

TRANSPARENCY AND ACCOUNTABILITY NETWORK



THE IMMC CONSORTIUM **INTEGRATED MOSQUITO AND MALARIA CONTROL**

A comprehensive integrated mosquito and malaria control program to reduce the incidence of malaria, and other insect spread diseases.

EXECUTIVE BRIEF **OVERVIEW OF THE CONSORTIUM**

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DRAFT – FOR DISCUSSION ONLY

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INTEGRATED MOSQUITO AND MALARIA CONTROL CONTEXT

**THIS DOCUMENT IS PART OF A SERIES THAT INCLUDES
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SLIDE PRESENTATIONS

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INTEGRATED MOSQUITO AND MALARIA CONTROL INTRODUCTION AND OVERVIEW

The IMMC Consortium has been formed to help improve the response to the current malaria crisis. An estimated 500 million cases of acute malaria occur worldwide each year, mostly in Sub-Saharan Africa (SSA). There are as many as 2 million deaths a year from malaria, primarily among infants and young children. Every 3 minutes a child dies of malaria, or about 3,000 children a day. Malaria is not only a killer of children, but is a debilitating disease for adults.

This is not the situation that was expected when projections were being made in the 1940s, 1950s and 1960s. It was reasonably expected that malaria was going to be reduced to a disease of virtual insignificance. Malaria had been overcome as a constraint to the construction of the Suez and Panama Canals, malaria had been substantially reduced in Europe and the USA prior to WWII and then practically eliminated between 1946 and 1950. Malaria was substantially reduced almost all over the globe, including much of South America and South Asia.

But policies changed, and the rapid progress did not continue through the 1970s, 1980s and 1990s. A large part of this was the discontinuance of DDT use as an anti-mosquito pesticide, and aggravated by limited funding for malaria by the international relief and development sector and poorly managed malaria control interventions that increased resistance in both the mosquito and the malaria parasite.

The IMMC Consortium is made up of: (1) Tr-Ac-Net Inc. (The Transparency and Accountability Network) with a focus on critical IMMC management information; (2) West Coast Aerial Applicators (WCAA) specializing in aerial operations and pest control, (3) ADAPCO, pesticide experts and consultants, (4) Acroloxus, experts in wetlands management; (5) Africa Fighting Malaria, experts in mosquito and malaria control; and, (6) an IMMC team of experienced entomologists. Together, the IMMC Consortium has expertise in operational matters, in management information and scientific analysis, which are all required together for success in mosquito and malaria control.

The strategy is to combine best practice in management information with best practice in practical integrated mosquito and malaria control (IMMC) interventions to get the best possible results for the least amount of money.

The practical IMMC interventions include: (1) community awareness, education and training; (2) neighborhood cleanup to reduce mosquito breeding places; (3) interior residual spraying (IRS); (4) mosquito larva control to kill larvae and stop mosquito recruitment into the population; (5) ultra low volume (ULV) external adulticide spraying to kill flying mosquitoes; (6) medical treatment of malaria cases; and, (7) personal use of insecticide treated bednets (ITN).

Preliminary cost analysis suggests that the most cost effective approach is an integrated program with multiple control interventions. The cost for substantial control of mosquitoes and malaria is likely to be an order of magnitude better using an integrated approach than any single control intervention on its own.

THE MANAGEMENT INFORMATION DIMENSION

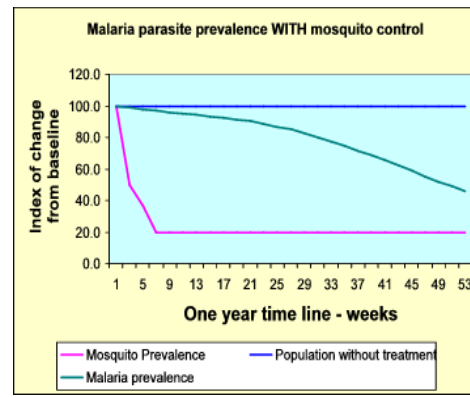
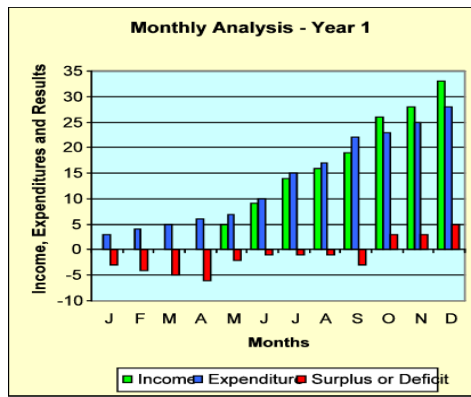
The information that is critical to measuring IMMC performance is founded on data that are collected “on the ground”. The success of IMMC is determined in large part by the entomological data that is collected and the analysis of this data to design effective interventions. The scientific data need to be combined with very basic information about costs to provide an understanding of cost and results.



The value of the data is maximized by using it to help planning for the best possible IMMC interventions, and using the data to understand what is working and what is not. The data has a lot of value if it can be used in a timely manner, and in a mosquito / malaria system that changes significantly from day to day, daily data is invaluable.

Costs, results and simulation models

Combine this with cost accounting information and measurement of medical status of the population and there is a comprehensive management information process. Simulation or planning models are being developed so that “what if?” simulations can be studied. The model attempts to relate cost with result, on top of calculations that reflect the underlying science, and solid measurement of the accomplishments that impact the socio-economic condition ... specifically reduction in the cases of malaria in society. The data are also designed to measure unintended or undesirable consequences that need to be managed, such as environmental issues and resistance to use of pesticides and drug treatment.



