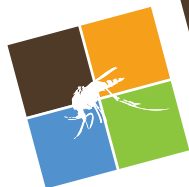


PRACTICAL GUIDEBOOK

FOR THE FIGHT AGAINST MALARIA

AIMED AT NGOs AND COMMUNITIES



 Sanisphère

C. Defrance
T. Miklavec
J. Bonneville

With the support of


sanofi aventis
Because health matters


TOTAL

Practical guidebook for the fight against malaria

aimed at NGOs and communities

Part I

Malaria and its risk

Chapter I: Understanding malaria

- Card 1 The parasite
- Card 2 The disease
- Card 3 The mosquito, vector of the parasite
- Card 4 Risks for partially immune populations
- Card 5 Risks for vulnerable populations

Chapter II: Assessing the situation and the specific risks

- Card 6 Defining the risks related to environmental factors
- Card 7 Defining the risks related to cultural factors
- Card 8 Defining the mode of malaria transmission
- Card 9 Assessing the impact of malaria

Part II

Malaria control

Chapter I: Creating conditions which facilitate action: Information-Education-Communication

- Card 10 IEC, the basic principles of a malaria control program
- Card 11 Choosing the right media and messages
- Card 12 Organizing community events
- Card 13 Personalizing IEC: home visits
- Card 14 Adapting IEC to children

Chapter II: Fighting the vector (larvae and mosquitoes)

- Card 15 Sanitation
- Card 16 Biological control
- Card 17 Insecticides
- Card 18 Outdoor insecticide treatment: spraying and fogging
- Card 19 IRS (Indoor Residual Spraying): general points
- Card 20 IRS: some practical tips
- Card 21 IRS: implementation conditions and precautions

Chapter III: Protection against mosquitoes

- Card 22 Personal protection measures
- Card 23 The mosquito net: characteristics and choice
- Card 24 The mosquito net: encouraging household use
- Card 25 The mosquito net: aiding correct use

Chapter IV: Implementing specific measures

- Card 26 Anticipating and managing epidemics and seasonal peaks
- Card 27 Protecting children and pregnant women
- Card 28 Protecting migrants and refugees
- Card 29 Chemoprophylaxis

Chapter V: Providing support to the patient

- Card 30 Diagnosing malaria
- Card 31 Laboratory diagnostic tests
- Card 32 Promoting rapid diagnostic tests
- Card 33 Treatment: basic knowledge
- Card 34 Supporting medical care provision
- Card 35 Promoting medical care for sick children
- Card 36 Supporting a community-based care policy

Part III

Implementing a malaria control program

Chapter I: Defining an action plan

- Card 37 Assessing the situation
- Card 38 Carrying out a KAP survey (Knowledge - Attitudes - Practices)
- Card 39 Defining the scope of action target zones and populations
- Card 40 Adopting an integrated approach combining several control measures
- Card 41 Adopting an integrated approach incorporating malaria into development programs

Chapter II: Working in partnership

- Card 42 Integrating in the intervention zone
- Card 43 Making use of partner associations
- Card 44 Cohabiting with traditional medicine
- Card 45 Working together with companies
- Card 46 Organizing coalitions

Chapter III: Managing the program

- Card 47 Maintaining team motivation
- Card 48 Fundraising
- Card 49 Evaluation and monitoring: ensuring efficient implementation
- Card 50 Evaluation and monitoring: measuring performance and promoting the program

Practical guidebook for the fight against malaria aimed at NGOs and communities

Charles Defrance - Thomas Miklaveč - Julien Bonneville

This guide is offered to you courtesy of sanofi-aventis and Total.



Sanofi-aventis and Total are not accountable for any inaccurate information or views contained in this guide. Such responsibility is solely incumbent upon the authors.

FOREWORD

As a disease, malaria is one of the world's biggest killers as well as a significant cause of poverty. Every year, the disease kills close to one million people and affects around 300 million people in some one hundred countries. Furthermore, malaria represents a considerable drain on the resources of the least affluent regions. Every year, Africa has to spend 12 billion dollars to cover costs directly related to the disease and the annual losses to the economy are greater still.

Unlike other complex global problems, malaria can be controlled by implementing some relatively simple, inexpensive measures. Four proven tools are available today to put an end to the socio-economic losses caused by the disease: insecticide-treated mosquito nets, indoor residual spraying of insecticide, preventive treatments for pregnant women and effective drug treatment against the disease.

Efforts to tackle this scourge have been stepped up considerably in recent years. Between 2003 and 2008, there was a four-fold increase in the amount of international funding - totaling more than a billion dollars this year - dedicated to preventing and treating malaria. The political commitment of the countries affected by malaria together with the increased support of donors and numerous other players involved in the "Roll Back Malaria" partnership have enabled more and more of these countries to achieve very promising results. In those regions where preventive and therapeutic strategies have been implemented on a large scale, malaria cases have plummeted by more than 50%.

Encouraged by recent successes in Rwanda, Ethiopia, Zambia, Tanzania (Zanzibar), Swaziland and other countries, the international community has stepped up its efforts to fight malaria around the world. The Global Malaria Action Plan is an ambitious project developed by representatives from 30 endemic countries, 65 international institutions and more than 250 experts from fields as diverse as the economy, public health and epidemiology. The project was ratified by all the partners and major players in 2008. The RBM program recommends a strategy that is designed to provide all at-risk populations with effective protection and treatment by 2010. The program will keep us on course until we reach our ultimate goal, namely the complete global eradication of the disease.

Nonetheless, the complete eradication of malaria remains a colossal task. Success will depend on the coordinated and sustained efforts of donor countries and the governments of endemic countries, as well as NGOs, associations and communities.

RBM is delighted with the initiative presented here, which provides civil society with a practical, comprehensive and accessible guide to fighting malaria. Its purpose is to help the various players act effectively to support at-risk populations, in line with the Global Malaria Action Plan.

Our hope is that this guide will mobilize communities, associations and NGOs on the ground and help them design and implement effective initiatives to rid the world of this curse.

Professor Awa Marie Coll-Seck
Executive Director of the Roll Back Malaria partnership

WHAT IS THE PURPOSE OF THIS GUIDEBOOK?

To be effective, the fight against malaria requires the simultaneous mobilization of all the players involved. A long-term impact can only be achieved through a strategy that includes tackling the vectors, improving patient care, reinforcing health systems and awareness-raising initiatives targeting decision-makers, carers and populations.

The success of *the Practical Guidebook for the Corporate Fight against Malaria*, produced by Sanisphere with the support of CFAO, Sanofi Aventis and Total, reinforced our belief that a simple, practical and yet comprehensive guidebook aimed at players working on the ground would be useful for the implementation of integrated anti-malaria programs.

This *Practical Guidebook for the Fight against Malaria aimed at NGOs* and communities covers many of the same themes tackled in the Corporate Guide but it also contains new sections reflecting the specific needs of communities and players on the ground, such as Non-Governmental Organizations. Like the previous one, this guidebook emphasizes the central role of National Malaria Control Programs in the coordination of initiatives in each country.

In a field as complex as the fight against malaria, the key to success lies in the development of partnerships between entities with complementary expertise, resources and legitimacy. The Roll Back Malaria Partnership, under the directorship of Dr. Awa-Marie Coll-Seck, is an exemplary model of a network of expertise that has already made significant progress in terms of reducing malaria in a number of countries.

Private companies are represented in this partnership and play an active role in its success. In helping Sanisphere to compile this new Guidebook, Sanofi Aventis and Total are seeking to fulfill their role as active partners of all players committed to the fight against malaria, a fight in which communities and field workers are on the front line.



BEFORE READING ON...

This guidebook is intended for all organizations⁽¹⁾ either involved or wishing to get involved in initiatives on the ground aimed at controlling malaria. It is specifically aimed at managers and members of associations and local NGOs; international organizations may also find it a valuable source of practical ideas and a useful training tool for their staff.

The guidebook's objective is to give all organizations - whether or not they have previously been involved in the fight against malaria - the knowledge and points of reference enabling them to:

- present themselves more effectively in terms of how they can support national public health policy in the area of malaria control (see cards 40 and 42 in particular);
- take part in a constructive dialogue with the National Malaria Control Program and other malaria control players;
- contribute, in partnership with these players, to initiatives in line with their resources (human, technical and financial) and with the social and health environment within which they operate.

The guidebook is intended to be **EXHAUSTIVE** in its coverage of the disease and its risks, existing control methods and the various aspects of program management. It lays emphasis on **PRACTICAL** aspects:

- **in its design:** it was written following field interviews with those actively involved in malaria control;
- **in its form:** it presents the various themes in the form of cards giving the reader quick access to the information sought;
- **in its content:** it highlights the essential information for easy implementation.

It champions an **INTEGRATED** approach, i.e. a twofold approach comprising:

- **Technical integration:** malaria control is not purely about providing medical care. It also involves controlling the vector (larvae and mosquitoes), protecting people from potentially infective mosquito bites, etc. Studies and experience have shown that malaria control is far more effective when several methods are implemented simultaneously⁽²⁾.
- **Social integration:** a program can only be effective and sustainable if it forms an integral part of public health policy, if it evolves in partnership with existing players and if populations embrace it and play their part in it.

The authors,

Charles Defrance

Thomas Miklavc

Julien Bonneville

¹ Sanisphere has previously published a guidebook aimed specifically at companies: *Practical Guidebook for the Corporate Fight against Malaria* (2006).

² BMJ 2005; 331; 1299 - Cost effectiveness analysis of strategies to combat malaria in developing countries

The recommendations of the *Practical Guidebook for the Corporate Fight against Malaria* are in line with the policies of the World Health Organization and the Roll Back Malaria partnership.

The RBM Global Strategic Plan 2005-2015 defines 4 main targets for 2010:

- "Protection of 80% of people at risk using appropriate vector control methods such as insecticide-treated mosquito nets, indoor spraying with long-acting insecticides and environmental management" (cards 15 to 29);
- "For 80% of malaria victims, accurate diagnosis and effective treatment, i.e. combination therapy based on artemisinin administered on Day 1 of the attack" (cards 30 to 36);
- "Within stable transmission areas, intermittent preventive treatment for 80% of pregnant women" (card 27);
- "Reduction of the malaria burden by 50% compared to that in year 2000".

This guidebook is intended to contribute towards these objectives by helping you to implement concrete operations as part of an integrated program in line with the RBM Strategic Plan.

This guidebook has been carefully reviewed by Orienne Boyer (Head of health programs at CARE France), Julien Grouillet (responsible for corporate partnerships and support for health projects in the workplace at CARE France) and Doctor Jean-Loup Rey (Caritas).

Neither the hands-on approach of this guidebook nor the accessibility of the scientific concepts presented to a non-specialist audience will be allowed to compromise the quality and rigor of its content. The scientific information is mainly derived from the *Practical Guidebook for the Corporate Fight against Malaria* (Sanisphere 2006), which was revised by Doctor Jean-Yves Le Hesran, Research Director of the IRD in Paris and Doctor Didier Fontenille, Head of the Entomological Research Unit of the IRD in Montpellier.

The IRD, a French public institution, oversees scientific programs focusing on the relationships between human beings and the environment in the southern hemisphere, in the context of development. Research into major endemic diseases (notably malaria, dengue and AIDS) is one of the institution's main research focuses and the expertise of the IRD in this field is internationally recognised.

Readers are advised to consult the official national and international recommendations in force and to check the terms and conditions of the national authorisations attached to the sale and marketing of products that may be quoted as examples.

This guide is not meant to be a reference work for doctors looking for documentation on malaria.

Moreover, the reader may discover a few inaccuracies. In view of the objective and the target group of this guide, the authors and proofreaders have considered those inaccuracies acceptable enough for the work to remain simple and accessible. Any reader who wishes to go further on the issue may consult some of the works listed in the bibliography.



PART I: MALARIA AND ITS RISKS

Before any control measures can be implemented, it is important to understand precisely what malaria means.

This part aims primarily at providing non-specialists with basic knowledge about:

- >> the parasite which is responsible for malaria;
- >> the mosquito which transmits the disease from person to person;
- >> the disease and its symptoms;
- >> the risks associated with malaria in different populations.

Thereafter, details are given on how an organization can assess the specific situation in the zone in question:

- >> Identifying the reasons underlying the problem: what are the local factors—environmental or human that favor malaria?
- >> Defining the nature of the problem: what is the prevailing mode of malaria transmission?
- >> Measuring the extent of the problem: what is the impact of the disease in the zone?

Chapter I: Understanding malaria

- Card 1 The parasite
- Card 2 The disease
- Card 3 The mosquito, vector of the parasite
- Card 4 Risks for partially immune populations
- Card 5 Risks for vulnerable populations

Chapter II: Assessing the situation and the specific risks

- Card 6 Defining the risk related to environmental factors
- Card 7 Defining the risk related to cultural factors
- Card 8 Defining the mode of malaria transmission
- Card 9 Assessing the impact of malaria

KEY POINTS

- Malaria is caused by a parasite, *Plasmodium*. Four species infect humans, including *Plasmodium falciparum* which is responsible for most malarial mortality.
- The parasite needs both a human and a mosquito host. It is transmitted from one to the other when the mosquito bites.
- In humans, the parasite migrates to the liver where it multiplies before invading red blood cells. After further parasite multiplication, the red blood cells burst.
- Controlling malaria means interrupting the parasite's cycle with three main objectives in mind, namely reducing the number of mosquitoes, the number of bites and the number of sick people.

Four *Plasmodium* species

- The malaria parasite belongs to the genus *Plasmodium*. Four species can cause the disease in humans: *Plasmodium falciparum*, *P. vivax*, *P. malariae* and *P. ovale*.
- These species have different characteristics:
 - » **Onset of symptoms:** in the case of *P. falciparum*, the disease starts 8 to 10 days after the infective bite; the incubation period may last several weeks for the other species;
 - » **Characteristics and severity of the disease:** *P. falciparum* may cause fatal attacks. The three other species may bring about relapses (a few weeks or a few years later). In very rare cases, *P. vivax* may trigger a fatal attack.

The cycle of the parasite

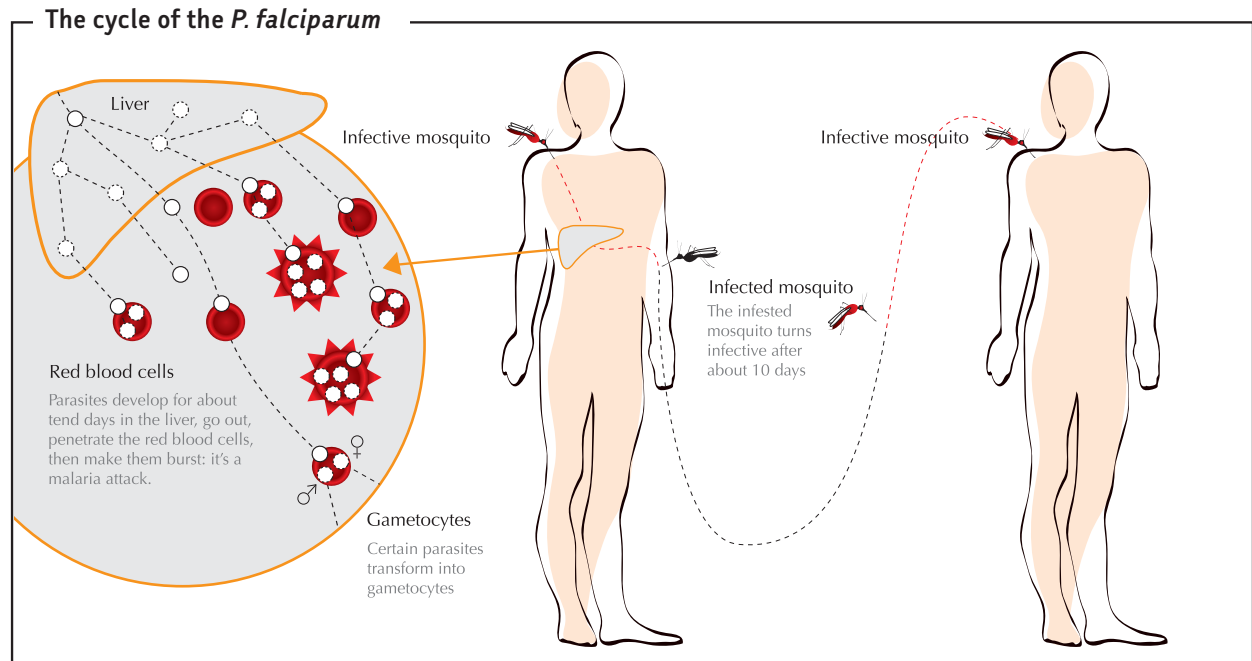
The parasite goes through two main stages, one in the mosquito, and the other in the human host. Transmission takes place from one to the other when the mosquito bites.

- **In humans**
 - » **The infective bite:** the person is inoculated with the parasite and the cycle starts.
 - » **Development in liver cells:** the parasite migrates to the liver, where it multiplies to generate thousands of new parasites. Infected liver cells burst and release the parasites, which then invade red blood cells.
 - » **Multiplication and re-release into the blood:** the parasites multiply inside the red blood cells causing them to burst and thereby, releasing more parasites to infect new red blood cells. The clinical attack or paroxysm occurs when the red blood cells burst.
 - » **The difference between parasites and gametocytes (the reproductive stage):** inside the red blood cells, some parasites transform into male and female gametocytes. At this stage the cycle cannot be perpetuated unless gametocytes are taken in by the mosquito.

· Inside the mosquito

» **Infection of the mosquito:** when it bites a human gametocyte carrier, the mosquito takes in gametocytes that will later transform into gametes.

» **Reproduction:** cross-fertilization of the gametes inside the mosquito's body produces new parasites that migrate to the insect's salivary glands. The cycle is now ready to resume in the next human who is bitten.

**A few remarks:**

- » The duration of the cycle in the mosquito varies, depending on temperature and on *Plasmodium* species.
- » Man becomes infectious for the mosquito ten days after the first appearance of the symptoms of malaria.
- » For instance, the *P. falciparum* cycle lasts 13 days at 25° and 30 days at 20°.
- » The parasite that infects man cannot continue its cycle in animals nor infect them, except for a few ape species that can be infected by *P. malariae* and *P. vivax*.
- » Malaria can also be transmitted between humans, from mother to child through the placenta and through organ transplantation, or blood transfusion (although these two modes of transmission are epidemiologically unimportant).

