

Within the framework of the 12th Edition of the World Malaria Day observed under the theme “Zero Malaria starts with me” the Centre for Research in Infectious Diseases (CRID) organised a number of activities thanks to of sponsorship PIIVeC

- **CRID's OPEN DAY** was a public engagement opportunity for science incline students, researchers, NGOs and the media to experience first-hand CRID's efforts to optimise malaria control in Africa. This open day event took place at CRID's office at Nkol-Eton, Yaoundé and welcomed 42 visitors from different institutions who were given access to the laboratory where experiments are carried out; and to the insectary where mosquitoes are kept, monitored and blood fed after collection for further analysis. At the end of the tour, visitors had a brief seminar during which they got to know in detail CRIDS objectives, target, research opportunities on vector borne disease and scholarship opportunities in molecular biology.
- **MEDIA OUTREACH.** To reach out to the public with CRID's contribution in malaria control, a team of researchers and experts from CRID were granted three separate interviews on the 24 hour news channel of National Television, CRTV-NEWS . Dr. Basil Kamgang and Dr. Emmanuel Elanga were guests on the show TWILIGH and Dr. Cyrille Ndo was guest on the show Cameroon Daylight and Carré Social during which they accentuated on CRID's research activities; Biomolecular research and the recent development on insecticide resistance
- **A SCIENTIFIC SYMPOSIUM** was also organised in collaboration with the National Malaria Control Programme (NMCP) at Hotel Franco, Yaoundé. The scientific symposium brought together partners to malaria control and stakeholders who discussed the Situation, Perspectives and Innovations of Malaria Control in Cameroon. Discussions were grouped in three key sessions: Situation and Perspectives of Malaria Control; Innovations in the fight against Malaria and Social and Behaviour Change Communication. The event was moderated by Prof. Rose LEKE and Prof. Wilfred Mbacham with each presentation proceeded by a series of questions and answers. It was heavily attended by 128 participants and widely covered by 18 media organs – TV, Radio and Print at the end of which 7 key recommendations were made for stakeholders to take in to consideration for effective malaria control in Cameroon





ALL HANDS ON DECK TO KICK OUT MALARIA, CRID & Co.

COMMUNITY ENGAGEMENT: REINFORCING CAPACITY IN BIO-MOLECULAR RESEARCH FOR VECTOR CONTROL

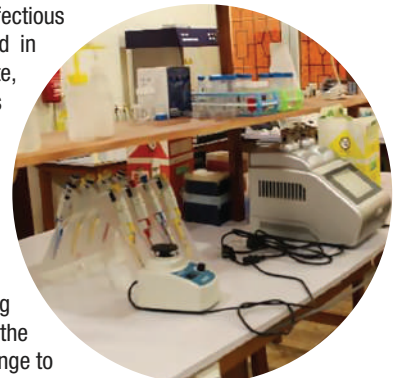


opened its doors to us to see and appreciate how mosquito bed nets can be used in different localities to better fight against malaria and the vector that causes the diseases. It was a very beneficial day for me as a young researcher because it permits me to network with other experienced researchers and build my capacity in the domain of vector control which is a real need in Africa" - Honore Awanakam, Research student, Yde I Univ.

A sneak peak in to CRID's work and perspective

A Amongst other measures to contribute in malaria control, the Centre for Research in Infectious Diseases (CRID) is very much involved in vector control. If there is no mosquito bite, there will be no malaria. Research at the CRID is centred on finding new ways to equip Cameroon and Africa with the right tools to eliminate the mosquito that transmits malaria.

The main anti-malarial tools in Cameroon are insecticide-based tools but unfortunately, mosquitoes are getting wiser and developing tactics not to be killed by the insecticide. So, the issue of insecticide resistance is a major challenge to efforts made so far to control malaria.



To contribute its own quota in vector control, the CRID has since 2018 been actively engaged in generating new class of insecticides by testing the already resistant mosquitoes.

Hopefully, with another year or two of work and with more investment in bio-molecular research, there will be a new insecticide generated from CRID's laboratories.

O ver forty visitors; students, researchers and NGO representatives made their way to the CRID's premises on the occasion of the Open Day event as part of its activities marking the 12th World Malaria Day. Despite efforts to end malaria, prevalence rate continue to rise and so investing and building capacity in bio-molecular research is a good way to prepare the next generation of researchers to optimise malaria control initiatives.

