Technical Update

1 NOVEMBERER 2017

Selected Recent Publications

Pyrethroid resistance alters the blood-feeding behavior in Puerto Rican Aedes aegypti mosquitoes exposed to treated fabric. Agramonte NM, Bloomquist JR, Bernier UR. PLoS Negl Trop Dis. 2017 Sep 20

This paper might be of interest to some as it shows some dose-response curves for a Puerto Rican strain of Ae. Aegypti in response to topical toxicity of five insecticides (permethrin, etofenprox, deltamethrin, DDT, transfluthrin) was determined
Behavioral differences in blood-feeding activity for pyrethroid-resistant and pyrethroid-susceptible strains of Ae. aegypti when exposed to pyrethroid-treated cloth were also explored.

The American Journal of Tropical Medicine and Hygiene recently published a supplement titled:
Evaluating the Impact of Malaria Control Interventions in sub-Saharan Africa
Which includes thirteen articles focused on a variety of topics related to impact evaluation of malaria control efforts.

The creation and selection of mutations resistant to a gene drive over multiple generations in the malaria mosquito. PLoS Genet. 2017 Oct 4, Hammond et al
Here the authors assess the potential for the emergence of resistance to a gene drive mechanism by allowing it to run for 25 generations and monitoring the frequency of the gene drive over time. They claim to be the first to document an example of selection for resistance to a synthetic gene drive. This raises questions about critical issues regarding design recommendations and considerations in order to mitigate possible resistance that could impact future gene drive applications.

Relative performance of indoor vector control interventions in the Ifakara and the West African experimental huts.
Oumbouke WA, Fongnikin A, Soukou KB, Moore SJ, N'Guessan R.
Parasit Vectors. 2017 Sep 19
This paper reminds us to remember the phrase, “it’s all relative” as it highlights the challenge we face with our experimental hut studies as we work toward improved “standardized” bioassay methods used to predict efficacy or assess insecticide susceptibility.

Benchmarking insecticide resistance intensity bioassays for Anopheles malaria vector species against resistance phenotypes of known epidemiological significance. Venter N, Oliver SV, Muleba M, Davies C, Hunt RH, Koekemoer LL, Coetzee M, Brooke BD. Parasit Vectors. 2017 Apr 20
It is evident that resistance intensity assays can add predictive value to the decision-making process in vector control settings…the recent scaling up of vector control activities has necessitated a revision of the WHO bioassay protocol to include the production of information that not only diagnoses resistance but also gives information on the intensity of expression of resistance phenotypes detected. The authors have tested a revised protocol

which they suggest will help assess the range of resistance phenotypes in a target vector population using discriminating/diagnostic insecticide concentrations (DC) as well as their potential operational significance using 5× DC and 10× DC assays. The aim of this project was to use the revised protocol to assess the intensity of pyrethroid resistance in a range of insecticide resistant Anopheles strains with known resistance mechanisms and for which there is evidence of operational significance in the field setting from which these colonies were derived.

A stochastic model for the probability of malaria extinction by mass drug administration

Peter Pemberton-Ross, Nakul Chitnis, Emilie Pothin and Thomas A. Smith
Malaria Journal 2017, 16:376 | Published on: 18 September 2017

I think this paper raises the important reality that silver bullets are rare and interventions are most likely to succeed when combined in complimentary approaches. The authors conclude in this paper that "MDA is expected to produce a significant probability of elimination only in areas of small populations with low R c where almost 100% of the population can be successfully treated." They also suggest that "MDA is most effectively deployed in combination with other interventions producing sustained reductions in the force of infection, such as long-lasting insecticide-treated nets, indoor residual spraying or other forms of effective vector control."

Protection of the house against Chagas disease, dengue, leishmaniasis, and lymphatic filariasis: a systematic review

Horstick & Runge-Ranzinger Lancet Infect Dis. 2017 Oct 23

A relevant NTD paper, "this systematic review aims to assess the evidence of vector control interventions applied in practice, which provide protection against Chagas disease, dengue, leishmaniasis, and lymphatic filariasis at the household level."

