durability on the efficacy of three types of dual-active-ingredient long-lasting insecticidal nets: a secondary analysis on malaria prevalence and incidence from a cluster-randomized trial in north-west Tanzania

Malaria Journal 28 June 2024

The Dual-Active Ingredient long-lasting insecticidal nets (Dual-AI LLIN) have been developed to counteract the reduced efficacy of pyrethroid (PY)-only nets due to widespread pyrethroid insecticide resistance in malaria vector mosquitoes. They constitute half of the nets distributed in sub-Saharan Africa between 2022 and 2024. However, their effectiveness once they develop holes is unclear, particularly in pyrethroid-resistant settings. This study evaluates the textile integrity of three dual- AI LLINs compared to standard PY LLN, over 3 years of use in a community in Tanzania and the associated impact on malaria prevalence and incidence.

Results: There was no significant association between damaged (OR 0.98, 95% CI 0.71–1.37, p-value = 0.655) and too-torn (OR 1.07, 95% CI 0.77–1.47, p-value = 0.694) compared to intact nets on malaria prevalence for all net types. However, there were reduced rates of malaria case incidence in children sleeping under a net in good condition compared to too-torn nets (incidence rate ratio (IRR) 0.76 [95% CI 0.63–0.92], p = 0.005). Malaria incidence was also consistently lower in too-torn PBO-PY LLIN (IRR = 0.37 [95% CI 0.19–0.72], p = 0.003) and chlorfenapyr-PY LLIN (IRR = 0.45 [95% CI 0.33–0.97], p = 0.053) compared to an intact PY-only LLIN during the first year of follow up. In year 2, the incidence was only significantly lower in intact chlorfenapyr-PY LLIN (IRR = 0.49 [95% CI 0.29–0.81], p = 0.006) compared to intact PY LLIN.

Conclusion: The study confirmed that sleeping under a chlorfenapyr-PY LLIN or PBO-PY LLIN offered superior protection to pyrethroid-only nets even when torn. Preventing the development of holes is essential as they impact the level of protection offered against malaria infection.

Non-contact detection of pyrethroids widely used in vector control by Anopheles mosquitoes

PLoS One 12 July 2024

Field data suggest the presence of spatial sensory detection by *Anopheles* mosquitoes of the pyrethroid molecules used in insecticide-based control tools, such as long-lasting insecticide nets or insecticide residual spraying. This opens the way to the emergence of a wide range of behavioral adaptations among malaria vectors. However, the spatial sensory detection of these molecules is controversial and needs to be demonstrated. The goal of this study was to behaviorally characterize the non-contact detection of three of the most common pyrethroids used for malaria vector control: permethrin, deltamethrin an α-cypermethrin. To reach this goal, we recorded the behavior (take off response) of *Anopheles gambiae* pyrethroid-sensitive and resistant laboratory strains, as well as field collected mosquitoes from the Gambiae Complex, when exposed to the headspace of bottles containing different doses of the insecticides at 25 and 35°C, in order to represent a range of laboratory and field temperatures. We found the proportion of laboratory susceptible and resistant female mosquitoes that took off was, in all treatments, dose and the temperature dependent. Sensitive mosquitoes were significantly more prone to take off only in the presence of α-cypermethrin, whereas sensitive and resistant mosquitoes showed similar responses to permethrin and deltamethrin. Field-collected mosquitoes of the Gambiae Complex were also responsive to permethrin, independently of the species identity (*An. gambiae*, *An. coluzzii* and *An. arabiensis*) or their genotypes for the *kdr* mutation, known to confer resistance to pyrethroids. The observed ability of *Anopheles* spp. mosquitoes to detect insecticides without contact could favor the evolution of behavioral modifications that may allow them to avoid or reduce the adverse effect of insecticides and thus, the development of behavioral resistance.

Assessment of household preferences for net textile type (polyester versus polyethylene) for decision-making of the National Malaria Control Programme in Burkina Faso: methods for a quasi-experimental study

Malaria Journal 12 Sept 2024

The suboptimal use of insecticide-treated nets (ITNs) in households may be linked to the influence of user preferences on net textiles (polyester or polyethylene).

Global procurement policies require that NMCP requests for ITNs of a single textile be justified by robust evidence that shows that there would be a significant reduction in ITN usage if the less-preferred textile was

procured. However, previous studies carried out in Burkina Faso on the use of ITNs and preferences for a specific textile have all been cross-sectional studies based on data from large national household surveys. These studies do not take into account people's perceptions and experiences from a qualitative approach. It is therefore important to complement the quantitative data collected with qualitative data via a combined approach to decision-making. In addition, no prospective studies have been carried out in Burkina Faso on the way that ITN preferences could influence the durability of nets under real conditions. To assess this phenomenon, the NMCP planned an evaluation to explore the acceptability and use of polyester and polyethylene ITNs in the community, with ITNs distributed during the 2022 mass distribution campaign. This methodological approach will be used by the National Malaria Control Programme to conduct this study on determinants of net use in Burkina Faso in order to provide robust evidence across diverse settings. This mixed-methods approach for data collection and analysis could be used in other countries to provide evidence that would help to increase the uptake of insecticide-treated nets, the main vector control tool in Africa.

