Plea for Support

The malaria crisis affects more than half a billion people. Even though the IMMC Consortium uses malaria and mosquito control interventions that aim to the most cost effective ... the costs for complete success far exceed funding that is available.

Accordingly, your support is very much needed and very welcome. The IMMC Consortium is a unit of the Ecologia Foundation, a tax exempt 501 c 3 organization based in Vermont.

Cash is always welcome ... any amount helps.

Please send check or money order made out to The IMMC Consortium and mail to:

The IMMC Consortium
c/o Tr-Ac-Net Inc.
221 East 66th Street (4C)
New York NY 10021 USA

The IMMC Consortium also welcomes corporate giving through a gifts in kind program. Arrangements have been made to sell surplus business inventory with proceeds being used to support IMMC operations. Gifts are tax deductible to the full extent allowed by law.

THE IMMC CONSORTIUM

INTEGRATED MALARIA AND MOSQUITO CONTROL

An Initiative to Address the Scourge of Malaria in Africa

Liberia

Liberia

About Liberia

The Republic of Liberia has a population of around 3.0 million and is located on the west coast of Africa. It is bounded on the north by Sierra Leone and Guinea, on the east by the Ivory Coast, and on the south and west by the Atlantic Ocean. Liberia is the oldest republic on the African continent. Almost 50% of the population live in urban areas, with around 1 million living in or around the capital city of Monrovia.

The coast of Liberia is approximately 370 miles long. The country extends inland about fifty miles. The area is around 43,000 square miles This coastal strip is the most developed region. The climate is typically equatorial, with an annual mean temperature of 82 degrees Fahrenheit, accompanied by an annual rainfall of about two hundred inches along the coastal strip and seventy inches in the interior. The rainy season occurs between April and October with drier periods from November through March.

Malaria in Liberia

According to WHO, Liberia is one of the most malarious places in the world. The conditions are perfect for a virulent mosquito population, there is a high prevalence of malaria in the human population. Almost the whole country has a prevalence exceeding 40%, and perhaps as much as 80% of the population live in areas with prevalence exceeding 60% and perhaps as much as 50% of the population are in urban areas with a prevalence exceeding 70%.

The Malaria Crisis

An estimated 500 million cases of acute malaria occur worldwide each year

In Sub-Saharan Africa there are about 450 million cases annually.

There are more than 1 million deaths a year, primarily among infants and young children.

Every 30 seconds a child dies of malaria, or about 3,000 children a day.

Pregnant women are also at high risk of death from malaria.

Malaria is not only a killer disease, but also a debilitating disease for adults.

THE TRAGEDY IS THAT MALARIA AND MOSQUITO CONTROL IS POSSIBLE BUT HAS NOT BEEN DONE.

The IMMC initiative is planned to be the most cost effective way of getting control of malaria and the mosquito vector ... and keeping the situation under control.

Data, Information and Analysis

Data collection in the community

The most important data are collected in the community. Data about all aspects of the program need to be collected on a timely basis in the community and transmitted efficiently for analysis and decision making.

Data flows

Data flows are designed to provide timely operational decisions at the local level, comprehensive scientific analysis and strong cost / performance modeling. A good understanding of the data makes it possible for correct decisions to be made rapidly.

Medical

There are three elements: (1) data about the cases; (2) data about the prevalence of malaria; and, (3) data about the science of the parasite. These data may be obtained from health clinics or from special surveys of the population.

Entomological

There are many dimensions of entomological data: (1) surveillance throughout the area to identify species of mosquito and map actual and potential breeding sites; (2) determine the sporozoite infection rates of the potential malaria vectors; (3) understand the behavior of the malaria vectors relative to egg deposition sites, adult resting sites, adult feeding behavior, etc.; (4) assess insecticide susceptibility and monitor for changes.

