

IMM

INTEGRATED MALARIA MANAGEMENT

to reduce the incidence of malaria, and other insect spread diseases.



ANNEX to **An Integrated Malaria Management Strategy for the Eradication of Malaria in Africa incorporating Community Analytics (CA)**

http://www.tr-ac-net.com/DBpdfs/CA_IMM_WBannex_001.pdf

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Characteristics of Data and Analysis within the CA/IMM Methodology

Overview

There are several different rhythms to data collection, data analysis and decision making. There is data: (1) that describes behavior hour by hour over a 24 hour cycle; (2) that describes behavior from day to day; (3) that describes seasonality or behavior from month to month, (4) that describes behavior from year to year; and, (5) that relates activities to results.

There are several different uses for the data: (1) to do local analysis and make operating decisions locally and rapidly; (2) to monitor local decisions and provide oversight; (3) to do large scale multivariate analysis of the data for scientific purposes and to identify better ways of deploying available resources.

While it is a challenge to manage in a complex environment, the CA and IMM methodology has been developed so that there are reliable decision oriented data in the most complex of situations.

The data comprise both operational data and cost/value data.

Some of the data change slowly and may be collected and used for a considerable length of time. In a well designed data architecture, these data are capable of being made very reliable.

Other data change rapidly according to either a periodic rhythm or in conjunction with some change agent.

Not all data re easy to express in hard numeric terms ... but some of the data that are soft, such as those related to value, are also very important for decision making.

Data collection ... mobile phone SMS, etc.

CA operates more like an accounting system than an academic research study. In this mode CA needs low cost reliable ubiquitous data collection. In corporate accounting ALL the economic transactions are recorded and then the accounting process aggregates the transactions so that financial reports can be produced. CA is similar with respect to transactions that are material to the community and the priority issues ... but must be very efficient and low cost in order to be sustainable.

This was not practical when information and communications technology was high cost and only available to the economic elite. CA ow has the option of using mobile phone SMS as a low cost efficient way of collection data ... and will do so getting data from the Tr-Ac-Net SMS data collection network that is being developed.

Data architecture for IMM

Data are central to the CA and IMM framework. In the CA methodology, data are ubiquitous and used to inform about everything: (1) the community; (2) spatial information about malariology; (3) entomology ... surveillance; (4) medical ... screening; (5) weather and the role of water; (6) performance ... cost and value; and, (7) research.

The data are of two types: (1) data that describes a state; and (2) data that describes an activity. This is the same concept that is used in corporate accounting where there is a balance sheet (that describes a state) and the operating statement or profit and loss account (that describes activities).

Item	State 0	Activity 1	State 1	Activity 2	State 2

IMM uses the following metrics to plan interventions and measure performance:

Item	State 0	Activity 1	State 1	Activity 2	State 2
State					
Where are mosquitoes breeding ... how big is this problem?	X		X		X
Where are people living and getting malaria ... is problem getting better?	X		X		X
What is mortality arising from malaria ... is mortality reducing?	X		X		X
What is morbidity due to malaria ... is morbidity reducing?	X		X		X
What is lost economic activity arising from malaria morbidity ... is it reducing?	X		X		X
What is prevalence of malaria parasite in the human host ... is it reducing?	X		X		X
What is prevalence of malaria parasite in the mosquito population ... is it reducing?	X		X		X
Activities					
Surveillance, data collection and analysis		X		X	
Education and awareness		X		X	
Area clean up		X		X	
Personal protection		X		X	
Strengthening community health infrastructure		X		X	
Medical case therapy		X		X	
Screening and treatment		X		X	
Interior residual spraying (IRS)		X		X	
Source control (larvaciding)		X		X	
Mosquito control (ULV adulticiding)		X		X	
Bednets (ITNs)		X		X	

Roll up and drill down

The following shows the “roll up” and “drill down” framework applied to places

Country	Province	District	Community	Location

This example shows the drill down from a summary number to more detailed information:

Summary cost	By intervention	Element of cost	Standard cost	Variance

This is another example:

Summary cost	For year	By month	Actual	Standard

There are many variants ... the one chosen should reflect the issue as clearly as possible.

Efficiency and effectiveness

The CA and IMM methodology measures both cost efficiency and cost effectiveness. Cost efficiency is how much something actually cost compared to what it should have cost. Cost effectiveness is how much cost there was to achieve the result. Comparison of cost effectiveness shows the relative performance of different strategies.

Standard and actual costs are used to measure cost efficiency. Standard is what one expects under normal good conditions, and actual is what actually happens.

The standard/actual concepts may also be applied for the relationship between costs and values. While value is not an easy concept to value, there can be agreement on what standard is used for comparison purposes.

Time Series

The natural time rhythm

There are several different rhythms to data collection, data analysis and decision making. There is data: (1) that describes behavior hour by hour over a 24 hour cycle; (2) that describes behavior from day to day; (3) that describes seasonality or behavior from month to month, (4) that describes behavior from year to year; and, (5) that relates activities to results.

The following relate to monthly time series ... but similar ideas may be applied to all time periods.

By month series

By month series are powerful for management oversight. They are rapid enough to be relevant to people making operational decisions, and slow enough for issues to be given some reasonable time for analysis and reflection.

By month seasonality

Many of the elements of the community socio-economy have seasonal characteristics, and the data needs to be compiled to show this. Using a monthly reporting format will show seasonality clearly.

Year over year by month ... times series by month for multiple years

Tables like this show both the seasonal changes and the year to year changes. Summary or aggregated data analysis loses this critical information, and most statistical measures merely indicate averages and generalities.

Example: Prices for ABC at XYZ point in the value chain

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Year 1													
Year 2													
Year 3													
Year 4													

Example: Intervention activity by month

Shows allocation of resources and activity level for a specific activity

Year	UOM	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Cost	\$													
How much done	Acres													
Unit cost	\$/acre													
Standard cost	\$/acre													
Cost efficiency	%													

A table like this for each intervention will show how the operations are performing relative to a cost standard. They measure cost efficiency but not cost effectiveness. They also serve to make the cost standard as reasonable as possible.

Times series by year

May be used to show changes in the profile of interventions over the years

Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	
Item 1														
Item 2														
Etc.														

Tables like this show how the use of malaria control interventions has changes over time

Multivariate analysis

Data are used to establish causality so that best results may be obtained.

Comparisons

Time series to compare different places for year YYYY

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Site 1													
Site 2													
etc.													

Time series to compare different years for the location ABC

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Year 1													
Year 2													
etc.													

Value chain analysis

The value chain is one of the keys to understanding complex systems. Value chain analysis may be applied in several different ways ... including the following:

- ◆ Supply chain value analysis
- ◆ Longitudinal value chain analysis
- ◆ Inter-organization value chain analysis
- ◆ Inter-place value chain analysis
- ◆ Inter-group value chain analysis

Even though value chain analysis is very powerful, the data associated with the value chain is difficult to access.

Supply chain value chain analysis

CA value chain analysis is a simple concept, but not simple to get the data that show how the value chain works. The data needed for optimization should be easily accessible, but has not been up to now. Key data are not easily accessible to the public or decision makers and it is not clear from the available data who are benefiting from the supply chain value chain.

The following data will help understand the value chain as it applies to bednets

Bednet value chain ... the generic model

	Unit cost	Cumulative unit cost	Unit profit	Cumulative profit	Unit Price
Ex factory					
Local freight					
Ocean freight					
Ocean insurance					
Export taxes					
Import taxes and duties					
Port charges					
Local freight					
Warehousing					
Inventory control					
Logistics management					
Project management					
MoH administration					
M&E expenses					
Retail costs					
Subsidy					
Training (of staff)					
Training (of clients)					
Advertising and promotion					
Fund raising expenses					
Awareness training					
Bednet marketing and promotion					

Longitudinal value chain analysis

Longitudinal value chain analysis is simply the idea that expenses today that result in value tomorrow should be clearly understood. Longitudinal value chain analysis is needed to allocate resources so that there us the best use of resources and the most value adding.