Malaria vector control in sub-Saharan Africa: complex trade-offs to combat the growing threat of insecticide resistance

The Lancet Planetary Health Oct 2024

This Personal View explores contemporary malaria vector control trends in sub-Saharan Africa and cost implications for improved disease control and resistance management.

While a portfolio of four types of ITN (pyrethroid, PY-PBO, PY-PPF, and PY-CFP) might appear to be reason for optimism, the reality is in stark contrast. The absence of a diverse ITN portfolio risks over-reliance on chlorfenapyr, with PY-PBO already becoming unviable in several locations due to rapidly evolving loss of PBO synergy and PY-PPF ITNs providing little or no public health benefit against pyrethroid-resistant mosquitoes. To enhance prospects for malaria control and elimination in sub-Saharan Africa, considerable funding is urgently needed both to develop a diverse range of insecticide classes for proactive resistance management and to support continent-wide roll-out of more expensive, but more cost-effective, ITNs. Considering the cost to develop a new insecticide is estimated at more than $250 million with more than 10 years of development time, rotational targeted IRS campaigns for resistance management might be worth maintaining in some locations despite the high associated funding required.

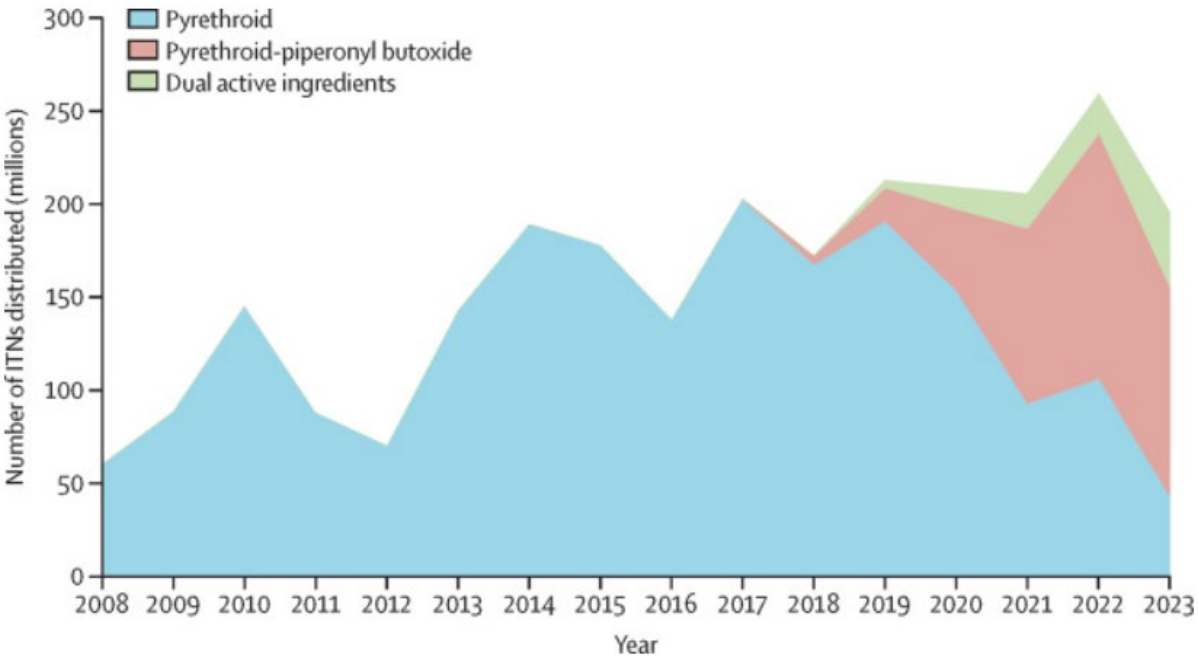


Figure 1 Number and type of insecticide-treated nets delivered to sub-Saharan Africa per year

