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# **Community Accountancy**

**PUTTING ACCOUNTANCY TO  
WORK FOR ALL OF SOCIETY**

# **REPORTING ABOUT MALARIA**

**FOR DISCUSSION ONLY**

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# COMMUNITY ACCOUNTANCY FOR MALARIA

## THE BASIC FRAMEWORK

### Community Accountancy for malaria

The first thing that Community Accountancy must be able to have on the record about malaria in any community is the following:

**These conditions existed ---> We did this, costing this much ---> The results were.**

These data are essential, because without them it is impossible to answer the following question:

**If these conditions exist ---> and we do this, costing so much ---> the results will be.**

It is very clear what constitutes progress in the control of malaria ... the goal is to make malaria a rare disease ... even to eradicate the disease ... and to achieve low cost sustainability and to minimize the socio-economic burden of malaria on society.

Progress in the control of malaria can be measured by the following:

1. reduction in morbidity caused by malaria;
2. reduction in work time lost due to malaria morbidity;
3. reduction in the number of cases of malaria;
4. reduction in the mortality due to malaria;
5. reduction of the prevalence of malaria parasite in the human host;
6. reduction of the prevalence of the malaria parasite in the mosquitoes;
7. reduction in expenditures associated with malaria control; and,
8. reduction in expenditures associated with malaria case treatment.

These data have added utility when the costs and amounts of the various interventions are also recorded. It is especially important to have data that includes both the spatial characteristics and the time to help with an understanding of the causalities. Maybe changes in the malaria situation are more to do with weather than any interventions being done.

With regard to temporal characteristics the science suggests that there are many data elements that change very rapidly ... rain today increase malaria transmission tonight ... and interventions optimized for results will change the data withing the week and withing the month.

And progress becomes sustainable when the health infrastructure is organized so that it knows what is happening ... screening of the people and surveillance of the area ... and there is a health and malaria intervention capacity to respond to control needs.

The following graphic shows the before and after situation for humans and mosquitoes with the range of interventions that can be used. It also shows schematically the strengthening of the health infrastructure. The graphic is a simplification, but a lot more comprehensive than most representations. The graphic aims to show how multiple interventions combine to provide an optimum outcome.

Most of the data needed to make it possible to compile specific reports about a community are often already available ... but what is missing is the Community Accounting framework or system that makes it easy to bring data from different origins together. At the community level and item by item, the data needed are relatively simple.

### Spreadsheet analysis

The spreadsheet models have two components (1) historic; and, (2) future. The spreadsheets are designed to answer three simple questions:

- How much did/will the interventions cost?
- Mow much of the interventions were used/are needed?
- What results were achieved/can be expected?

The Community Accountancy system provides a framework for data collection, data organization and storage. These data are neutral and organized so that they are easy to access and use for further analysis.

In order to facilitate easy analysis of the data, the Integrated Malaria Management Consortium (IMMC) has developed some simple spreadsheet analysis that integrates with the Community Accountancy data so that operational conclusions can be made.

### **Time frame**

The manager in charge of a US vector control district has pointed out that the situation as of 2 pm in the afternoon is going to drive the decisions being made about mosquito control interventions to be carried out that night. Broadly speaking this is mere “nuisance control” ... hardly as important as the vector control where malaria is ubiquitous.

Most of the operations data need to be organized around days, weeks and months. The mosquito situation changes from day to day and interventions have an impact in hours so that day to day data is very meaningful. Prevalence of the malaria parasite in the mosquito should change from day to day and week to week with effective interventions ... if not, why not? Prevalence of the malaria parasite in the human host should reduce measurably month to month with effective interventions ... if not, why not?

Accordingly, management information should be compiled on a monthly cycle ... and this is a good period for cost data, summarized activity data and summarized results data. Monthly data are also useful to show the seasonality of mosquitoes, malaria, intervention activities and impact.

### **Collaboration**

Very little is successful without cooperation and collaboration. Community Accountancy facilitates collaboration so that the community gains value at least cost. In the case of malaria, there is collaboration both with the community and with the international community of malaria experts. The malaria community is coordinated by the Integrate Malaria Management Consortium (IMMC) located at the University of Alabama in Birmingham.