KEY POINTS

- Malaria is a serious parasitic disease, of variable symptoms and often fatal.
- The various forms of malaria can be divided into two main categories, uncomplicated malaria and severe malaria.
- Uncomplicated attacks are characterized by various symptoms, including fever, fatigue, headache and gastrointestinal problems.
- The complications of severe malaria can be fatal.

The uncomplicated attack

- A very high **fever of sudden onset and short duration** (lasting just a few hours), often accompanied by fatigue, headache and shivering followed by sweating, and sometimes diarrhea, nausea or vomiting.
- The table below shows the frequency of the main symptoms.
- **NB:** the gastrointestinal symptoms (diarrhea and vomiting) are mainly seen in children.
- Repeated uncomplicated attacks weaken the body and are accompanied by a gradual increase in the size of the spleen.

Symptoms	Observed Frequency
Fever	> 95%
Headache	80%
Muscular Pain	60%
Palpable liver and spleen	30%
Nausea and Vomiting	25%

(source - US Navy Medical Center)

The severe attack

- The severe attack is characterised by **one or more complications:** severe anemia, coma, generalized spasms, hypoglycemia, pulmonary edema, kidney failure, fulminant infection and bleeding.
- Most severe attacks are caused by *P. falciparum*, occasionally *P. vivax*.
- An uncomplicated attack caused by *P. falciparum* may develop into a severe malaria in a few days, sometimes even in a few hours. This progression is rarely seen in adults living in an endemic zone but is quite common in children and immunologically naive subjects (cards 4 and 5).

· The severe attack is typified by cerebral malaria: parasitized red cells block the blood vessels supplying the brain causing coma and spasm, and impairing motor function. Cerebral malaria is fatal in many cases even with the best possible treatment.

Manifestation	Frequency observed in children	Frequency observed in adults
Severe Anemia	+++	+
Pulmonary Œdaema	+	+
Hypoglycemy	+++	++
Renal Insufficiency	+	+++
Repeated spasms	+++	+
Consciousness problems	+++	++

(source: WHO)

! **NB:** Severe attacks can be avoided if uncomplicated attacks are properly dealt with in a timely manner (less than 24 hours).

Parasite load and the onset of malaria

- An “immunologically naive” subject (who has never been infected before) will fall ill from the least infection by the parasite.
- In contrast, adults living in endemic zones will usually tolerate the presence of the parasite without presenting any symptoms. They become sick if and only if the parasite load exceeds a certain threshold.
- This threshold will depend on a number of different factors, notably the individual’s immune status, age, and genetic makeup, as well as the species of parasite.

! **Malaria-infection and malaria-disease:** A partially immune subject may carry the parasite without getting sick: this situation is referred to as malaria-infection as opposed to malaria-disease (paroxysm).

! **A few remarks:**

- » The probability that an uncomplicated attack will develop into a severe one, and the time taken for the progression will depend on individual variables (immunity, genetic factors, etc.).
- » If it is not effectively managed, a severe attack may prove fatal within a few hours.

THE MOSQUITO, VECTOR OF THE PARASITE

KEY POINTS

- The vector of malaria is the female *Anopheles*. It bites man to take in blood which it needs for reproduction.
- The cycle of the mosquito comprises four stages: egg, larva, pupa and adult. The larvae develop in almost stagnant, unpolluted water.
- Mosquitoes bite all night, but mostly between 11 pm and 5 am.
- There are many different anopheles species and the behaviour of the species involved in local transmission needs to be understood before suitable control measures can be devised.

The female mosquito is said to be the vector of malaria because it is essential for both part of the parasite's developmental cycle and for the transmission of *Plasmodium*.

- It takes in the parasites in gametocyte form from a human carrier.
- Parasite fertilization and development take place inside the mosquito.
- The mosquito inoculates another human with the parasite when it bites.

The life cycle of the mosquito

- The mosquito goes through two main stages, an aquatic stage which lasts about ten days (egg, larva and pupa) and an aerial stage (the adult mosquito). The female adult mosquito has a life span of about one month.
- Breeding sites
 - >> Eggs of about 0.5 millimeters in length are laid on a water surface. The larvae develop therein and can grow up to 2 mm.
 - >> The water must be relatively clean and clear with at most very low-level pollution and little mud or sludge (the acceptable amount depending on the species); the water deposit has to be more or less stagnant and must persist for a least 15 days. Preferred breeding sites may be shady or well-exposed depending on the species.



Credit: WHO-TDR-Stammers

An. gambiae

It is important to identify the exact species involved in a given context as different anopheles mosquitoes have different behavior patterns which impose different control methods.

Mosquito species	Preferred host	Biting time	Biting site	Resting site	Larval site
<i>An. gambiae</i>	Humankind	Primarily after midnight	Inside	Primarily inside	Temporary sunlit sites
<i>An. funestus</i>	Humankind	Primarily after midnight	Inside	Inside	Sites with vegetation and weak currents
<i>An. arabiensis</i>	Humankind and animals	Primarily after midnight	Inside and outside	Inside and outside	Temporary sites, paddy fields
<i>An. dirus</i>	Humankind	Primarily after midnight	Inside and outside	Primarily outside	Small shady spots, in forests and plantations
<i>An. stephensi</i>	Animals	Before Midnight	Inside and outside	Inside	Tanks, wells, polluted water, along rivers

It is worth noting that the favourite resting sites of *An. nilli* and *An. moucheti*, two species also widely spread in Central Africa, are the banks of big rivers and streams with vegetation. (Source WHO)

Vector behavior

• The flight of the mosquito

- >> Anopheles mosquitoes fly more silently than most other species.
- >> In a zone where there are numerous potential hosts to bite, the mosquito travels less than a hundred meters from the breeding site to its blood meal but if there is no target in the vicinity, it can travel up to 5 kilometers.
- >> Most of the time, it flies at night, when the air is more humid.
It can happen that the mosquito enters a house during daytime.

• The mosquito's target

- >> The mosquito is attracted by smell, warmth and carbon dioxide. At the moment of biting, the target feels no pain.
- >> Different anopheles species bite either humans or animals.

• Biting time

- >> Most species mainly bite during the second part of the night (after midnight).
- >> However, there exists a risk of being bitten at any time from dusk to dawn.

• Biting site

Mosquitoes feed either inside the house (endophagous species) or outside (exophagous). Most vectors are endophagous.

• Resting site

After the bite, the mosquito takes a rest to digest its blood meal either inside the house (endophilous behavior) – preferably in dark and moist corners on walls or under furniture – or outside (exophilous).

A few remarks:

- >> Anopheles mate only once during their lifetime. After mating, the life of the female mosquito proceeds in cycles of two or three days, alternating between egg-laying and searching for food (blood) to drive its reproduction; so, a mosquito bites once every two or three days.
- >> Anopheles mosquitoes can also feed on plant nectar and the males never bite.
- >> There are more than 500 species of Anopheles, at least 60 of which can transmit the Plasmodium.

RISKS FOR PARTIALLY IMMUNE POPULATIONS



KEY POINTS

- In endemic areas, individuals acquire partial immunity.
- Partial immunity is enough to prevent the progression of an uncomplicated attack into a severe, possibly fatal one.
- Immunity is only acquired over a period of years so children are not protected (card 5).
- The higher the malaria transmission rate, the more solid the immunity and the quicker its acquisition.
- Immunity is never 100% and even those who are partially immune should be on their guard against malaria.

Subjects living in endemic zones are exposed to successive infective bites through which mosquitoes transmit the parasite. As a reaction to this constant exposure to the parasite (immunization), the human body defends itself by slowly developing natural immunity.

Immunization

- Immunization leads to an immune response that inhibits (to a greater or lesser extent) multiplication of the parasite in the body – and therefore controls the onset of the symptoms of malaria. As a result, partially immune populations are:
 - >> less prone to uncomplicated attacks;
 - >> more protected against the progression of an uncomplicated attack to a severe one.
- Immunity does not preclude the presence of parasites in the body. Immunization actually occurs because of regular exposure with the parasite presence being renewed or reinforced with each infective bite. The higher the level of malaria transmission in a particular zone (i.e. the more frequent the infective bites), the stronger the immunity in the local population.
- Immunologically naive people, non-immune foreigners, and travellers from malaria-free zones have not been immunized against malaria in this way (card 5). Moreover, in endemic zones, immunity is compromised in pregnant women, children and people with some form of immunodeficiency (notably HIV disease). Immunity is also less solid in people living in zones where malaria is unstable (cards 5 and 8).

Regular immunization does not preclude the need for close monitoring

- Immunity is partial, progressive and temporary:
 - >> **Partial:** a subject is never completely protected from malaria – no-one is ever 100% immune. Moreover, a partially immune subject has been immunized by the strains of parasites that he or she has been exposed to most regularly: the degree of protection will be lower vis-à-vis other strains.

» **Progressive:** immunity is acquired in childhood over a period of five to eight years if the subject is regularly infected. A naive adult subject arriving in an endemic zone might take even longer to acquire immunity.

» **Temporary:** a subject must be "regularly" infected to maintain immunity. An immune person can completely revert to the naive state if he or she leaves the endemic zone for more than a year, in which case he or she will be just as susceptible as any other non-immune subject (see card 5).

· **Immunity is variable:**

» The table below summarises the risks and dangers of malaria for adults as a function of local transmission conditions.

NB: this table points to general tendencies but it should be remembered that malaria is a very complex disease and can affect individuals in very different ways (see below).

	Immunization	Types of malaria attacks and their risks
Stable malaria transmission High continued transmission	+++	Uncomplicated attack with weak symptoms
Moderate continued transmission Seasonal transmission	++	Uncomplicated attack with clear symptoms
Unstable malaria transmission	+	Risk of potentially fatal attacks
Urban malaria	+	Risk of potentially fatal attacks

» Immunization does not prevent uncomplicated attacks which, if they are recurrent, can lead to enlargement of the spleen, chronic anemia and general weakening of the body.

» Malaria remains a complex disease: it should be remembered that an apparently immune subject is never completely protected against a severe attack.

» For all these reasons, malaria can never be considered as a benign disease, even for adults living in endemic zones who have apparently developed solid immunity.

RISKS FOR VULNERABLE POPULATIONS



KEY POINTS

· Certain groups have little or no immunity, notably young children, pregnant women and embryos, people already weakened by certain diseases, people moving from a stable malaria transmission zone to an unstable malaria transmission zone, and immunologically naive subjects (foreigners from the northern hemisphere).

· These groups – especially young children – are the main victims of severe malaria attacks: it is estimated that malaria kills between one and two million people yearly, and that more than 90% of them are children (source WHO).

Susceptible populations are those that have no immunity at all or very little (card 4):

- >> either because they have not been bitten for several years;
- >> or because their immune system is deficient.

They are thus far more susceptible to severe attacks.

Children

· The risk for children is relatively low during the first six months of life:

Through the umbilical cord, the child receives maternal antibodies that give some protection against malaria. The levels of these antibodies gradually wane over the baby's first six months of life.

· The critical period lasts from the age of six months to five years:

As a result of frequent infective bites, antibodies will be elicited and the child's immune response will gradually develop, becoming relatively effective by the age of five to eight.

· The risks: a young child is likely to develop severe malaria following an uncomplicated attack that has not been effectively treated.

A severe attack can lead to death: malaria is one of the main causes of mortality amongst children with the highest mortality rates in children of between one and two years of age.

Severe malaria may be responsible for irreversible neurological sequelae (including learning difficulties and memory deficit), acute anemia and other serious complications.

The mother, the foetus and the baby

· Pregnant women constitute the adult group that is most exposed:

- >> Pregnancy (particularly first-time pregnancy) compromises immune responses, especially after the first trimester.
- >> The associated rise in body temperature further attracts mosquitoes (card 3).

· The risks: both the mother and the baby are concerned:

- >> For the mother: the likelihood of a severe attack is quite high, especially in zones of unstable malaria transmission (card 8).
- >> For the child: no matter how solid the mother's immunity, malaria may have serious effects on the baby, including low birth weight, premature birth, spontaneous abortion and neonatal death.

Sick people

- Many diseases that affect the immune system compromise the immune response against malaria, notably HIV/AIDS (which, unlike malaria, is not transmitted by mosquitoes).
- **The risks:** immunodeficiency could be the reason why malaria attacks are more severe and more difficult to manage in HIV-infected subjects.

Partially immune people who leave an endemic zone

- People quickly lose their immunity when they leave an endemic region – possibly within as little as one year. Should they come back, it will take them years to re-acquire the same degree of immunity.
- **The risks:** the risks are the same as for a non-immune subject, with the same susceptibility (see below).

Partially immune people who change endemic zones

- People living in areas where malaria transmission is unstable are markedly less immune than those living in areas of stable transmission. The same applies to city-dwellers who go and spend time in the countryside.
- **The risks:** increase of the risk of severe malaria.

Non-immune subjects

- A subject is said to be immunologically naive if he/she has never been exposed to *Plasmodium*. This applies to expatriates and tourists from northern countries who, without the least degree of immunity, are highly susceptible.
- **The risks:** a higher risk that a uncomplicated attack may develop into a potentially severe and deadly one, especially since “cultural” factors may come into play: being unfamiliar with the disease, foreigners may not have the appropriate reaction when faced with the symptoms of malaria, leading to delayed diagnosis and treatment.

DEFINING THE RISK RELATED TO ENVIRONMENTAL FACTORS

KEY POINTS

- There is a natural risk of malaria when the local climatic, geographical and environmental characteristics favor:
 - >> mosquito growth;
 - >> parasite development.
- The main natural risk factors are related to water (rainfall, water deposits and humidity levels) and temperature.

Prior to implementing malaria control measures, the factors that dictate the prevalence of malaria in the zone in question must first be identified. These may be environmental factors (i.e. associated with the natural setting) or cultural ones (i.e. associated with human activities).

The main environmental factors which will affect mosquito density and parasite development are:

- >> general climatic variables, e.g. rainfall and temperature;
- >> features which can be identified by observing the local environment.

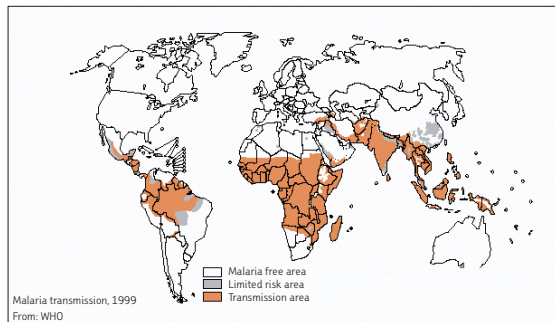
Climatic factors: rainfall and temperature

· Rainfall and mosquito density:

Anopheles mosquitoes lay their eggs in water so the number of breeding sites depends on the presence of permanent and temporary water deposits, both of which are closely related to the amount of rainfall. In the absence of rain, the larvae do not survive when the sites dry up; when the rains are too heavy, breeding sites may get washed out.

· The impact of temperature on mosquito and parasite.

- >> The percentage of infective anophelines and therefore the malaria transmission rate will depend in part on the duration of the parasite's reproductive cycle inside the mosquito which is highly temperature-dependent.
- >> E.g. *Plasmodium falciparum* can only develop at temperatures of between 15° and 35°, the optimum being 25°; the further one is away from this optimum, the longer the duration of the parasite's reproductive cycle meaning that the transmission rate is correspondingly reduced.



Local features and the immediate environment

Generally, anopheles mosquitoes lay their eggs on the surface of clean, stagnant water.

>> Identify local rivers, waterways and marshes

Study whether the local vegetation and relief favors the development of pools in which the water is not much disturbed by currents.

The degree of soil permeability may have an incidence on the persistence of breeding sites.

>> Study how long puddles persist

Water may collect in ruts, excavated pits, and ditches but sandy or igneous land will not hold surface water for very long.

Most anopheles mosquitoes cannot survive at high altitudes.

>> Find out the altitude of the zone being studied

Transmission rates are very low above 1,000 meters.

NB: certain species are capable of biting at altitudes of up to 2,500 meters.

Some shade-loving species look out for sites covered with vegetation to lay their eggs.

> Search for marshes with standing vegetation and rivers sheltered by forest trees within a 5-kilometer radius.

NB: shade-loving species need shade but are not found in primary forest or jungle that is too dense – look out for lightly covered woodland.

Identifying Anopheles larvae on the surface of water

With a little practice (half a day's practical training with an entomologist out in the field is enough), it is possible to recognize anopheles larvae and therefore to be able to confirm whether or not a water point is a breeding site. This can be done by carefully sampling a small amount of water from the surface of the potential breeding site (using a small cooking pot hooked onto a stick about 1 metre long, for example). After the water has been left to stand for a few seconds, Anopheles larvae can be seen "lying" horizontally (unlike Culex larvae, which hang down vertically).



Credit: SaniSphere

NB.

Although figures may be available to define the amount of rainfall and the temperature, these factors are somewhat relative as their impact on mosquito density will depend on the species and strains concerned, e.g. in South-East Asia, because of the high density of the shade-loving *An. dirus*, malaria transmission rates are higher around forests whereas in Africa, where the sun-loving *An. gambiae* predominates, transmission rates are higher on savannahs and steppes.

DEFINING THE RISK RELATED TO CULTURAL FACTORS



KEY POINTS

- Human activities and behaviour may exacerbate malaria. It may be possible to alter these factors.
- Human activities may underlie:
 - >> the formation and maintenance of deposits of still water;
 - >> increased exposure of certain groups to infectious mosquitoes;
 - >> a failure to implement personal protective measures;
 - >> inappropriate care and treatment.

Apart from natural conditions (card 6), human activities and behavior may affect the following factors:

- >> mosquito density;
- >> the number of bites;
- >> the number and severity of attacks.

Factors that increase mosquito density

Stagnant water deposits provide breeding sites.

- Identify any activity or installation within a radius of a few kilometers where water might accumulate:
 - >> Paddy fields and other arable land: water stagnates between harvest in rice paddies, and irrigation practices generate puddles;
 - >> Badly kept irrigation ditches and canals, dams;
 - >> Gutters, wells, unsealed water tanks;
 - >> Engineering sites, forestry operations: ruts on tracks, holes, trenches, excavations, etc.

...

Factors that increase transmission

Migration and outdoor work may increase exposure to bites, especially in populations that have not yet developed an effective immune response against malaria.