IRS

A review of selective indoor residual spraying for malaria control

Malaria Journal 23 Aug 2024

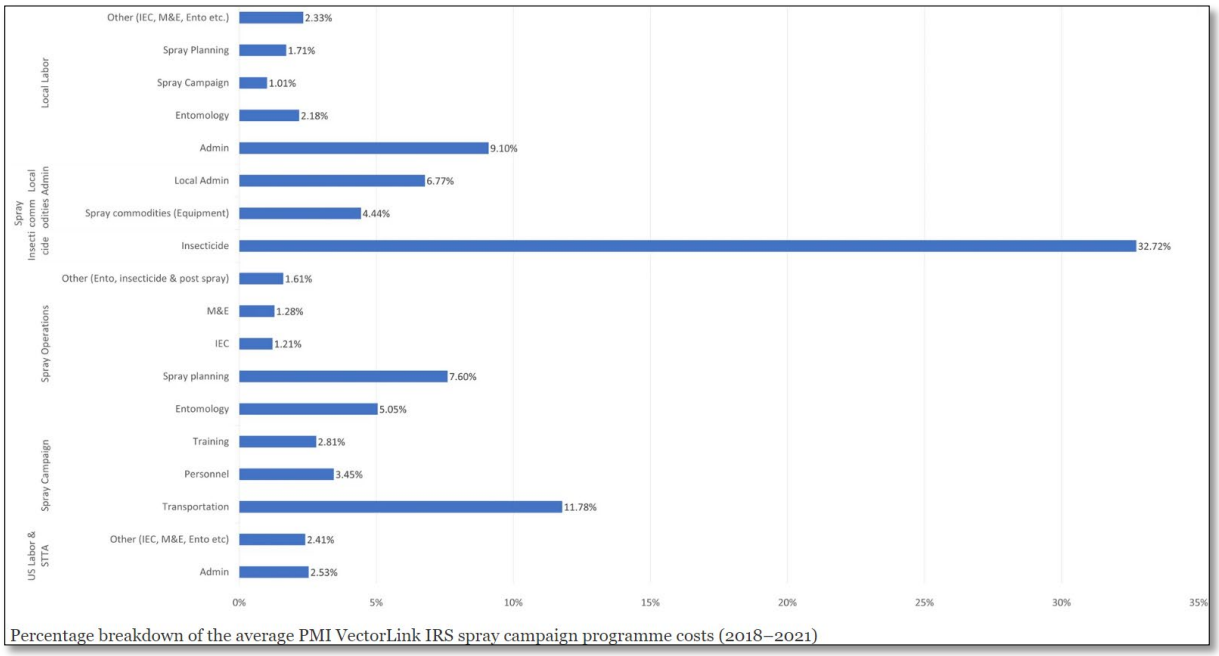
Currently, indoor residual spraying is conducted by spraying all sprayable interior surfaces of a house to maximize the likelihood of a mosquito coming in contact with the insecticide. However, this may not be necessary if mosquitoes preferentially rest on certain surfaces of the house.

Background: Indoor residual spraying (IRS) is one of the most effective malaria control tools. However, its application has become limited to specific contexts due to the increased costs of IRS products and implementation programmes. Selective spraying—selective spray targeted to particular areas/surfaces of dwellings—has been proposed to maintain the malaria control and resistance-management benefits of IRS while decreasing the costs of the intervention.

Methods: A literature search was conducted to find (1) studies that assessed the resting behaviour of *Anopheles* mosquitoes and (2) studies that evaluated the impact of selective spraying on entomological and malaria outcomes. A cost model was developed from PMI VectorLink IRS country programmes, and comparative cost analysis reports to describe the overall cost benefits of selective IRS.

In some studies, there appeared to be a clear resting preference for certain *Anopheles* species in terms of the height at which they rested. However, for other species, and particularly the major African malaria vectors, a clear resting pattern was not detected. Furthermore, resting behaviour was not measured in a standardized way.

Results: For the selective spray studies that were assessed, there was a wide range of spray configurations, which complicates the comparison of methods. Many of these spray techniques were effective and resulted in reported 25–68% cost savings and reduced use of insecticide. The reported cost savings in the literature do not always consider all of the IRS implementation costs. Using the IRS cost model, these savings ranged from 17 to 29% for programs that targeted *Anopheles* spp. and 18–41% for programmes that targeted *Aedes aegypti*.



Percentage breakdown of the average PMI VectorLink IRS spray campaign programme costs (2018–2021)

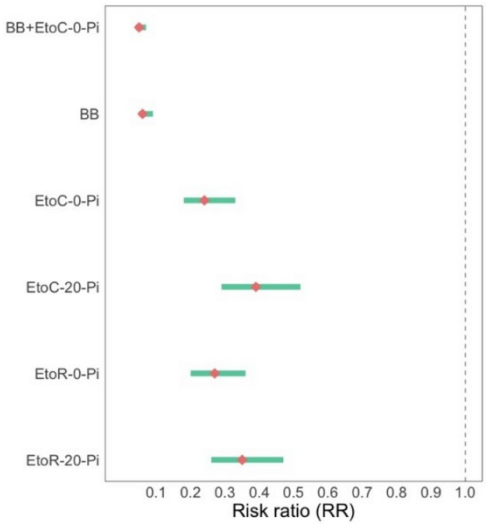
Spatial emanators

Field evaluation of a volatile pyrethroid spatial repellent and etofenprox treated clothing for outdoor protection against forest malaria vectors in Cambodia