### **Anticipated outcome**

Cooperation with IMMC brings international malaria expertise that make it possible to develop and deploy:

- ❖ A scalable cyberenvironment for integrated malaria management with the capability of expanding to an unlimited number of locations world-wide.
- ❖ A scientific modeling capability that has the flexibility and power to analyze complex multi-variable time series and to provide cost effectiveness predictions based on cost accounting data and scientific behaviors.
- ❖ A cadre of locally trained specialists in the IMM modalities for surveillance, data collection and the use of the data for local decision making, central analysis and cyberenvironment.

### **Pilot countries**

The development and deployment of a large scale system requires external funding, and the proof of concept will be established in three countries: Kenya, Zambia and Peru.

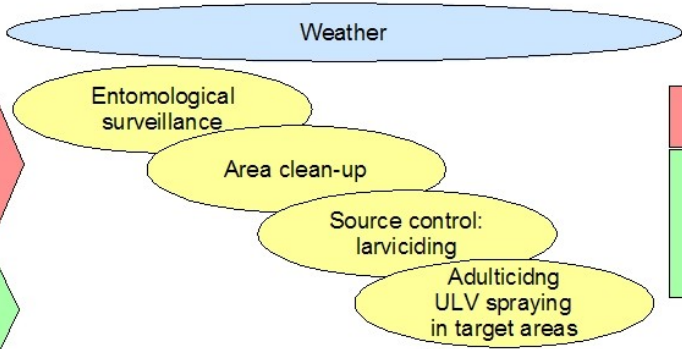
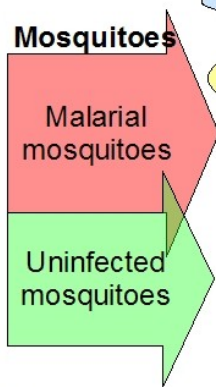
### **Broad applicability with practical utility**

Surveillance, data collection and cyberenvironment modeling modalities may be used in cooperation with existing initiatives so that their performance can be optimized using IMM style management information. This information has the potential to demonstrate not only that there are considerable opportunities to improve the cost effectiveness of the many initiatives that are presently funded and operational, but also to show how to make the most impact using the limited funds available.

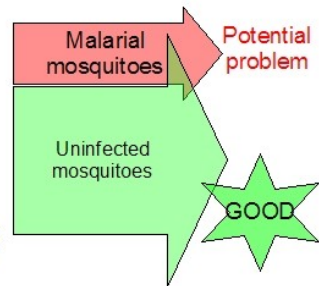
The following graphic shows the elements schematically:

# Integrated Malaria Management

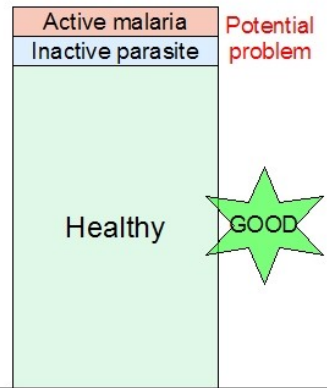
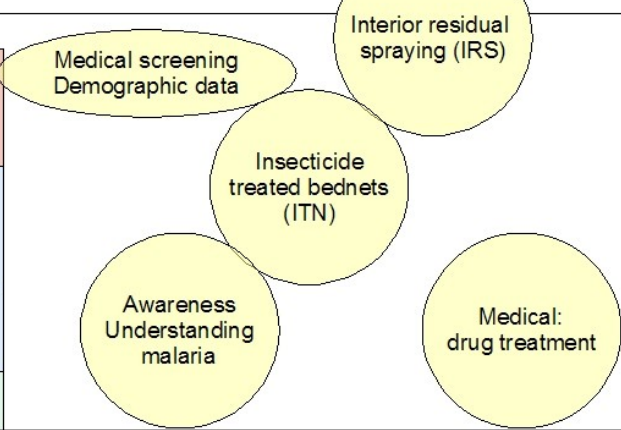
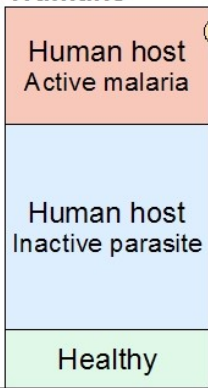
## Before