- Identify factors that bring man and mosquito into contact:
 - >> Large-scale engineering projects which attract people with little immunity into zones where the transmission rate is high on either a temporary (e.g. construction projects) or a permanent (e.g. plantations) basis.
 - >> Unorganised urban growth, the development of urban agriculture: the settling of people with little immunity in marshy zones or regions liable to flooding will increase the risk of malaria epidemics.

...

Certain beliefs and behavior patterns may lead to increased exposure to biting mosquitoes; similarly, perceptions and misconceptions may act as an obstacle to the implementation of personal protection measures.

· Identify beliefs and customs which may compromise efforts aimed at reducing exposure to mosquitoes:

- » Ignorance of the link between malaria and mosquitoes: malaria is ascribed variously to exposure to sunlight, contact with somebody suffering from malaria, diet, witchcraft, overwork, cold weather, etc.
- » High-risk habits such as sleeping out of doors during the hot season.
- » High-risk situations such as funeral wakes and town-dwellers' staying in the countryside without any protection at biting times.
- » Failure to ensure protection against bites.

Factors that increase the number of sick and infected people

7

Beliefs and practices may constitute obstacles to proper patient management and represent a risk to both the patient and others who can be more readily infected.

· Identify beliefs and customs which are obstacles to timely, effective treatment:

- » Lack of awareness: populations are not always aware that they need to be treated without delay.
- » Traditional medicine: consulting a witch-doctor is often the first step in cases of fever.
- » Ignorance of the symptoms of malaria: delayed treatment.
- » Street medicine: drugs that are past their sell-by dates or have been poorly stored; failure to stick to the right dosage (purchase of tablets one by one).
- » Many clinics and hospitals have a poor reputation so people are reluctant to attend.

DEFINING THE MODE OF MALARIA TRANSMISSION

KEY POINTS

- Different types of malaria require different control strategies.
- Different systems exist for classifying the various types of malaria transmission. Although these systems are diverse and complex, for the purposes of simplicity, malaria transmission can be broken down into the following categories:

- >> stable with constant, high-level transmission;
- >> stable with constant transmission at a low-to-moderate level, or seasonal transmission;
- >> unstable;
- >> urban.

It is essential to define how malaria is transmitted locally if an appropriate control strategy is to be devised. Various classification systems can be used:

- parasite species (card 1);
- zones resistant to treatment (card 29);
- epidemiological classification systems, presented hereafter.

Given the complexity of malarial transmission, it is impossible to establish a single classification system that will reflect all the relevant characteristics of a particular site. In practice, we begin by classifying the different epidemiological forms of malaria which, at the same time, provides information about other characteristics of the zone, e.g. the level of drug resistance (always bearing in mind that special cases exist).

Classification of malaria transmission in terms of stability

This type of classification is based on entomological characteristics. A key distinction is made between zones where malaria is transmitted in a stable pattern and zones where transmission is unstable.

- **Stable transmission** describes a repetitive situation, where malaria strikes each year with the same characteristics. Usually, zones of stable malaria (which are quite diverse) are defined more precisely in terms of the pattern of transmission:
 - >> zones of stable malaria with **constant** transmission (year-round transmission at relatively high rates);
 - >> zones of stable malaria with **seasonal** transmission (transmission during only a few months of the year).
- **Unstable transmission** applies to zones (e.g. the Sahel, Madagascar Plateau) where climatic conditions are only favorable to mosquito growth in certain years; as a result, malaria only breaks out from time to time.

A classification system based on the local stability of malaria coupled with additional information on transmission may be sufficient to define a given zone, provided that the special case of urban malaria is taken into account (see below). The Malaria Atlas Project (Kenya Medical Research Institute / University of Oxford) proposes maps of stable and unstable malaria transmission zones, country by country (cf. To find out more).

Classification in terms of epidemiological facies

An epidemiological facies is a set of sites where malaria has the same mode of transmission, the same profile of immunity, and similar symptoms.

Classification systems based on epidemiological facies are more global than systems based on stability (which depend on the mosquito). The former type of classification attempts to take greater stock of the environment and is therefore more difficult to handle and less frequently used.

Africa comprises 6 facies:

	Localisation	Transmission	Immunization in the population
Equatorial	Forests and savannas of Central Africa	High level of continued transmission throughout the year, up to 1000 infective bites a year, per person, with a peak during the rainy season	Good
Tropical	Humid savannas of East and West Africa	Seasonal transmission during 6 to 8 months a year, 100 to 400 infective bites a year	Good but belated
Sahelian	Dry savannas	Short transmission rate of less than 6 months, again during the rainy season, less than 20 infective bites a year	Immunization that takes longer to manifest itself, with the risk of neuromalaria (card 2) in the adult if the level of transmission becomes very low
Desert	Steppes	Very short transmission rate, nil during a certain number of years	No immunization, hence a frequent outburst of epidemics
Austral	Plateaus in Southern Africa		
Mountain	Zones located above an altitude of 1000 m		


If the facies are classified in terms of malaria transmission stability, the equatorial, tropical and Sahelian facies are zones where malaria transmission is stable, whereas the desert, austral and mountain facies are zones where malaria transmission is unstable.

Urban malaria: a special case

- Urbanized zones often present epidemiological characteristics that are distinct from those in the broader regions in which they are implanted, and they tend therefore to be more difficult to classify.
- Modes of malaria transmission in the urban environment are varied.


A distinction can be made between:

- >> highly urbanized zones (city centers...) where the prevalence of malaria is relatively low;
- >> less urbanised zones (suburbs) where transmission rates range from low to moderate. Nevertheless:
 - >>> a low level of immunity increases the risk of severe malaria attacks;
 - >>> in exceptional circumstances (e.g. floods), the sudden appearance of large numbers of breeding sites can cause an epidemic.


 As an indication, the number of infective bites per person per year is on average:

- **7** in city centers;
- **46** in the outskirts of cities;
- **168** in rural areas.

(source: IRD)

 **A few remarks:**

There exist other types of classification system, e.g. based on spleen size. This attempts to define the density of infected individuals and according to this system, endemic malaria may be (in order of increasing prevalence) hypo-, meso-, hyper-, or holo-endemic.

 **To find out more:**

MAP, Malaria Atlas Project (Kenya Medical Research Institute / University of Oxford)
www.map.ox.ac.uk

A detailed model, country by country, of the spatial limits of *P. falciparum* and *P. vivax* malaria.

KEY POINTS

- There are several indicators for measuring the epidemiological impact of malaria, the major ones being prevalence, incidence and mortality rate.
- The table provided here based on these indicators can be used to predict the impact of the disease in each of the various broadly defined zones (card 8).

Three major epidemiological indicators

- **Incidence = the number of cases identified within a given population over a given period**

The year is the most commonly used time frame and the number of people surveyed is 1000 (or 100).

The number of malaria attacks per person per year is the indicator that is most often used to classify clinical incidence.



E.G. if 8,000 cases are documented in one year in a town of 5,000 people.

>> Incidence: 8,000

>> Rate of incidence: 1,600 for 1,000

>> Number of malaria attacks/person/year: 1.6/person/year

- **Rate of mortality due to malaria = number of deaths per year per 1,000 people**

The rate of death due to malaria is the number of deaths from malaria within a given population over a given period, normalized to 100 or to 1000 people.

- **Prevalence = number of infected subjects per 100 people at a given point in time**

An infected subject is anyone who is carrying the parasite, whether sick or not. Prevalence only gives a measure of the "human reservoir".

Prevalence is measured at a given date and not over a period of time.

This type of indicator is mainly used by researchers and scientists.

Prevalence is often wrongly taken to mean incidence.



Malaria-infection and malaria-disease

Partially immune people may be carrying the parasite without ever getting sick: this situation is referred to as malaria-infection as opposed to malaria-disease (malaria attack, see card 2).

Incidence is a measurement of malaria-disease whereas prevalence measures malaria-infection.

What is the epidemiological impact in the various broadly defined zone types (card 8)?

The averages below give only an idea of the epidemiological impact in the various zone types. The data are merely indicative and do not pretend to give a full account of the complex reality.

Malaria transmission	Transmission	(Facies)	Prevalence (% Individuals vectors of the parasite)	Number of malaria attacks/ year (incidence)		Mortality Rate (% dying of malaria)	
				Children	Adults	Children	Adults
Stable	Very High (Up to 1000 bites/ year)	<i>Equatorial</i>	More than 80%	Between 3 & 10	Between 0.2 & 1	About 1%	Close to 0%
	High (100 to 400 bites/ year)	<i>Tropical</i>	Between 50% and 80%	Between 3 & 10	About 1	About 1%	Close to 0%
	Low or moderate	<i>Sahelian desert</i>	Between 10% and 50%	Twice or 3 times	Once or twice	/**	/**
Instable	Episodic	<i>Desert austral mountain</i>	Less than 10%	/*	/*	/**	/**
Urban	Episodic	/	Less than 10%	/**	/**	/**	/**

/* : lack of average data as malaria is, by definition, very irregular, epidemic..

/** : lack of data

The term "children" here refers to children below 5

⚠ Caution: transmission and incidence are not proportional!

- There is no direct relationship between incidence and transmission (the number of infective bites): whether someone is bitten 20 or 200 times a year, he or she will suffer more or less the same number of attacks over their lifetime (however, they will be concentrated to a variable degree during the early years of a child's life; see the example below).
- For this reason, in a zone of high transmission, a reduction in transmission rate does not necessarily have significant impact on incidence.

⊕ TWO EXAMPLES: DIELMO AND NDIOP (SENEGAL)

Dielmo :

- continuous transmission, 200 infective bites/year/person.
- Children below 5: 6 malaria attacks/year
- Adults: 0.3 malaria attacks/year

Ndiop :

- seasonal transmission, 20 infective bites/year/person.
- Children below 5: 3 malaria attacks/year
- Adults: 1 malaria attack/year

(source: IRD)



Part II

Malaria control

This part of the guidebook aims to present the various malaria control methods available, focusing on the practical aspects of their implementation.

Before examining technical methods, it is important to once again stress that the success of any program depends on the active involvement of its target population. A program necessarily involves Information - Education - Communication (IEC) campaigns. Several cards are dedicated to this subject in order to:

- >> Review the basic principles of IEC: why IEC is essential and the broad lines to be followed.
- >> Define the messages to be disseminated and the aids that can be used.
- >> Provide practical tips concerning the organization of community events.
- >> Provide guidelines for implementing a home visit campaign.
- >> Help develop aids and events aimed specifically at children.

In the first instance, malaria control involves combating the mosquito that carries the parasite. "Vector control" methods include the following:

- >> larvae control methods: sanitation, biological control; outdoor insecticide spraying;
- >> mosquito control methods: insecticide treatment by fogging or indoor residual spraying (IRS).

Then it is necessary to limit contact between humans and mosquitoes, which mainly involves personal protection measures. All the available methods are described, with an in-depth focus on insecticide-treated nets (ITNs), which are an extremely cost-effective method of malaria control.

Chapter I: Creating conditions which facilitate action: Information-Education-Communication

- Card 10 IEC, the basic principles of a malaria control program
- Card 11 Choosing the right media and messages
- Card 12 Organizing community events
- Card 13 Personalizing IEC: home visits
- Card 14 Adapting IEC to children

Chapter II: Fighting the vector (larvae and mosquitoes)

- Card 15 Sanitation
- Card 16 Biological control
- Card 17 Insecticides
- Card 18 Outdoor insecticide treatment: spraying and fogging
- Card 19 IRS (Indoor Residual Spraying): general points
- Card 20 IRS: some practical tips
- Card 21 IRS: implementation conditions and precautions

Chapter III: Protection against mosquitoes

- Card 22 Personal protection measures
- Card 23 The mosquito net: characteristics and choice
- Card 24 The mosquito net: encouraging household use
- Card 25 The mosquito net: aiding correct use

These preventive measures apply to the whole population. Additional measures can also be implemented for specific groups, e.g. the protection of pregnant women by means of intermittent preventive treatment (IPT).

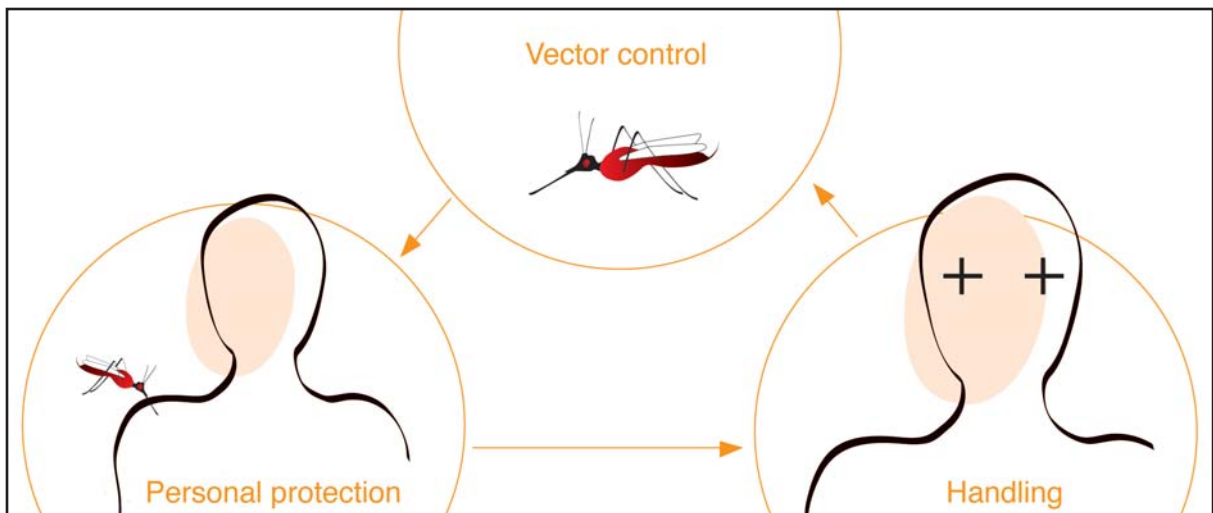
Finally, a malaria control program obviously needs to include medical care for the sick. The right medical care needs to be rapidly available in order to prevent complications. It must also be systematic, in order to help reduce the prevalence of malaria by eliminating the parasite in patients. The cards concerning these questions focus on the support given to patients in terms of provision of medical care in accordance with national policy. They do not go into details concerning medical aspects, which are a matter for the medical profession.

Chapter IV: Implementing specific measures

- Card 26 Anticipating and managing epidemics and seasonal peaks
- Card 27 Protecting children and pregnant women
- Card 28 Protecting migrants and refugees
- Card 29 Chemoprophylaxis

Chapter V: Providing support to the patient

- Card 30 Diagnosing malaria
- Card 31 Laboratory diagnostic techniques
- Card 32 Promoting rapid diagnostic tests
- Card 33 Treatment: basic knowledge
- Card 34 Supporting medical care provision
- Card 35 Promoting medical care for sick children
- Card 36 Supporting a community-based care policy



IEC, THE BASIC PRINCIPLES OF A MALARIA CONTROL PROGRAM



KEY POINTS

- The success of a malaria control program depends on the support and involvement of local people. This can be gained by ensuring they have a better understanding of the disease and the ways they can protect themselves against it, and demonstrating that a program will be of benefit to everyone.
- IEC (Information - Education - Communication) is therefore central to any malaria control program: it is essential that control measures be preceded and accompanied by IEC.
- This approach needs to follow certain principles: it must be based on participation, have clear, simple messages, and take into account social structure, etc.

NGOs and associations have a crucial role to play when it comes to the IEC (Information - Education - Communication) component of programs. Any organization working on the ground can potentially become involved in malaria control, by implementing an awareness-raising campaign.

Why is IEC so essential?


- A successful malaria control program is dependent on changing people's perceptions and behavior with respect to the disease: a program cannot be successful without their involvement.
- However, getting local people to participate is a complex task, particularly when it comes to a disease that they have "known" all their lives.
- So IEC is key to winning local support for the program and ensuring active participation. The emphasis must be on:
 - >> Knowledge of the disease, its risks and the treatment options.
E.g.: *It may be possible to save the life of a child who is having convulsions if he receives treatment as soon as possible at a clinic.*
 - >> Understanding malaria control methods, their benefits and their limitations.
E.g.: *Why a mosquito net is useful even though it's only used for 7 or 8 hours out of 24.*
 - >> Individual motivation, based on the conviction that control is possible and effective and that it will improve the welfare of each and everyone.
E.g.: *With the full commitment of everyone, death from malaria can become a rare event.*

A few basic principles for effective IEC

One of the challenges for IEC in the field of malaria is to improve knowledge and change behavior among people who already have deep-rooted beliefs and customs with respect to the disease. Below are a few tips to help ensure messages are taken on board by local people:

- Favor participation-based approaches.
 - >> Discussion is always more constructive than a "lecture" in terms of getting a message across (cf. card 12).
 - >> The aim is to encourage people to make links themselves on the basis of their own observations (e.g.: When are there lots of mosquitoes? And when is there a lot of malaria?)
 - >> Eliciting suggestions from the community rather than imposing solutions is the best way of winning support.

- **Make messages clear and simple**, and do not have more of them than strictly necessary.
- **Aim for consistency of content and creativity of form.** Do not hesitate to repeat the same information again and again, but try to find new ways of presenting it.
- **Rely on the group to combat false beliefs.** Beliefs are often deeply entrenched in people's minds. A good way of tackling this problem is to make use of the most enlightened members of the group, encouraging them to speak up to persuade the others.
- **Make sure that the information given fits with the reality.** For example, before telling people that pregnant women are eligible for a free mosquito net from clinics, it is preferable to make sure that mosquito nets are indeed available there, to prevent a lasting loss of credibility in the community.

 There is never any pre-ordained approach to be followed when it comes to IEC: messages and methods always have to be adapted to a given context and to the needs of a particular population. In particular, in order to design appropriate activities and aids, it is first of all necessary to examine local beliefs concerning transmission modes, people's perceptions of the disease, etc. (cf. cards 37 and 38).

Fitting IEC into the social structure

For greater impact, IEC must fit into the community's social structure and respect its rhythms.