Inter-entity value chain analysis

Inter-organization value chain analysis shows how costs and value are attributed to different entities in a value chain. In CA one entity may well be the community, and another entity may be a corporate organization. The data may help to explain the conundrum of “private wealth, and public squalor” that may be observed in urban areas of poor countries with wealthy elites.

Inter-place value chain analysis

Inter-place value chain analysis shows how places that have the potential to be prosperous merely serve to make other places prosperous. Inter-place value chain analysis explains how it is that places that have very valuable natural resources are terribly poor.

Inter-group value chain analysis

The corporate system of group accounts and consolidations makes it possible to have a useful understanding of how value adding works in a complex corporate structure. A similar technique is used in CA so that all the activities in a community may be understood and good decisions made about resource allocation. One of the key differences between the CA view of inter-group transactions and that of the corporate system of consolidation is that there is more value when the activities remain inter-group and less value when they are external to the group.

Elements of Cost

Introduction

People costs
Equipment costs
Materials and supplies
General expenses
Operating overhead
Financial costs

People costs

People costs	<p>Collecting costs about people cost is also very useful. The basics are the same, though sometimes, indeed frequently, the pay rates are not common knowledge:</p> <ol style="list-style-type: none">1. Who is working?2. How long?3. How much are they being paid?4. Multiply and the cost amount is known. <p>Some information is quite sensitive, such as pay rates and benefit packages, and the like. Though they are sensitive, they are also important to understand since the cost of activities is very much a function of the cost of people.</p>
Consultants	<p>Consultants are often employed instead of salaried staff. People costs should be adjusted to reflect this where needed.</p>
Salary scales	<p>In many situations the salary scales that apply to different groups of staff are very different. This makes cost analysis difficult ... but it also is an important issue that needs to be considered in planning, developing a strategy for sustainability and the analysis of performance.</p>
Different pay scales	<p>International pay scales are usually very much higher than local pay scales. This may be justified by the idea that international staff are better trained and have more experience ... but this justification may not always be valid. Where labor costs are a critical component of cost this differential becomes important. Expatriate staff costs may be 100 or 1,000 times the cost of local labor ... to some extent justified by the knowledge and experience of the expatriate, but the design of programs should include this important economic parameter</p>
Incentives and bonuses	<p>Incentives and bonuses have value because of the role they play in motivating for high performance. They also play into the human characteristic of greed which can also produce perverse results.</p>
Benefits	<p>In most situations the benefits accruing to staff are significant and should therefore be taken into consideration when computing costs</p>
Expatriate benefits	
Government staff benefits	
Outsourcing	
Staffing tables	<p>The Tr-Ac-Net metric for the labor component of cost includes a profile of labor cost by wage rate.</p>
Workplace conditions	<p>The question of workplace conditions should be addressed ... especially where potentially dangerous chemicals are being handled. Safety and worker health is important.</p>

In the CA analysis there is value associated with capacity building and training that makes it possible for the organization to be optimized for cost effectiveness and local staff to be training so that they are productive and able to do most of the work that needs to be done.

Organization?	
What work does the organization do?	
What staff are needed by the organization (staffing table)?	
What staff are employed?	
What is the salary, wage and benefit profile of the staff?	

Labor cost matrix

Example

This is a table of standard costs that shows the enormous variability in the per month remuneration of staff based on job function and to what group of staff they belong. This table is set out in a reference currency ... in this case the \$US. The International set are usually paid in an international currency like the US\$ or Euro while others are paid in local currency. Currency exchange rates have an important influence on cost and the effective value of remuneration to the employee.

Standard cost by work type (US\$ per month)				
Inclusive of ALL benefits				
	International	Local Int Scale	Local Private	Local Government
Program manager	20,000	12,000	8,000	6,000
Malaria control area manager	15,000	10,000	6,000	5,000
Malaria control zone manager	10,000	5,000	3,000	2,000
Junior government staff				1,000
MD (experienced)	20,000	12,000	8,000	4,000
MD (early career)	12,000	7,000	4,000	3,000
Nurse	3,000	1,000	600	300
Nurse assistant		600	300	200
Village health worker		200	100	50
Senior Scientist	15,000	6,000	4,000	2,000
Mid-level scientist (international)	10,000	3,000	2,000	1,500
Junior scientist (international)	6,000	2,000	1,500	1,200
Technician		500	300	200
Junior technician		300	200	150
M&E consultant	20,000	6,000		
M&E staff assistant		3,000	2,000	1,000
IRS spray supervisor		600	600	600
IRS sprayer		300	300	300
IRS driver		300	300	300
ULV Aircraft pilot	10,000	6,000		
Aircraft maintenance	7,000	3,000	2,000	
ULV vehicle driver		500	500	200
ULV operator		500	400	200
Chemical supervisor	10,000	4,000	2,000	600
Chemical handler		2,000	1,500	400
Laborer		300	200	150
Admin supervisor				
Admin clerk				
Accountant supervisor	10,000	2,000	1,500	1,000
Accountant clerk	6,000	400	350	200
Community data collector		200	100	150
Messenger		200	100	150
Driver		200	100	150
Security guard		200	100	150

Comparisons

Change to an item over time

Example: What is the salary trend for a technician year by year from 1990

Change to an item from place to place

Example: What is the salary difference between an IRS sprayer in DRC and Angola?

Change from item to item within similar types of work

Example: What is the difference in pay and cost when a CHW does a doctor's work?

Change from item to item for different levels of work

Example: What is the difference in pay when senior people do junior level work

Equipment costs

Cost to purchase	The initial cost to purchase is usually a substantial outlay, but because the life of the equipment is long ... several years ... the period cost is relatively low. The cash cost is high and immediate ... the operating cost may, however, be quite low.
Depreciation	Depreciation is the way accountants allocate cost to the current period from equipment that has a long life. If the equipment will last five years, the annual depreciation is the total cost divided by five. This is referred to as straight line depreciation because the annual charge is the same over the five years of the equipment's life.
Provision for depreciation	The annual or periodic depreciation charge is credited to an account usually called a provision for depreciation ... and specifically associated with the equipment item. As the equipment gets older the provision for depreciation becomes larger. When the equipment reaches the end of its life ... that is accounting life ... the cost to purchase and the accumulated provision for depreciation are the same.
Net book value	The net book value is the cost of purchase less the provision for depreciation. At the end of the accounting life the net book value of an equipment item is zero. Usually this is adjusted to be \$1 so that there continues to be a flag in the accounts about this equipment.
Fully depreciated equipment	Fully depreciated equipment does not require ongoing depreciation charges, and is to this extent lower cost than newer equipment not yet depreciation. On the other hand technical considerations may mean that maintenance is higher cost and there may also be operating qualities issues to be taken into account.
Operating costs	Most equipment has considerable operating costs ... operator costs (labor) ... fuel and lubricants ... maintenance ... operating supplies ... etc.
Machine hour costing	Sometimes it is convenient to calculate a machine hour rate for costing. This might be calculated incorporating all the operating costs, or may be simply the cost of the equipment depreciation for the period divided by the anticipated hours of use anticipated for the period.
Variability of cost	Because each cost has a different behavior, it is usually preferable to limit the costs that are aggregated for calculation. There is a trade-off between precision and convenience.