## After

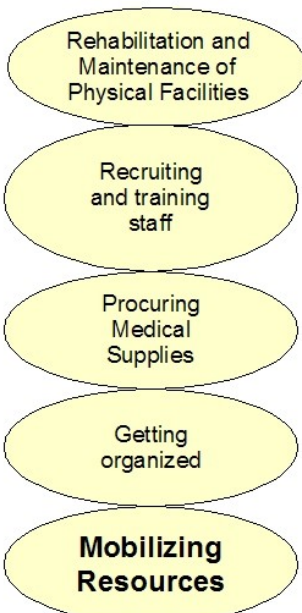
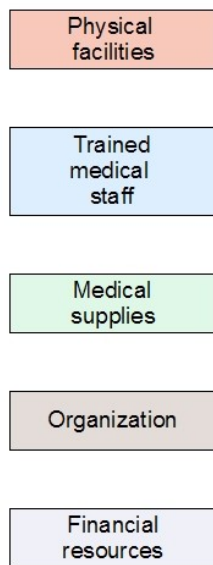


## Humans

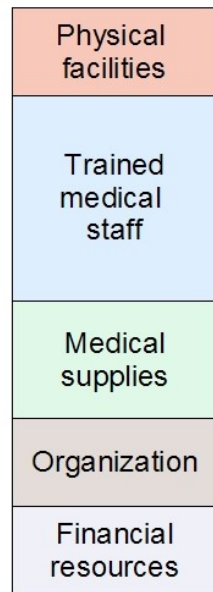


# Health Infrastructure

## Before



## After



# COMMUNITY ACCOUNTANCY INTEGRATED MALARIA MANAGEMEN

## INTRODUCTION

### Prevailing situation

Malaria has been a serious tropical disease since colonial times. Some progress was made in understanding the disease by the end of the 19<sup>th</sup> century, and it was possible to get sufficient control of the disease in the early 20<sup>th</sup> century for the Panama Canal construction to go forward to completion. This was accomplished using an integrated approach that targeted the environment, the vector, and the parasite. There was a maximum of prevention as well as the best possible curative treatment for the time.

Since 2000, there has been an increase in the disbursement of funds to support malaria control interventions in Africa from around \$100 million to more than \$1 billion. The African HIV-AIDS crisis focused international attention on the broader crisis of African health, and especially the issues of malaria and tuberculosis. The international community has responded with support for the new Global Fund for HIV-AIDS, Tuberculosis and Malaria (GFATM), and the United States has responded with the President's Malaria Initiative (PMI).

Malaria control programs lack quality, action-oriented management information about malaria control interventions. Such information is necessary to assess performance of malaria control programs and to plan for optimum use of limited resources toward the elimination of malaria. The performance metrics show growth in activity, but it is not clear what specific interventions there have been, where they have been done, how much they have cost, how much has been done, what results have been achieved and the value that this represents. The existing management systems do not ensure adequate financial control for the most effective use of these funds and there is no broad and uniform approach that enables critical scientific data to be shared and analyzed in the most effective way.

### Integrated Malaria Management (IMM) and Community Accountancy (CA)

Integrated malaria management (IMM) interventions are designed to reduce the prevalence of malaria and to decrease associated morbidity and mortality. Community accountancy (CA) is a system that organizes data about costs and values in the community setting. The IMM system addresses the challenge of achieving optimal performance of malaria control interventions with the most efficient use of scarce resources. IMM uses a combination of scientific data and accounting information to build a management information matrix that shows costs, activities and results in a spatial framework that will permit cross-comparison between areas, provinces and countries with the combinations of landscape parameters, human demographics and interventions. Such a matrix will enable improved predictions about the current status of the disease, the impact of interventions as well as addressing the economic factors needed for more efficient and cost-effective programs.

### Three aspects of the CA/IMM approach:

There are three aspects of the CA/IMM approach to malaria control. They are:

- I. *Performance metrics: data, analysis and reporting*  
Organizing surveillance and screening, establishing data collection, and data analysis that determines the best interventions.
- II. *Active control interventions:*  
Planning intervention operations and reporting on activity costs and amount done.
- III. *Surveillance and sustainability:*  
Doing surveillance and screening, data collection, and data analyses to ensure that malaria resurgence is contained. Integrating activities into the community and the available health infrastructure

## **Performance metrics: data, analysis and reporting**

Organizing surveillance and screening, establishing data collection, and data analysis that determines the best interventions.