- **Choose the right moment:** during the dry season, at medical consultations or antenatal visits, etc.
- **Focus on mothers:** the aim is to reach women (who are more concerned about health issues, particularly the health of their children) but care must be taken to ensure men do not feel excluded (they have the power to make decisions).
- **Involve a variety of players, using existing networks.**
 - >> Health personnel: they possess the necessary medical knowledge and have the authority, skills and credibility to raise awareness among local people.
 - >> Community health workers: they are in a position to establish informal, personal contact with local people.
 - >> Village committees: they use appropriate language to pass on the information and are in touch with the concerns of local people.
 - >> Existing community organizations: women's associations, youth clubs and forums, trade unions, schools, etc.
- **Respect local customs and hierarchies.**
 - >> Involve natural leaders: religious leaders, village chiefs, traditional healers, etc.
 - >> Avoid bypassing the official hierarchy.

CHOOSING THE RIGHT MEDIA AND MESSAGES

KEY POINTS

- A broad range of media can be used in an IEC (Information - Education - Communication) campaign, chosen on the basis of various criteria: cost, effectiveness, logistics required, target population habits, etc.
- The form of the messages must be tailored to the local population (language, level of education, etc.), while the content must be approved by the health authorities.
- Messages must focus on a few major themes: the risks of malaria, mosquitoes, transmission, protection measures, what to do when the first symptoms appear and treatment is given.

The success of a communication campaign depends on its capacity to reach the broadest possible audience via appropriate communication media and on the effectiveness of the messages disseminated to a given population. The advice and examples given here in no way obviate the need to consider the specific features of the local context.

! Aids and messages must always be approved by the health authorities before being distributed in the zone in question. It should be noted that the NMCP is a good possible source of posters and flyers.

The various communication aids

Posters

>> **Usefulness:** To promote a protection measure, encourage the involvement of local people, etc.

>> **Design / production:** The text size depends on:

>> where the poster will be displayed (a few words only in areas where people are just passing through, etc.)

>> the target population (very short text (one or two sentences) for children).

Producing a good poster takes several days (sketch, test, modifications, etc.).

• **Advice / precautions:** It is essential to **test the poster** to make sure people understand it (especially if it is a picture). Beware of using speech or think bubbles: the communities in question do not always know how to interpret these devices specific to cartoons.

Flyers

• **Usefulness:** To give practical tips, act as a memory-aid during home visits (cf. card 13), etc.

• **Design / production:** To ensure they are read, they must be easily assimilated and make full use of illustrations, etc.

• **Advice / precautions:** Flyers can be designed in the form of "advice cards" providing information and practical tips on important themes, such as home-based care or how to put up a mosquito net.

Picture boxes (large-format books with illustrated pages, each depicting a particular scenario)

• **Usefulness:** To illustrate the words of the session leader during group IEC sessions.

+ **Fostering a good understanding**

An illustration for a poster on the use of mosquito nets depicted a bed with a spring mattress. Rural communities did not feel that this applied to them. The illustration had to be changed to show a woven straw mat. *(source: Agereil)*

• **Design / production:** Allow several months to complete the work, with two or three test phases with session leaders and the target population. Each scenario is created with the help of the artist. On the back of each picture, a session plan (description of the picture, relevant question(s), key message that must be delivered) should be provided. Each picture concerns a specific theme (e.g.: ITP taken in the presence of the health worker, etc.). A picture box on malaria includes between 15 and 25 pictures: an awareness-raising session should not exceed 1 h 30 minutes.

Example of design costs: It cost a local specialized agency 1500 euros to create a picture box for the Burkina-Faso plan

(prix Agereil Burkina-Faso 2007)

• **Advice / precautions: Produce picture boxes made of fabric** (more resistant, washable, lighter for the session leader); however, fabric costs twice as much as paper.

Radio

• **Usefulness:** Pass on **simple messages**, rally support, etc.

• **Design / production:** Have a radio team produce the spots.

• **Advice / precautions:** Medium recommended when at least *30% of the target population* regularly listens to the radio. Two pitfalls must be avoided.

» Broadcasting spots at the wrong time: favor the early morning and the evening.

» Not broadcasting spots often enough: on average, a listener only retains a message if he hears it at least 3 or 4 times. It is recommended that a spot be broadcast at least twice daily for 3 or 4 months (source AED / USAID).



Organizations with very substantial resources can also make use of **video**. Videos can be used to tackle certain sensitive subjects in-depth (e.g.: malaria and witchcraft). In this case, organize mobile units to show the films in villages where televisions are rare.

A few particularly important messages and themes

• **The risks:** emphasize the risks to vulnerable populations and, especially, children.

E.g.: "Malaria kills children and pregnant women".

• **Mosquitoes:** stress that it is mosquitoes that transmit malaria and draw attention to the times at which they bite.

E.g.: "The malaria mosquito only bites at night".

• **Protection:** stress that the risk of infection can be significantly reduced by implementing a few simple precautions.

E.g.: "Insecticide-treated nets effectively protect against malaria-carrying mosquitoes".

• **Treatment:** emphasize the importance of going to see a doctor or nurse as soon any malaria symptoms appear.

E.g.: "Running a fever? Get to your clinic as quickly as you can."

• **The switch to ACT:** emphasize how effective new treatments are.

E.g.: "Together, let's ACT" (source: Senegal NMCP)

• **Motivation:** stress the need for a combined effort: health workers are a crucial link in the chain, but no progress can be made without the support of the local population.

E.g.: "Malaria is everyone's business. If we work together, we can make a difference."



The language of IEC: Messages conveyed in local dialects often have more impact in rural areas. It is recommended that as many messages and aids as possible be translated into these dialects.

To find out more:

« Spot on Malaria »

www.changeproject.org/pubs/spotonguide.pdf

AED / The Manoff Group / USAID guide to adapting, developing and producing effective radio spots.

KEY POINTS

- Regular community events (religious ceremonies, various gatherings) are ideal opportunities to disseminate the principal malaria messages, ensuring they have the greatest possible impact on the broadest possible audience.
- Specific events on the theme of malaria can also be organized in order to:
 - >> rally community support (concerts, sports events with a malaria theme, etc.);
 - >> improve knowledge and give advice for concrete action (plays, events founded on a participation-based approach).

The use of appropriate aids and media (cf. card 11) is not enough to guarantee the success of an IEC (Information - Education - Communication) campaign: it is also necessary to organize local events in order to speak directly to communities.

Taking advantage of community gatherings to raise awareness

- Official ceremonies, cultural or religious gatherings in the community are good opportunities to disseminate important messages (cf. card 11):
 - >> Local people often respect and listen to the speakers at such events.
 - >> The community is already gathered and ready to receive important information.
 - >> In this way, malaria becomes one of the community's main concerns.
- The best approach is to ask political and religious leaders to reiterate the most important recommendations.
- These recommendations must be short and formulated in just a few sentences, in order not to lose the attention of the speaker or his audience. Messages must be kept simple: this is neither the time nor the place to enter into too much concrete detail (e.g.: it is important to sleep under mosquito nets).

Motivating and triggering enthusiasm

- Informing and awareness-raising are necessary steps prior to action. But it is important to supplement these with activities that will effectively encourage people to act and to change their behavior. The aim is to trigger enthusiasm by fostering a positive view of malaria control: **if we decide to act together, we can control malaria.**
- Festive gatherings are a way of motivating people:
 - >> concerts, sports events, in which the money raised is put towards malaria control;
 - >> competitions for the best poem or the best song about malaria, quizzes (see box), etc.;
 - >> official days: Health Day (at village level), Africa Malaria Day, etc.



Making events attractive by offering small prizes

Small prizes, carefully chosen on the basis of needs (pencils, soap, etc.) can encourage communities to take part in these events. It only takes a few euros to purchase prizes for an evening event.

Improving knowledge and fostering concrete action

An IEC campaign also includes meetings at which community knowledge is improved, questions are answered and practical advice is given.

• Plays

» **Value:** Attract the interest of the community, identification with actors in the play, possibility of giving practical demonstrations, etc.

» **Design / production:** Train the troupe and the actors and then allow them to create the play. Then monitor the various scenes, stressing the need to be specific (e.g.: show how a mother gives medicine to her child by crushing the tablet with a fork).

» **Organization:** Inform the local authorities that the play is to be performed. Always invite a local health worker so that he or she can answer any questions after the performance.

» **Advice:**

»» Put the play on in the local language. It is better to choose a local troupe, even if this means supplying them with equipment (less expensive (see example), knowledge of the language, customs, etc.).

E.g.: A performance by a local troupe costs 120 euros (vehicle hire, fees, sound equipment, etc.). The Ouagadougou troupe wanted 600 euros (*source: Burkina-Faso 2007 plan*).

»» Give priority to performing in villages where habits and behavior are the least good.

• Participation-based events

» **Value:** Elicit solutions from the community (which is more inclined to implement “its own” solutions), make it easier to take on board information, answer individual questions at the same time as addressing a group.

» **Organization:** No longer than 1 h 30 minutes, no more than 20 participants.

» **Advice for the session leader:** Be as approachable as possible for local people (simple dress, verbal and body language similar to that used in the community), give the impression of sharing its experiences. If the session leader does not come from the region, he must be introduced by a member of the community.

» **Design:** The session can be held using a picture box (cf. card 11). In this case, the session leader encourages people to voice their comments and ask questions before giving the key message. The session may also be based on other participation-based techniques (see box).



3 participation-based techniques

• Educational talks and brainstorming sessions

» Principle: To gather everyone's opinions before identifying a common solution to a problem.

» Procedure: Presentation of a problem or a situation; everyone is then free to give their opinions before a vote is taken on the best suggestion; once selected, all the participants are again given the opportunity to voice their opinions in order to fine-tune the idea.

» Recommendation: Nobody should pass judgement on other people's ideas.

» Idea: Set the ball rolling by showing a video or putting on a short play.

• Mapping

» Principle: Get participants to identify and map breeding sites and homes that need to be protected (pregnant women, children) to help them understand the purpose of this activity.

» Idea: Draw attention to the correlation between the rainy season, breeding sites and transmission.

• Role playing

» Principle: Participants are given roles to demonstrate the core problem and the various possible reactions and attitudes, including those that should be encouraged and those that should be resisted.

» Procedure: participants are divided into two, three or four groups, with roles defined by the session leader. These groups then act out the roles freely. Either the game comes to a conclusion naturally or the session leader decides that the main points have been covered and brings the game to an end. The session leader then sums up the main elements.

» Recommendation: Keep the game simple so that groups clearly understand their roles.

PERSONALIZING IEC: HOME VISITS

KEY POINTS

- Home visits are a very effective way of improving knowledge and fostering a change in practices in homes. They are also a way of monitoring how a program is being put into practice.
- In rural areas, visits should preferably be made during the dry season and in the second half of the day, when all the members of the household are available.
- A visit lasts between 20 and 30 minutes and requires the expertise of a field worker who is part of the community and who has been trained in malaria issues; he must know how to use participation-based methods to encourage the people he is visiting to come up with “their own” solutions.

Aims and advantages of home visits in a program

• Reinforce IEC (Information - Education - Communication)

>> **Proximity:** When it comes to IEC, remaining close to local populations and understanding their concerns and expectations are key to ensuring good results. Home visits are the most effective IEC method in terms of establishing this sense of proximity with communities.

>> **Adaptation:** Malaria is a “known” disease and everyone has their own perceptions of it. These perceptions - and the resulting behavior - can vary from one individual to another, even within the same household. Home visits offer an opportunity to adapt the messages to the knowledge of each member of the household, to answer specific questions and, above all, to harmonize knowledge and, therefore, attitudes (fundamental, for example, when deciding whether or not to take a sick or feverish child to the clinic).

• **Enhance the effectiveness of a program:** Home visits are an opportunity to distribute aids explaining how to hang and install mosquito nets properly, how to give a sick child a tablet, how to choose a suitable place to store medication, etc. Visits are also a chance to implement “positive supervision” (cf. card 49): at the same time as ensuring that good practices are being adopted, visiting field workers boost motivation by making the communities visited feel that their actions are important.

• **Improving monitoring / evaluation:** Home visits are a safe and effective way of gathering certain data on the effective application of measures (e.g.: number of mosquito nets hung).

Organizing a home visit campaign

• Training field workers (cf. card 43)

• Visit strategy

- >> In rural areas, home visits are mainly conducted during the dry season, when local people spend less time out working in the fields.
- >> Once a target zone has been selected, the first step is to contact the people in charge of the areas in question (village chief, land chief, administrative officials, etc.) to inform them when the visits will take place.
- >> A prior census of homes in the zone is recommended to make it easier to monitor the campaign (chalk a number on houses counted or visited - unless this practice would pose a cultural problem for the communities concerned).
- >> A home visit program generally schedules only one visit per home.
- >> In order to foster emulation within the community, it is preferable for visiting field workers to arrive in a group in the same village before moving on to the next one (see box).

**Creating a buzz**

It is good to use visits as an opportunity to stimulate the community's enthusiasm.

On the evenings of their visits, for example, field workers can organize a quiz with small prizes (cf. card 12). This acts as a reminder for people who have already had their awareness raised that day and gives others an opportunity to prepare for a visit in the next few days.

• Visit procedure

>> The visiting field worker (one is enough) begins by sounding out the level of knowledge of members of the household and assessing their behavior. He continues the visit, maintaining a participation-based approach (see below). If mosquito nets have been distributed, he may ask to check that they have been hung up (giving priority to the beds of young children). Before leaving the house, the field worker checks that he has passed on the most important messages (provide every visiting field worker with a **memory aid containing the key messages**).

>> It is recommended that visits be rounded off with a few questions about the points discussed and by giving the head of the family a flyer in the local language summarizing the main messages (cf. card 11).

Note: It is better to tackle one theme only (malaria) to avoid any confusion.

• Monitoring of visits

This is done on the basis of monthly reports by field workers (activity, number of visits made, any difficulties encountered, etc.).

**Home visits in the Ngog-Mapubi health district (Cameroon)**

In 2006, the Cameroon NMCP launched a large-scale home visit campaign. 1500 associations took part in the operation. In Ngog-Mapubi district, during the first quarter of the program, approximately 27,000 people were seen (6000 homes). 36 field workers from 12 health associations each made some 200 visits (15 to 20 days' work). Over the quarter, the payroll was 3,700 euros for the 36 visiting field workers and 550 euros for the coordinator and his 3 supervisors: **the cost per capita of a home visit is less than 0.16 euros here** (source Asademir 2008)

**Duration of a home visit**

A visit generally lasts **20 to 30 minutes** per home. A field worker can make up to 10 visits per day.

A few principles for successful home visits

• Adopt a participation-based approach: "Lectures" must be avoided. Instead instigate a discussion based on the knowledge, questions and ideas of the people visited. The more involved they are in the discussion, the more they will take on board new knowledge and the more willing they will be to put into practice solutions found together with the field worker.

Note: Do not waste your breath fighting against the beliefs of people as this could cause them to dig their heels in. Concentrate on passing on the key messages. Never mind if they coexist with a range of different beliefs.

• Trigger the "questioning habit": A visit is successful if it leads the people visited to make links between what they have observed and reality themselves: between the arrival of mosquitoes and the malaria peak, between their habits and the risks they run, etc.

It is important to instill in people an automatic thinking reflex. For example, even if not all the members of the household have acquired the level of knowledge hoped for at the end of the visit, if an episode of malaria occurs, people whose awareness has been raised are more likely to discuss it together, which could encourage them to seek advice in case of doubt.

• Checking through dialogue: When the aim of a visit is, among other things, to check that mosquito nets have been installed, the visiting field worker must always remain as courteous as possible and make sure it is understood that the check is not for the purposes of sanctioning people, simply to provide more advice.

KEY POINTS

- Educating children about malaria lays the foundations for a fundamental change in behavior with respect to the disease.
- In the short term, it is a means of reinforcing the interest and commitment of local people (family discussion following a lesson or game about malaria, children's desire to sleep under mosquito nets, etc.).
- IEC (Information - Education - Communication) aimed at children is not merely a simplified version of IEC: it is IEC adapted to their own particular methods of assimilating knowledge (imagination, identification with a hero, etc.) and motivations fostering their involvement (interest in games, desire to be taken seriously, etc.).

The importance of IEC aimed at children

- Today's children are tomorrow's parents: if they take on board the fundamental knowledge and automatic reflexes, the fight against malaria - which, for many, is based on a change in behavior - will be truly successful in a few years.
- But educating children is not only a matter of the future, since, in their own way, children can already play an active role in malaria control today:
 - >> Through their questions and discussions, they help to get their parents thinking about malaria.
 - >> By knowing about the benefits of mosquito nets, they can encourage their parents to get one, they can install them for their younger brothers and sisters, they can make sure they are not damaged, etc.

Educational aids

- It is necessary to produce a small reference document:
 - >> activity aid (source of information for children when they have to write a sketch, do a drawing for a competition, etc.);
 - >> aid for parents (to help them explain malaria to their children);
 - >> aid for children (who need to read things to assimilate what they have learned during activities, especially quite technical terms (see box)).
- The ideal aid is a comic of around ten pages, starring a young hero of their own age.
 - >> It is always easier to keep a child's attention for longer if the child is able to identify with a character and follow his adventures.
 - >> Cartoons make it possible to illustrate every message with a picture.
 - >> The same process is used to produce a short comic as to produce a picture box (cf. card 11).

The difficulty of effectively reaching children

Fun activities are necessary, but children tend to lose focus and miss the most important information. It is important to go over the main points with them at the end of the activity, using the training aid.

Furthermore, it is often necessary to overcome a certain amount of indifference among children, who are used to other people dealing with health problems for them.



Tips for producing a teaching aid for children

- Do not overload their minds with too much information (e.g.: Only present the mosquito net to them and avoid talking about coils or insecticide sprays).
- Simplify without distorting (e.g.: Speak about "parasites" not "bugs").
- Make sure children can make the link between their day-to-day lives and what is depicted in the picture (e.g.: Show a mosquito net nailed to the ceiling and not with a pretty wooden canopy which costs more than the mosquito net itself, etc.).
- Make sure that drawings are very accurate as the images serve as an instruction manual (e.g.: Reject a drawing in which the mosquito net installed does not touch the floor around the straw mattress).