Materials, supplies

Materials, supplies		Materials and supplies are frequently the key cost, and therefore important to understand and control.
Supply chain ... value chain		The cost of materials depends very much on where the cost is measured in the logistics, supply or distribution chain. The cost “ex factory” may be very different from the cost delivered to an end user. Logistics ... ocean shipping, port dues, insurance, duties, warehousing, trucking, etc. are usually substantial costs even when done as efficiently as possible. Costs such as pilferage can also add substantially to the total cost.
Use of materials and supplies		Efficiency in the use of materials and supplies can make a big difference to the total cost of materials. This may be technical in nature as for example in the case of ULV spraying where droplet size can make a substantial difference in the amount of chemical used as well as how well the chemical works to kill mosquitoes.
Life of active materials		<p>The life of active materials is another consideration. A long lasting insecticide treated bednet may have a life of several years ... so the annual cost is lower than the total cost outlay in the year of distribution and first use.</p> <p>The life of IRS treatment is several months ... maybe a year ... depending on the type of dwelling construction, the spray equipment and the chemical being used. Annual periodic cost is also impacted by the duration of the malaria season ... what might be OK for a short malaria season does not suffice for a longer season.</p>
		In malaria control the active materials and supplies are both a big cost and a key to success. The behavior of cost and the way these active materials impact
Cost behavior		The analysis of cost should be based on units of measure that are the most relevant. Where the goal is the reduction of malaria, the unit of measure for cost analysis should be a good proxy for this goal, or a logical step towards this goal. In the case of ULV spraying, cost per acre is a useful metric because it relates to performance in an understandable technical way ... while cost per capita is an indicator of cost and possible cost effectiveness of impact on the population.
		CA uses indexes as a way to simplify the recording of change ... but mainly at the detail level. Progress requires change, and change can be reported using an index as a measure.
		CA identifies key indicators of progress in a community, but does not generally combine these indicators to form an aggregate index with the exception of the CA progress indicator. This indicator is a measure of the change in profile of the

	community over a period of time.
	<p>Costs vary depending on the circumstances. Good program design minimizes costs and maximized cost effectiveness. This is a central focus of the IMMC strategy.</p> <p>Cost effectiveness is most easily optimized when there is good information about costs, without this information planning is merely a guessing game.</p> <p>In the IMMC cost effectiveness model, the strategy has a focus on achieving low cost so that there can be permanent sustainability. Accordingly there is a need to understand how costs behave under varying conditions.</p>
	<p>The analysis of costs should be based on the units of measure that are the most relevant. Where the goal is the reduction in the burden of malaria. The unit of measure should be a good proxy for this goal, or a logical step towards that goal.</p>
	<p>In the case of ULV spraying, cost per acre treated is a useful metric because it relates to performance in a useful technical way ... while cost per capita is an indicator of cost and cost effectiveness impact on the population. .</p>

General expenses

General expenses

Everything that is not already included in people costs, equipment and material costs should flow through general expenses. There are many things that must be included.

Rent

Insurance

Telecom

General repairs

Security

Travel

Etc

Operating overhead

Operating overhead

In most organizations there are multiple levels in the organization. An operating overhead are the expenses that are incurred in running a unit that is not directly involved with the operations.

These units may be responsible for several operating units. Thee expenses have to be “allocated” between the various units to get the true total cost of the operating unit.

Financial costs

Financial costs

Money has a cost ... though there are cases where money comes at no cost as, for example, as a gift or grant ... but usually free money comes with some strings or constraints.

If money is borrowed, and there are fees and interest to be paid, this is a cost that must be taken into consideration

When money must be paid back ... this is not a cost, but it is a very important drain on the cash of the organization, and there must be planning for repayment.

A good way of costing the use of money is to compute how much of the organization's assets are deployed to do the work. Assume a cost of capital ... of say 12% per annum ... and think of this as the cost of capital. It is a useful discipline. The best operations are those that do valuable work with the least possible use of resources.

Data about Community and the Area

About the community

CA aims to put into the record everything that is important for the progress of the community.

The first step should be to get information that is easy ... usually this is information about the state

A second step is to get data that are about progress and the changes in state over time.

Information about activities is usually more difficult, and especially to get all the data that are needed.

The following are some of the data elements that are of the most potential interest and value.

- ◆ Geography
- ◆ Demographics
- ◆ People
- ◆ Organizations
- ◆ Health infrastructure
- ◆ Entomological data
- ◆ Medical data

Data collection should be kept as cost effective as possible ... this may be achieved by using the optimum balance of technology and personnel.

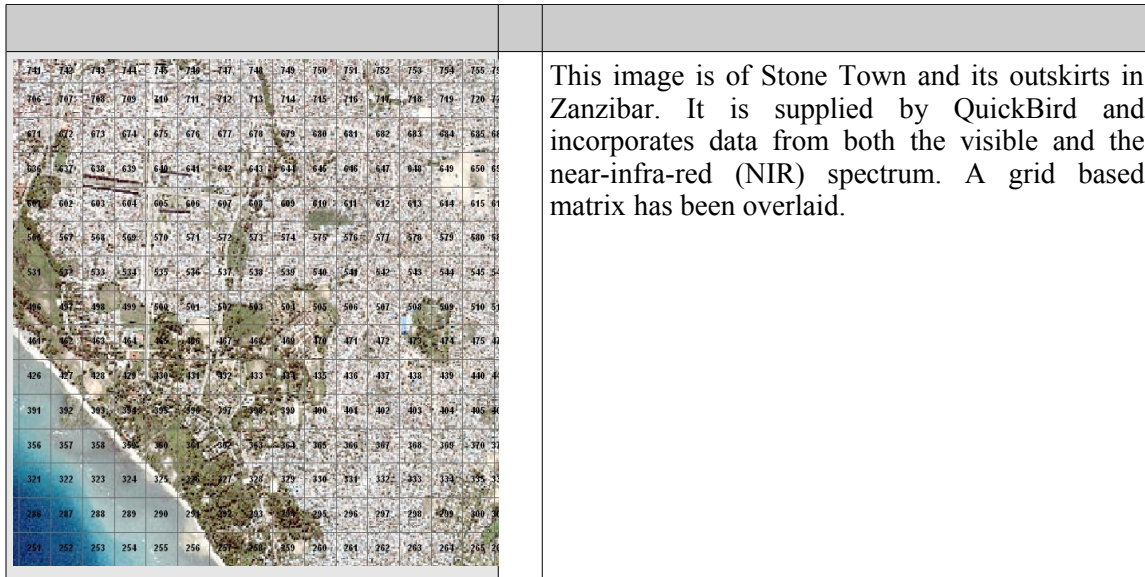
Identification of the community	<p>There is a need to know some basic information about the community:</p> <ol style="list-style-type: none">1 Name of the community?2 Where is it?3 What is it like?
Where is it?	<p>There are several ways to specify the location of a community</p> <ol style="list-style-type: none">1 GPS coordinates2 Distance from three or more key places such as area town
What is it like?	<ol style="list-style-type: none">1 Physical geography2 Weather patterns: rainfall, temperature, humidity

Area geography

Area geography has a big impact on many aspects of the socio-economic situation. It is therefore of importance to have data about: (1) topography; (2) altitude; (3) weather ... etc. These data normally change slowly.

Getting data from satellite imagery

These data can sometimes be obtained from existing maps or satellite imagery. The satellite and aerial photograph imagery is available from different places at different prices. Some imagery is available free from sources such as Google Earth ... some is available commercially from organizations like QuickBird, ESRI and others. The cost effectiveness of satellite imagery for purposes like IMM is improving rapidly ... but it is not yet clear that the prices for access to these tools will be affordable for sustainable use in IMM type work.



Item	Past	Now	Future
Area (total)		X	
Urban built up area		X	
Agriculture		X	
Irrigated agriculture		X	
Undeveloped dryland		X	
Undeveloped marshland		X	
Forest		X	
Number of houses		X	

Demographics

Population demographics

What age profile?		
What sex mix?		
What socio-economic profile?		
What educational profile?		
What skills profile?		
What health profile?		
What population density?		

Item	Past		Now		Future
Population (total)			X		
Population (male)			X		
Population (female)			X		
Population (5 and under)			X		
Population (6 to 15)			X		
Population (16 to 45)			X		
Population (46 up)			X		
Population (female pregnant)			X		

Most of the time, data about population changes slowly. However, from time to time there are rapid migrations that can materially change the population data.

The data about population has a major impact on planning, and performance. Increasingly it is apparent that very different strategies are needed for high density urban communities and for low density rural areas.

People

People are more important than anything else ... they are the focal point of a community and the underlying purpose of the community.

Who are key people in the community leadership?	
Who are the community leaders?	
Who else are in leadership roles?	
Who are the external friends of the community?	
Who are international friends of the community?	
Who are the business leaders?	
Who are the religious leaders?	
Who are the professional leaders ?	
Who are the teachers?	
Who are the doctors, nurses and health workers?	
etc.	

Activities

About activities ...

What do people do?

What is going on?

What projects?

What ordinary activities?