There are various techniques for effective and cost efficient surveillance and data collection that build the knowledge base about the area needed for CA/IMM interventions and associated variable updates. Moving data is easy and low cost when there is economical access to the Internet. The IMM approach is to build data flows in electronic form for easy and economical transmission, and to cooperate with all available Internet access initiatives in the areas addressed, especially with the emerging telecentre community increasingly engaged in community development initiatives.

Feedback from scientific data analyses will improve the knowledge base for decisions and improve the management models. The daily, weekly or monthly accumulation of data is perpetual, and in time the data analysis can yield broad perspective and clarity about the mechanisms that drive the optimization of malaria control interventions. The value of the data obtained through this system will flow through various levels.

### **Remote sensing satellite imagery**

Careful use of remote sensing, together with other data such as weather data, will enable much improved prioritization of effort:

- Use of satellite imagery (Digital Globe Quick Bird 0.6m resolution),
- Ground truthing for satellite validation,

### **Community level data collection**

Data collection in the community for data that changes rapidly, including both manual recording and deployment of new systems like FrontlineSMS for cellphone transmission of SMS messages

- Entomological data
- Daily intervention data
- Epidemiological data
- Socio-economic data

The IMM approach builds on the foundation of data already being collected using labor intensive paper-based and local data entry techniques to develop an efficient information management system that acknowledges local circumstances in malaria-burdened areas.

### **On time ... in time**

The data analysis needs to provide results quickly enough for the best possible decisions to be made. Thus, for example, the following needs to be done in a matter of days or even hours:

- A decision to do larviciding needs to be made before the larvae become flying adult mosquitoes
- Identification of resistance needs to be made in time for the chemical or biological agents to be changed to address resistance issue
- Within 24 hours after the interventions have been conducted, analysis needs to be used to determine whether the expected results have been achieved

### **Multiple use of data**

Data are most cost-effective when they are used in multiple ways. CA/IMM uses data in both the local and global context:

- Local data and management
  - To inform the local malaria control community using rapid local analysis and local management information techniques
  - To update a local mirror of the centralized data
  - To update the local malaria control communities about results
- Global data and management
  - To update the IMM cyberenvironment and data analysis system for cross area comparison, alternative intervention comparison, and time series analysis
  - To update responsible government authorities about results
  - To update the mosquito and malaria research community about results

## **Management information**

Management information has the most value when it is quick, clear, easy to understand and relevant to decisions that need to be made immediately, thereby providing the most efficient amount of information that ensures the right decisions are being made. In the IMM approach, data about activities and costs are compiled to provide a timely understanding of how much is being spent and of the outcomes that are being realized. This data has a focus on:

- How much things have cost
- What results have been achieved
- What results the scientific data suggest will be achieved
- What changes are needed to optimize the cumulative cost and the cumulative result

These data are valuable when the information can be used to improve immediate operations and to improve the allocation of resources wherever they are being used for malaria control interventions.

## **Scientific data**

Scientific data has the most value when the analysis can look at a very large dataset with many variables over a significant period of time. In the IMM approach, scientific data are compiled and analyzed to determine what actions lead to the best possible outcomes and what underlying science is driving the process. In addition, the IMM approach to scientific analysis includes an element of cost analysis to account for the financial and economic parameters. By providing a means of understanding past behaviors, the IMMC's management information system will make improved predictions about the future possible.

## **Community Accountancy: Cost and activities**

A combination of scientific data and management information makes it possible for non-scientific decision makers to understand the implications of their decisions and for scientists and researchers to understand the cost and value implications of their work. Used together, scientific data and management information offer a means to analyze and use complex multi-dimensional, longitudinal information that is important in determining and implementing the most effective and efficient intervention programs.

## **Community Accountancy: Outcome and value**

IMM uses data that are both scientific and social. CA applies costs and values to these same data. Some of the typical outcome metrics include:

- Number of cases of active malaria
- Prevalence of malaria parasite in the human population
- Human population infection rates (temporal and spatial)
- Anopheles species present
- Temporal and spatial abundance of mosquitoes
- Transmission dynamics
- Prevalence of malaria parasite in the mosquito population (EIR)
- Reduction of mortality associated with malaria
- Reduction of morbidity associated with malaria
- Socio-economic benefits

## Active control interventions

Planning intervention operations and reporting on activity costs and amount done.