Events

- **Educational talks:** These must be short (no more than 45 minutes) and designed to allow the children to talk (a maximum of 20). The leader must intervene as little as possible, except to correct their answers.
- **Games and competitions:** Children readily get involved in quizzes (provide them with a short teaching aid in advance) or poetry or drawing competitions on the theme of malaria. It is recommended that these types of activities include prizes, preferably related to malaria (re-impregnation kits, mosquito nets, etc.).
- **Sketches and short plays:** It is useful for children to prepare short sketches.
- **Educational outings:** Field outings are ideal to trigger their curiosity and encourage them to make links (e.g.: outing to look for mosquito larvae, cf. card 6)

Get children involved in malaria control activities

- Children like to be treated as more grown-up than they are; if they are more involved, they feel that they are being taken seriously thanks to their actions.
- Some activities can be good fun for children and help in the fight against malaria simultaneously. A few examples:
 - >> Mapping of breeding sites: Draw up a map of the village's permanent breeding sites with them.
 - >> Monitoring of mosquito net use: Make children responsible for checking that their brothers and sisters are sleeping under mosquito nets every night (cf. card 27).
 - >> Making a radio program: Help them prepare a sketch, record a spot or a program on malaria (see box).



Bibir Radio, the kid's radio station (Burkina-Faso Plan)

Bibir Radio is a radio program produced by schoolchildren and broadcast on Burkinabé national radio.

The children are given training and then design their messages, prepare the questions they want to ask the village chief, the health worker, etc.

The program is recorded in public in a village by a radio team. The plan organizes the rest of the logistics: agreement of parents, training of teachers, transport and installation of equipment, etc.

Other radio stations have asked to be able to broadcast these programs next season.

(source Plan Burkina-Faso)



IEC for children: concentrate on teaching the right reflexes

The aim is not to instill academic knowledge but to teach them things of practical use with respect to malaria:

- >> Night is falling. Watch out, the malaria mosquito might bite me.
- >> To protect myself from malaria, I sleep under a mosquito net, being careful not to leave any gaps that a mosquito could get through.
- >> I have a fever. It might be malaria. I'll ask my parents to take me to the clinic as soon as possible.
- >> The nurse has given me medicine to treat malaria. I'll take the treatment right to the end to make sure I'm all better.

KEY POINTS

- The global purpose of sanitation efforts is better waste water management but such operations help with malaria control since they eliminate mosquito breeding sites.
- However, the reduction in mosquito numbers is only a collateral effect of drainage operations rather than being the primary objective: major sanitation operations (cleaning of waterways, construction of waste water evacuation networks, etc.), fall within the framework of public development policies and require financial resources that would usually go beyond the scope of malaria control.
- “Micro-sanitation” or domestic sanitation generally has little impact in terms of reducing the number of malaria cases. It is, nonetheless, an action that should be encouraged with a view to raising people’s awareness and improving levels of hygiene overall.

Anopheles mosquitoes lay their eggs on the surface of still or almost still waters (card 3) so the mosquito population can be attacked and potential breeding sites eliminated by clearing stagnant and very slow-flowing water deposits (e.g. in holes and ditches, around natural streams, etc.).

Given that different methods require different types of resources, a distinction needs to be made between, on the one hand, the type of major sanitation operation that is undertaken by public authorities or large organizations, and on the other hand, “micro-sanitation” operations that can be achieved on a very small scale or even by individuals.

Major sanitation operations

• Diverse methods:


- >> **Clearing of waterways** (canals, streams, rivers): in certain areas, big waterways provide important breeding sites (card 3). Many species lay eggs in surrounding watercourses or along banks where the vegetation helps to create almost stagnant water pockets. Clearing the banks means removing the vegetation to eliminate such niches.
- >> **Filling up depressions:** ruts on tracks, uneven surfaces dug out for construction projects, flood zones, etc.: all can be filled in with earth, sand or rubble.
- >> **Water evacuation and drainage:** in cities, construction of pipelines.
- >> **Road surfacing** (cobblestones, concrete, coating...)
- >> **Control of water deposits:** sealing of wells and water tanks, etc.
- >> **A few secondary techniques:**
 - >>> Planting eucalyptus trees in swamplands: these trees suck up huge volumes of water and help to dry up marshy areas. This natural technique is all the more promising in that the wood of the eucalyptus tree has many uses, e.g. as a construction material, in paper production, etc.
 - >>> Applying light oils or monolayer films to water reservoirs to kill the larvae which feed at the surface. Using this method; the water remains fit for drinking. This option is useful in urban areas where breeding sites are easily identified and accessible. Not widely used in Africa.



Checking water reservoirs in Bombay (India)

The municipality sends out agents every week to check drinking water reservoirs. Oil spiked with pyrethrin is spread over the water surface if any anopheles larvae are detected.

- However, these techniques are more than simple malaria control measures:
 - >> Major sanitation operations are usually undertaken by government institutions and fall within the wider framework of general development programs rather than that of malaria control.
 - >> It is conceivable, however, that a big company could exploit such methods in two particular situations:
 - >>> in partnership with public institutions in a jointly managed, large-scale operation;
 - >>> on an extensive site requiring road-mending and ground-levelling or the construction of temporary buildings in the framework of a project to improve the welfare of workers and the indigenous population.
- Such major sanitation operations are rarely undertaken with the sole objective of preventing malaria.

 Apart from the issue of resources, sanitation measures will be efficient only if they **drain the natural stream network and all water holes over a radius of several kilometers:**

- since the mosquito population must be greatly reduced, as many water deposits as possible must be drained to remove a maximum of breeding sites before a fall in malarial incidence can be expected (card 9);
- a radius of several kilometers is imposed because anophelines can fly 5 kilometers from their breeding site to find a blood meal (card 3).

For these reasons, sanitation operations in the framework of a malaria control program will only be effective in **urban areas, in other zones where transmission rates are relatively low**, or where water deposits are relatively sparse and readily identified and drained.

Micro-sanitation measures

- This section covers all the measures that can be implemented with limited resources, such as filling in puddles, getting rid of empty cans, old tyres or any other container which can hold water, and pruning trees.
- Such simple everyday precautions will help to improve local living conditions but they will not have any real impact on the incidence of malaria. Somebody who cleans up the space in his immediate surroundings will not be protected unless his whole environment is properly drained. Moreover, *Anopheles* rarely lays its eggs in small, dirty, polluted water deposits close to human dwellings (card 3).
- This does not mean that it is not worth encouraging people to undertake micro-sanitation operations as a way of improving hygiene in general as well as killing other mosquitoes like *Aedes* or *Culex* (respectively vectors of yellow fever and dengue) which preferentially breed in old tyres and discarded cans.
- Encouraging micro-sanitation also has the advantage of raising the population's awareness of the relationships between malaria, mosquitoes and breeding sites in a concrete manner. It is therefore very important for NGOs or associations to include micro-sanitation in their IEC themes.

KEY POINTS

- Biological control refers to all natural processes designed to control mosquito larvae at existing breeding sites, the most commonly used of these being bacteria and larva-eating fish.
- Biological control can be an efficient method of controlling malaria in urban areas.
- Its use requires very careful organization: mapping of all existing breeding sites, regular treatment (once weekly with bacteria), etc.

Larva control, one of the main components of malaria control, covers the methods used to eradicate *Anopheles* mosquito larvae. Aimed at eliminating potential breeding sites, sanitation measures (cf. card 15) are one such method. A non-polluting and non-toxic alternative to insecticides, biological control acts directly on existing breeding sites.

The two principal methods

Larva-eating fish

• **Main species:** guppies and gambusias.


• **Use conditions:** Guppies can survive in muddy or sludgy water as long as it is warm (above 20°C). Gambusias thrive at all temperatures, in ponds or water holes that are at least 1.5 meters deep, in clear water with little aquatic vegetation. The required fish density is between 5 and 20 fish per m².

• **Advantages:**


- >> A "sustainable" method: if they are happy in their environment, the fish will reproduce until an ecological balance is obtained.
- >> A non-toxic method: the water remains fit to drink.
- >> Relatively inexpensive.

• **Drawbacks and restrictions:**

- >> Fragility of the fish: any contact with chemical substances must be avoided (beware of agricultural pesticides). The fish require regular monitoring.
- >> The effectiveness of this method is still uncertain: there is always a risk that the fish might feed on organisms other than the mosquito larvae.
- >> May upset the natural ecological balance: the introduction of a new species can endanger an ecosystem.
- >> Supply problems: the commercial network is still not properly developed in Africa.
- >> Use in permanent breeding sites.

 With fish, an NGO acting for children can offer an original and concrete follow-on activity after mapping permanent breeding sites (cf. card 14):

- introduction of larva-eating fish at identified sites with the help of children;
- monitoring of the healthy development of the fish by children, aided by a field worker.

 **Recommendations:** this method is suitable for artificial breeding sites (large wells, stored water, tanks) or natural, but well-defined ones (ponds) in urban areas.

Bacteria

- **Main species:** Bt (*Bacillus thuringiensis*) and Bs (*Bacillus sphaericus*). These bacteria produce toxins which, after purification, are capable of killing larvae.
- **Use conditions:** all types of completely stagnant water. Bs is more suitable for polluted water and can destroy *Culex* larvae. Available in the form of granules (to be spread manually), tablets, powders, liquid or cake.
- **Advantages:** effective, non-toxic, low risk of disrupting the balance of the ecosystem, moderate cost.
- Drawbacks and restrictions:
 - » Spraying frequency: every week or every two weeks due to the low remanence.
 - » Frequent supply problems, since this method is still little used.

Recommendations: this method is suitable for breeding sites in stagnant water, not exceeding a few dozen m² in urban areas.

Methods that are still little used

• Although biological control appears to be an attractive alternative, its use against malaria vectors is still very limited for at least two reasons:

» **significant logistical constraints** (very frequent spraying for the bacteria, regular monitoring for fish, supply problems, etc.);

» **significant technical constraints** (difficulty treating large area of water (more than 100 m²) with bacteria, difficult to introduce fish, etc.).

• However, biological control in urban areas (see boxes) can be a sensible and effective malaria control measure as long as the following conditions are met:

» **It is necessary to work with the assistance of a research institute** (at least for the launch phase: preliminary studies, mapping, team training);

» **It is necessary to set up a very rigorous organizational system with members of the communities concerned:** The cost effectiveness of biological control can be of interest as long as local personnel are used. In addition, it is necessary to monitor the work of a very large number of personnel every week.

The Dar-es-Salaam pilot program (Tanzania)
 Launched in 2006 in several districts of Dar-es-Salaam, in 2008 the operations now cover an area of 55 km², representing more than 600,000 people; 100,000 breeding sites are treated every week, mainly with bacteria (Bti in granule form) dispensed manually; 250 people, 93% of whom come from the communities involved, work there; the dispensing and study/surveillance teams are monitored weekly. In the first 3 districts treated in 2006, the prevalence fell by 43% in one year.
 The cost of larva control is approximately 1 dollar (US) per year and per capita during the operational study pilot phase. Once the system has been fine-tuned (mapping of breeding sites by type, training, etc. completed), the program managers hope to reduce this cost to 0.5 dollar (US) per year and per capita.
 (source Dar-es-Salaam City Council / 2008 price)

Context and conditions of use of biological control

Biological control is only suitable in zones where breeding sites can be readily identified and are accessible and well-defined. In addition, as with any larva control method, it can only have any real impact in low-transmission areas or urban malaria areas (cf. card 15).

To find out more:

- **"Guide d'utilisation des poissons larvivores"**
www.namp.gov.in/Doc/GUIDELINES
 Indian government guidelines

• "A tool box for operational mosquito larval control"

www.malariajournal.com/content/7/1/20

Publication on the biological control program conducted in Dar-es-Salaam (Tanzania)

KEY POINTS

- Insecticides are an integral component of vector control, from larva to adult mosquito.
- They can be classified according to their efficacy, remanence (active lifetime) and selectivity.
- The main insecticides used against mosquitoes are the organic chlorides (e.g. DDT), organic phosphates, synthetic pyrethrins and growth inhibitors.

Insecticides are used:

- >> in larva control operations – the dissemination of larvicidal insecticides in breeding sites (card 18);
- >> in operations against adult mosquitoes – outdoor spraying operations (card 18);
- >> for the protection of houses – indoor spraying (card 19);
- >> for individual protection – body sprays and impregnated clothing (card 22); impregnated mosquito nets (card 25).

The main characteristics of insecticides

- **Efficacy/resistance:** a small dose of a potent insecticide rapidly kills mosquitoes. The efficacy of a given insecticide will depend on the resistance of the mosquito to its action. The degree of resistance will determine the proportion of the mosquito population that will survive doses that would kill most sensitive anophelines. Resistance is due to genetic mutations in certain individuals which make them less susceptible to the toxic compounds intended to kill them.
- **Duration of activity (remanence)/bioaccumulation:** remanence describes the period of time during which the insecticide remains active. Highly remanent insecticides can accumulate in the insect's body in an active form in which case they can become dangerous to other living organisms as they gradually diffuse up the food chain.
- **Selectivity/toxicity:** under normal conditions of application, a selective insecticide only kills mosquitoes and is non-toxic for humans and other living organisms.

The main types of insecticides

- **Organic chlorides** (e.g. DDT)
 - >> **Efficacy/resistance:** cost-efficient as they are easy to manufacture.
 - >> **Remanence/bioaccumulation:** high remanence, therefore harmful for the environment.
 - >> **Selectivity/toxicity:** low selectivity, toxic effects on numerous organisms.

NB: DDT, which for a long time was banned, is now authorized again in some countries for IRS operations (see box).

- **Organic phosphates** (e.g.: Chlorpyrifos, Fenthion, Malathion, Temephos...)
 - >> **Efficiency/resistance:** highly effective, limited resistance.
 - >> **Remanence/bioaccumulation:** very low remanence therefore no risk of bioaccumulation but they have to be applied frequently.
 - >> **Selectivity/toxicity:** low toxicity at recommended doses.

» **Cost:** limited, the cheapest of the modern insecticides.

The organic phosphates are used in outdoor treatment operations (card 18).

NB: because of their unpleasant smell, they are used only outdoors.

It should be noted that carbamates, which can also be used to control Anopheles mosquitoes, have similar characteristics to organophosphates.

• **Synthetic pyrethrins** (e.g.: Lambda-cyhalotrin, Alpha-cypermethrin, Deltamethrin, Permethrin...)

» **Efficiency/resistance:** very high efficacy, resistance on the rise.

» **Remanence/bioaccumulation:** remanent but not high enough to engender risks of bioaccumulation.

» **Selectivity/toxicity:** low toxicity at recommended doses.

» **Cost:** quite expensive.

The pyrethrins are used for indoor spraying (card 20) and impregnating mosquito nets and fabrics.

NB: the pyrethrins may cause certain side effects, such as numbness and itching.

• **Growth inhibitors** (e.g.: Methopren, Diflubenzuron, Pyriproxyfen...)

» **Efficiency/resistance:** highly effective, no resistance.

» **Remanence/bioaccumulation:** highly remanent but no risk for the environment.

» **Selectivity/toxicity:** no toxicity.

» **Cost:** very expensive. Moreover, there are practically no inhibitors on the market.

Growth inhibitors are used for outdoor spreading (card 18): they prevent the development of larvae. They are to be used only in cases of strong resistance against organic phosphates or at sites that are very difficult to access during the rainy season (since organic phosphates require frequent application).

NB: because of their high cost, growth inhibitors are still only really used by scientists.



The gradual rehabilitation of DDT for IRS

Due to its low cost, its high effectiveness and high remanence, DDT represented one of the pillars of malaria eradication policies in the 1960s. It was subsequently banned for two reasons:

- the emergence of resistance in certain Anopheles mosquito populations;
- the phenomenon of bioaccumulation: its exceptional remanence meant that DDT could be found throughout the food chain. Yet DDT is toxic for numerous organisms.

Recently, however, several countries - mostly in Southern Africa - have been supporting the use of DDT for IRS operations (indoor spraying on the internal walls of homes). This trend is in line with WHO's decision in September 2006, to authorize DDT for IRS once more in the context of the reintroduction of the latter as a priority component of malaria control (cf. card 19). Used exclusively for IRS and in strictly controlled conditions (cf. card 20), DDT does not present any risks to human health or the environment.

Two measures to limit resistance

- One of the best ways to limit the development of resistance is to use different classes of insecticides **in rotation**: this will reduce the chance of the mosquito developing resistance to a particular insecticide to which it has been regularly exposed.
- Before an insecticide is used, a susceptibility test must be carried out to determine whether the product is effective locally as well as to check that it is active against the relevant mosquito species (card 37).



Important: The choice of insecticide and its dosage must always be in line with WHO/PES guidelines (WHO Pesticides Evaluation Scheme: the WHO organ that regulates the use of insecticides and pesticides).



To find out more:

• "Guide OMS sur les produits de prévention, de diagnostic et de traitement"

www.who.int/entity/medicines/areas/access/med_prices_malaria/en/index.html

Name of insecticide manufacturers, range of prices...

• « Specifications for insecticides used in public health » (WHO)

www.who.int/whopes/quality/newspecif/en

WHO evaluation reports on the various insecticides

OUTDOOR INSECTICIDE TREATMENT: SPRAYING AND FOGGING

KEY POINTS

There are two ways of performing insecticide treatment outdoors:
 >> spraying, a larva control measure involving the spraying of breeding sites;
 >> fogging, directed kills adults which involves disseminating an insecticide into the air in the early evening when mosquitoes come out to bite. These are secondary prevention measures, only suitable for urban settings or zones where the rate of malaria transmission is low, and then only in certain circumstances.

The outdoor use of insecticides, particularly through large scale DDT spraying operations (card 17), constituted the basis of malaria control strategies in the 1960's. When it was found that mosquitoes were becoming more and more resistant to DDT, and once better targeted and less polluting alternatives had been developed, the outdoor use of insecticides was relegated to the rank of complementary methods for use only in certain specific situations.

Spraying insecticides on water surfaces

- **Principle:** spraying insecticides onto the breeding sites to destroy the larvae (only the perimeter in the case of big expanses of water).

- **Frequency:** depending on the product used and the prevailing weather conditions (heavy rains may dilute the insecticide), sites may be sprayed at intervals of between 2 and 10 weeks.

- **Implementation:** the spraying equipment is similar to that used for farming applications.

- **Available insecticides:** essentially organic phosphates as the growth inhibitors are very costly (card 17). The choice will depend on the acceptable level of water pollution.

It should be noted that DDT is strictly prohibited for outdoor use and pyrethrins cannot be recommended as they are highly toxic for other species (particularly cold-blooded ones).

- **Necessary precautions:**

- >> Insecticides (except Temephos) should never be sprayed into a source of drinking water or be allowed to come into contact with food for animals intended for human consumption.

- >> Operatives should be equipped with protective gear (boots, gloves, masks, overalls) and should be trained to avoid accidents.