Where Malaria Control Has Been Successful

For many years, efforts to build the Panama Canal failed because workers succumbed to malaria. But in the early 1900s the Panama Canal was constructed after the impact of malaria on workers had been controlled. Quinine was used as a medicine, and major efforts were made to reduce the mosquito population and its proximity to people. The efforts were spearheaded by the legendary W. C. Gorgas who used simple methods and strong discipline to keep people and mosquitoes apart.

Prior to WWII, the USA experienced malaria seasonally in many parts of the country, especially the Southern States. In the period 1946 to 1951, the precursor to the well respected Center for Disease Control (CDC) based in Atlanta, had the mandate to eradicate malaria and used mosquito control as a key intervention, and was successful.

In medieval times much of Europe suffered from malaria, but malaria receded as modern agriculture and better drainage cut down the habitat for mosquito breeding. However, malaria remained a problem in southern Europe until after WWII. Greece and Italy, including famously, Sardinia, reduced malaria almost completely in the immediate post-war years.

It is noteworthy that very heavy use of DDT in Sardinia was expected to have serious lasting health consequences for the human population, especially cancer, but to much surprise, 50 years later, this has not materialized as expected.

Programs to reduce the prevalence of malaria in India were largely successful in the 1950s and 1960s. Millions of cases a year were reduced to tens of thousands. The malaria prevalence reduction programs in Sri Lanka were very successful in the 1950s and 1960s.

Parts of South Africa have endemic malaria. This was brought under control using IRS and DDT, but when DDT uses was terminated malaria cases increased dramatically. Malaria was brought under control once more by using IRS and DDT again. In other isolated instances malaria programs have been successful in Africa.

In Africa generally malaria control interventions have been limited and therefore not successful.

Personal Protection

Coils, sprays, repellents, etc

Individual households spend substantially on commercially available anti-mosquito products to the extent that it is affordable.

The cost of buying these items can easily be more than $100 per family per year, for most people, a substantial drain on family finances.

Insecticide treated bednets

Use of long lasting insecticide treated bednets (LLITN) makes it possible for family members, especially children, to be less exposed to malarial mosquitoes, and to have a reduced level of morbidity and mortality. Experience shows that many people do not use bednets in an effective way.

The cost of a LLITN bednet is in the range of $2 to $8. Usually there is a subsidy component financed by donors to encourage acquisition by poor at risk groups. The effectiveness is high for users who use the nets rigorously.

Interior residual spraying (IRS)

Interior residual spraying is effective in reducing the impact of mosquitoes on residents of the treated dwelling. For *An. Gambiae,* a night biting specie, Deltamethrin/LambdaCyhalothrin/Bifenthrin is suitable, though arguably not as effective as DDT which is particularly long lasting.

The cost of IRS is substantial, requiring expensive pesticide and labor intensive application using well trained staff. However, some studies show that IRS is much more cost effective than LLITN.

The IMMC Consortium

Science

Dr. Robert Novak coordinates science for the IMMC Consortium. He is Professor of Biomedical Sciences and Associate Dean of Research, School of Medicine at the University of Illinois, Chicago. He cooperates in the US with the Universities of Florida, Oklahoma, California-Riverside and Harvard University and in Africa with Universities of Nairobi (Kenya), Makerere (Uganda), and Cuttington (Liberia) and ICIPE, the International Center for Insect Physiology and Ecology in Kenya.

Operations

Dave Malone from ADAPCO, the largest vector management company in the USA advises on the technical aspect of insecticide application and GIS technology. Guidance is also provided by Mosquito Control Districts from California, Louisiana, Florida and Texas. Bill Nesler of West Coast Aerial Applicators coordinates operations in West Africa and acts as General Manager in Liberia.

Data, Information and Analysis

Peter Burgess of the Transparency and Accountability Network (Tr-Ac-Net Inc) and Hans Herren (The Millennium Institute) together with local professional associates in Africa and the National Center for Super-Computer Applications at the University of Illinois provide the framework for data collection, data flows and analysis.