Nature Scientific Reports 29 July 2024

This study evaluated the outdoor application of a transfluthrin-based passive emanator, etofenprox treated clothing and a picaridin topical repellent against wild *Anopheles* landing in Cambodia. A 7 × 7 Latin-square

study was conducted over 49 collection nights in temporary open structures. All interventions substantially reduced *Anopheles* landing, with protective efficacy ranging from 61 to 95%. Mathematical modeling showed significant reductions in vectoral capacity, especially with the combined passive emanator and treated clothing and the emanator alone. These interventions have the potential to reduce outdoor and daytime *Anopheles* biting, offering valuable contributions to malaria elimination efforts in Cambodia and the Greater Mekong Subregion, contingent upon achieving effective coverage and adherence.



Estimated risk ratios (95% CI) for the effect of each intervention on risk of *Anopheles* landing (plotted on log scale).

Mosquito Shield™, a transfluthrin passive emanator, protects against pyrethroid-resistant Anopheles gambiae sensu lato in central Benin

Malaria Journal 31 July 2024

A two-arm single-blinded small-scale household randomised entomological trial was conducted to assess the impact of Mosquito Shield™ on the human landing rate of wild pyrethroid-resistant *Anopheles gambiae* sensu lato (*s.l.*) vector mosquitoes in houses in the Ganhoua village of the Zakpota District of central Benin. From a total of 30 houses, 15 were randomly allocated to receive Mosquito Shield™, while the remainder received a placebo product. The trial lasted through the life of the Mosquito Shield™ product (32 days). Mosquito sampling was performed by human landing catches at baseline and at 6 timepoints post-intervention. WHO cylinder bioassays were conducted during the trial with F1 *An. gambiae s.l.* mosquitoes that emerged from larvae from the study area to assess the intensity of resistance to pyrethroids in the wild vector population.

Fig. 2

Installation of Mosquito Shield™ products on home walls

The vector population in the study area showed a high intensity of resistance to pyrethroids. Baseline *An. gambiae s.l.* human landing rates were similar in houses in both study arms before product application (11.53/person/night vs 11.67/person/night, $p > 0.05$). A total of 5736 mosquitoes were collected in the placebo control arm and 3862 in the Mosquito Shield™ arm post-intervention. Overall *An. gambiae s.l.* post-intervention human landing rates were significantly lower in houses in the Mosquito Shield™ arm (18.13/person/night) compared to the houses in the placebo control arm (26.84/person/night, IRR = 0.658, $p < 0.001$). Over the lifespan of the product, Mosquito Shield™ provided a significant protective efficacy of

34.2% (22.1–44.4%, p < 0.001) against wild pyrethroid-resistant *An. gambiae s.l.* vectors compared to the placebo. Human landing rates of other nuisance vector mosquito species (*Culex* and *Mansonia*) were also reduced in houses treated with Mosquito Shield™ compared to the placebo.

Larval control

The impact of Bacillus thuringiensis var. israelensis (Vectobac® WDG) larvicide sprayed with drones on the bio-control of malaria vectors in rice fields of sub-urban Kigali, Rwanda

Malaria Journal 17 Sept 2024

A non-randomized larviciding trial was carried out in irrigated rice fields in sub-urban Kigali, Rwanda. Potential mosquito larval habitats in study sites were mapped and subsequently sprayed using multirotor drones. Application of *Bacillus thuringiensis* var. *israelensis* (Bti) (Vectobac® WDG) was followed by entomological surveys that were performed every two weeks over a ten-month period. Sampling of mosquito larvae was done with dippers while adult mosquitoes were collected using CDC miniature light traps (CDC-LT) and pyrethrum spraying collection (PSC) methods. Malaria cases were routinely monitored through community health workers in villages surrounding the study sites.

The abundance of all-species mosquito larvae, *Anopheles* larvae and all-species pupae declined by 68.1%, 74.6% and 99.6%, respectively. Larval density was reduced by 93.3% for total larvae, 95.3% for the *Anopheles* larvae and 61.9% for pupae. The total adult mosquitoes and *Anopheles gambiae* sensu lato collected using CDC-Light trap declined by 60.6% and 80% respectively. Malaria incidence also declined significantly between intervention and control sites (U = 20, z = − 2.268, p = 0.023).