⚠ Context and conditions for the spraying of insecticides

- In zones where malaria transmission is unstable, where it is stable but the transmission rate is low, or urban locations.
- As a complementary measure in an integrated program (card 40) when all breeding sites within a large perimeter can be identified and treated (card 15). Such treatment may also be applied to individual sites as long as it does not entail any risk to human health or the environment.

Caution: except in cases when it is undertaken to prevent an epidemic (card 26), spraying must necessarily be carried out over the long term: to **discontinue spreading may result in lethal epidemics** among populations that have not developed enough immunity to protect them from a sudden upsurge in the transmission rate.

Fogging

• **The principle:** fogging is an vector control measure which involves destroying adult mosquitoes by spraying a cloud of insecticide over inhabited zones where the mosquito density is extremely high. Today, it is rarely used against *Anopheles*. It is to be noted that fogging may also be carried out inside dwellings (although this is rare).



Credit : Sanisphere

A spectacular technique

Fogging has a positive psychological impact on people who feel that they are being looked after (given that they have been reassured that the product is not toxic).

Frequency: for malaria control, fogging should be performed as often as possible (at least once every 10 days) when mosquitoes bite, i.e. at nightfall. People living in the area to be fogged must leave all their doors and windows open to allow the cloud of insecticide into the house.

- **Implementation:** vehicles equipped with manual sprayers or atomisers and a compressor. Fogging requires well trained teams.
- **Available insecticides:** those containing organic phosphates or pyrethrin (card 17), with diesel oil (thermal fogging) or without (cold fogging).
- **Constraints and limitations**
 - >> Fogging is particularly effective against exophilic anopheles species (which remain outdoors, card 3). The behaviour of local mosquitoes must first be elucidated (card 37).
 - >> Globally expensive: the product and the special equipment, trained teams, frequent application.
 - >> Wind (>10 Km/h) or unstable weather conditions can compromise efficacy.
 - >> Fogging will affect only those mosquitoes that are outside during the operation.
 - >> "Thermal fogging" emits a thick cloud as well as a strong smell, and leaves behind unpleasant oily deposits.
 - >> *Anopheles* bites all night: a fogging operation at nightfall will mainly destroy mosquitoes which are outside at that particular time, such as dengue-fever carrying *Aedes*.

Context and conditions for fogging

- In densely populated (notably urban) zones where malarial transmission is unstable or stable but low (card 15), this option may be implemented as a complement to an integrated program (card 40).
- This basically applies to **epidemic outbreaks** when there is an explosion of mosquitoes around human dwellings (card 26) as well as the special case of refugee camps (card 26).

To find out more:

- "Manual on fogging"

whqlibdoc.who.int/hq/2003/WHO_CDS_WHOPES_GCDPP_2003.5.pdf

WHO manual on fogging.

INDOOR RESIDUAL SPRAYING (IRS): GENERAL POINTS

KEY POINTS

- IRS (Indoor Residual Spraying) is a vector control method in which liquid insecticide is sprayed on the interior walls and ceilings of homes.
- It has a two-fold effect:
 - >> lethal: the insecticide kills *Anopheles* mosquitoes when they land on the wall;
 - >> repellent: the insecticide keeps *Anopheles* mosquitoes outside dwellings.
- It is particularly suitable for urban areas with unstable or moderate seasonal malaria transmission and also in emergency situations.
- Therefore, although it is expensive (5 to 20 euros for one treatment in a standard home), IRS is the most widely used vector control solution.

IRS (Indoor Residual Spraying) is an effective method that can be used as an alternative to mosquito nets, especially in regions where malaria transmission is moderate. The ban on DDT introduced at the start of the 1980s meant that it was little used thereafter. However, many countries are now beginning to use the method again (cf. card 17).

Since September 2006, IRS has been one of the three priority control methods recommended by WHO, alongside insecticide-treated nets (cf. card 22) and ACT treatment (cf. card 33).

The two-fold effect of IRS

Liquid insecticide sprayed over walls and ceilings has a two-fold effect against mosquitoes lasting several months:

• **A lethal effect:** *Anopheles* mosquitoes which bite inside the house and then land on the walls to digest their blood meal will be killed within seconds (cf. card 3). This first effect is termed "altruistic" since it does not protect the individual who has already been bitten but does protect other people who may have been bitten later. The lethal effect interrupts the future transmission cycle.

• **A repellent effect:** IRS acts as a repellent - in this case before the bite - by deterring *Anopheles* mosquitoes from entering a home in which the walls have been impregnated with insecticide. This repellent effect substantially reduces the number of mosquitoes entering the house and, consequently, the number of bites.

Other positive effects
Some insecticides used for IRS also significantly reduce the presence of other unwanted insects, such as cockroaches and flies, etc.

⚠ Caution: IRS only provides partial personal protection. Some *Anopheles* mosquitoes may still get inside a treated home and are capable of biting. Consequently, the simultaneous use of mosquito nets (the safest personal protection method when a person is in bed) is still recommended, even in homes treated by IRS (cf. cards 22 and 40).

A method particularly suited to areas where the transmission rate is low or moderate

- When the transmission rate is too high, a reduction in transmission will not result in a significant drop in the incidence of malaria (cf. card 9).
- Therefore IRS is particularly recommended in areas where malaria transmission rates are low to moderate: urban areas or areas where malaria transmission is unstable, or where it is stable or seasonal with a low to moderate transmission rate.
- In areas where the transmission rate is very high, it is recommended that IRS be combined with other measures (mainly insecticide-treated nets, cf. card 40) or that the frequency of IRS campaigns be increased. Otherwise, the results could be disappointing.

A priority method in emergency situations

- IRS is particularly recommended to control epidemics or protect groups at risk (work, military or refugee camps, cf. card 26).
- According to WHO, IRS ought to be considered a priority preventive measure in numerous emergency situations: it can be implemented quickly and it is possible to achieve total cover of the entire target population.

A relatively expensive method


- Out-sourcing to a service-provider will cost around 20 euros for the equivalent of an average-sized house (200 m² of surface area to be treated, including walls and ceilings). The price of the insecticide accounts for a third of this cost: 7 euros per 200 m² (source Jaco SA, Cameroun 2006).
- A NGO or association can only justify using a private service-provider in very exceptional circumstances (e.g.: in the event that a very localized epidemic is triggered).
- For a large-scale program (lasting cover for several hundred homes), it is preferable to conduct IRS operations with the aid of members of the community. This can bring the cost down to between 5 and 8 euros per home (see box).

The IRS program in Zanzibar (Tanzania)

The Zanzibar NMCP, which has the technical support of the Research Triangle Institute, a NGO based in Washington, has been running a large-scale IRS program since 2006. There are 2 campaigns every year (only one from 2008 with the use of high-remanence pyrethrinoids) covering the whole island (apart from the old town, where access is difficult for the teams). 450 agents and 90 supervisors, all local, work for a period of 55 days. Approximately 200,000 homes are treated in each campaign, guaranteeing a coverage rate of more than 90%.

In addition to the initial costs associated with training and renovating several storage buildings, **the cost of a campaign is around 9.3 dollars (US) per home**, i.e. 1.8 dollars (US) per capita. See card 40 for the results of the Zanzibar integrated program.

(source Zanzibar Malaria Control Program)

 The lethal effect can only work if the mosquito bites and then lands on the walls or ceilings inside the house. Although this is usually the case (cf. fiche 3), it is important to identify the species present (with the help of an entomologist, if necessary) in order to make sure that IRS is suitable for its particular behavior. (cf. card 21).

INDOOR RESIDUAL SPRAYING (IRS): SOME PRACTICAL TIPS

KEY POINTS

The implementation of an IRS campaign (indoor residual spraying, cf. card 19) requires careful preparation and significant human and logistical resources:

- Choice of insecticides and dosages on the basis of resistance patterns, types of surface to be treated and ministry of health authorizations;
- Special IRS spraying and protective equipment;
- Recruitment of agents from the community and training of teams (2 weeks): safety rules, behavior, equipment handling, spraying technique, etc.



Warning: IRS is a method that is complex to implement. It is recommended that the assistance of the NMCP, a research institute or any other organization experienced in the various phases (choice of insecticide, purchasing of equipment, training of teams, general organization, etc.) be sought.

Insecticides: choice, form, dosage

• **Choice of insecticides:** it is necessary to comply with WHOPES recommendations (cf. card 17). A list of suppliers is available on the RBM site.

Two precautionary measures are necessary: the absence of any resistance of the vector to the product chosen must be verified and the insecticides used must be varied (cf. card 17).

>> DDT (see box), which is inexpensive and effective and has high remanence (lasts 6 to 13 months) is particularly suitable for traditional dwellings with porous walls.

>> DDT Pyrethrins are also suitable due to their low toxicity and their good remanence: very high-remanence pyrethrins (lasting 9 to 12 months) are now available for IRS. The variety of pyrethrins available makes it possible to rotate the insecticides used, which is a good way of limiting the development of resistance.

• **Insecticides exist in different forms:** wettable powders (the most widespread form, but one which can leave stains), emulsifiable concentrates, concentrated suspensions, micro-encapsulated suspensions (the latter form does not stain walls).

• **Insecticide dosage:** this is specific to each insecticide and WHOPES recommendations must be strictly followed (cf. card 17). The surfaces to be treated will each have a different absorption capacity which affects the efficacy of the insecticide and hence the dosage that needs to be used: walls made of earth absorb more than walls made of concrete blocks and plaster.

Example: The pyrethrin used for the Zanzibar program is packaged in 62.5-mg sachets, to be diluted in 8 to 10 liters of water. One diluted sachet can treat a surface area of 200 m² (i.e. one town house or 2 / 3 traditional houses) *(source ZMCP)*.



Is DDT authorized again?

In September 2006, WHO decided to re-authorize the use of DDT **for IRS operations** only. Several countries, particularly in Southern Africa, now allow DDT to be used once again for IRS. Others are in the consultation phase. Therefore it is essential to contact the Ministry of Health in all cases to check what the national regulations are.

Equipment required

- Pumps (motor, tank, nozzle, etc.) and protective gear (see below). Allow around €300 for spraying equipment and €30 for protective gear (source *Jaco SA, Cameroun, 2006*).
- **Caution:** the spraying equipment is not the same as that used in an agricultural setting, for example: **using unsuitable equipment may endanger the health of residents** of treated houses due to the risks of overdose. In Africa, it is often necessary to import suitable nozzles (via an insecticide supplier, for example).
- It is also necessary to provide vehicles to transport the teams, along with **secure premises for storing equipment and insecticides** (see box).

⚠ Beware of theft! Insecticides, and particularly DDT, must be very strictly controlled. If they are stolen and resold as products for use in farming, their incorrect use can pose a significant danger to public health and the environment.

Human resources required

- IRS is an expensive method; the only way of keeping the cost reasonable is to recruit members of the communities concerned to carry out spraying operations (cf. card 19). It is worth noting that women, often very industrious in their work, can make very good operatives.
- To avoid any risk of operatives being poisoned and because IRS is a very physically tiring activity requiring a lot of concentration, **teams should not work for more than 4 or 5 hours per day** (WHO recommendation). **An operative can therefore treat between 6 and 10 homes per day** (standard home, 3 / 4 rooms).
- Constant supervision is essential: ideally, there should be one team leader for every 5 operatives.

Training teams

- **It often takes 2 weeks to train an operative.**
 - >> **Theoretical component** (one week): the purpose of IRS, safety precautions, signs of poisoning, equipment handling and maintenance, how to act with communities, etc.
 - >> **Practical component** (one week): spraying (crucial part requiring genuine expertise), insecticide mixing, pressure to be obtained (do not fill the tank right to the top), etc.
- **Teams need to take a series of precautions:**
 - >> Wear protective gear: mask, hat, gloves, goggles, overalls, boots.
 - >> Wash face and hands, avoid eating and drinking while working, wash at the end of the day and change clothes.
 - >> Wash work clothes every day (separately from any other clothes), change mask filters every day.
 - >> Have antidotes available in case of poisoning.

To find out more:

- **"IRS manual"**

[Whqlibdoc.who.int/hq/2000/WHO_CDS_WHOPES_GCDPP_2000.3.Rev.1.pdf](http://whqlibdoc.who.int/hq/2000/WHO_CDS_WHOPES_GCDPP_2000.3.Rev.1.pdf)
WHO practical guide on IRS implementation

- **"Insecticides for IRS"**

www.who.int/whopes/Insecticides_IRS_Malaria_ok.pdf
List of insecticides recommended by WHO for IRS

Learning how to spray

- Apply spray standing 45 cm away from the wall (too close and the concentration will be too high, too far away and the insecticide will not penetrate properly).

A good training method involves attaching a 45 cm-long stick to the end of the nozzle.

- Spray from bottom to top in 75 cm wide strips, without leaving any gaps.

A training wall must therefore be provided, with vertical lines painted every 70 cm (to teach operatives not to leave any gaps), which operatives can practice on for 2 or 3 days...

IRS: IMPLEMENTATION CONDITIONS AND PRECAUTIONS

KEY POINTS

- IRS (Indoor Residual Spraying) involves going into people's homes to treat them: information campaigns are necessary to prepare the household and prevent any risks of poisoning.
- For IRS to have a significant impact, the mosquito population needs to be substantially reduced. For this reason, a campaign must seek to cover the whole target zone.
- Discontinuing IRS may endanger people. If it is impossible to continue operations, it is essential to plan substitution measures (mosquito nets, sanitary measures, etc.) a year or two before they are definitively stopped.

⚠ Important: The use of IRS (and, in particular, the choice of insecticide used, cf. card 20) is subject to Ministry of Health authorization. It is essential to contact the NMCP as well as the administrative and political authorities before planning any IRS program.

Prepare the target population for an IRS campaign

• **IRS involves going into people's homes, which must be prepared for spraying:** the population may express genuine reluctance or real concerns:

- >> danger to health,
- >> staining of walls,
- >> smell, etc.

• **A prior IEC campaign is therefore necessary** to win the support and full cooperation of local people:

- >> reassure with respect to common concerns;
- >> convince them of the benefits of the operation;
- >> inform them of the date and time their home will be sprayed;
- >> give instructions on how to prepare their home and avoid any risk of poisoning (see box).

• It is recommended that these messages be passed on via community leaders, by means of door-to-door operations and media campaigns (radio, newspapers, etc.). Photos of sprayed walls may be useful for demonstrating how clean the result is.

⚠ 3 essential pieces of information to be passed on

- Get your house ready for the arrival of the spraying team:
 - >> Walls and doors must be cleared to allow spraying: remove furniture or cover it carefully.
 - >> Remove any food, water, crockery and clothes, and any harvested crops that may be kept in the house.
- Wait for at least 2 hours before going back home again to avoid any risk of poisoning or irritation.
- IRS only kills malaria-carrying mosquitoes that bite at night. Do not be surprised, therefore, if you continue to see mosquitoes during the day. Skepticism of local populations in response to the continued presence of Culex or Aedes mosquitoes can lead to refusal to take part in future campaigns.

Aim for total cover of the whole target zone

- To break the transmission cycle, the Anopheles mosquito population needs to be substantially reduced. For this reason, the lethal effect of IRS can only have a significantly impact if almost all homes in the target zone are treated (cover > 90% of a target zone).
- If the cover is inadequate, only the repellent effect will have any impact. In this case, the cost of an IRS campaign may prove to be excessively high relative to the results obtained.
- Consequently, IRS is a solution more suitable for areas that are more densely populated:
 - » for reasons of efficacy, with the aim of bringing down the number of Anopheles mosquitoes within a well-defined perimeter;
 - » for logistical reasons, in view of the difficulty of treating very dispersed homes



A danger to untreated houses

- The few untreated houses located close to treated ones are at risk of being targeted by mosquito attacks, constituting a real danger to their residents.
- An IRS campaign in a given area must therefore aim for total cover of all the homes in the zone.

N.B : To enhance their effectiveness, it is recommended that spraying operations be carried out in the weeks preceding the rainy season..

Sustaining operations in the long term

- It is dangerous to stop IRS, just as it is to stop spraying for larva control (cf. card 18), since to do so would suddenly expose populations to renewed transmission.
- IRS campaigns are therefore part of a long-term initiative. It is important to:
 - » **make sure that there are sufficient funds to continue the program in the long term** (cf. card 19);
 - » **make use of the community and forge partnerships** in order to ensure enough long-term support to be able to conduct regular campaigns, at least once or twice a year;
 - » **monitor campaigns to make sure that** IRS continues to be effective (every 1 to 2 years).
- Several types of studies can be conducted for the purposes of monitoring:
 - » Epidemiological studies to assess the reduction in malaria cases.
 - » Tests to assess the resistance of vectors to insecticides, to be conducted every 2 years. Unlike mosquito nets, IRS can quickly lose its effectiveness if resistance develops.
 - » Entomological studies (cf. card 37) to measure the fall in transmission and the development of behavioral resistance in Anopheles mosquitoes (mosquito traps to count the number of mosquitoes coming out, collection of mosquitoes entering the house). The vector may gradually change its behavior, biting or digesting its blood meal outside, for example.



Before discontinuing IRS, replacement measures must be immediately implemented to prevent risks linked to renewed transmission: massive distribution of mosquito nets and strict monitoring of their use, launch of a sanitation or biological control program one or two years prior to discontinuation.

KEY POINTS

- Insecticide-treated mosquito nets are the cornerstone of personal protection.
- These nets have an exceptional cost/efficiency ratio.
- The numerous other solutions are significantly more expensive and hence should be considered as complementary measures, to be used in exceptional cases.

The aim of personal protection is to limit contact between individuals and the vector. There are numerous ways of doing this, but the associated efficacy and costs of each vary considerably.

The use of personal protection is related to a change in behavior: IEC plays a key role in this process (cf. part II, chapter 1).

Insecticide-treated mosquito nets

- Insecticide-treated mosquito nets (ITNs) provide a remarkable degree of protection to individuals during their sleeping hours, i.e. when people are most exposed to infective bites (cf. card 3).
- The cost/efficacy ratio is exceptional, to the extent that WHO classifies it as one of the cheapest methods in terms of cost per avoided case, for any disease, and Time Magazine made the insecticide-treated mosquito net Invention of the Year in 2004. In addition, implementation of a mosquito net operation is much simpler than other vector control measures.
- However, additional measures are still necessary to protect individuals outside their sleeping hours.

