



Contribution of larviciding within the High Burden to High Impact initiative in Africa.

**Mavy Hernández Rodríguez MsC.
mavygaby05@yahoo.com**

BACKGROUND

BIG CHALLENGES FOR VECTOR CONTROL

1. TO SPREAD OF INSECTICIDE RESISTANCE.
2. CHANGE IN VECTOR FEEDING AND BITING BEHAVIOUR (*An.arabiensis*).
3. RESIDUAL MALARIA TRANSMISSION.
4. ADAPTATION OF MOQUITOES TO POLLUTED WATER.

IMPORTANCE OF LARVICIDING AT A GLANCE

1. It is an effective preventive action.
2. To control of high quantity of mosquitoes larvae in one round of application.
3. It is very effective against indoor & outdoor mosquito biting.
4. Successful activity to control the Residual Malaria Transmission.
5. Help to reduce the spreading of chemical resistance.
6. Strengthen the vector control national strategy.



Interim Position Statement

The role of larviciding for malaria control in sub-Saharan Africa



World Health Organization

Global Malaria Programme

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Mosquito larval source management

Lucy S Tusting, Julie Thwing, David Sinclair, Ulrike Fillin
and Steven W Lindsay

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Abstract

Background

Malaria is an important cause of illness and death in people living in many parts of sub-Saharan Africa. Long-lasting insecticide treated bed nets (LLINs) and indoor residual spraying (IRS) are the main malaria control interventions available in sub-Saharan Africa.



LARVAL SOURCE

OPEN ACCESS Freely available online



Microbial Larvicide Application by a Large-Scale, Community-Based Program Reduces Malaria Infection Prevalence in Urban Dar Es Salaam, Tanzania

Yvonne Geissbühler^{1,2,3}, Khadija Kannady², Prosper Plus Chaki^{2,4,5}, Basillane Emidi^{2,5}, Nicodem James Govella^{2,4,6}, Valeriana Mayagaya^{2,6}, Michael Kiama^{2,5}, Deo Mtshwa⁶, Hassan Mshinda⁷, Steven William Lindsay⁴, Marcel Tanner⁸, Ulrike Fillinger⁴, Marcia Caldas de Castro⁷, Gerry Francis Killen^{3,4,8,9}

1 Department of Public Health and Epidemiology, Swiss Tropical Institute, Basel, Switzerland, **2** Dar es Salaam City Council, Ministry of Regional Administration and Local Government, Dar es Salaam, United Republic of Tanzania, **3** Coordination Office, Swiss Health Institute, Dar es Salaam, United Republic of Tanzania, **4** School of Biological and Biomedical Sciences, Durham University, Durham, United Kingdom, **5** Department of Zoology and Marine Biology, University of Dar es Salaam, Dar es Salaam, Tanzania, **6** Ministry of Health and Social Welfare, Dar es Salaam, United Republic of Tanzania, **7** Department of Population and International Health, Harvard School of Public Health, Boston, Massachusetts, United States of America, **8** Vector Group, Liverpool School of Tropical Medicine, Liverpool, United Kingdom

Abstract

Background: Malaria control in Africa is most tractable in urban settlements yet most research has focused on rural settings. Elimination of malaria transmission from urban areas may require larval control strategies that complement adult mosquito control using insecticide-treated nets or houses, particularly where vectors feed outdoors.

Methods and Findings: Microbial larvicide (*Bacillus thuringiensis* var. *israelensis* (Bt)) was applied weekly through programmable, non-randomized community-based, but vertically managed, delivery systems in urban Dar es Salaam, Tanzania. Continuous, randomized cluster sampling of malaria infection prevalence and non-random programmatic surveillance of entomological inoculation rate (EIR) respectively constituted the primary and secondary outcomes surveyed within a population of approximately 612,000 residents in 15 fully urban wards covering 55 km². Bt application for one year in 3 of those wards (17% of the population) reduced EIR by 50% and malaria infection prevalence by 20% (Relative RR [CI] = 0.68 [Relative RR [CI] = 0.35-1.0]). Larviciding reduced malaria provided protection at least in its rapidly growing urban areas.

Conclusions: In this context, insecticide-treated nets, LLINs, and larviciding reduced malaria in its rapidly growing urban areas.

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Competing Interests: A substantial documented suppression of malaria prevalence was observed in the study area, which is partially supported by larval source management (LSM) interventions. The authors have no competing interests.

*** Author Information:** Yvonne Geissbühler is the corresponding author for this article. Email: ygeiss@swiss TPH.ch

† Deceased: Gerry Francis Killen (1947–2013) was a leading expert in malaria control and a pioneer in the use of larvicides for malaria control.