New vector control tools and approaches

Entomological effects of attractive targeted sugar bait station deployment in Western Zambia: vector surveillance findings from a two-arm cluster randomized phase III trial

Malaria Journal 18 July 2024

Attractive targeted sugar bait (ATSB) stations are a novel tool with potential to complement current approaches to malaria vector control. To assess the public health value of ATSB station deployment in areas of high coverage with standard vector control, a two-arm cluster-randomized controlled trial (cRCT) of Sarabi ATSB® stations (Westham Ltd., Hod-Hasharon, Israel) was conducted in Western Province, Zambia, a high-burden location were *Anopheles funestus* is the dominant vector. The trial included 70 clusters and was designed to measure the effect of ATSBs on case incidence and infection prevalence over two 7-month deployments. Reported here are results of the vector surveillance component of the study, conducted in a subset of 20 clusters and designed to provide entomological context to guide overall interpretation of trial findings. *Anopheles funestus* parity did not differ across study arms, but ATSB deployment was associated with a non-significant 35% reduction in vector LT density, results that are consistent with the epidemiological impact reported elsewhere. Additional research is needed to better understand how to maximize the potential impact of ATSB approaches in Zambia and other contexts.

Evaluating trends in damage to attractive targeted sugar baits (ATSBs) deployed during the second year of a two-year Phase III trial in Western Zambia

Malaria Journal 29 August 2024

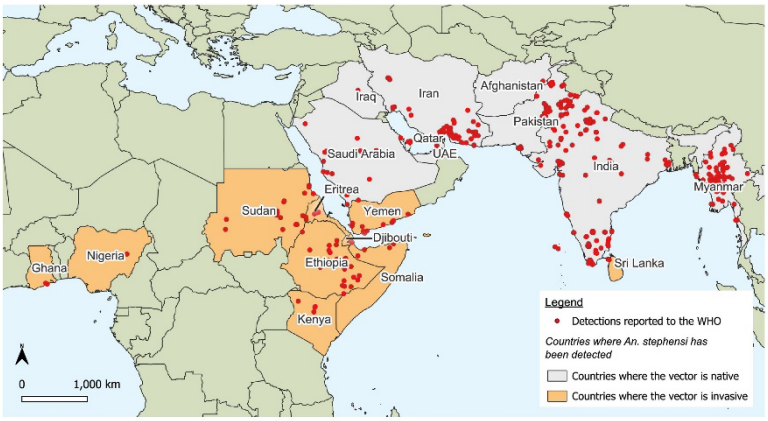
During a two-arm cluster randomized Phase III trial conducted in Zambia to test the efficacy of ATSB stations on malaria incidence, ATSB stations deployed on eligible household structures within intervention clusters were routinely monitored to ensure their good physical condition and high coverage. This study investigates trends in prevalence and rate of damage to ATSB stations during year 2 of the two-year trial. Overall, 45.6% of structures had at least one damaged ATSB station, however this varied spatially across the trial site.

Anopheles stephensi

Invasive Anopheles stephensi in Africa: insights from Asia

Trends in Parasit August 2024

Anopheles stephensi is a highly competent urban malaria vector species, endemic in South Asia and the Persian Gulf, which has colonised eight countries in sub-Saharan Africa (SSA) since 2013 and is now spreading uncontrollably. In urban areas of Africa, where malaria transmission has previously been low or non-existent, the invasion of *An. stephensi* represents a significant problem, particularly to immunologically naïve populations. Despite this rapidly advancing threat, there is a paucity of information regarding the bionomics of *An. stephensi* in SSA. Here, we offer a critical synthesis of literature from *An. stephensi*'s native range, focusing on the future of *An. stephensi* in a rapidly urbanising Africa, and highlighting key questions that warrant prioritisation by the global malaria vector control community.



Trends in Parasitology

Resurgence of Clinical Malaria in Ethiopia and Its Link to Anopheles stephensi Invasion

Pathogens 31 Aug 2024

It is not clear if the recent malaria resurgence in Ethiopia has linked to the expansion of *An. stephensi*. We obtained the clinical malaria case reports and malaria intervention data from the Ethiopian Ministry of Health (MoH) for the period 2001–2022. We analyzed clinical malaria hotspots and investigated the potential role of *An. stephensi* in the 2022 malaria outbreaks. Clinical malaria cases in Ethiopia decreased by 80%, from 5.2 million cases in 2004 to 1.0 million cases in 2018; however, cases increased steadily to 2.6 million confirmed cases in 2022. *Plasmodium vivax* cases and proportion have increased significantly in the past 5 years. Clinical malaria hotspots are concentrated along the western Ethiopian border areas and have grown significantly from 2017 to 2022. Major malaria outbreaks in 2022/2023 were detected in multiple sites across Ethiopia, and *An. stephensi* was the predominant vector in some of these sites, however, it was absence from many of the outbreak sites. The causes of recent upsurge in malaria in Ethiopia may be multi-factorial and it is a subject of further investigation.