Organizations

What organizations are in the area

Government offices
Local private
businesses
Businesses from other
places
Local NGOs
International NGOs
Religious
organizations
Political organizations

Sectors

What are the economic activities;

Agriculture and fisheries
Post harvest processing
Manufacturing
Construction
Transport
Warehousing, wholesale
Small business ...
retail
Etc.

About jobs

What jobs in agriculture, fisheries and forestry;

1. Crops
2. Livestock
3. Fisheries
4. Lumber, fuel wood

What jobs in industry;
What jobs in services;
What jobs in trade and commerce;
What jobs in tourism;
What jobs in culture, entertainment, sports, etc.

Health

Patients
Staff
Supplies
Infrastructure

Education

Students
Teachers
Supplies
Infrastructure

Construction

Workers
Organizations
Skills and knowhow
Building materials
Equipment
Demand

About infrastructure:

Housing;
Transport ... roads,
etc.
Health ... clinics,
hospitals, etc.
Education ... schools,
etc
Water
Sanitation
Electricity
Telecom

About resources

Minerals
Energy
Timber ... forest
products
Agricultural land
Fisheries
Tourist destinations

Issues

About governance

Government admin
Security ... crime
Police
Prisons

About jobs and economic opportunity

Jobs and economic
activities
Security, crime, etc.
Everything else that is
material

About crime, violence and security

Crime and violence
Security

About constraints

Financial;
Organizational;
Knowledge;
Politics, Governance;
Everything else that is
material

About possibilities and potential

What is possible;
What is not;
What are key
constraints?

How can resources be best used

Natural resources
Human resources
Organizations
Know-how

Data about the Health Sector

What there is ...		The baseline information is about what facilities and resources are actually available in the community or nearby to service the community.
What is needed ...		Another level of baseline information is about the facilities and resources that are needed by the community, and how these compare with what the community actually has. This shows the deficit (or perhaps a surplus) between what is available and what is the need.
What is needed for all health issues		The IMM approach is that health is very much broader than just malaria, and it is health capacity building and training that should be embraced, not just the subsector of malaria ... in other words, facilities that are good for malaria, are good for many other health interventions.
What is the long term value for the community		More important is that the facilities that help to achieve success in reducing the burden of malaria can be used subsequently to address other diseases of importance in the community.

Community health strategy

The strategy for health in a community ... and from a community perspective ... should be to do all that is needed to have good health using available resources in the best possible way. Few organizations have this focus ... and few donors or funding organizations have this focus explicitly. People and families who live in underserved locations around the world who, more than anything else, need access to health care for themselves and their families that treats all the ailments of the area.

Many organizations have a single disease focus. In some ways this is a good way to organize, but it limits health benefit from the perspective of the community and all its needs.

From the community perspective it is better to be more than malaria ... while malaria is the focus of the IMM initiative ... the clinics and community health centers should have staff, equipment and supplies for all ailments in the area.

Coordination

When there are many organizations, it is usual for the authorities to ask for more coordination. This is never easy, and much of the process of coordination has form ... has cost ... but not much value. Coordination should produce value for the community ... if the community benefits, then coordination is adequate

Coordination activities		

It is difficult to show the impact of not having health infrastructure when much of the dataflow about health originates at health facilities

People

Doctors?		

Nurses?		

Administration, coordination, etc.		

Community health workers		

Traditional birth attendants		

Training		

Certification		

Remuneration		Base pay of health workers is low in almost all developing countries
Incentive pay		Incentives are rare ... and when they exist they are usually not providing the right incentives.
Career path		Career path is also important for people working in the sector.

Health activities

Health activities		What focus ... What organization?
What is missing ... what is needed?		

Organizations

The quality of the health care, and the performance of a malaria program is determined not only by the physical facilities but also by the organizations and their capacity to perform. There are many issues that interact and impact performance.

Ministry of health		The Ministry of Health (MoH) is the apex organization within the health sector. The limiting factor for its activities is usually the lack of an adequate budget for all the programs needed.
What MoH presence?		Name of the MoH unit? Where is the unit? What are its capabilities? Who runs the unit (organization)? Who is in charge of the unit? How big a staff?

Universities	Universities are training staff, though less than are needed to satisfy the need for trained health personnel. The shortage of staff is aggravated by trained staff migrating out of the country where they have been trained mainly because staff salaries are low.
Do education and training	
Doing research	
Doing consultancy	

Public hospitals	There are not enough hospitals ... and where there are physical facilities there are staff shortages, equipment shortages and medical supply (including drug) shortages.
Private hospitals	
Mission hospitals	
Humanitarian aid hospitals	

MoH clinics	There are not enough clinics run under the auspices of the MoH and offering low cost or free treatment to patients. Access to medical services is limited by both the
Private clinics	
NGO clinics (including religious organizations)	Clinics run by NGOs are of varying quality ... some are very good.

Health sector physical facilities and equipment

Health clinics

Name of clinic?		
Location ... distance?		
Where is the clinic?		
What size?		
What capabilities?		
Who runs the clinic (what organization)?		
What is the staffing?		
Who is in charge of the clinic?		
Who is the contact?		

Hospitals

Name of hospital?		
Location ... distance?		
Where is the hospital?		
What size?		
What capabilities?		
Who runs the hospital (what organization)?		
What is the staffing?		
Who is in charge of the hospital?		
Who is the contact?		

Equipment

Equipment?		What equipment are needed? What equipment is in place? What condition is the equipment?
Lab for blood work		
X-Ray		
etc.		

Utilities

Utilities?		Buildings and equipment are not enough. People and skills are not enough. In addition there has to be access to utilities.
Electricity		
Water		
Sewage		
Telephone		
Mobile phone access		
Internet access		

Diagnostics

Examples		
Diagnostics		

Support services

Lab capability		Lab capability is needed
Diagnosis		Do people have malaria ... or is it a fever caused by something else? What is the capacity to do "blood work" for the analysis of a patient's health?
Medications		Are the available drugs of the correct standard and quality ... or are they fake or counterfeit? Are any testing facilities available?
Blood		Where are blood supplies available? What steps are taken to ensure that the blood is safe?
Cold chain		How are drugs, vaccines, etc transported and stored? How much medicine is stored at the proper temperature?
Transport		How do patients get to the clinic ... or to a referral hospital. Are there any vehicles that are equipped as ambulances?

Pharmaceuticals and medical supplies

What is the point of having competent staff if there are no medicines and supplies to treat the patients? And what is the point of dispensing drugs when their quality is unsatisfactory? There are all sorts of questions that need to be addressed so that the system works and serves the public well.

What is the medical drug supply situation?		Name of the drug sale outlet? Where is the outlet? What are its capabilities? Who runs it (organization)? Who is in charge of it? How big a staff? How are drugs verified as good?
Problem of resistance		Resistance is widespread for the low cost anti-malarial drugs (e.g. chloroquine, pyrimethamine). This must be taken into consideration and data collected to identify emerging new resistance.
Drug quality		There is a problem with fake drugs, counterfeits and drug quality. There is big profit in bad practice and little incentive to follow high ethical standards. There must be a practical enforcement mechanism and easy access to testing facilities so that bad practice can be identified.
Government regulation		The Government's regulatory environment is often weak partly because of lack of legal regulation and partly because of the capacity to provide oversight and enforcement
Generic drugs		
Prices		
Subsidies		
Mark-ups		
Taxes and duties		
Regulation		
Professionalism		

Health economics

Health science and health economics		Health science has made amazing progress ... health economics does not reflect the same progress. Why not?
Staff pay		High pay for some and low pay for others is distorting the cost and performance of the health sector. There is a need for radical reform of the systems for remuneration.
Funding		The system of funding accentuates some of the dysfunctional distortion in the sector.
Subsidy		How should subsidy be integrated into the sector? High cost, high profit and high subsidy is expensive and unsustainable. How much should subsidy be used to maintain a high profit or should the social business model be embraced within the broader health sector.
Private/public issue		
For profit or not for profit focus		
Why health costs are out of control (as in the USA)?		
Why socialized medicine (as in the UK) has quality and delivery issues?		
Why government health service in developing countries is often dysfunctional.		