THE OPEN DAY EXPERIENCE, A VISITOR'S TESTIMONY

"I've been exposed to what CRID is doing in so far as vector control in Cameroon is concerned. At the insectary, we had a very good drill on how live mosquitoes are captured, nursed and kept at a specific temperature in order to monitor their resistance and the development of insecticide treated bed nets. The centre

NATIONAL MALARIA CONTROL PROGRAMME (NMCP) - pilot of malaria control activities



As the main malaria control body in Cameroon under the Ministry of Public Health, the NMCP has developed a 3 YEAR STRATEGIC PLAN to curb the over 2million malaria cases recorded each year;

- Reduce malaria-related mortality by at least 60% from the 2015 situation;
 - Reduce malaria-related morbidity by at least 60% compared to the situation in 2015;
- To achieve this, NMCP employs a 04 PILLAR ACTION based on the "High Burden High Impact" approach which consists of;

- Strengthening political will;
 - Strategic use of information;
 - Adopt appropriate antimalarial policies and strategies;
 - Strong Coordination and national response
- Since the NMCP engaged in the fight against malaria in Cameroon, it has adopted 6 principal malaria control methods
- Systematic use of LLINs by the entire population;
 - Intermittent Preventive Treatment (IPT3) in pregnant women according to national guidelines;
 - Chemoprevention of Seasonal Malaria in children from 03 to 59 months;
 - Household Residual Spraying in targeted districts;
 - Larval control in pilot urban areas;
 - Management of vector resistance to insecticides

VECTOR CONTROL & THE ISSUE OF INSECTICIDE RESISTANCE



Despite efforts made so far to control malaria, the vector remains a major problem in some communities as mosquito resistance to insecticides is becoming a major concern. Though the female Anopheles mosquito has become resistant to the insecticide treated bed net, the latter remains the fastest way to kill the mosquito - continuous exposure to LLINs shortens the lifespan of the vector as results from the Centre for Research in Infectious Diseases reveal. There is a limited number of insecticides for the control of public health pests in Cameroon. And for the past 20 years, there has been no new insecticide. Meanwhile, previously used ones are becoming inefficient. There is therefore a need to invest in research for new insecticides to be developed.

Despite mosquito resistance to insecticide, malaria endemic populations are advised to continue using LLINs to



reduce risk of infection. When exposed to the insecticide treated bed net, the female Anopheles mosquito dies faster than when it is not exposed to the treated bed net.

According to research, tested in Tanzania, the PBO-based nets provided better protection than pyrethroid-only nets with:

- Lower Prevalence of parasiteamia (29% PBO vs. 42% non-PBO nets)
- Lower prevalence of severe to moderate anaemia
- Lower Entomological Inoculation rate (87%)

As such, it is recommended to adopt the systematic use of PBO nets but the challenge remains, PBO nets are more expensive.

TRAITEMENT DU PALUDISME fondé essentiellement sur les considérations socio-économiques



Selon la présentation faite par le professeur Same EKOBO, jusqu'à présent, deux types de paludisme ont été enregistrés: un paludisme simple et un paludisme grave pour lesquels le traitement est administré différemment.

Une initiative de l'OMS recommande le traitement du paludisme simple et grave, y compris le traitement du paludisme chez la femme enceinte comme suit :

A. PALUDISME SIMPLE- le traitement dure trois jours

- artésunate + amodiaquine,
- Artmether + Lumefantrine,
- artésunate + méfloquine,
- Artésunate + SP, Dihydroartémisinine + PPQ



B. PALUDISME GRAVE

- Artésunate IV
- Artémether IM
- Quinine IV/IM



Relai, dès que le patient peut avaler avec ACT (sauf ASMF) ou ATV-Prg

- Artesunate suppositoire (en pré-transfert)

C. TRAITEMENT DU PALUDISME CHEX LA FEMME ENCEINTE

ACTs contre indiqués : Quinine seule ou Quinine +Clindamycine pendant 7 jours durant la 1er et 2nd trimestre. Et ACTs controversées pendant la 3èmetrimestre L'OMS recommande que chaque pays choisisse en fonction des données épidémiologiques locales un Mpl et réserver les autres aux cas d'échec thérapeutique avec le Mpl