RESEARCH

Evaluation of long-lasting microbial larvicide for malaria vector control in Kenya

Yaw A. Afrane^{1,2}, Nixon G. Mweresa², Christine L. Wanjala⁴, Thomas M. Gilbreath III³, Guofa Zhou³, Ming-Chieh Lee³, Andrew K. Githeko² and Guiyun Yan^{3*}

Abstract

Background: Outdoor malaria transmission is becoming an increasingly important problem in malaria control in Africa. Larval control is a promising intervention as it can target both indoor and outdoor biting mosquitoes. However, the currently available biolarvicide formulations have a short effective duration, and consequently larval control incurs a high operational expense due to the requirement for frequent re-treatment of larval habitats. Formulations of biolarvicides with longer effective durations are needed to reduce the operational expense of larval control.



MINISTRE DE LA SANTE
SECRETARIAT GENERAL
CENTRE DE RECHERCHE EN SANTE DE
NOUNA



RAPPORT D'EVALUATION FINALE DU PROJET PILOTE DE LUTTE CONTRE LE PALUDISME PAR L'UTILISATION DES BIOLARVICIDES DANS LA VILLE DE OUAGADOUGOU (PPLPBL/VO)

Malaria Journal

Open Access



NATIONWIDE

**POLITICAL WILL –
Countries Led Malaria
Response**

**Better Guidance-
Policy-Strategies)
(LARVICIDING)**

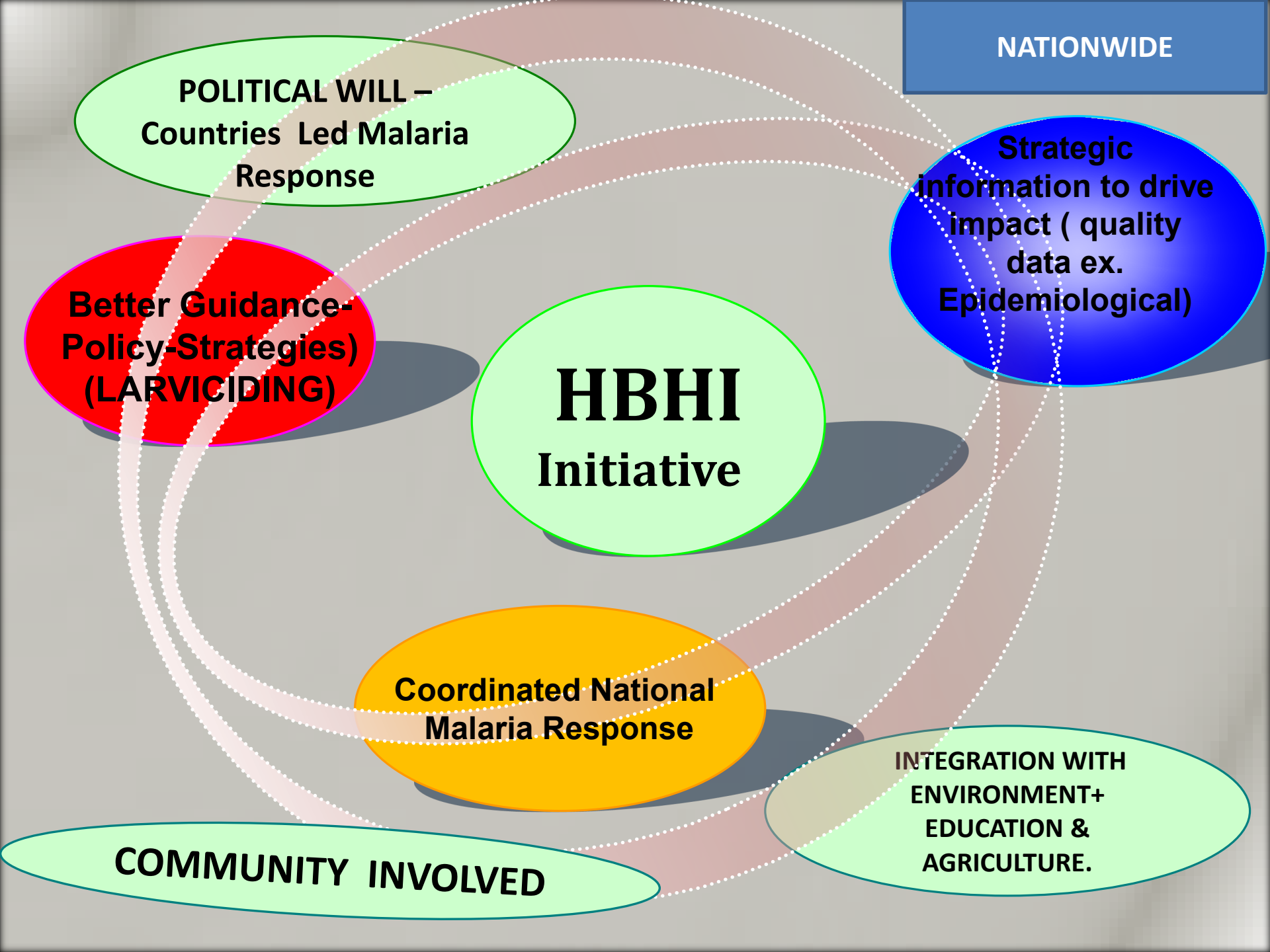
**HBHI
Initiative**

**Strategic
information to drive
impact (quality
data ex.
Epidemiological)**

**Coordinated National
Malaria Response**

COMMUNITY INVOLVED

**INTEGRATION WITH
ENVIRONMENT+
EDUCATION &
AGRICULTURE.**



OUTCOMES OF LARVICIDING / HIGH BURDEN AREAS

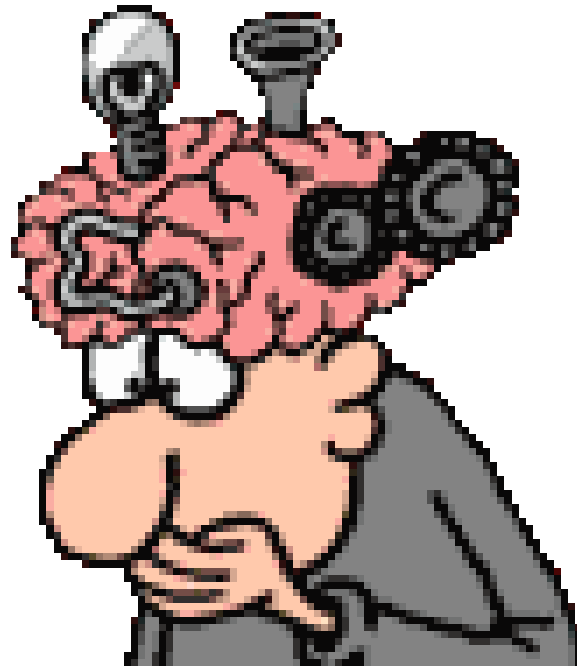
ENTOMOLOGICAL OUTCOMES

- 1. TO REDUCE MORE THAN 90% OF MOSQUITOES LARVAE.**
- 2. TO REDUCE MORE THAN 75% OF MOSQUITOES ADULTS.**

CLINICAL OUTCOME

- 1. IT MAY CONTRIBUTE WITH A REDUCTION (25-50%) IN THE BURDEN AREAS.**

HOW CAN BE IMPLEMENTED LARVICIDING IN AFRICA ?