Surveillance Data ... including mosquitoes

Characteristics of these data

Entomological surveillance is used to get data about mosquitoes, the mosquito behavior and the mosquito habitat. A large mosquito population is always a nuisance ... but it is only a danger for humans when the malaria parasite is in the area either withing the mosquito population or the human population.

Changes in mosquito population come about for two reasons: (1) natural habitat and environmental considerations; and (2) various public health interventions.

Cost of surveillance

Cost of data collection and analysis

Activity cost

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Cost 1													
Cost 2													
Cost 3													
etc.													
Total													

About the weather

The population density of mosquitoes is directly related to weather conditions, especially precipitation (irrigation), temperature and relative humidity.

Rainfall (mm per month)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Site 1													
Site 2													
Site 3													
Site 4													
Etc.													
Average													

Temperature

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Site 1													
Site 2													
Site 3													
Site 4													
Etc.													
Average													

Humidity

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Site 1													
Site 2													
Site 3													
Site 4													
Etc.													
Average													

Prevailing winds

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Site 1													
Site 2													
Site 3													
Site 4													
Etc.													
Average													

About people

Mapping people

Where do people live,
work and travel?

Mapping prevalence of parasite in people

Where are people that
are host to the malaria
parasite located: where
do these people live,
where do they work,
where do they
congregate together,
where do they travel to.

Mapping cases of malaria

Where are people
getting malaria?

About houses

What sort of houses		
What sort of houses are people living in? Are they susceptible to ingress of mosquitoes?		
What is the most suitable way of keeping mosquitoes away from people in these houses?		

About sources

Mapping sources

What is the breeding status of the place?

How should the source be treated?

Where are the sources of mosquitoes.

What is the state of the breeding place? Should the place be treated to kill the emerging larvae? Is this the right time?

What is the best way to treat the sources? What is the best way for the sources to be treated that is possible with the larvaciding materials, equipment and staff that are available?

About mosquitoes

Mapping the mosquito population (Traps)

Where do the mosquitoes travel and other details of their behavior including when they travel and how they behave relative to homes, people and animals?

Mapping infected mosquitoes (traps plus analysis)

Where are infected mosquitoes located?

The population of mosquitoes fluctuates over the course of a year. Controlling the mosquito population has a favorable impact on quality of life, as well as the transmission of disease.

Summary about mosquitoes

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Population of mosquitoes – an index													
Population of malarial mosquitoes													
Percentage of malarial mosquitoes													

Population of mosquitoes – index by month for several sites

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Site 1													
Site 2													
Site 3													
Site 4													
Etc.													
Total													

Population of malarial mosquitoes - % or index by month for several sites

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Site 1													
Site 2													
Site 3													
Site 4													
Etc.													
Total													

Population of mosquitoes – year on year comparison for a single location

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Year 0													
Year 1													
Year 2													

Population of malarial mosquitoes – year on year comparison for a single location

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Year 0													
Year 1													
Year 2													

Percent of malarial mosquitoes – year on year comparison for single location

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Year 0													
Year 1													
Year 2													

Surveillance Data ... medical

About health status

Health data inclusive of malaria

Health data will be most useful when they are for both malaria and all other diseases affecting the people in the community.

About diagnosis

Diagnostic activity - # of tests performed by site

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Site 1													
Site 2													
Site 3													
Site 4													
Etc.													
Total													

Diagnostic activity – results of diagnostic testing – per site

Site # NNN	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
# of tests													
# positive for malaria													
Percent having malaria													

Diagnostic activity – results of diagnostic testing – summary for area

Area # NNN	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
# of tests													
# positive for malaria													
Percent having malaria													

Actual cost of diagnostic activity - by site

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Site 1													
Site 2													
Site 3													
Site 4													
Etc.													
Total													

Standard cost of diagnostic activity - by site

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Site 1													
Site 2													
Site 3													
Site 4													
Etc.													
Total													

About medical cases

Time series of malaria cases

By population segment	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Population (total)													
Population (male)													
Population (female)													
Population (5 and under)													
Population (6 to 15)													
Population (16 to 45)													
Population (46 up)													
Population (female pregnant)													

The number of cases is a result and can be considered either as a state or as an activity ... the number of cases can be used as a metric for “state” or as a metric of “activity”.

About medical treatment

TABLE to come

Purpose of these data

The purpose of these data is to help achieve the most cost effective outcome as possible, and one that is sustainable.

The history of malaria treatment drugs is that there has been an increase in resistance over time ... and drugs that were widely used and effective for many years are now almost totally ineffective. (e.g. Chloroquine).

Summary of drug history

Example	Description
Quinine, Choroquine	Medication has been used for many years. Initially it was quinine that served to minimise the fever due to malaria. For a very long time the drug Chloroquine was used both as a prophylactoc and as a treatment, but over the years, malaria has become resistant to chloroquine and it is no longer effective.
Fansidar	Fansidar became the preferred treatment in the 1980s as chloroquine resistance became widespread, but it is more expensive and not easily affordable by the majority of the affected population.
Artemesin Combination Therapy (ACT)	Artemesin Combination Therapy (ACT) has been developed and is now the preferred treatment, but it is again more expensive than Fansidar.

Data are needed to identify emerging resistance. These data may be at the level of monitoring outcomes or intense analysis of the biology of the disease.

Data are also needed to identify the high degree of informal drug commerce that is taking place and potentially causing serious complications for the successful treatment of disease, and especially malaria.

Drug therapy

Parasite prevalence in the human host	<p>Drug therapy is used to reduce parasite prevalence. Medical treatment that addresses the active malaria bout should be supplemented by medical treatment that addresses the parasite that is simply hosted in the human subject.</p> <p>A bite from a non-malarial mosquito is not the start of transmission when the source of a blood meal is not host to the malaria parasite. The bite is a nuisance, but the bite is not dangerous. Medical treatment to reduce the prevalence of the malaria parasite in the human host is a key part of an integrated malaria management regime.</p>
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About prevalence of malaria parasite

The malaria in the population can be measured in various ways. This may be done using statistical sampling with a sufficient sample size and an approach that includes all the population.

It is not normally satisfactory to use those visiting a health center as a sample that reflects the whole population.

It is possible, however, to use almost any time series of data that are compiled on a consistent bases to serve as an indicator of change.

Time series about malaria parasite prevalence

These data have the same analytical breakdown as the data about population.

Malaria parasite prevalence ... month by month

By population segment	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Population (total)													
Population (male)													
Population (female)													
Population (5 and under)													
Population (6 to 15)													
Population (16 to 45)													
Population (46 up)													
Population (female pregnant)													

Malaria parasite prevalence ... year by year

Community	Year 1	Year 2	Year 3	Year 4	Year 5	5 year change
Population (total)		X				
Population (male)		X				
Population (female)		X				
Population (5 and under)		X				
Population (6 to 15)		X				
Population (16 to 45)		X				
Population (46 up)		X				
Population (female pregnant)		X				

The malaria in the population can be measured in various ways. This may be done using statistical sampling with a sufficient sample size and an approach that includes all the population.

It is not normally satisfactory to use those visiting a health center as a sample that reflects the whole population.

It is possible, however, to use almost any time series of data that are compiled on a consistent bases to serve as an indicator of change.

About mortality due to malaria

Time series about mortality in the population

The data about mortality with the same analytical breakdown as the data about population. There are two groups that normally have high mortality: (1) children under 5 and (2) pregnant women.

Mortality ... month by month

By population segment	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Population (total)													
Population (male)													
Population (female)													
Population (5 and under)													
Population (6 to 15)													
Population (16 to 45)													
Population (46 up)													
Population (female pregnant)													

Mortality ... year by year

Community	Year 1	Year 2	Year 3	Year 4	Year 5	5 year change
Population (total)						
Population (male)						
Population (female)						
Population (5 and under)						
Population (6 to 15)						
Population (16 to 45)						
Population (46 up)						
Population (female pregnant)						

About morbidity due to malaria

Time series about morbidity in the population

The data about morbidity with the same analytical breakdown as the data about population. Morbidity affects all of the population. Morbidity in the group aged 16 to 45 has the most impact on economic performance.