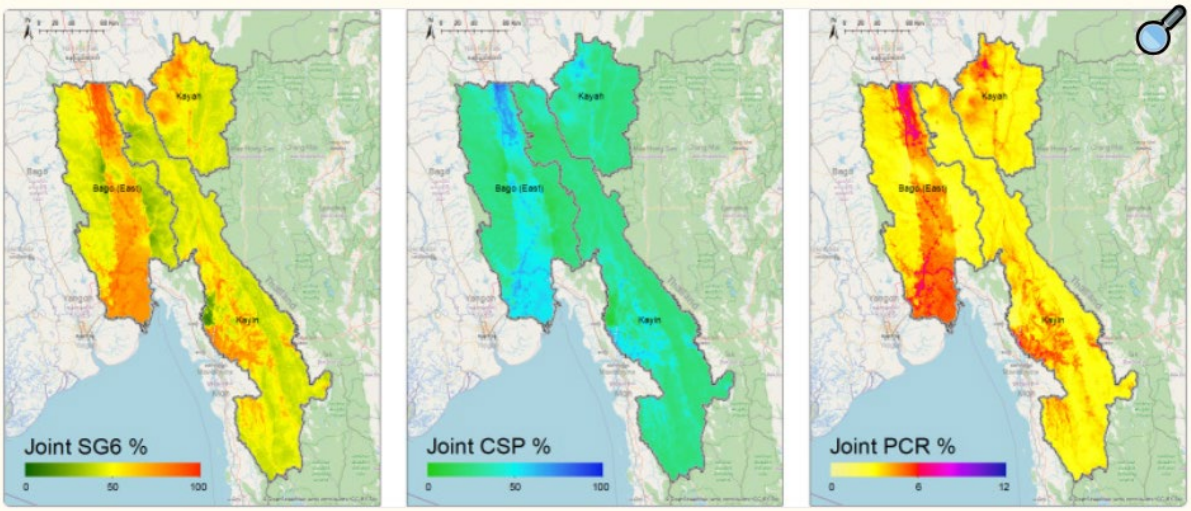
Odds & Ends

Geospatial joint modeling of vector and parasite serology to microstratify malaria transmission

PNAS 4 June 2024

Evaluation of human antibodies against *Anopheles* salivary proteins has emerged as a sensitive and feasible advancement on traditional entomological methods to quantify exposure to vector bites and malaria transmission. Using samples collected during routine malaria testing by village health volunteers, our study inputs serological biomarkers of vector and parasite exposure into a geospatial modeling framework to generate fine-scale predictive maps of *Anopheles* biting exposure and malaria transmission intensity. Our predictions advance current maps of only vector occurrence, and our methodology suggests a framework that could be readily expanded into a surveillance platform to identify high-risk areas for targeted intervention delivery planning.

Fig. 3.



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Predicted seroprevalence of anti-SG6 and CSP IgG antibodies and predicted prevalence of PCR-detectable *Plasmodium* spp. infections after joint modeling of these outcomes. Estimated using a geospatial model that adjusts for distance to water, topographical wetness index, slope, tree coverage fraction, inaccessibility to cities, and night-time lights (models were fitted to data from participants in all villages who had observations for all outcomes, n = 11,988).

Unpacking WHO and CDC Bottle Bioassay Methods: A Comprehensive Literature Review and Protocol Analysis Revealing Key Outcome Predictors

Gates Open Research 4 June 2024

This study aimed to identify variations in bottle bioassay methodologies and assess the potential impact on the data that is generated. Our literature review exposed a significant inconsistency in the how bioassay methods are reported, hindering reliable interpretation of data and the ability to compare results between studies. The experimental research provided further insight by specifically identifying two key factors that influence the outcomes of bioassays: mosquito dry weight and relative humidity (RH). The study also demonstrates the importance of controlling bioassay variables, noting the significant influence of wing length, as an indicator of mosquito size, on mortality rates in standardized bioassays.

The rising global economic costs of invasive Aedes mosquitoes and Aedes-borne diseases

Science of The Total Environment 10 July 2024

Invasive *Aedes aegypti* and *Aedes albopictus* mosquitoes transmit viruses such as dengue, chikungunya and Zika, posing a huge public health burden as well as having a less well understood economic impact. We present a comprehensive, global-scale synthesis of studies reporting these economic costs, spanning 166 countries and territories over 45 years. The minimum cumulative reported cost estimate expressed in 2022 US$ was 94.7 billion, although this figure reflects considerable underreporting and underestimation. The analysis suggests a 14-fold increase in costs, with an average annual expenditure of US$ 3.1 billion, and a maximum of US$ 20.3 billion in 2013. Damage and losses were an order of magnitude higher than investment in management, with only a modest portion allocated to prevention.