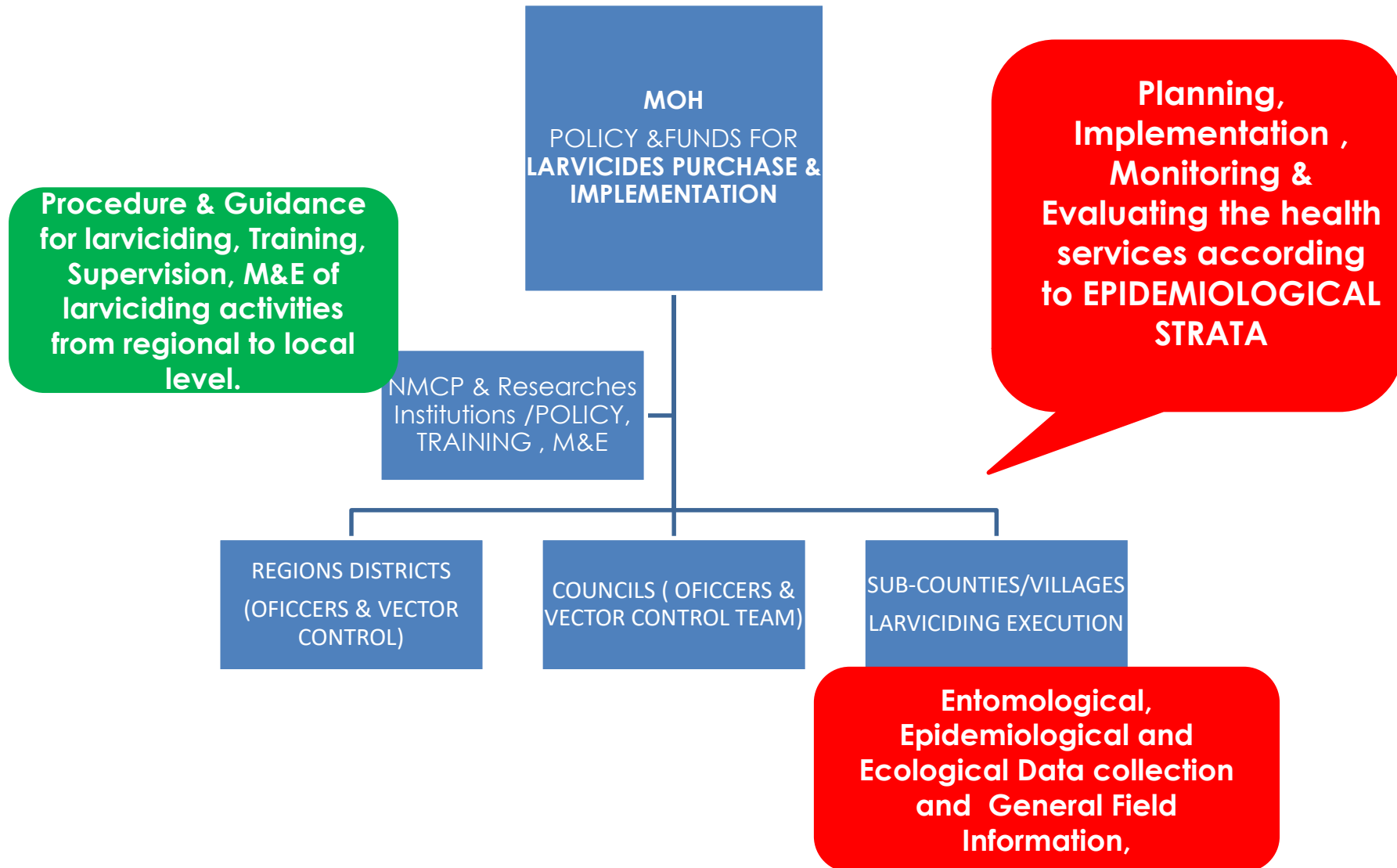


"Madness is doing the same thing over and over again hoping to get different results."