Each of the interventions has a unique cost behavior. Because of the complex biological system and limited knowledge, historically the results have been difficult to predict with great certainty. However, the benefit of the IMM approach is that data about the cost and outcome from all specific interventions becomes a part of a cumulating dataset, providing both information about performance of interventions and action-oriented management information.

### Malaria control interventions

During the construction of the Panama Canal, Gorgas successfully used an integrated approach that had a focus on the human, the habitat and the mosquito. A similar set of interventions is the basis of the Integrated Malaria Management (IMM) approach:

- Medical:
  1. Treatment of active cases;
  2. Pre-emptive treatment of vulnerable groups;
  3. Screening to identify parasite carriers and treat;
- Personal protection:
  1. Bednets (ITN);
  2. Indoor residual spraying (IRS);
  3. Insecticide treated clothes (ITC);
- Vector control:
  1. Source control: remediation of breeding habits, area cleanup, larviciding;
  2. Mosquito control: ultra low volume (ULV) adulticiding ;
  3. Entomological surveillance.

### Other operational needs

The deployment of standalone projects also requires substantial investment in mobilization and support.

- Mobilization:
  1. Mobilization, relocation, setting up, getting started;
  2. Working capital ... inventory;
  3. Equipment.
  4. Training
- Support:
  1. Accounting and admin;
  2. Data collection and analysis ... data logistics;
  3. Maintenance and support services;
  4. Training.

### Health infrastructure

The CA/IMM strategy depends on local conditions and local priorities and approaches. CA/IMM recognizes that it is the community level health infrastructure that has the long term responsibility for success, and that this should be a focus of development assistance to the extent that this is practical.



## **Surveillance and sustainability:**

Doing surveillance and screening, data collection, and data analyses to ensure that malaria resurgence is contained. Integrating activities into the community and the available health infrastructure

### **Strategy for Sustainability:**

The IMM strategy for sustainability has four components:

- Low costs
  - Focus on local people doing essential work at local salary and wage rates in perpetuity
  - Multi use of data: local and global; for science and for management performance metrics.
  - Scale so that computer analysis of data is extremely low cost per data transaction
- Focus on results that have substantial tangible economic value
  - Reduction of morbidity so that economic activity is not constrained by recurrent malaria
  - Reduction in the prevalence of malaria in both human hosts and mosquitoes so that the need for perpetual high cost interventions is reduced
  - Ongoing analysis so that there can be minimum cost interventions that sustain progress
- Cooperation and collaboration
  - With international NGOs
  - With community organizations
  - With local and international research institutions
- Strengthening local health infrastructure

### **Training and local staff employment**

Training and local staff employment can have multiple benefits including reducing implementation costs, creating local incentives for performance, and starting the local economic multiplier effect. Local staff employment needs salary money as well as training money in order to be sustainable. Some, if not all, of this can come from community resources if the community economic development is made to progress in parallel with the health initiatives.

### **Cooperation and collaboration:**

The malaria control sub-sector has many organizations involved, all of which can benefit from a low-cost, high-performance scientific data analysis and management information system that is developed and deployed specifically to address the issues of the malaria control sector.

Accordingly, the IMM will cooperate with the various groups to provide an information service that is useful for the participants and is adaptable to the circumstances of an individual country and community. However, the underlying data flows, data analysis and management information will not change considerably, and the ability to do cross-location comparisons will not generally be compromised.

### **Health infrastructure**

The CA/IMM strategy depends on local conditions and local priorities and approaches. CA/IMM recognizes that it is the community level health infrastructure that has the long term responsibility for success, and that this should be a focus of development assistance to the extent that this is practical.

### **Multi-use of data**

CA and IMM both use data ... in quite different ways and for different purposes that together optimize the performance of malaria control in a community. The immediate value of data is realized by using the data locally, this value is enhanced as the data are used for socio-economic community accountancy and management purposes, and then further enhanced when the data are used for scientific analysis. Each adds value to the data ... but not to the cost of the data itself.