Morbidity ... month by month

By population segment	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Population (total)													
Population (male)													
Population (female)													
Population (5 and under)													
Population (6 to 15)													
Population (16 to 45)													
Population (46 up)													
Population (female pregnant)													

Morbidity ... year by year

Community	Year 1	Year 2	Year 3	Year 4	Year 5	5 year change
Population (total)		X				
Population (male)		X				
Population (female)		X				
Population (5 and under)		X				
Population (6 to 15)		X				
Population (16 to 45)		X				
Population (46 up)		X				
Population (female pregnant)		X				

The data about mortality with the same analytical breakdown as the data about population. There are two groups that normally have high mortality: (1) children under 5 and (2) pregnant women.

Drug resistance

Example	Description
Drug resistance	Drug therapy is increasingly compromised by resistance to the low cost drugs like Chloroquine and more recently Fansidar. As long as there is endemic malaria and massive reinfection, medical treatment as a standalone curative treatment cannot be expected to produce sustainable progress. Rapid development of resistance is facilitated by rapid reinfection and the need for repeated treatments. Another factor is the poor diagnostic performance, with widespread use of malaria drugs being used for other ailments.

Focus on high risk groups

Example		Description
High risk groups:		Malaria is a deadly disease for children and pregnant women, and some types of malaria are also deadly for everyone. Malaria in all its variations is a debilitating disease for everyone.
(1) Young children		
(2) Pregnant women		

Sustainability

Example	Description
	Medical care is expensive. Though there has been a massive increase in the capacity of the medical experts to address the science, there has not been the same progress in building an effective local or a global medical system.
	With limited resources, the activities have been directed to segments of the population that are considered to be at risk, such as young children and pregnant women, and though this results in reduction in mortality of these vulnerable groups, the overall effect on morbidity in the vast bulk of the population is small, and the economic situation is not improved.
	The strategic impact of this approach is likely to be failure because it is not a tactic that builds towards the reduction of parasite prevalence and reduction in the transmission of the disease.

Screening and treatment to reduce parasite prevalence

The prevalence of parasite in the human host is a factor in the reinfection cycle. By reducing the prevalence of the parasite in the human host, there is a lower risk of the blood meal adding to the population of infected mosquitoes. This helps.

Long term strategy for sustainability

Long term strategy for sustainability	<p>Medical treatment that helps to eradicate the disease is very much more cost effective than medical treatment that only addresses a presently active bout of malaria, that will reactivate in a matter of weeks, and perhaps many times in a single year.</p> <p>The data are not clear yet, but the simple model for an optimized program suggests that a geographic focus with multiple interventions can move towards elimination of the malaria parasite in the community in months not years ... and of course, the long term cost of this approach is very much better than anything else.</p>
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Drill Down to Intervention Costs

Summary of IMM Interventions

The management and control of costs requires useful, reliable and timely cost information. This is the bedrock of accountability and efficiency. The following summary tables are interesting in aggregate, but even more interesting when it is possible to drill down to more detail

Activity summary – How much done

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Surveillance													
Education and awareness													
Community clean up													
Personal protection													
Medical													
IRS													
Source control - larvaciding													
ULV adulticiding													
ITN													
Total													

Activity summary – How much cost

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Surveillance													
Education and awareness													
Community clean up													
Personal protection													
Medical													
IRS													
Source control - larvaciding													
ULV adulticiding													
ITN													
Total													

Activity summary – % of month total each intervention

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Surveillance													
Education and awareness													
Community clean up													
Personal protection													
Medical													
IRS													
Source control - larvaciding													
ULV adulticiding													
ITN													
Total													

Activity summary – Standard cost

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Surveillance													
Education and awareness													
Community clean up													
Personal protection													
Medical													
IRS													
Source control - larvaciding													
ULV aduaticiding													
ITN													
Total													

Activity summary – Cost efficiency (actual as % of standard cost)

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Surveillance													
Education and awareness													
Community clean up													
Personal protection													
Medical													
IRS													
Source control - larvaciding													
ULV aduaticiding													
ITN													
Total													

Surveillance

Surveillance cost – actual by month for year N

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Training													
Salaries													
Workshops													
Transport													
Equipment													
Supplies													
Etc.													
Total													

Training programs

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Person.days of trainers													
Cost													
Person.days of students													
Unit cost per student													

Activities – Standard versus actual

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
People involved													
Std. cost													
Standard													
Actual													
Variance													

Education and awareness

Education and awareness cost – actual by month for year N

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Training													
Salaries													
Workshops													
Transport													
Equipment													
Supplies													
Etc.													
Total													

Training programs

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Person.days of trainers													
Cost													
Person.days of students													
Unit cost per student													

Activities – Standard versus actual

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
People involved													
Std. cost													
Standard													
Actual													
Variance													

Community Clean Up

Cost factors

Area clean up may not cost much money, but it does require effort and organization. The organization is facilitated when there is local understanding of what causes malaria.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Training													
Salaries													
Chemicals													
Transport													
Equipment													
Supplies													
Etc.													
Total													

Personal protection

Cost factors

Getting rid of malaria would make it possible for substantial expenditures on personal protection by the more affluent to be substantially reduced. The out of pocket costs may easily add up to \$1,000 per household per year, and the potential danger of using sprayed pesticides should also be taken into consideration.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Training													
Salaries													
Chemicals													
Transport													
Equipment													
Supplies													
Etc.													
Total													

How it works

Exposure to mosquito bites can be reduced by many different techniques. Some of the approaches are expensive and therefore limited to the wealthier members of society.

Example	Description
Air conditioning	Living in air-conditioned space is one way to reduce exposure to mosquitoes ... but it is an expensive option and only available to a very few.
House construction	House construction can make a big difference to the number of mosquitoes seeking blood meals in the house
Insecticide sprays	Using insecticide sprays is another way. These are also expensive, and they have potentially bad side effects both to the people exposed to the insecticides and to the environment. Many of the sprays commonly used in malaria endemic areas are banned from the EU and the USA because of their dangerous potential.
Coils	Burning insecticide treated coils keeps mosquitoes away from possible blood meal targets.
Traps	In some situations mosquito traps can help reduce the level of mosquito bites.
Appropriate clothing	Wearing appropriate clothing that covers the legs and arms also helps keep mosquitoes from reaching a blood meal.
Prophylactics	Taking anti-malaria drugs as a prophylactic is possible ... but has the disadvantage of creating resistance which may preclude effective curative therapy if needed.

Medical

Activity cost

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Training													
Salaries													
Drugs													
Transport													
Equipment													
Supplies													
Etc.													
Total													

Training

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Cost													
Person.days													
Unit cost													

Medical intervention

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Number of cases													
Unit std. cost													
Standard													
Actual													
Variance													

What is most cost effective?

A strategy that has the least amount of treatment and medical care being required ... the most success is the least amount of health care being needed

Table of cost elements

Element of cost	Type of facility	Health clinic	Rural hospital	Referral hospital	Community health worker	Transport
Capital cost of land and buildings						
Capital cost of medical equipment						
Capital cost of vehicles						
Capital cost of office equipment						
Total capital cost						
Annual cost of land and buildings						
Annual cost of medical equipment						
Annual cost of vehicles						
Annual cost of office equipment						
Total annual cost of capital items						
MD salary and benefits						
Nurses salary and benefits						
Other staff salary and benefits						
CHW salary and benefits						
Consultants, etc						
Total staff costs						
Drug costs						
Other medical supplies						
General expenses						
Travel						
Housing						
Training						
Other						
Awareness training						
Bednet marketing and promotion						

Interior residual spraying (IRS)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Training													
Salaries													
Chemicals													
Transport													
Equipment													
Supplies													
Etc.													
Total													

Training

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Cost													
Person.days													
Unit cost													

Spraying operations

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Number of houses													
Unit std. cost													
Standard													
Actual													
Variance													

Source control ... larvaciding

Activity cost

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Training													
Salaries													
Chemicals													
Transport													
Equipment													
Supplies													
Etc.													
Total													

Training

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Cost													
Person.days													
Unit cost													

Larvaciding operations

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Scale of activities													
Unit std. cost													
Standard													
Actual													
Variance													