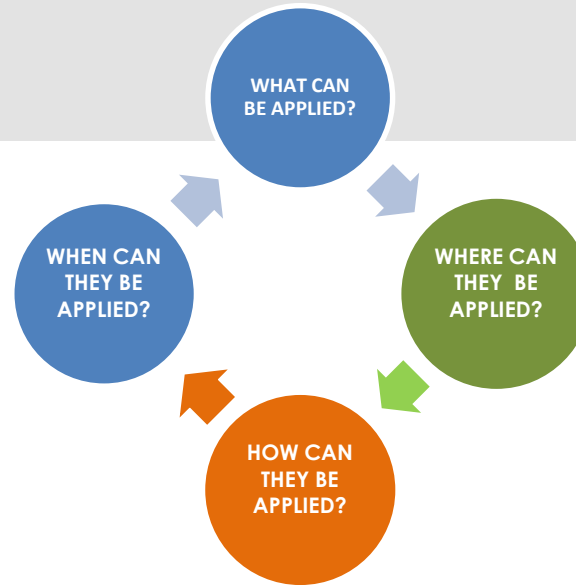
EINSTEIN

POLICY-FUNDS-CAPACITY BUILDING

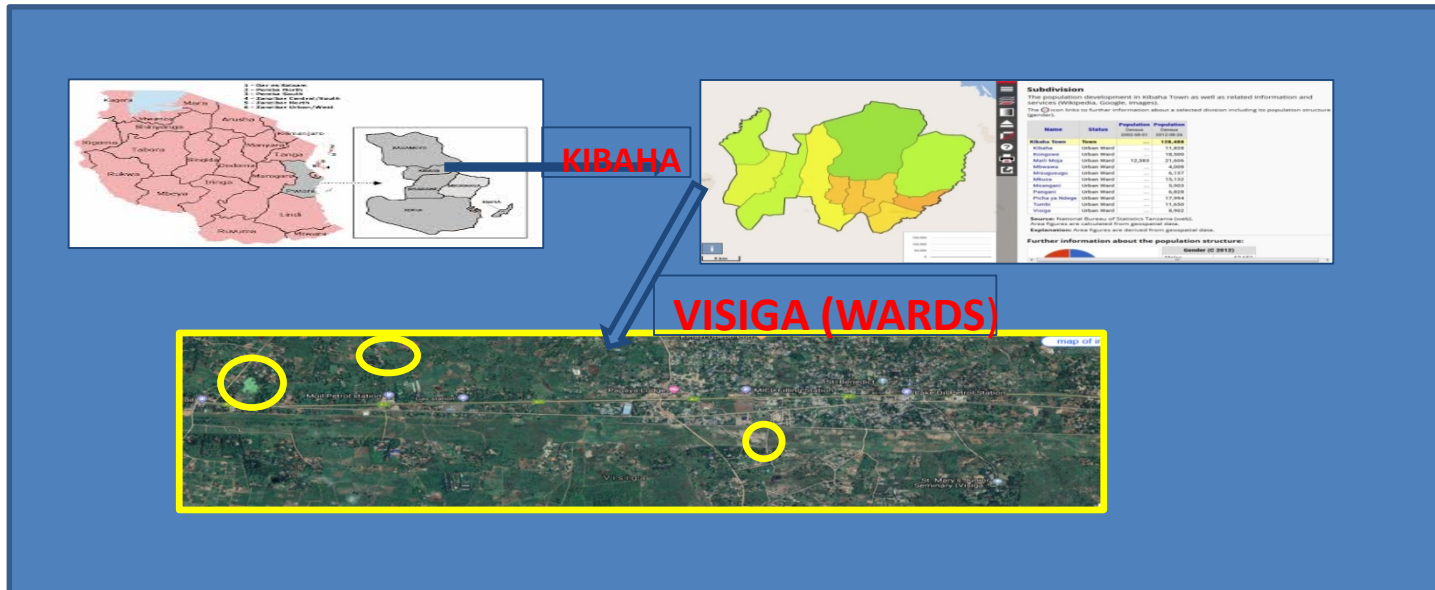
OPERATIONAL STRUCTURE FOR LARVICIDING IMPLEMENTATION AT COUNTRYWIDE.