Community

The community is place where people live, and the place where IMMC interventions take place, data are collected and the benefits of the program are realized.

Education and training in the community

The population needs to know the basics of malaria and mosquito science so that they can do things to help themselves. Training the trainers is

Health clinics – case management

Health clinics in the community are the front line of case management. Staff must know enough about malaria

Environmental clean up

Reducing the breeding places for mosquitoes is effective, and something a community can do. The IMMC program helps with training and guidance and help with planning and prioritization.

Collecting data

Data collection in the community is a priority. The data are fed into an IMMC data management and analysis process to help with decision making.

Malaria Control Districts

Communities can organize and operate malaria control districts to serve as a way to coordinate efforts so that they are community centric, effective and durable.

Medical Case Management

Clinics

Public health clinics are critical to give access to diagnosis and treatment for malaria. Medical staff need to have adequate training and be reasonably remunerated, and the clinics need to have adequate supplies of medications

Diagnosis

Timely diagnosis of malaria is needed in order to sustain progress ... followed by effective treatment

Treatment

Chloroquine, a low cost medication, was the most widely prescribed malaria treatment for many years but most malaria strains have now developed resistance tp chloroquine.

Malaria can still be treated with a range of more expensive drugs. The following medications can be used alone or in combination:

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

Prevention better than cure

In order to treat 450 million cases a year, at $10 per case, the cost is $4.5 billion a year, and likely to increase as more expensive treatments are required to overcome resistance ... and it never ends. If it is $100 a case, then the cost is $45 billion, not to mention the lost lives and the lost productivity. But treatment is critical to reduce the levels of parasite in the human host as part of an complete IMMC program.

The IMMC Approach

Strategy

Use every available malaria and mosquito control intervention possible in the most cost effective way using best of scientific and cost / performance information.

Objectives

The primary objective is to reduce morbidity and mortality due to malaria by 90% in five years. The aim is to convert cost into results, and have results sustainable in the future at a low recurrent cost.

Tactics

IMMC is a multi-discipline approach with community interventions, medical case management, personal protection components, and integrated vector control. The specific interventions are determined by analysis of metrics about conditions in the area and progress being made.

Organizational

The organization of the IMMC operations includes the local community as well as IMMC staff and experts. The community involvement has some of the elements of "vector control districts" where local knowledge is combined with global best practice to give the most effective outcome.

Information

Data, information and analysis are used to drive decision making so that operations produce optimum results. Data relates costs and results, and helps with scientific understanding of the process.

Integrated Vector Management

Data driven program

The vector management component will be driven by data and analysis, taking into consideration all the relevant science., including what is learned about resistance to insecticides in use for the personal protection interventions of LLITN and IRS.

Larval surveillance and treatment.

Larval inspection teams are needed. They should be local staff, trained appropriately. They should be supplied with suitable larvicides that are proved effective under the prevailing conditions.

Ground and aerial ULV treatments.

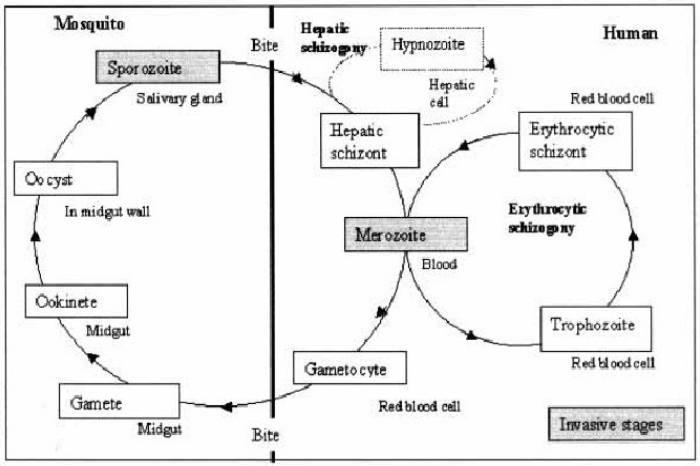
Rapid control of the vector can be accomplished using ULV treatment. It is low cost when done at the right scale, and will probably be very cost effective when done in conjunction with other interventions. Ground and aerial ULV spraying may not be all that effective *An. gambiae* in reaching vectors that have moved indoors but it will impact adults that are outside, and will allow treatment of areas that are generally inaccessible. Dibrom is a suitable material for aerial application, and is very effective.