ULV Adulthood

Activity cost

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Training													
Salaries													
Chemicals													
Transport													
Equipment													
Supplies													
Etc.													
Total													

Training

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Cost													
Person.days													
Unit cost													

Spraying operations

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Scale of operations													
Unit std. cost													
Standard													
Actual													
Variance													

Insecticide Treated Bednets (ITNs)

Bednet intervention cost ... by element of cost

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Training													
Salaries													
Chemicals													
Transport													
Equipment													
Supplies													
Etc.													
Total													

Bednet intervention cost ... by type of activity

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Cost													
Person days													
Unit cost													

Summary of bednet distribution and cost by month for year N

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Number of bednets													
Unit std. cost													
Standard													
Actual cost													
Variance													

Bednet distribution by month year to year (000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Year 0													
Year 1													
Year 2													
Year 3													
Year 4													

Bednet coverage by month year to year (%) for all of population

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Year 0													
Year 1													
Year 2													
Year 3													
Year 4													

Bednet coverage by month year to year (%) for children under 5

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Year 0													
Year 1													
Year 2													
Year 3													
Year 4													

Bednets in use by month for year

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Population of the area													
Of which children under 5													
Total bednets needed													
Of which for children under 5													
Bednets per total population													
Bednets per under 5 child													
Total bednets needed													
Bednets needed for under 5 children													

Bednets in use ... year trends ... 5 year intervals and year by year

	1980	1985	1990	1995	2000	2005		2004	2005	2006	2007	2008	2009
Population of the area													
Of which children under 5													
Total bednets needed													
Of which for children under 5													
Bednets per total population													
Bednets per under 5 child													
Total bednets needed													
Bednets needed for under 5 children													

Bednets in use ... month by month detail

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
In use BOM													
Distributed													
Discarded													
Adjustments													
In use EOM													
In use average													
% of total													
% of under 5													

Bednet value chain

The value chain associated with bednets has the potential to be optimized. The data needed for optimization should be easily accessible, but has not been up to now. None of the key data are easily accessible to the public or decision makers and it is not clear from the available data who are benefiting from the bednet value chain. CA value chain analysis is a simple concept, but not simple to get the data that show how the value chain works. The following data will help understand the value chain.

Bednet value chain ... the generic model

	Unit cost	Cumulative unit cost	Unit profit	Cumulative profit	Unit Price
Ex factory					
Local freight					
Ocean freight					
Ocean insurance					
Export taxes					
Import taxes and duties					
Port charges					
Local freight					
Warehousing					
Inventory accounting					
Logistics management					
Project management					
MoH administration					
M&E expenses					
Retail costs					
Subsidy					
Training (of staff)					
Training (of clients)					
Advertising and promotion					
Fund raising expenses					
Awareness training					
Bednet marketing and promotion					

Bednet cost/price/profit value chain analysis time series

A very simple table showing the price month by month for a bednet shows a lot. The price should be recorded at the same level in the value chain. A series of these tables reflecting prices at different levels of the value chain shows even more. These are very simple data ... very very clear ... and missing because, in all probability, there are stories that would emerge from these data that key actors would not want to be so clear! Comparisons of these datasets shows very clearly where there is efficiency and where there are costs ... legitimate or otherwise.

Year over year by month ... prices for ABC at XYZ point in the value chain

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Year 1													
Year 2													
Year 3													
Year 4													

Bednet supply chain data

Bednet value chain ... the generic model

	Unit cost	Cumulative unit cost	Unit profit	Cumulative profit	Unit Price
Ex factory					
Local freight					
Ocean freight					
Ocean insurance					
Export taxes					
Import taxes and duties					
Port charges					
Local freight					
Warehousing					
Inventory accounting					
Logistics management					
Project management					
MoH administration					
M&E expenses					
Retail costs					
Subsidy					
Training (of staff)					
Training (of clients)					
Advertising and promotion					
Fund raising expenses					
Awareness training					
Bednet marketing and promotion					

Bednet cost/price/profit value chain analysis time series

A very simple table showing the price month by month for a bednet shows a lot. The price should be recorded at the same level in the value chain. A series of these tables reflecting prices at different levels of the value chain shows even more. These are very simple data ... very very clear ... and missing because, in all probability, there are stories that would emerge from these data that key actors would not want to be so clear! Comparisons of these datasets shows very clearly where there is efficiency and where there are costs ... legitimate or otherwise.

Year over year by month ... prices for ABC at XYZ point in the value chain

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Year 1													
Year 2													
Year 3													
Year 4													

By month seasonality

Many of the elements of the community socio-economy have seasonal characteristics, and the data needs to be compiled to show this. Using a monthly reporting format will show seasonality clearly.

Time series that compares different places for year YYYY

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Site 1													
Site 2													
etc.													

Time series that compares different years for the location ABC

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Year 1													
Year 2													
etc.													

Coordination

When there are many organizations, it is usual for the authorities to ask for more coordination. This is never easy, and much of the process of coordination has form ... has cost ... but not much value. Coordination should produce value for the community ... if the community benefits, then coordination is adequate

Coordination activities		

It is difficult to show the impact of not having health infrastructure when much of the dataflow about health originates at health facilities

Associating Costs with Results

Purpose of these data

Operational performance data are needed to ensure that there is progress ... that the strategy for progress is working ... that the operational activities are effective and efficient. These data address the questions of cost effectiveness and cost efficiency.

In most cases the aim of cost analysis is to: (1) compute the total cost of an activity; (2) compute the unit cost; and, (3) see whether the costs are in line with what was expected and adequately efficient. Are the data capable of providing this analysis?

Total cost?
How many?
Unit cost?
Standard cost?
Cost efficiency?

The data should also show the impact of the activities. Impact is different from the scale of the activity ... it is what value the benefit had to the end beneficiary.

How much benefit?	If the benefit is less mortality ... this is good
How much value?	And the value of less mortality is very high ... and in the CA methodology is computed using a table of standard values.
For what standard cost?	How much did it cost to get this benefit? One calculation is done using standard cost?
For what actual cost?	An alternative calculation of cost is to use actual cost data ... which should normally be similar to the standard cost, but when it is not should be subject of inquiry.
Cost effectiveness?	Cost effectiveness ... somewhat similar to cost benefit analysis ... shows the relationship between the value added and the costs incurred.

Characteristics of these data

These data are, above all, timely and relevant. They are data that are used to manage operations and as such have to be sufficiently detailed to facilitate decision making.

Cost and cost efficiency

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Interventions - cost													
Surveillance													
IRS													
Source control													
Adulticiding													
Medical													
ITN													
Education													
Total													
Interventions - quantity													
Surveillance													
IRS													
Source control													
Adulticiding													
Medical													
ITN													
Education													
Interventions – unit cost													
Surveillance													
IRS													
Source control													
Adulticiding													
Medical													
ITN													
Education													
Interventions – cost efficiency (actual cost as % of standard cost)													
Surveillance													
IRS													
Source control													
Adulticiding													
Medical													
ITN													
Education													

Impact (or results) and cost effectiveness

The most impact is not achieved using a single intervention but many interventions ... and impact is not measured easily using one single metric.

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Impact													
Mortality arising from malaria													
Morbidity due to malaria													
Lost economic activity arising from malaria morbidity													
Prevalence of malaria parasite in the human host													
Prevalence of malaria parasite in the mosquito population													
Index of progress													
To be developed													
Cost (from above)													
Total cost of multiple interventions													
Cost Effectiveness													
A derived index to be developed													

These tables give a very clear indication whether the results are good or bad ... whether they are in line with expectations. If the results are poor relative to expectations, there should be inquiry and an explanation of why there are differences. These results may be compared to other communities and lessons learned from the comparison.

Because of the large number of variables it is difficult to optimize without a large dataset and computer assisted analysis. (See page nnn for more).

Monthly summary of community activities and impact

Data are recorded in the most convenient way possible and summarized to give a month by month time series. The purpose is to help inform decision makers about the malaria situation.