METHODOLOGY OF LARVICIDING



MACRO-STRATIFICATION TO MICRO-STRATIFICATION



SOME RESULTS OF LARVICIDING IN AFRICAN COUNTRIES

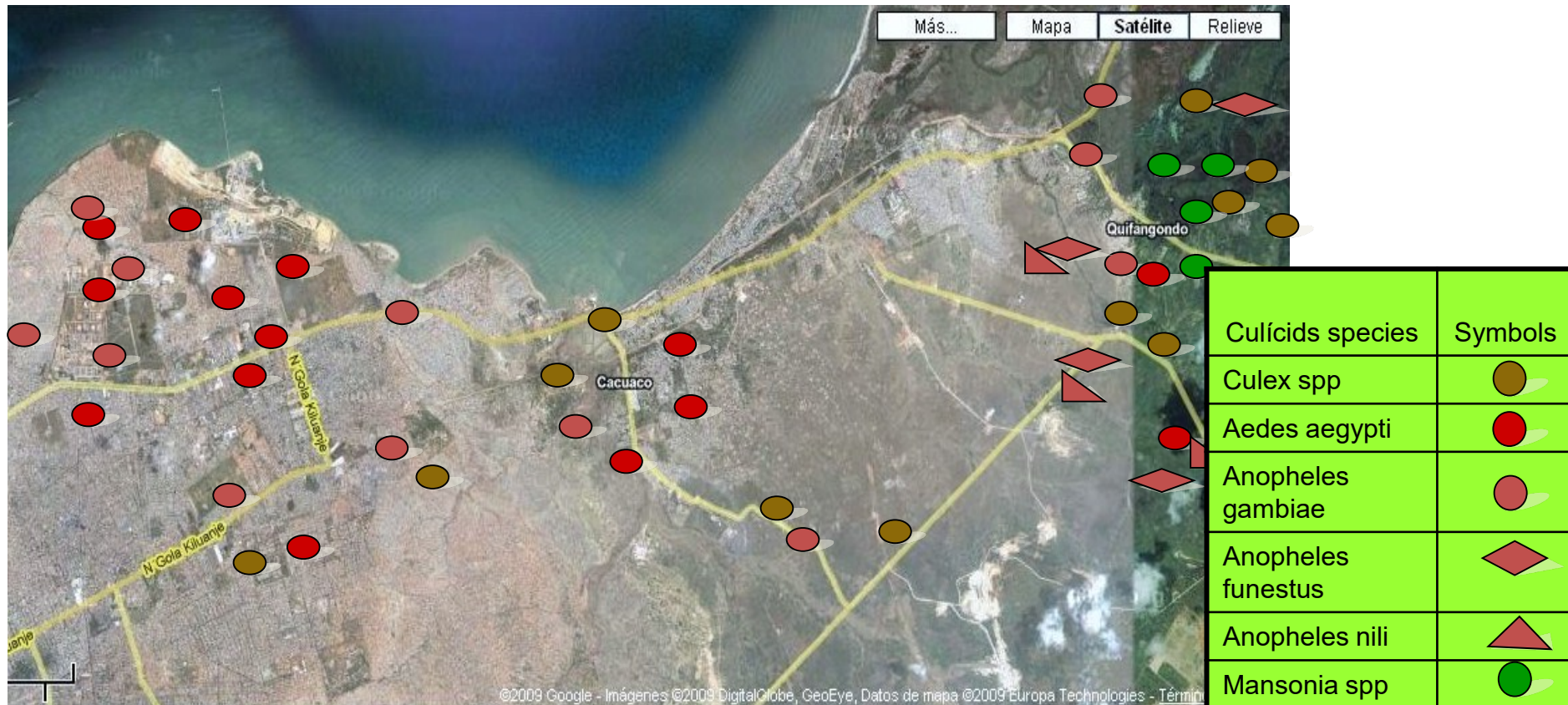
Country	Total of treated Breeding Sites /month	% of larval Reduction (30 days)	Reapplication time (days)	% of Adults Mosquitoes Density	% EIR	% of Reduction Malaria Cases
Angola (Luanda)	3550	90.2	28 to 45	80	0.9 to 0.04	25- 57
Zambia	1749	92	50	76		52
Ghana	570	90	35 to 45	86		53,57
Burkina Faso	1214	93	30 to 45		0,10 to 0.04	17
Nigeria (RS)	2971	98	35 to 50	93		63
Tanzania	1185	97	40	82		38,23
Níger	100	96	30	80		High reduction
Gabón	520	95,8	30 to 45			27,4 (Libreville 2014)

COST VS EFFECTIVENESS

USD per treated hectare of breeding sites	2.12
USD per travelled Km	36.28
USD per inhabitant benefit	0.69

ENTOMOLOGICAL RESULTS OBTAINED DURING LARVICIDING EXECUTION

Anopheles gambiae sl, *Anopheles coustani*, *Culex quinquefasciatus*, *Cx annularis*, *Cx tigripes* and *Aedes Albopictus*, *Anopheles funestus*



TECHNICAL GRANTS OF LARVICIDING

The activities of the team and the entire Project are as follows:

	SUPPLIED PRODUCTS	LAND MASS TRAETED M ²
Bactivec	17,586 Tanks (351,720 litres)	42,436,000 Totals
Griselesf	6,206 Tanks (124,120 litres)	
Mini dose (30ml)	1,296, 626 unit	

Local Government Areas covered: Port Harcourt, Obio/Akpor, Eleme, Bonny, Andoni, Degema, Okrika, Oyiabo, Opobo/Nkoro and Ogu/Bolo.

Both products were supplied on a 70:30 % proportion, using manual or motorised means as well as using the aerial (Aircraft) spraying in those breeding sites that are hard to reach and water bodies that are larger than one hectare; protecting cities, villages and the surrounding with a dose of 10ml /m². Alongside the use of biolarvicides, indoor residual spraying (IRS) using the chemical pesticide, Lambda-cyhalothrin and outdoor environmental spraying with a mixture of Acetellic and diesel to knock down the adult mosquito population, where it was very high, were carried out.

The outcome obtained on the entomological field shows a larval reduction (Anopheles spp, Culex spp, Aedes spp) of 90% to 98% at sentinel breeding sites after 72 hours and product activity effective for up to three months. With the aerial spraying, more than 93% larval reduction was achieved within 72 hours.

On the epidemiological assessment, data were collected mainly from the Ministry of Health and two public hospitals in Port Harcourt and compared between the periods before (2007-2010) and after (2011-2012) the intervention of the Malaria Elimination Project with Labiofam collaboration. There was confirmed a reduction of malaria cases by 63%.

The project has so far trained 5 Specialised Technicians, 23 Malaria Focal persons, 23 Social Mobilisation Officers and 732 Spray men and women.