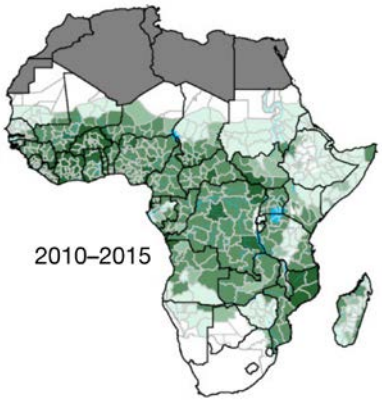
Modelling the implications of stopping vector control for malaria control and elimination

Joshua O. Yukich and Nakul Chitnis Malaria Journal 13 October 2017

Various groups have employed mathematical and simulation models of malaria in attempts to improve our understanding of malaria transmission and to compare the effectiveness and cost-effectiveness of current and new interventions with a focus on the impact of increasing the coverage of interventions. This manuscript outlines the use of the SwissTPH OpenMalaria model of *Plasmodium falciparum* malaria transmission to explore scaling back of vector control after transmission has been reduced.

The prevalence of Plasmodium falciparum in sub-Saharan Africa since 1900

Robert W. Snow et al, Nature 26 October 2017



Editor's note: "In this landmark study, Robert Snow and colleagues have collated the largest ever dataset of *Plasmodium falciparum* prevalence in sub-Saharan Africa, covering 7.8 million individuals at more than 30,000 locations over a period of 115 years. Through the analysis of this unique dataset, the authors describe the patterns of malaria prevalence since 1900, identifying periods of

rapidly increasing and decreasing transmission, which is probably the result of several different contributing factors. Importantly, although recent interventions have contributed to an unprecedented decline since the year 2000, reductions have not occurred uniformly throughout the continent."

Global trends in the production and use of DDT for control of malaria and other vector-borne diseases. Henk van den Berg, Gamini Manuweera and Flemming Konradsen Malaria Journal Published on: 5 October 2017

WHO Publications

The WHO has updated their recommendations on the ***Conditions for deployment of mosquito nets treated with a pyrethroid and piperonyl butoxide.*** In the ongoing transition of the WHO evaluation process for vector control products from WHOPES to the Prequalification Team, this update aims to further clarify the available evidence base for pyrethroid-PBO nets, their categorization under the revised evaluation system, and the additional data required to support WHO's policy-making process. These recommendations replace the 2015 WHO recommendations on pyrethroid-PBO nets and will be further revised as new data become available.

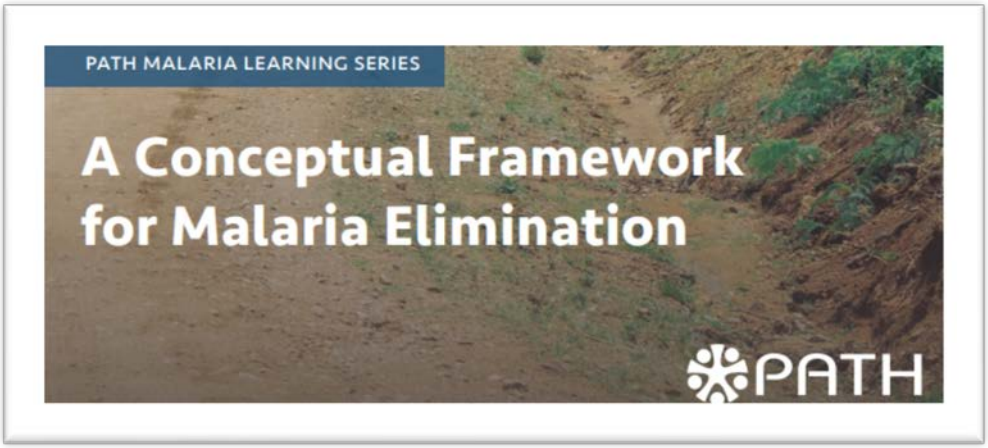
The WHO has finalised ***the Global Vector Control Response (GVCR)*** was which endorsed by member states at the World Health Assembly in May this year. The GVCR provides a new strategy to strengthen vector control worldwide through increased capacity, improved surveillance, better coordination and integrated action across sectors and diseases. A range of communications materials has been produced by WHO to enable the dissemination of the GVCR, comprising an ***advocacy brochure,*** a dedicated ***vector control webpage*** and an ***online FAQs.***

Useful websites and resources
Recent and upcoming events of note

The ***Global Health Technologies Coalition (GHTC)*** is funded by the Bill & Melinda Gates Foundation (and other members) and is housed at PATH and aspires to serve as the premier advocacy organization focusing on global health R&D for new tools and technologies. They are a coalition of more than 25 nonprofit organizations advancing policies to accelerate the creation of new drugs, vaccines, diagnostics, and other health tools that bring healthy lives within reach for all people. GHTC has published a new set of six fact sheets examining the contributions of US government agencies to advancing global health R&D. It is useful to see who is funding what and also to see how they communicate their impact.