According to WHO, a rate of ITN use of more than 80% leads to a reduction in infant and child mortality of around 25%.

Other measures

⚠ Important : All the following measures (apart from the treatment of tents with insecticide) are considerably more expensive than ITNs, as shown in the comparative table at the end of the card. They are briefly outlined in order to provide general knowledge about personal protection and overcome misconceptions with a view to persuading readers that mosquito nets are the best solution. Theoretically, an NGO or association will only turn to these measures in exceptional circumstances.

- **Mosquito coils:** repellent and knock-down effect that works for 6 to 8h. Inexpensive (less than one euro for a dozen mosquito coils), this solution can be recommended for indoor use, alongside mosquito nets, before going to bed. Mosquito coils can cause irritation (cough) or discomfort (odor) and they are of variable quality.
- **Electric insecticide diffusers:** a good means of protection and a potential alternative to the mosquito net. These should be plugged in one hour before going to bed. They last between 8 and 45 days (for liquid insecticide). Expensive (approximately 10 euros for 300 hours, 2008 price, Cameroon).

- **Body repellents:** very effective if the right product is used in the right concentrations. But the cost is prohibitive (between 5 and 10 euros for one can, price 2008, Cameroon). Four products are currently effective: Citrodial (30 to 50%), KBR 3023 (20 to 30%), DEET as a priority (at a concentration of 30% and over), IR35.
- **Aerosols:** Immediate lethal effect. Expensive (300 ml: 1.5 euros, enough to treat 2 or 3 rooms for one week, price 2008 Cameroon). Awkward to use and may cause irritation (cough, etc.).
- **Impregnation of fabrics with insecticide:** clothing, but also curtains, canvas tent linings (suitable for tents in refugee camps), bed covers, veils, scarves, etc. Useful for light clothing, even long garments: some bites may penetrate clothing). Treatment needs to be repeated every 2 months or after 5 washes. Cost and application methods highly variable. Recommended for expatriates or in very specific situations (forestry workers, etc.). Curtains are treated with the same insecticide as that used for mosquito nets.
- **Air-conditioning and fans:** air-conditioning makes mosquitoes less aggressive (low temperatures make them sluggish) and keeps them away. Fans can also keep them away. These methods can only be used as complementary measures: they do not stop mosquitoes biting and are therefore not reliable).
- **Mosquito screens fitted at windows:** this makes it difficult for mosquitoes to get into the house and is useful when a house is already well protected.
- **Other precautionary measures:** wearing loose, full-length clothing, preferably light-colored, limiting sources of light, etc.

By way of indication, the table below provides an estimate of the respective annual costs of 5 personal protection methods used for a family of 5 people, sleeping in 3 separate beds in 2 different rooms (2008 price, Cameroun).

	Cost / year	Assumptions
Insecticide-treated mosquito net	€6	Average annual cost of €2 for a long-lasting ITN
Mosquito coil	€50	1 coil / room / day, €1 for 15 coils
Electric insecticide diffuser	€240	10 hours of use / day (i.e. 20 hours for both rooms), €10 for 300 hours of use
Body repellent	€300	1 can / month / person, €5 per can
Aerosol	€100	1 can for the house / week, €2 per can

To find out more:

- **"Safe and effective use of household insecticide products"**

www.malaria.org.zw/Vector/vc13.pdf

Additional information on mosquito coils, electric diffusers, body repellents, aerosols and textile insecticide treatment.

• "Mosquito Control : Personal Protection"

www.malariasite.com/malaria/personal.htm

A variety of information, in particular concerning repellents, insecticide diffusers and the treatment of clothing.

THE MOSQUITO NET: CHARACTERISTICS AND CHOICE

KEY POINTS

- It is essential to favor long-lasting insecticide-treated mosquito nets over any other type of mosquito net. The insecticide used to treat the mesh of these nets remains effective for between 3 and 5 years.
- These can be obtained from suppliers approved by the NMCP, in particular social marketing organizations, or directly from manufacturers (for large volumes).

Choosing the right mosquito net

Mosquito nets can have different characteristics, some of which may have a significant impact on how effective and resistant they are, as well as on their adoption and use by people.

· Treatment of the mosquito net with an insecticide:

- >> This adds a repellent and lethal effect to the physical barrier represented by the net. Therefore, even if it has a hole in it or is not properly tucked in or is in contact with part of a person's body, it remains effective. In contrast, in such cases, an untreated mosquito net turns into a mosquito trap.
- >> When the level of coverage is high, there is a "mass repellent effect": mosquitoes enter equipped homes less often. Consequently, it is recommended that the highest possible level of coverage be aimed at.
- >> The majority of mosquito nets distributed today are "long lasting" insecticide-treated nets. These nets do not need to be retreated every 6 or 12 months, unlike traditional insecticide-treated mosquito nets. They remain effective for 3 to 5 years.

! It is essential to choose long-lasting insecticide-treated nets:

- elimination of re-treatment campaigns (always very difficult to conduct);
- more economical solution (no need to buy retreatment kits regularly);
- better resistance to washing (they can be washed up to 20 times).

• **The fabric:** Cotton, nylon, polyethylene, polyester, etc. Polyester is the most suitable for insecticides, provides better ventilation and has good physical characteristics. Long-lasting insecticide-treated nets are made of polyester. Polyethylene is often popular with users, but its physical characteristics are inferior to those of polyester. Cotton and nylon are less widely used, more expensive and less resistant.

• **The denier:** This is an indicator of the physical resistance of the mosquito net. A 100 denier net will be stronger, more expensive, more bulky and heavier than a 75 denier net.

• **Mesh size:** A 156 (holes per inch²) mesh net has larger holes than a 196 mesh net, providing better ventilation. This has no impact on the protection afforded.

• **The color:** Beware of colors that might be rejected for cultural reasons (black and white are sometimes risky). Dark blues and greens are preferred as they do not show dirt as much.

• **The shape:** Rectangular mosquito nets offer more space, whereas conical ones are easier to hang and store (cf. card 25).

• Conical or rectangular?

It is preferable to distribute nets in the shape that local people are most accustomed to. Their preference is often for a conical mosquito net since this is easy to install. A preliminary survey (concerning the shape and possibly also the color) among people may be useful.

Ordering and importing mosquito nets

· A list of approved suppliers in the country may be obtained by contacting the NMCP. Priority should be given to these since they are generally exempt from customs duties.

· **Among approved suppliers, social marketing organizations (e.g.: PSI, the leading non-profit-making organization in the social marketing sector, To find out more) are particularly recommended:**

» They are capable of negotiating highly advantageous prices and have special rates for NGOs and associations.

» They provide training in promotion (posters and flyers supplied), mosquito net use (hanging, retreatment, etc.) and campaign management.

Even when there is no social marketing structure in the country, it may be worth seeking one in a neighboring (source ACMS)).

Example: price of a long-lasting insecticide-treated net (including insurance and shipping), in the context of an order for 80,000 nets placed with PSI by the NGO Plan in Burkina-Faso: **\$5.32** (source Plan Burkina-Faso 2007).

· For large volumes (several tens of thousands of mosquito nets), it is possible to contact manufacturers directly to find out their prices. Two difficulties need to be taken into account in this case:

» Delivery times: since the majority of mosquito nets are made in Asia, delivery to Sub-Saharan Africa may take up to 6 months;

» Customs duties: it is important to explore avenues for avoiding these (registration of the structure with the relevant ministry, certification as a donation with the Ministry of Health, etc.).



Credit: WHO/TDR/Crump

Storage and transportation of mosquito nets to distribution points

· Storing mosquito nets does not pose any particular problems: mosquito net packaging is not sensitive to sun or rain. Expect a bale of 100 mosquito nets to weigh around 50 kilos and occupy a space of 0.5 m³. Mosquito nets are often available in bales of 25, 50 or 100.

· Stocks must be monitored: release forms indicate at least the date, quantity and distribution point concerned. The same process is necessary at the distribution point in order to monitor transportation of mosquito nets.

How many mosquito nets can be transported depending on the mode of transport?

· A motorcycle, scooter or even a bicycle can transport a bundle of 25 mosquito nets.

· A private car can take up to 400 or 500 mosquito nets.

· For greater numbers, a 4x4 vehicle or truck is preferable. A 10-ton truck can transport 15,000 mosquito nets.



Example of transport costs: It is necessary to allow 3 euro-cents to transport a mosquito net from the main storage point to the nearest office (100 km) and 4 euro-cents to the furthest office (400 km). (Source: Plan Burkina-Faso)

To find out more:

· "Insecticides recommended for ITNs" (WHO)

www.who.int/whopes/Insecticides_ITN_Malaria_ok2.pdf

List of insecticides with formulation and dosage.

· "Map of PSI programs"

www.psi.org/malaria/malaria-programme-maps.htm

Map of countries benefiting from a social marketing program coordinated by PSI.

THE MOSQUITO NET: ENCOURAGING HOUSEHOLD USE

KEY POINTS

- The same “marketing” criteria apply to mosquito nets as to any other product. To encourage their widespread adoption by populations, it is necessary to:
- Convince people of their value: benefits, the reasons why they are effective, etc.
 - Make them financially accessible: free of charge, grants, etc.
 - Make them physically accessible: multiple distribution points (health clinics, maternity clinics, town hall, commercial network, etc.), multiple opportunities to obtain one (antenatal and post-natal visits, vaccination campaigns, etc.).

It is not enough to make mosquito nets available. It is essential to ensure their adoption by the target population. The first step is to encourage households to obtain them in sufficient quantities. The next step is to make sure that they are properly used and that this use is sustained in the long term (cf. card 25).

Convincing people of the value of mosquito nets

• Emphasize the benefits in terms of wellbeing

Example: “With an insecticide-treated mosquito net, mosquitoes are KO and your sleep is OK” (Slogan painted on the WHO building in Congo).

• **Convince people that they are effective** in comparison with other methods of protection: “Mosquito nets are the best way of protecting yourself against mosquito bites”, “It’s at night that mosquitoes infect you with malaria: sleep under a mosquito net”, etc. Anopheles mosquitoes are silent when they fly. Therefore some people think that there are none in their area and so do not feel that they are at risk.

• **Stress the economic benefits:** The cost of malaria to populations is very high. One case of malaria avoided means one less doctor’s visit and no medicines to be paid for.

• **Answer questions and challenge preconceived ideas:** How do you hang them up? Do they irritate the skin? Do they make you hot? Do they restrict your movement? Do they make the room ugly or reduce visibility in it? (cf. card 25)...

• **Reassure people with respect to the insecticide treatment:** The process used prevents any risk of poisoning, even if the skin, nostrils or lips are in contact with the mosquito net.

• **Emphasize the value of mosquito nets:** Their use is a sign that parents are behaving responsibly with respect to malaria (in communities sensitive to this type of argument, a slogan of the following type could be used, for example: “Good fathers protect their families; they choose mosquito nets”), etc.

⚠ N.B.: It is tiresome to install mosquito nets every night and put them away again in the morning. **If people are not convinced of the value of sleeping under a mosquito net, they will stop using them.**


Propose accessible solutions for acquiring nets

Once populations have had their awareness raised, it is necessary to make mosquito nets financially accessible to them.

• **Distribution free of charge:** WHO considers that distribution free of charge is the best way of rapidly and effectively ensuring the widespread use of mosquito nets among populations that are often very poor. Free distribution obviously depends on the structure’s funding capacities.

• **Subsidized distribution:** This limits the risk of under-valuing mosquito nets and makes the system sustainable by helping to recover costs. But, obviously, the less subsidized mosquito nets are, the more difficult it will be for populations to buy them (especially in rural areas). Subsidies may be:

- >> generalized (the same subsidized price for everyone);
- >> targeted (subsidized price for priority targets);
- >> cross-subsidies (higher price for some targets in order to reduce the price for others), system adopted by social marketing organizations.

 A study conducted in Cameroon by the Association Cameronnaise de Marketing Social (ACMS, PSI network, cf. card 23) demonstrated that people are willing to spend up to 3.5 euros on average to purchase a mosquito net (3 euros in rural areas).

Multiplying distribution strategies and sites

Improving the physical accessibility of insecticide-treated nets (ITNs) involves providing multiple opportunities to distribute them.

• **Distribution in health structures and maternity clinics** (free of charge or highly subsidized):

- >> during routine consultations (particularly for malaria cases);
- >> during vaccination campaigns (measles, polio, etc.) or antenatal or post-natal visits (way of reaching a large number of priority targets - i.e. children and pregnant women - as well as making these health visits more attractive to people). However, beware of missing out part of the priority target: it is important, if possible, to allow the parents of children who have already been vaccinated or who have completed all their post-natal visits to benefit from the program.

• **Distribution at town halls or prefectures** (also free of charge or highly subsidized) when registering births.

• **Distribution by the commercial network** (paying or subsidized): Organize a system to supply commercial structures likely to sell mosquito nets: drugstores, grocery stores, etc.

• **Free distribution campaigns:** Make populations that are difficult to reach using the above distribution methods, due to their geographic isolation or social customs, the priority target. Make use of existing structures (village committees, women's associations).



The coupon system

A coupon (worth a set amount) is given to target people. In exchange for this coupon, they can receive their mosquito nets free of charge or at a reduced price (the coupon is a subsidy). This has several advantages:

- It increases attendance at health clinics, with health workers being made responsible for distributing coupons.
- It supports the local economy and small businesses, who continue distributing mosquito nets in the long term.
- It adds value to mosquito nets as a result of the effort involved in getting them: three months later, the use rate was 90% among the beneficiaries of a program conducted by ACMS (PSI) in Cameroon.



To whom should mosquito nets be distributed?

The strategies outlined above make the most vulnerable populations - children under the age of 5 and pregnant women (cf. fiche 27) - their priority target. However, in areas where malaria transmission is unstable, WHO recommends extending distribution to the whole population.

THE MOSQUITO NET: AIDING CORRECT USE

KEY POINTS

- A good system of distribution (cf. card 24) is not enough: it is necessary to continue following up the people who have received mosquito nets to ensure that they are being correctly used and maintained.
- There are two types of obstacles: bad habits with respect to mosquito nets and practical problems (primarily hanging and installation).
- IEC operations (Information - Education - Communication) combining the dissemination of messages with practical demonstrations must be carried out regularly after mosquito nets have been distributed.
- Home visits are a particularly suitable method of following up a mosquito net campaign.

It is common for mosquito nets to be used or maintained incorrectly. The focus on distribution (cf. card 24), which takes a great deal of energy, must not lead to the crucial follow-up phase being neglected. NGOs and associations are best placed to carry out this long-term action in the field.

Combating bad habits

Follow-up after a mosquito net campaign must incorporate IEC operations (Information - Education - Communication) to combat the bad habits and various reasons leading to:

• Mosquito nets not being used or only being partially used.

>> The fact that people may sleep outside during the hot season: present a hanging method allowing mosquito nets to be taken outside (see ¶ on hanging).

>> The impression of suffocating under a mosquito net (claustrophobia, feeling of being too hot - it is slightly warmer under a mosquito net): convince people that any discomfort is preferable to the risks associated with not using mosquito nets.

>> Laziness about installing mosquito nets: try to find the least tiresome method of hanging a net.

• Mosquito nets being used incorrectly.

>> Incorrect installation of the mosquito net: remind people that the net must be tucked in under the bed or under the mattress to ensure total protection.

>> Rough handling: nets are still relatively fragile. Remind people that torn mosquito nets lose all or some of their effectiveness and that they should therefore be handled with care.

• The most vulnerable people not benefiting from mosquito nets.

>> Appropriation by the head of the family: where communities are receptive to this, stress how honorable it is to be a responsible father or husband, capable of putting the health of his pregnant wife or young children before his own comfort.

⊕ Expect the unexpected!

In Lagdo (Northern Cameroon), a fishing region, some mosquito nets have been used as fishing nets...

(source CARE Cameroun)

Provide support to populations to resolve practical difficulties

Follow-up must also incorporate practical advice and demonstrations covering points that generally pose problems, right from the distribution stage.

• Hanging mosquito nets

This is the main difficulty; many people give up using their mosquito net because they cannot find a good way to hang it up properly. Here are a few solutions that can be suggested:

- >> for rectangular mosquito nets.
 - Attach the mosquito net to the ceiling with metal hooks;
 - Nail vertical lengths of wood to the feet of the bed to create a sort of canopy;
 - Take 4 sticks and push them into tins packed with earth and stones, again to create a sort of canopy. This is an ingenious system that can be used when there only a mat rather than a bed. It also makes it possible to sleep outside under a mosquito net.
- >> for conical mosquito nets.
 - Hammer in a nail to the ceiling and bend it or screw in a hook.

Note: In addition to hanging, two further difficulties may be encountered when hanging a conical mosquito net.

- The rope at the top of the conical mosquito net is often too short and the mosquito net does not touch the floor: in this event, lengthen the rope with a piece of string.
- The ring has been bent inside the packaging: use your hands to reshape it back to a circle.

• Treatment or retreatment of mosquito nets with insecticide

This operation will become less frequent with the advent of long-lasting ITNs but it will still have to be carried out for several years for existing mosquito nets.

Mosquito nets can be treated by people themselves at home, using treatment kits (see box). The main role of NGOs and associations is to:

- >> stress the need for this operation, which is often neglected by people;
- >> supply kits (see box);
- >> help people to use them, if necessary by organizing demonstrations and collective retreatment operations.

• Washing

People should be reminded to take a few precautions (normally included in the instructions for the mosquito net):

- >> Do not wash the mosquito net more than 5 times per year (no insecticide is left after 3 washes for a conventional ITN and after 20 washes for a long-lasting ITN).
- >> Do not wash or discard the water used for washing ITNs too close to a well, river or any drinking water source.
- >> Wash with soap and cold water.
- >> For mosquito nets to be retreated, wash the net before retreatment.



Treatment kits

- These contain a dose of insecticide for one mosquito net, protective gloves, a calibrated bag for mixing and instructions.
- The operation takes 15 minutes (plus one hour for drying).
- Long-lasting retreatment kits (around 2 years) are already available on the market.
- As with mosquito nets, it is necessary to make kits affordable. A study conducted in a rural area in Burkina-Faso demonstrated that people are willing to pay around 0.8 euros to treat their mosquito net (Okrah et al. 2002).
- After treatment, a mosquito net may smell slightly of insecticide. Inform people that this minor inconvenience will not last more than a few days and, above all, that it poses no danger to people sleeping under the net.