The communities treated have been positively impressed because of the better health they were having, the reduction of sleep disturbance and the ability to enjoy their evenings outdoors as a result of mosquito reduction.

An agreement for the extension of the programme for one year with the goal of covering all the State has recently been signed. The current LGA cover with the programme is about 50% of the State land mass and 55% of the population.

Dr. Kalada Dick Iruenabere
Coordinator, Malaria Elimination Project

Dr. Conrado Vazquez Murillo
Team Leader, Labiofam Rivers State

February 13th of 2011

CERTIFICATION OF THE INTEGRATED MALARIA VECTOR CONTROL PROJECT RESULTS, 2010

This report contains the continuation of the work carried out in the Greater Accra, Brong Ahafo and Ashanti Regions within the period of January 2010 and December, 2010.

From our monitoring assessment, this has resulted in maintaining very low larvae population in the water bodies located in the aforementioned regions. It has also led to a reduction in the population of mosquitoes within the surrounding communities.

There are indications that in addition to a perceived reduction in nuisance in some facilities in A.M.A have started recording reduction in malaria cases reported at Out-Patients Department. The Ministry of Health is currently putting together data to demonstrate this.

Based on these results, the Ministry of Health has now adopted the use of Biolarvicides as a key strategy for malaria vector control nationwide.

With those bases, we are recommending that the project continues with the third phase having a nationwide.

Lic Felix Ouedraogo Puidou
Project Governor of Labiofam

Dr. Hafez Adam Taher
Local Advisor.

With the approval of:
Isaac Adams
Coordinator of Project MOH, Ghana.

MINISTÉRIO DA SAÚDE
DIRECCÃO NACIONAL DE SAÚDE PÚBLICA
PROGRAMA NACIONAL DE CONTROLO DA MALÁRIA

AO
SECRETÁRIO GERAL DO MINSA
ATT. DR JOAQUIM MOÇAMBOUE
LUANDA

Assunto: Parecer sobre o Projecto de Lata Anti-Larvar Angola-Cuba

Exmo Sr.

Os meus respeitosos cumprimentos.
No âmbito da implementação do Projecto de Lata Antilarvar contra o mosquito da malária em Angola, foi assinado em 24 de Junho de 2008 um contrato de prestação de serviços entre o Ministério das Finanças e a Empresa Cubana denominada Corporação Antex S. A. Este contrato começou a ser implementado em 2009 e actualmente encontra-se implementado nas 18 províncias, em 155 municípios, tendo sido capacitados 1175 trabalhadores Angolanos enquadrados em equipas móveis a nível municipal com a assessoria Cubana.

O Projecto tem sido monitorado em conjunto (Programa Nacional e Cooperação Cubana) e os resultados verificados em 2010 mostraram uma eficácia 98,7% de eficácia nos criadouros tratados com redução significativa do vector da malária. Simultaneamente, em áreas seleccionadas foi efectuada a aplicação de produto para eliminação de zats com uma eficácia estimada em 95%.

Durante 2010, o Programa Nacional de Controlo da Malária registou uma redução de mortalidade no País de 25% devido à utilização de estratégias combinadas de distribuição de redes mosquiteiras, melhoria do diagnóstico e do tratamento e também da componente de lata anti-larvar.

Actualmente, Angola tem o maior Projecto de Lata Antilarvar do Continente Africano, o qual está a ser seguido com muita atenção pela OMS com vista à recolha de evidências que permitam eventualmente adoptar esta medida como prioritária nas estratégias mundiais.

Pelos elementos apresentados somos do parecer que o país devia manter este projecto.

Aproveitamos a oportunidade para informar que a construção em Angola da fábrica de larvicida (prevista no contrato inicial), levará à redução dramática de custos do projecto, e possibilitará no futuro a distribuição do mesmo para outros países Africanos.

Sem outro assunto de momento, endereço as minhas mais cordiais saudações e votos de "Natal Feliz" e "Ano Novo Próspero".

Luanda, aos 23 de Dezembro de 2010

O Coordenador do Programa
Prof. Dr Filomeno Fortes

OFISI YA RAIS
TAWALA ZA MIKOA NA SERIKALI ZA MITAA
SIMU: "REGCOM COAST"
Simu. 02-2402500.
Simu. 02-2402250/2402686/2402151
Barua pepe: jasi@pwanet.co.tz
fhtmtawani@yahoo.com



Certificate of Recognition

Awarded to

Tanzania Biotech Products Limited

For

Biological efficacy of BACTIVEC – Batch: 0516004

The effectiveness of the Biolarvicide - Bactivec produced by **Tanzania Biotech Products Limited**, which is located along TAMCO Industrial Estate at Kibaha - Pwani Region. The product was tested and evaluated under field conditions of Anopheles sp and Culex sp larvae. The test was done according to WHOPEs 2005 guidelines for the evaluation of Biological Larvicides.