MALARIA CONTROL, INNOVATIVE APPROACH HOPE FOR THE GENERATION STERILE/INCOMPATIBLE INSECT TECHNIQUES, HOUSING IMPROVEMENT, OCEAC PERSPECTIVE

WHO reports between 2014 and 2016 hold that malaria incidents have been on the rise despite control methods in place. Change in vector behaviour and insecticide resistance demands innovative approaches to fight malaria. Larval Control could be adopted;

permanent or temporary elimination of standing water collection - Biological control or Larviciding. These methods are convenient in controlling outdoor & resistant mosquitoes, Control several diseases, best when breeding site are few, fixed and findable. However, the challenge of Short residual effect (frequent retreatment), Toxicity for non-target species and Labour and financial constraints remain major limitations in achieving these changes in house design to reduce exposure to malaria mosquitoes: Screen on windows Eaves tubes, Block eave spaces, improved door

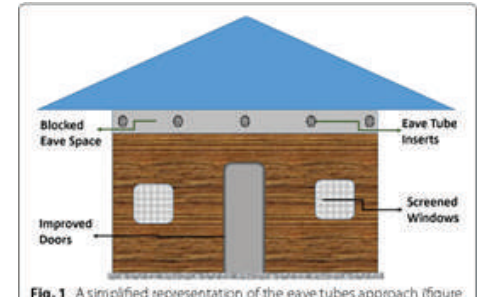


Fig. 1. A simplified representation of the eave tubes approach (figure)

This will conveniently control resistant and indoor biting mosquitoes with a Long term impact



Block eave spaces, improved doors

Durable Wall Lining could also be efficient in eliminating the mosquito that transmits malaria.

- Control resistant and indoor biting mosquitoes
- No need for frequent reapplication
- Long term impact (sustainable)

Most recently, the Gene drive innovative malaria control tool which a genetic phenomenon that occurs in the nature and causes a selected trait to spread rapidly through a species via sexual reproduction, can be used to insert a trait which makes the mosquito unable to host the parasite affect local population dynamic (sex ratio distortion)

PRELIMINARY ENTOMOLOGICAL SURVEILLANCE RESULTS a Vector-Link angle

These results show the study of vector species composition and behaviour; assess the intensity of transmission, and the vectors' susceptibility to different insecticides; measure the resistance intensity and determine the resistance mechanisms. The 4,497 Anopheles mosquitoes collected in 2018 by HLCs were monitored. Vector surveillance showed a great diversity of species: An. gambiae s.l., An. ziemanni, and An. funestus, are the most abundant and are found in all sites. An. moucheti and An. nili were found only in the Nyabessang (Douala) site, dominated by large rivers that offer favourable breeding sites for these two species. Bioassays showed resistance to all pyrethroids (permethrin, deltamethrin, and alpha-cypermethrin) in all sentinel sites with varying intensities. These mosquitoes were further exposed to PBO nets. Preliminary exposure to PBO



showed a partial restoration of susceptibility; A resistance management strategy should be put in place to ensure effectiveness of vector control and strengthen the use of LLINs with PBO; Implementation of Indoor Residual Spraying (IRS) using other classes of insecticides (Organophosphate, Carbamate, Neonicotinoide)

Innovation gaps in malaria control & elimination

Centre Pasteur du Cameroun

Presented by Dr. Ayong Lawrence, so much research has been done to bring innovative tools to control malaria, yet the gap between the innovations and its effectiveness still remains. A real need at hand:

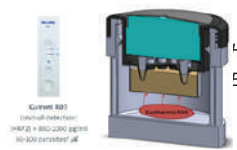
- New vector control tools: insecticide & behavioural resistance
 - New & better medicines to solve rising drug resistance
 - More sensitive & user-friendly diagnostics: parasite reservoirs
 - Vaccines! Vaccines! & Better Vaccines
- Centre Pasteur du Cameroun has experienced great innovations in malaria control equipment