Dengue: the threat to health now and in the future

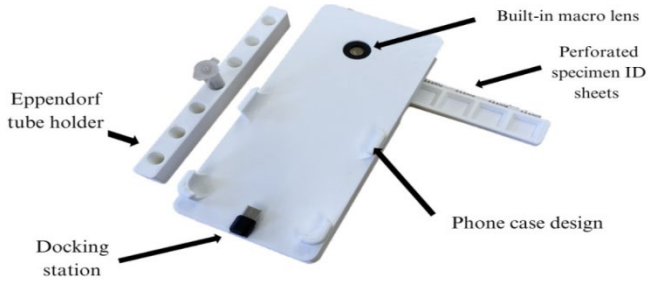
The Lancet 27 July 2024

2024 is the worst year for dengue cases on record. As of July 23, over 10 million cases of dengue have been reported from 176 countries across all WHO regions (although the Americas account for most cases), with more than 24000 severe cases and 6508 deaths. Over the past two decades, there has been a tenfold increase in reported cases, and even this figure is likely an underestimate. It is the only infectious disease for which annual mortality is rising (80% of infections are asymptomatic or produce mild febrile illness but the case fatality rate increases during outbreaks). Rightly so, WHO has classified dengue as a grade 3 emergency (ie, requiring a major to maximal WHO response).

A Handheld Tool for the Rapid Morphological Identification of Mosquito Species (VectorCam) for Community-Based Malaria Vector Surveillance: Summative Usability Study

JMIR Human Factors 16 August 2024

Vector surveillance and entomological classification are the cornerstones of malaria prevention. Through this study, it has been demonstrated that VectorCam, an AI-based tool for task-shift vector surveillance, can effectively empower VHTs to conduct vector surveillance. This study has illustrated VectorCam's usability and accessibility, showing its potential to task-shift the time-consuming and resource-intensive process of vector identification to village health teams embedded in malaria prevention strategies within their communities. Modifications to the hardware and software solutions that are currently in progress are needed to ensure optimal usability and are the current focus of ongoing efforts by our research group.



The hardware components of the VectorCam system include the light box with a built-in 15x macro lens, a phone case design, and a docking station. Hardware also includes an Eppendorf tube holder and mosquito trays and perforated specimen ID sheets to adequately pack and store these mosquitos for molecular identification after imaging.

AnophelesModel: An R package to interface mosquito bionomics, human exposure and intervention effects with models of malaria intervention impact

PLoS Computational Biol 13 Sept 2024

In recent decades, field and semi-field studies of malaria transmission have gathered geographic-specific information about mosquito ecology, behaviour and their sensitivity to interventions. Mathematical models of malaria transmission can incorporate such data to infer the likely impact of vector control interventions and hence guide malaria control strategies in various geographies. To facilitate this process and make model predictions of intervention impact available for different geographical regions, we developed AnophelesModel. AnophelesModel is an online, open-access R package that quantifies the impact of vector control interventions depending on mosquito species and location-specific characteristics. In addition, it includes a previously published, comprehensive, curated database of field entomological data from over 50 *Anopheles* species, field data on mosquito and human behaviour, and estimates of vector control effectiveness. Using the input data, the package parameterizes a discrete-time, state transition model of the mosquito oviposition cycle and infers species-specific impacts of various interventions on vectorial capacity. In addition, it offers formatted outputs ready to use in downstream analyses and by other models of malaria transmission for accurate representation of the vector-specific components. Using AnophelesModel, we show how the key implications for intervention impact change for various vectors and locations. The package facilitates quantitative comparisons of likely intervention impacts in different geographical settings varying in vector compositions, and can thus guide towards more robust and efficient malaria control recommendations. The AnophelesModel R package is available under a GPL-3.0 license at https://github.com/SwissTPH/AnophelesModel