Identity of the community

Name

Location

ID Reference

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Rainfall													
Temp (High average)													
Temp (Low average)													
Mosquito population (an index)													
Prevalence of malaria in the mosquitoes													
Hours of adulticide spraying													
Area covered with adulticide spraying													
Workdays of surveillance													
Prevalence of larvae in the area (index)													
Workdays of source control													
Workdays of work doing environmental clean up													
Workdays of IRS team spraying													
Workdays of training													
Amount of spraying done													
Bednets distributed													
Bednets treated													
Coverage of bednets													
Population of the community													
Estimated number of cases of malaria													
Estimated number of deaths due malaria													

Data about a household

Simply put, the data at the lowest level will start to inform decision makes in a useful way.

At the family or household level, the critical information is: (1) What was done, and when; and (2) what have been the results.

This is a sample of the data table that could be used.

Identity of the household

Name

Location

ID Reference

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Number of people in the household													
Number of adults (F)													
Number of adults (M)													
Number of children													
Bednets acquired this month (quantity)													
Number that used a bednet every night this month													
House was treated with interior residual spraying this month													
Adult cases of malaria this month													
Adults that got treatment for malaria this month													
Children cases of malaria this month													
Children that got treatment for malaria this month													
Number of clinic visits this month													
Deaths in the household this month													

The specific questions might vary for clarification. The aim is to have a simple time series that serves to show what is happening in the household in respect of malaria interventions (bednets and IRS)

Data from a clinic

Data at a clinic is different. These data are about those that come to the clinic, which is a subset of all the population. These data also start to inform decision makes in a useful way.

The aim of these data is to show the malaria case activity in the clinic, the treatments and the outcomes. By summarizing by month it is possible to have a view of the trend over time.

This is a sample of the data table that could be used. This is at a summary level by month. The data is recorded daily, summarized for the week ... and then summarized for the month.

Identity of the clinic

Name

Location

ID Reference

Data for year NNNN	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Total number of people presenting at the clinic													
Of which malaria cases													
Of which adult (M)													
Of which adult (F)													
Of which pregnant													
Of which age 5-16													
Of which age < 5													
Malaria - no treatment													
Malaria treatment A													
Malaria treatment B													
Malaria treatment C													
Malaria hospitalization													
Malaria death at clinic													
Malaria death elsewhere													

The data detail may be different ... the aim is to get an indicator of the scale of the problem, and how the disease profile is changing over time.

Data from an organization

Organizations like plantations, mines or manufacturing plants and commercial enterprises that employ many people have data about employees that are indicators of health status.

The aim of these data is to show the malaria case activity in the clinic, the treatments and the outcomes. By summarizing by month it is possible to have a view of the trend over time.

This is a sample of the data table that could be used. This is at a summary level by month. The data is recorded in the most convenient way possible.

Identity of the organization

Name

Location

ID Reference

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Total number of people in the workforce.													
Number of cases of malaria reported by employees.													
Malaria - no treatment													
Malaria treatment A													
Malaria treatment B													
Malaria treatment C													
Malaria hospitalization													
Malaria death of the employee													
Malaria death in the family													

The data detail may be different ... the aim is to get an indicator of the scale of the problem, and how the disease profile is changing over time. \

Community activities and impact

Data are recorded in the most convenient way possible and summarized to give a month by month time series. The purpose is to help inform decision makers about the malaria situation.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Rainfall													
Temp (High average)													
Temp (Low average)													
Mosquito population (an index)													
Prevalence of malaria in the mosquitoes													
Hours of adulticide spraying													
Area covered with adulticide spraying													
Workdays of surveillance													
Prevalence of larvae in the area (index)													
Workdays of source control													
Workdays of work doing environmental clean up													
Workdays of IRS team spraying													
Workdays of training													
Amount of spraying done													
Bednets distributed													
Bednets treated													
Coverage of bednets													
Population of the community													
Estimated number of cases of malaria													
Estimated number of deaths due malaria													

Cost computation using standard costs

Base data			
Item	Population	Area	Houses
UOM	#	acres	#
Value	10,000	4,000	2,000

Cost table

For activity 1 with a standard cost of \$X.XX per unit

Tables something like this should be available for ALL malaria control activities. This is basic cost accounting, and all organizations using economic resources should have this minimum data.

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Training													
Salaries													
Workshops													
Transport													
Equipment													
Supplies													
Etc.													
Total													
How much done?													
Unit cost													
% of standard													

Cost computation using standard costs

To allocate resources

A worksheet of this sort makes it possible to estimate the costs of adopting a specific intervention set.

Item	UOM	Std cost	Est. amount	Per month	Per year			
Population	000	-	10,000					
Area	acres	-	4,000					
# of houses	000	-	2,000					
Organize data/planning ... review/ revise/ replan	\$/mnt cost	\$500.00		500				
Entomological surveillance	\$/acre/mnth	\$0.15	4000/m	600				
Source control ... larvaciding	acre	\$10.00	400 acres	4,000				
Adulticiding ... ULV spraying	acre	\$2.00	4,000 acres	8,000				
Interior residual spraying (IRS)	house	\$6.00	300 houses	1,800				
Area clean up	acre	\$3.00	500	1,500				
Education and awareness	\$/m people	\$10.00	500	5,000				
Strengthening community health infrastructure	\$/m people	\$10.00	Plan \$ spend	5,000				
Insecticide treated bednets (ITNs) ... delivered to user	\$/unit	\$12.00	1000	12,000				
Insecticide treated bednets (ITNs) ... ex factory	\$/unit	\$4.00						
Diagnosis ... microscopy	\$/m units	\$100.00	2000	200				
Diagnosis ... RDTs	\$/m units	\$800.00	2000	1,600				
Drug treatment	\$/m persons	\$1000.00	1000	1,000				
Hospitalization if needed	\$/person	\$50.00	100	5,000				
Screening	\$/m people	\$100.00	2000	200				
Drug treatment to lower parasite prevalence	\$/m people	\$500.00	2000	1,000				
TOTAL				47400				

In the following section the cost of carrying out a range of interventions is related to the amount of change being achieved. There are many ways in which the performance analysis can proceed depending on the availability of data and the issues that are apparent. Over time there will be learning relative to the quality of the standard costs, and a growing appreciation of what works best to control malaria in the community.

It is possible to assign cost to each of the interventions by using the amount of the intervention and the related standard cost. No attempt is being made here to assign values to the results being achieved, though this would be normal in a full CA analysis.

Intervention activity by month

Base data			
Item	Population	Area	Houses
UOM	#	acres	#
Value	10,000	4,000	2,000

Intervention activity by month

To show allocation of resources and activity level for all interventions

Year	UOM	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
These costs may be detailed or not														
Total Cost	\$000	47	47	47	47	47	47	47						
How much done														
Entomological surveillance	acres	4000	4000	4000	4000	4000	4000	4000						
Source control ... larvaciding	acres	400	400	400	400	400	400	400						
Adulciding ... ULV spraying	acres	4000	4000	4000	4000	4000	4000	4000						
Interior residual spraying (IRS)	houses	300	300	300	300	300	300	300						
Area clean up	acres	500	500	500	500	500	500	500						
Education and awareness	acres	500	500	500	500	500	500	500						
Insecticide treated bednets delivered to user	units	1000	1000	1000	1000	1000	1000	1000						
Diagnosis ... microscopy	units	2000	2000	2000	2000	2000	2000	2000						
Diagnosis ... RDTs	units	2000	2000	2000	2000	2000	2000	2000						
Drug treatment	units	1000	1000	1000	1000	1000	1000	1000						
Hospitalization if needed	units	100	100	100	100	100	100	100						
Screening	units	2000	2000	2000	2000	2000	2000	2000						
Drug treatment to lower parasite prevalence	units	2000	2000	2000	2000	2000	2000	2000						
Impact of interventions														
Mosquito population	Index	10	10	10	10	40	70	100						
Prevalence of malaria parasite in mosquito	%	35%	35%	35%	35%	35%	45%	55%						
No of cases at a specific location	#	50	50	50	50	50	50	50						
No of treatments with specific drug	#	50	50	50	50	50	50	50						
[Total and by each drug]														
No of deaths from malaria	#	0	0	0	0	2	5	8						
[Total and by age group]														