We know that spatial information is very useful for planning IMMC interventions. The following are satellite images of Monrovia, Liberia. One image shows all of Monrovia, and the location of a tidal marsh running through the center of the city. The other is a section of the city at higher resolution that shows individual houses. Data can be used to make IMMC interventions most effective.



The management information dimension of operated independently from the IMMC operations and support activities. Because of this, the management information approach is available to any group or organization carrying out IMMC type activities that wants to manage and control the operations and optimize results.

The program will always try to make the most possible use of already available data, and encourage data to be in the public domain for widespread scientific and management use. A web enabled database is planned to help provide widespread easy access, as well as cooperation with telecenters to facilitate communications.

IMMC INTERVENTIONS

Community awareness, education and training

The role of individual knowledge in helping to prevent malaria must not be underestimated. Everyone can change behavior to reduce the impact of mosquitoes and malaria on the family, but only to the extent that people know what to do. It is a priority to integrate malaria messages into ALL health related education everywhere in endemic areas. Local techniques for communicating important messages like plays

and puppet shows will be used as well as modern ICT techniques such as the TALC initiative.

Neighborhood cleanup to reduce mosquito breeding places

In the early days of mosquito and malaria control, environmental clean up played an important role. It should do so again. Communities must take control of the local environment and stop mosquitoes breeding close to residential areas and work places. More recently it has become apparent that a lot of man-made structures contribute to mosquito abundance.



Interior residual spraying (IRS)

IRS has proven to be an effective way to reduce the number of cases of malaria in malaria endemic areas.



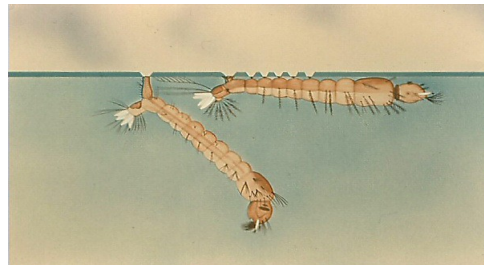
IRS works through three mechanisms: (1) there is a repellent action that keeps mosquitoes out of the house; (2) there is an irritant action that makes a mosquito leave a house quickly after entering; and, (3) a toxic action that kills the mosquito if it rests for any time in the house. Broadly speaking, the size of the mosquito population is not affected by an IRS intervention, but behavior is modified so that there is less human blood meal taking by the mosquitoes. IRS is most effective when DDT is used is the pesticide.

In an area where there is a substantial IRS intervention, the mosquito population moves outside, where it can be effectively subject to adulticide control.

Mosquito larva control to kill larvae and stop mosquito recruitment into the population

Mosquito larvae attach themselves to the surface of the water. In the images below, the examples hanging vertically are probably *Culex* larvae. The *Anopheles* larvae

attaches itself horizontally to the surface of the water as shown in the right hand image.



Mosquitoes lay eggs in stagnant water, and in a matter of days eggs become larvae, become pupae and then adult flying mosquitoes. This is what mosquito larvae look like.

The success of larviciding has been demonstrated over and over again, but it requires a lot of organization. Precise data are needed, timely intervention and well trained staff. Some bodies of water are difficult to access, and larviciding can be done by air. In some places helicopters are used for very precise delivery of treatment.



Ultra low volume (ULV) external adulticide spraying to kill flying mosquitoes

Adulticiding can be done from the air, using vehicle mounted equipment or using hand held equipment. The aircraft used for ULV spraying are very maneuverable, and suited to flying with very precise positioning and they are also equipped with spray equipment that enables them to generate very small spray droplets just microns in size.

Spraying by air is the lowest cost per acre when large areas have to be treated. It also

makes it possible to have a quick impact over a very large area. The results of the IMMC operation simulation show the importance of timeliness and speed, and argues for rapid aerial treatment as a key component of an integrated coordinated program. Vehicles can also be quite cost effective where there is good road access. Hand adulticiding is very costly for large programs.



All pesticide use must be done under controlled conditions with strong safety protocols in place.

Medical treatment of malaria cases

There are many different treatments. The following medications are used alone or in combination:

- Chloroquine
- Mefloquine (Lariam)*
- Doxycycline*
- Clindamycin*
- Malarone*
- Quinidine*
- Quinine*
- Artemisinin*
- Combination of pyrimethamine and sulfadoxine (Fansidar)*
- Primaquine (for hepatic phase of *P. vivax* and *P. ovale*)



*Commonly used to treat chloroquine-resistant strains of *P. falciparum*

With a high level of reinfection there is growing resistance to the various

medications. This is cause for concern, and the best way to address this is through reduction in the vector, and limiting the opportunities to infection. A vaccine is difficult, and probably more than 20 years away even with heavy investment in research and obtaining regulatory approvals.

Personal use of insecticide treated bednets (ITN)

Bednets have been used for a long time. In recent years insecticide treated bednets (ITN) that retain their effectiveness for about 5 years have been introduced . The bednet shown below is being used in Uganda.



Data regarding the effectiveness of bednets seems to show that a bednet reduces the risk of malaria infection for the users of the bednets, but has no appreciable impact on the community as a whole that does not have bednets. This is in contrast to IRS, where the community at large seems to benefit from an IRS program, even where less than all the houses are sprayed. A study done in Kenya suggests that IRS is more than three times most cost effective than ITN in averting malaria cases.

IMMC IS A RESULTS BASED PROGRAM

What is the most cost effective program?

At the present time NOBODY seems to know, or if they know are not saying. The IMMC Consortium believes that a data driven integrated IMMC program can be much more cost effective than any single intervention program, and around 10 times as cost effective as ITN on its own.

What is a data driven program?

IMMC is a real time data driven program. The specific interventions are planned based on results being achieved in more or less real time, and the data is used in a management feedback loop every day. If it does not work, do something else and find out why.