Innovations in malaria diagnosis



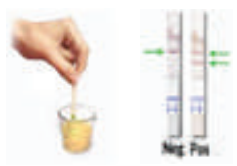
1. microscope
2. RDT

Innovations in Malaria Diagnosis to tackle sensitivity



- High sensitive RDT
- Electricity-free RT-LAMP

Non-invasive malaria diagnosis innovation



1. Urine/saliva-based



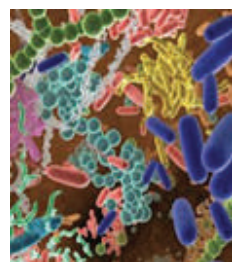
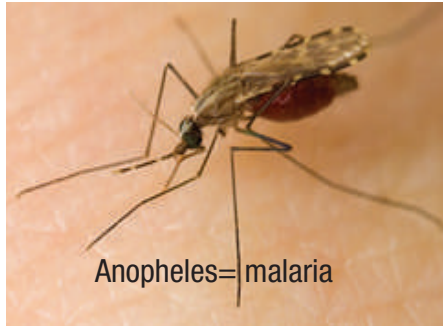
2. Breath analyser

Several exciting new products in R&D against malaria: New insecticides, drugs, diagnostics, vaccine candidates amongst others. However (1) Elimination is possible with the existing tools and (2) Speed seems critical.



PIIVeC'S VECTOR borne diseases control contribution

The need for expertise in vector control is more pressing than ever seeing that 1,000,000,000 people get sick and 1,000,000 die each year from diseases transmitted by insects.



Decline in Burden of Malaria across Africa has been largely attributed to scale up of ITNs. To help scale up malaria in Cameroon, PIIVeC is funding a 3 year project to identify molecular markers of insecticide resistance in the major malaria vector an gambiae. To eliminate Microbiome and Plasmodium infection in mosquitoes PIIVeC is designing new tools to block malaria transmission. Scale up of malaria would be more effective if stakeholders brought hands on deck to finding permanent malaria control solutions. This need led to the initiation of the Technical Vector Control Advisory Group (TVcAG). Its first meeting took place in Yaoundé December 2018



To further strengthen collaboration with private researchers for a national goal, PIIVeC conceived the Implementation of operation research to better inform control program. This resulted to the launch of a call for application for operational research projects which was coordinated by CRID. Submission specificities include seven projects that may lead to rapid, visible and positive impact on control of vector borne diseases in Cameroon

As part of its efforts to ensure the efficient use of Insecticide Treated Nets, PIIVeC through CRID and the LSTM, carries out quality control of bed nets to ensure the insecticide content of these nets is actually



what is stated by the manufacturers seeing that insecticide loss could happen during manufacturing, shipment or storage and to ensure that the new nets are able to kill mosquitoes as supposed.

As part of its contribution to bring together stakeholders to discuss and find solutions to vector-borne diseases in Cameroon, PIIVeC was the official sponsor of the Scientific Day hosted by CRID as part of the 12th World Malaria Day activities in Yaoundé

COMMUNICATION AND COMMUNITY BASED INTERVENTIONS FOR EFFECTIVE OUTREACH

The right communication tools and channels must be mobilised to engage communities to take action.

Breakthrough ACTION ignites collective action and encourages people to adopt healthier behaviours—from using modern contraceptive methods and sleeping under bed nets to being tested for HIV and preparing for epidemic outbreaks—by forging, testing, and scaling up new and hybrid approaches to social and behaviour change.



We cannot assume that humans understand and will act accordingly. Human behaviour is much more complex than we think and so to cause our community to take action, we must adopt behaviour change actions like practical signs and directions to act as indicators for call to actions.

In Cameroon, Breakthrough Action carried out the formative quantitative research on household malaria-related behaviours in the North and Far North regions during end of rainy season (August – October), improved the capacity of NMCP and other partners to coordinate, design, implement, monitor, and evaluate SBC at national and sub-national levels.

COMMUNITY DIRECTED INTERVENTION, AN MC-CCAM DRIVE



To ensure that at least 80% of the population adopts practices that favour the promotion of healthy behaviour, the prevention and integrated management of diseases malaria inclusive, MC-CCAM liaises with Communities, Community Health Workers (CHW), Traditional rulers, Chiefs of Centres (COC), District Civil Society Organisation (DCSOs) and Mayors / local authorities to implement behaviour change initiatives. Community Health Workers are expected to carry out at least 1 sensitisation and educative talk per week with 10 homes visited each time using megaphones, flipcharts and the Multipurpose CHW's Integrated image Box amongst other items.