The formula was applied by spraying method on the active surface of breeding sites depending on dose 5ml/m², as it is indicated in the label.

After 24 hours of application the product, 100 percent of mortality of anopheles sp and Culex sp larvae was observed.

The effectiveness of the Biological Larvicides BACTIVEC is successful to control Anopheles sp and Culex sp larvae as Intervention for fighting against Malaria Vector.

REGIONAL MEDICAL OFFICER
DR. HENRY MUYA
Regional Medical Officer

Date: 16.09.2010

Mr. NIHANDO MUYA
Regional Malaria Focal Person

MINISTÈRE DE LA SANTÉ
SECRETARIAT GENERAL
CENTRE DE RECHERCHE EN SANTÉ DE
NOUAK



RAPPORT D'ÉVALUATION FINALE DU PROJET PILOTE DE LUTTE CONTRE LE PALUDISME PAR L'UTILISATION DES BIOLARVICIDES DANS LA VILLE DE OUAGADOUGOU (PPLPBL/VO)

Equipe d'évaluation

Dr Ali Sidi, Médecin épidémiologiste, MO PhD
Dr Maurice Yé, Médecin Santé Publique, MD, MSc
Dr Boubaacar Coulibaly, Biologiste, MSc, PhD
Dr Abdoulaye Faneas, Socio-anthropologue, MSc, PhD
Dr Ousmane M'Baye, Médecin épidémiologiste, MD, MSc
Mr Adams Traoré, Economiste en santé, MSc
Mr Séraphin Simboro, Spécialiste SIC, MSc

REPUBLIQUE DU NIGER
"Fédération Travail Progrès"
MINISTÈRE DE LA SANTÉ PUBLIQUE
SECRETARIAT GENERAL
DIRECTION DES ETUDES ET DE LA PROGRAMMATION
PROGRAMME NATIONAL DE LUTTE
CONTRE LE PALUDISME

Niamey, le 15 FEV 2010

LA COORDONNATRICE
A
LA SOCIÉTÉ LABIOFAM SA

N° 0005/053
DANS/SPG-DEP/PNLP

Objet : appréciation de l'intervention des experts Cubains

Monsieur Le Directeur,

Dans le cadre de la coopération avec la République de Cuba signée le 30 septembre 2014 à la Havane à travers la société LABIOFAM S.A relatif à la prestation de services et la fourniture de bio-larvicides, pour mettre en œuvre la lutte anti-larvaire par l'utilisation des bio-larvicides sur l'ensemble du pays et la pulvérisation extra domiciliaire (PED) dans les grandes villes afin de contribuer efficacement à la lutte contre le paludisme, une première phase a concerné trois régions du pays à savoir: Dasso et Niamey. Ceci a donné de résultats probants de diminution significative de cas de paludisme enregistré, de réduction du nuisances de moustiques domestiques. C'est pourquoi le PNLP apprécie positivement cette intervention en attendant l'évaluation globale des activités. La mise en œuvre des activités terrain de lutte contre le paludisme par l'utilisation de biolarvicides avec la coopération cubaine se poursuivra dans les autres régions jusqu'en fin 2010, afin de permettre aux cadres du PNLP de pérenniser l'expertise cubaine voir même l'appropriation de cette intervention par les collectivités et les populations elles-mêmes pour l'amélioration de leur propre santé. Recevez Monsieur le Directeur mes salutations les plus cordiales.

DR. HADIZA JACKOU
Regional Medical Officer

CHALLENGES

- There is not a local VC structure. (VC Teams)
- Lack of minimal resources to apply larvicides.
- There are not enough funds .
- Poor or not real entomological & epidemiological data (number, area, localization & characterization of breeding sites & identification of mosquitoes species)
- There is not a clear guidance and methodology at the country level.

RECOMENDATION

**TO INTRODUCE LARVICIDING , AS PART
OF MALARIA PREVENTION ACTIVITIES
WITHIN HBHI INITIATIVE .**

“We need to change course and improve how we combat malaria, particularly in those countries with the highest burden. The status quo will take us further off track and have significant negative socio-economic consequences beyond malaria.”

Dr Tedros Adhanom Ghebreyesus,
WHO General Director

THANK YOU