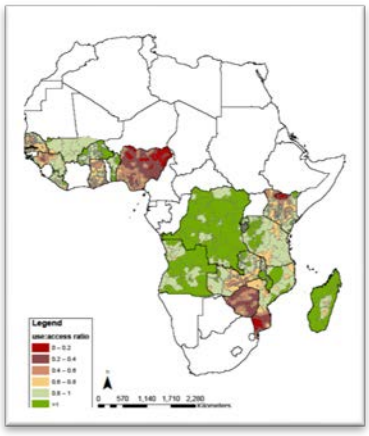
- ***USAID, NIH, CDC, FDA, DoD, BARDA***

PATH has launched the third installment in the series entitled: ***A Conceptual Framework for Malaria Elimination***. This issue of the Learning Series builds directly upon the recently-published WHO Elimination Framework, and further **describes the steps to elimination as a practical approach for national malaria programs as they move along the continuum of decreasing malaria transmission intensity**. These steps aim to help program managers and team members think about how to best deploy the tools available according to their country's malaria transmission strata, and varying ecologic, epidemiologic, and societal features.



Building out vector-borne diseases in Africa (BOVA): new research network and funding call. Durham University and University College London are pleased to announce the establishment of a new multi-disciplinary research network called the BOVA (Building out vector-borne diseases in sub-Saharan Africa) Network. The Network, funded by the Global Challenges Research Fund aims to bring together researchers and practitioners working in the fields of the built environment and vector-borne diseases such as malaria and dengue. The goal of the network is to stimulate inter-sectoral collaboration by forming a multi-disciplinary network of stakeholders with an interest in reducing vector-borne diseases through improving the built environment in sub-Saharan Africa. They aim to do this through three key activities: global advocacy to engage stakeholders, capacity building and providing funding for small pilot research projects (approx. 8 projects of £100,000) to stimulate larger research projects. Interested parties are encouraged to join the BOVA Network.

VectorWorks continues to make regular updates to the ***ITN Access and Use Report*** as soon as new data are released. The report now includes data from 24 President's Malaria Initiative (PMI) countries, including sub-Saharan Africa and Asia, and 22 non-PMI countries. In addition, VectorWorks created an annex that includes maps depicting the use-to-access ratio in a variety of settings. The data and maps present a strong picture of the culture of net use across sub-Saharan Africa, as well as the remaining work to be done to increase ITN access.



In the news

In case you missed it, Sumitomo Chemical has recently announced that its new IRS, SumiShield 50WG, has been prequalified by WHO, through the evaluation scheme that would have resulted in a WHOPES recommendation under the previous system. A new, single mode of action chemistry – Clothianidin – makes SumiShield 50WG a valuable new tool for use in rotation strategies. Read the full press release for further details on the WHO prequalification and what makes SumiShield 50WG so effective. See the Sumitomo press release ***here*** and the WHO PQ information ***here***.

This editorial raises yet another isooxazoline showing promise at least as a systemic for ectoparaite control. With the growing interest in ivermectin type MDA approaches, the isoxazolines are also drawing attention.

Lotilaner - a novel systemic tick and flea control product for dogs **Susan E. Little,** Parasites & Vectors 2017, 10:539 | Published on: 1 November 2017

The isoxazolines approved for veterinary use so far are the following:

- Afoxolaner: used in dogs against fleas and some tick species (NEXGARD and NEXGARD SPECTRA from MERIAL).
- Fluralaner: used in dogs and cats against fleas and some tick species (BRAVECTO oral chews and BRAVECTO topical solution from MERCK ANIMAL HEALTH); and in chicken against red fowl mites (EXZOLT)
- Sarolaner: used in dogs against fleas and some tick species and certain mites (SIMPARICA from ZOETIS).
- Lotilaner: used in dogs against fleas and some tick species (CREDELIO from ELANCO).

Quotes

"Malaria prevention and eradication should be inspired by General George Patton's advice: 'A good plan executed violently today is better than a perfect plan in a week.'"

--T.K. Naliaka