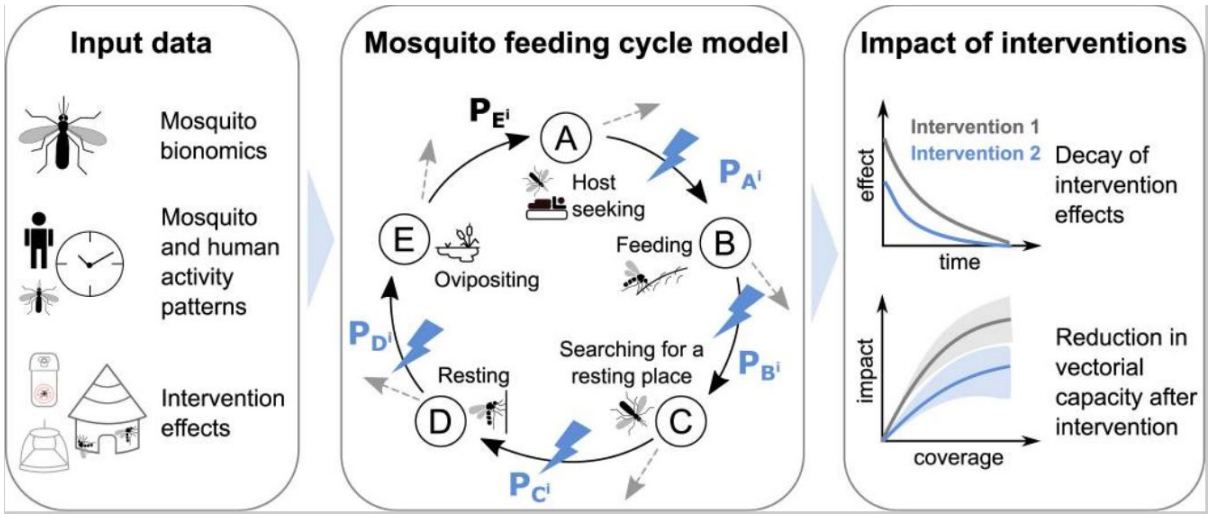


Figure 1. Overview of the AnophelesModel R package and its components.

WHO news and publications

WHO Malaria Policy Advisory Group (MPAG) meeting report, March 2024

1 July 2024

The meeting focused on the following topics:

- malaria vaccine introduction and scale-up, and the Gavi-supported malaria learning agenda;
- the High burden to high impact (HBHI) approach;
- subnational tailoring; biological threats to vector control in Africa;
- the strategy to respond to antimalarial drug resistance in Africa;
- the development of guidelines recommendations on tafenoquine, primaquine and near-patient glucose-6-phosphate dehydrogenase (G6PD) diagnostic tests to support radical cure of *Plasmodium vivax*; and
- malaria elimination, including zoonotic malaria.

Twentieth meeting of the WHO Vector Control Advisory Group 25–28 March 2024

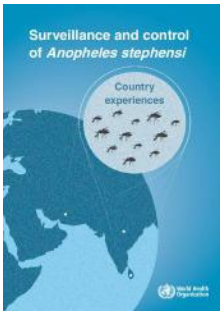
Meeting report 1 July 2024

Experts from the WHO Vector Control Advisory Group (VCAG) met with product developers, innovators and researchers from 25–28 March 2024 for the 20th 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: spatial repellents, topical repellents, and sterilization of male mosquitoes.

Key conclusion: Regarding the SC Johnson Mosquito Shield™, VCAG congratulated the applicants on completing their trial in Kenya, which demonstrated the public health value of the spatial repellent for the prevention of malaria, above that provided by LLINs alone (nets treated with a pyrethroid + PBO), based on the analysis of time to first infection (primary end-point).

Surveillance and control of Anopheles stephensi

WHO 2 July 2024



This document aims to summarize key lessons from 3 countries – India, the Islamic Republic of Iran and Sri Lanka – that have been working to control *An. stephensi*. It is hoped that their experiences and insights will be valuable for countries encountering *An. stephensi* for the first time.

The RBM Vector Control Working Group (VCWG) is hosting a webinar in collaboration with the WHO PQT/VCP team to raise awareness about the procedures, requirements and assessments implemented by WHO/PQ to ensure quality standards for ITNS and consistency of production.
Register here

Egypt is certified malaria-free by WHO

20 Oct 2024

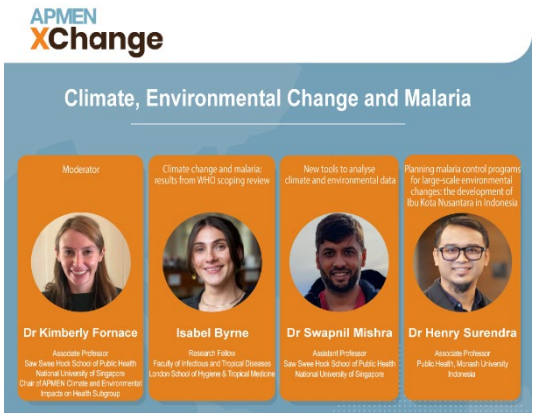
The World Health Organization (WHO) has certified Egypt as malaria-free, marking a significant public health milestone for a country with more than 100 million inhabitants. The achievement follows a nearly 100-year effort by the Egyptian government and people to end a disease that has been present in the country since ancient times.

Webinars, websites and other resources

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:

- 28 August 2024 – *Climate, Environmental Change, and Malaria*



In the news and social media

Envu Signs Definitive Agreement to Acquire In2Care

22 October 2024

Envu announced it has signed an agreement to acquire In2Care®, a technology company headquartered in the Netherlands that specializes in the development and commercialization of novel mosquito control products. The acquisition will further diversify the Envu mosquito management portfolio, offering pest control operators, lawn care companies, mosquito abatement professionals and other customers even more nature-positive innovations for nuisance mosquito control and preventing the spread of vector-borne diseases.