Cost and effectiveness

Cost of ULV application improves with scale, especially air application where per capita cost per application in urban settings may be as low as 1 cent per application. The effectiveness of aerial application is enhanced by the ability to do a lot in a short period of time.

Malaria and Mosquitoes
The Biology

The basic biology of malaria and mosquitoes is well known, and this enabled progress to be made in combating malaria and mosquitoes. The malaria parasite lives part of its life in the human host, and part in the mosquito as shown below:



The mosquito acts as the vector because of its need to have blood meals. The female *anopheles* mosquito carries and transmits the malarial parasite during blood feeding at the adult sexual stages. The mosquito is an uninterrupted individual feeder and is predominantly a night biting insect. The *anopheles* mosquito lays eggs that hatch in shallow, warm, slow moving or relatively still water.

Data, Information and Analysis (continued)

GIS and spatial analysis

Use of GIS systems will facilitate tracking and record keeping of treatments/surveillance etc.

Cost

The cost of all activities should be prepared using simple basic cost accounting concepts. The goal is simple information that is very easy to understand, and available in time to be useful. The accounting should have adequate audit trail and the ability to be easily verified.

Effectiveness

The measurement of effectiveness should have two components: (1) metrics that show how the intervention activity was carried out, and how well this was done against some useful benchmarks; and, (2) metrics that show the impact and result of doing the work, and especially metrics that link the activity to reduction in the prevalence of malaria and the associated morbidity and mortality.

Local data and centralized data

The IMMC program is based on local data that are analyzed to optimize activities in the local community and the same data consolidated centrally so that they can also be used for broader analysis and system modeling to optimize the program globally. The data are generally the same ... the analysis is different and the results are of value in different ways.

Contacts

Dr. Robert J. Novak
Professor of Biomedical Sciences
and Associate Dean of Research,
School of Medicine,
University of Illinois, Chicago
1816 S. Oak St.
Champaign, IL 61820 USA
Tel: 217 333 1186
Email: rjnovak@uiuc.edu

David Malone.
Program Manager
ADAPCO
550 Aero Lane
Sanford, FL 32771 USA
Tel: 800 367 0659
Email: dmalone@e-adapco.com

Peter Burgess.
President.
The Transparency and Accountability Network
(Tr-Ac-Net Inc.)
221 East 66th Street (4C)
New York NY 10021 USA
Tel: 212 772 6918
Email: peterbnyc@gmail.com

Bill Nesler.
President.
West Coast Aerial Applicators
South Dakota and Liberia
PO Box 395
Miller, SD 57362 USA
Tel: 605 853 2227
Email: sdbc@hur.midco.net

Liberia (continued)

Cooperation

A success will be achieved through cooperation between all the stakeholders: people in the communities, officials in government and the IMMC staff. Data will show how the program is performing.

Government

The IMMC program is implemented in cooperation with Government, especially the Ministry of Health. The program operates as a public private partnership with citizen involvement.

Community and the ordinary citizen

The IMMC program is driven by the needs of community and the ordinary citizen, and every effort is made to ensure that they are actively engaged to make community priorities the driver of the program.

Local scientists and professionals

The IMMC program cooperates with local scientists and professionals from the start so that there is a cadre to provide perpetual continuity.

Budget and Funding

Money for IMMC is a major constraint. Though IMMC is low cost relative to alternative strategies, it is a major expenditure in comparison to the total government budget. Funding needs to be sourced from donors and the international community as supplementary funding over and above other national priorities for funding.