Monitor mosquito net use via home visits (cf. card 13)

Communication campaigns are sometimes not enough to guarantee long-term use of mosquito nets. Home visits are particularly appropriate for the follow-up phase of a mosquito net operation. They are an opportunity, after distribution, to:

- remotivate the households visited by reminding them of the advantages of mosquito nets and answering individual questions;
- provide assistance in the event of installation difficulties.

Unscheduled visits are also a way of checking whether mosquito nets are used. They are the most reliable way of measuring the success of a campaign (cf. cards 49 and 50).

ANTICIPATING AND MANAGING EPIDEMICS AND SEASONAL PEAKS

KEY POINTS

- Epidemics and seasonal peaks result from sudden increases in transmission rate at a particular time.
- These two forms of outbreak are quite different:
 - >> Epidemics break out from time to time in populations with low-grade immunity and result in a sudden increase in the number of severe malaria attacks.
 - >> Seasonal peaks concern partially immune populations and result in a more or less marked increase in malaria incidence.
- Epidemics require an immediate and integrated response; seasonal peaks demand a reinforcement of measures already undertaken.

Epidemics

- Epidemics are characterised by the **sudden outbreak** of malaria – particularly of **severe attacks** – amongst populations **with little or no immunity**. They occur:
 - >> in **unstable malaria** transmission zones: when subjects who have not developed any immunity are exposed to the parasite during a more or less isolated episode of transmission;
 - >> in **stable malaria** transmission zones: in immunologically naive subjects or in communities of people with low-grade immunity who have settled in a high transmission zone (refugee camps, lumbering sites, etc.).
- **Several factors call for enhanced vigilance vis-à-vis epidemic malaria**
 - >> unusual climatic conditions favorable to the development of mosquito and parasite;
 - >> migrations of non-immune populations;
 - >> interruption of malaria preventive measures.

There is a system to detect epidemics (MEWS, Malaria Early Warning System), based on monitoring of the three imbalances which can lead to epidemics.
- **Measures to be adopted:**
 - >> **Prevention**



Caution:

All preventive measures must be implemented within a few weeks of the appearance of epidemic-favoring factors (see the example below). Later, the mosquito and parasite populations will become too large and it will be impossible to interrupt transmission or reduce the incidence of the disease.

1. IRS: priority preventive strategy when the circumstances are propitious, i.e. adequate financial and logistic resources, conducive geographical conditions, endophilic mosquitoes (card 3) and willingness of the population (card 21 and box). At sites where the risk of an epidemic is high, teams should be trained and prepared to carry out a campaign within one month of the detection of changes that might favor the outbreak of malaria (see box).

2. **ITNs:** urgent distribution of insecticide-treated bed nets (ITNs), very high cost/efficacy ratio. Beware: ITNs must be procured several months in advance to avoid logistic problems.
3. **Treatment of textiles:** in the case of refugee camps, distribution of treated clothing, treatment of tents and tarpaulins.
4. **Fogging and spraying:** techniques which have an immediate effect on transmission but which can only be applied in very specific circumstances, e.g. in highly urbanized zones or in refugee camps (card 18). Spraying is carried out on a regular basis as breeding sites emerge. Fogging is carried out only when there is an explosion of the mosquito population around houses.
5. **Chemoprophylaxis:** an appropriate measure for a population which has been correctly identified (card 29).

>> Treatment

It is essential that malaria cases be systematically treated on the appearance of the first suspicious symptom. The most appropriate drugs should be administered before any preventive action is implemented. This will block progression to severe malaria and break transmission by reducing the human parasite reservoir (card 33).

Seasonal peaks

· Seasonal peaks – during which malarial transmission and incidence temporarily rise – generally occur a few weeks after the first rains (see following example) in a **stable transmission** area.

· It is easy to define the seasonal nature of malaria. The MARA project (Mapping Malaria Risk in Africa) has created maps detailing the seasonality of malaria in the various different zones.


· **Measures to be adopted:** reinforce existing initiatives

>> Prevention

1. **IEC:** intensify awareness-raising campaigns focusing on the disease and solutions (mosquito nets and a medical visit as soon as fever appears).
2. **ITNs:** emphasize the importance of the mosquito net, in spite of the heat (nights are often warm during the rainy season); distribution campaigns.
3. **IRS:** launch operations during the weeks preceding the rainy season for optimal effectiveness.

>> Treatment

Here again, systematic management of fever cases is the priority measure that will bring the transmission peak down.

 **E.g. in Dakar,** the rainy season peaks in August and malarial transmission peaks in September; incidence and mortality peak shortly afterwards, in October and November respectively. *(source IRD)*

To find out more:

· “MEWS (OMS) ”

www.who.int/malaria/cmc_upload/0/000/014/807/mews2.pdf

Malaria Early Warning System.

· “MARA - ARMA project”

www.mara.org.za

Mapping Malaria Risk in Africa / Map of malaria, distribution, intensity, seasonality.


PROTECTING CHILDREN AND PREGNANT WOMEN

KEY POINTS

- Children and pregnant women are the groups that need to be protected as a priority due to their vulnerability to malaria (cf. card 5).
- Every effort should be made to ensure that these groups always sleep under insecticide-treated mosquito nets.
- In areas of stable malaria transmission, pregnant women should be given intermittent preventive treatment (IPT) to provide additional protection. This involves taking preventive medication at least twice during the second and third trimesters of their pregnancy.

Children (infants)

- Children are particularly vulnerable during the first few years of their lives: the protection passed onto them from their mothers disappears after a few months and it takes several years for them to build up their own immunity (cf. card 5).
- Consequently, all official malaria control policies emphasize the specific need to protect children under the age of 5 years.

 The age of 5 had to be set in order to harmonize the various health policies pursued under the aegis of WHO. Since the length of time taken to acquire immunity varies depending on the zone and the individual (cf. card 4), extending preventive measures to incorporate children between 6 and 10 years old can only be beneficial.

>>> Fostering correct use of ITNs for children

- Malaria prevention in children relies primarily on promoting the use of insecticide-treated mosquito nets (except, possibly, in areas where there are regular IRS operations (indoor residual insecticide spraying, cf. card 19)). Mosquito nets are particularly suitable for children since the latter normally sleep all through the night. i.e. throughout the period when Anopheles mosquitoes bite (cf. card 3).
- In addition to distribution strategies targeting children (cf. card 24), promoting mosquito nets to parents must involve:
 - >> Reminders about the effectiveness of mosquito nets as a preventive measure in children.
- Repeat that a mosquito net protects them throughout the entire period when the malaria mosquito bites.
- Reassure parents that the insecticide used is not toxic, even for the very youngest children.
 - >> Reminders about the specific vulnerability of children
- If there is only one mosquito net in the home, priority should be given to the bed of the youngest children when installing it.
 - >> Practical reminders.
- Tuck mosquito nets in properly to prevent children from uncovering any parts of their body while moving around in bed.
- Make sure children go to bed early enough in the evening to avoid any risk of bites.



Encouraging children to take responsibility!

Promotion of mosquito nets, while primarily aimed at parents, can also target children from the age of 5 or 6. It is good to encourage them to take responsibility for the use of mosquito nets for both themselves and their younger brothers and sisters or their young neighbors. Their natural enthusiasm can have very good results (cf. card 14)!



The end of "Chloroquinization" in schools

Up until the end of the 1980s, children were given a dose of Chloroquine every week. The development of resistance to this drug and possible problems related to the acquisition of immunity have led to this preventive measure being abandoned (cf. card 29).

Pregnant women

- A pregnant woman's immunity decreases after the first three months of pregnancy, making her more vulnerable to malaria. The risks are therefore increased, not only for herself but also for the baby she is carrying (cf. card 5). Therefore pregnant women represent the second target group in malaria control programs.
- As for children, the focus in terms of prevention is on **insecticide-treated mosquito nets** (except possibly in areas benefiting from regular IRS campaigns), as well as on **intermittent preventive treatment (IPT)** in areas of stable malaria transmission.

>>> Fostering correct use of ITNs for pregnant women

- In addition to a targeted distribution strategy (cf. card 24), it is important to promote mosquito nets to pregnant women themselves and to their husbands:
 - >> Remind pregnant women that their pregnancy makes them doubly responsible: they need to protect both themselves and their baby.
 - >> Remind men that the comfort of a responsible husband and father is secondary to the safety of his pregnant wife and his child.



Warning : Some pregnant women wait until their baby has been born to start using the mosquito net they have been given. It is necessary to stress that they are at risk now.

>>> Encouraging pregnant women to take IPT

- IPT involves giving pregnant women at least two doses of a preventive treatment (generally sulfadoxine-pyrimethamine, SP) at antenatal visits from the second and third trimesters of their pregnancy. The conventional protocol is as follows: a first dose during the second trimester and a second one during the third trimester of pregnancy.
- IPT is suitable for areas of stable malaria transmission. In areas of unstable malaria transmission (or an epidemic), the level of acquired immunity is too low for IPT to be effective. In these situations, the focus should be on a rapid treatment strategy (cf. card 34).
- The main roles of NGOs and associations concerning IPT consist in:
 - >> convincing pregnant women of the importance of antenatal visits (for malaria and for a host of other diseases, for the future health of their baby, etc.);
 - >> making sure that pregnant women attend all their planned visits and, if necessary, accompanying them to these crucial appointments.

KEY POINTS

- Partially immune adult populations can be at increased risk in the event of moving from one region to another or following excessive exposure to mosquito bites.
- This is particularly true of people moving from a zone where there is no malaria or malaria transmission is unstable or an urban zone to an area where malaria transmission is stable and high.
- NGOs and associations must be vigilant in the event of any population movements and they must be prepared to implement specific awareness-raising and protective measures.

Natural disasters or wars and various lifestyles or jobs may lead people to move to zones where malaria transmission is more stable and higher: refugees, forestry workers, miners, as well as expatriates returning to their country or city-dwellers visiting the country, etc. In these new environments, their partial immunity may provide inadequate protection, exposing them to increased risks.

N.B.: This card makes particular reference to the different malaria transmission zones (cf. card 8), premunition (cf. card 4) and risks to vulnerable populations (cf. card 5).

Migrants

· People moving from one stable malaria transmission zone to another

Although premunition is partial and specific to certain strains of parasites, it is enough to protect migrants from severe malaria episodes (for example, a Gambian arriving in Congo).

>>> **No specific protective measures**

· People moving from an unstable malaria transmission zone to a stable malaria transmission zone

People living in an unstable malaria transmission zone or highly urbanized setting moving to a stable malaria transmission zone have inadequate immunity for this new environment and run real risks.

>>> **Systematic use of insecticide-treated mosquito nets. Immediate medical consultation in the event of a fever.**

Two examples :

>> City dwellers in highly urbanized zones, returning occasionally to their village: urban malaria >> stable malaria

>> Mountain populations moving down to rural plains: unstable malaria >> stable malaria.

· People returning from a malaria-free area to a stable malaria transmission zone

People originally from an endemic zone returning there after several years spent in a malaria-free area will have lost their immunity, and will be as unprotected as a foreigner from the North. Their situation is particularly risky since these people seldom realize that they are no longer immune and are not aware of the risks they are running.

>>> **Adoption of the same methods used for non-immune subjects (cf. card 4 and box), such as chemoprophylaxis (cf. card 29), intensive awareness-raising of the risks run.**

**Protecting non-immune subjects**

Any organization may need to plan protection for non-immune people (arrival of foreigners from the North, for example). Several methods exist (cf. cards 22 and 29):

- **Chemoprophylaxis:** priority measure, especially for people living in an endemic zone for a period of less than 6 months.
- **Insecticide-treated mosquito nets:** stress that the protection offered by air-conditioning is insufficient.
- **Diffusers and insecticide sprays:** more convenient than mosquito nets, these can replace the latter in a room in which the doors and windows can be hermetically sealed.
- **Repellent sprays:** for skin and clothing. These are the only means of protection against bites outdoors once night has fallen.

Naturally, these people must be treated immediately in the event of a fever.

- **Protecting refugees**

- The increased vulnerability of displaced populations (see previous part), the absence or collapse of the health system and a lack of human and financial resources often make malaria the leading cause of mortality in refugee camps in Africa.
- These camps are often affected by epidemics, particularly if the natural immunity of refugee populations is low.

>>> The measures to be taken to protect a refugee camp are therefore the same as those recommended to prevent and tackle an epidemic (cf. card 26).

KEY POINTS

- Chemoprophylaxis consists in taking regular doses of a medicine to protect against the onset and development of malaria attacks.
- It is aimed at non-immune people. It does not concern local populations – either adults or children – with the exception of pregnant women (cf. card 27).
- It is recommended that partially immune pregnant women be given IPT, intermittent preventive treatment (cf. card 27) and that medication for non-immune people be chosen on the basis of the three main resistance zones defined by WHO.

- Chemoprophylaxis involves taking a drug to prevent malaria attacks. Having previously been mass-administered to local people, it is now exclusively recommended in the following cases:
- in non-immune people residing in endemic zones, particularly travelers spending less than six months there;
 - in pregnant women, IPT (intermittent preventive treatment) being a form of chemoprophylaxis (cf. card 27).

The abandonment of large-scale chemoprophylaxis

- In the 1950s, the advent of chloroquine, a very cheap, effective drug with few side effects, led to the adoption of mass chemoprophylaxis policies aimed at local populations.
- Large-scale chloroquinization campaigns (Nivaquine®: one of the brand names for chloroquine) were conducted, particularly in schoolchildren.
- These policies came up against three main obstacles, leading to them being completely abandoned:
 - >> people tended to stop taking their medicine after a few months;
 - >> the parasite began to develop resistance to chloroquine;
 - >> there were major concerns about how the immune system might be affected (especially for children: how can immunity develop with the constant presence of drugs in the body?).

Chemoprophylaxis for non-immune people

N.B.: The information below is given by way of indication only, and for exceptional situations in which an organization is required to protect a non-immune subject (e.g.: an expatriate member from the North, cf. card 28).

- Chemoprophylaxis is a **priority preventive measure for non-immune people**, especially travelers (cf. card 28).
- The parasite has developed resistance to numerous drugs. Consequently, WHO has classified countries into four major types, based on the level of resistance.
- Different drugs may be used for chemoprophylaxis, on the basis of this typology. It is the physician who will choose which ones to use, since he has the knowledge required to define the most appropriate chemoprophylactic strategy for each situation. The table below provides an indication of the possible drugs depending on the zone:

	Risk	<i>P. falciparum</i> resistance	Drug	Approximate price / week
Type 1	Nil or very limited	Nil	No chemoprophylaxis	/
Type 2	Low and seasonal	Nil	Chloroquine	\$1
Type 3	Moderate	Low	Chloroquine + proguanil	\$4
Type 4	High	Strong, multiple resistance	Mefloquine	\$6
			Atovaquone + proguanil	\$20
			Doxycycline	\$3

(Table adapted from WHO / price Cameroon 2008)

Note : Malarone® (Atovaquone + Proguanil) has no marketing authorization in France for continuous use for more than 3 months

Warning

No chemoprophylactic treatment can offer total protection against malaria.

- Today, there are no longer any official recommendations concerning the use of preventive drugs for more than 6 months. For long-stay expatriates, it is therefore up to the physician to decide on the chemoprophylaxis strategy and duration.
- If a person is to stop chemoprophylaxis after several months, it is important that they have already adopted other personal protection measures (sprays, mosquito nets, etc.).

Why should chemoprophylaxis be continued after individuals have returned to their own country?

Preventive medicines protect against attacks but do not prevent the presence of parasites in the body.

Since attacks only begin several days after an infective bite, it is necessary to continue taking the drugs after having left endemic zones (e.g.: 8 days for Malarone®, 4 weeks for Savarine®).

To find out more:

• Malaria prevention

(Institut Pasteur / Institut de Veille Sanitaire)

<http://cmip.pasteur.fr/cmed/voy/frame-general1.html#paludisme>

Information concerning chemoprophylaxis

• Chemoprophylaxis by country (WHO)

www.who.int/ith/countries/en/index.html

Details by country of malaria type present and recommended preventive treatments

KEY POINTS

- Malaria is a disease with multiple forms, making its diagnosis complex.
- Clinical diagnosis, which is based on the symptoms observed, is therefore unreliable, leading to the number of malaria cases being grossly overestimated.
- A laboratory diagnosis (blood test, taken by a qualified person) is therefore necessary to confirm a genuine malaria attack and fine-tune the diagnosis (identification of the parasite species responsible and measurement of parasite density).
- In particular, the use of laboratory tests helps prevent antimalarial treatments being given to patients suffering from another disease that causes fever and also aids the diagnosis of the disease in question.

A distinction should be made between two different types of diagnosis: clinical diagnosis and laboratory diagnosis:

- **clinical diagnosis**, or diagnosis of a suspected case, is a diagnosis made following a full clinical assessment of the patient (including questioning and physical examination);
- **laboratory diagnosis**, or diagnosis of a certified case, is a diagnosis based on tests designed to detect the presence of the parasite in the patient's blood.

A complex and "blurred" diagnosis

• Malaria is an insidious disease that can appear in many different forms depending on the individual, to the extent that the main symptoms (cf. card 2) are themselves difficult to interpret (see box), even for experienced physicians.

Fever in the diagnosis of uncomplicated malaria

- Fever is the main symptom of malaria.
- The fever is not constant throughout the course of a malaria attack: therefore a drop in temperature does not necessarily mean that the patient is getting better, likewise, it may be the case that the patient's temperature has dropped at the time of the clinical assessment.

• Malaria can be easily confused with other diseases that cause fever, such as influenza. In practice, the clinical diagnosis of malaria is a "differential diagnosis": in a patient with a fever, the physician or nurse will only diagnose malaria once all the other diseases that can cause fever have been systematically ruled out.

• The many difficulties involved in diagnosing malaria lead to its incidence being over-estimated. It is estimated that, on average, **only 20 to 30%** of fevers in endemic zones are caused by malaria.

• However, in many clinics, fever cases are usually attributed to malaria. Many experts therefore estimate that **at least 50% of cases diagnosed in Africa are not actually malaria**.

• WHO has implemented a procedure to aid differential diagnosis, having devised a decision-making tree showing the various cases that the person making the diagnosis may encounter. However, many errors still occur.

Laboratory diagnosis: a major asset in terms of patient management

- Given the complexity of malaria symptoms, laboratory diagnosis is an essential complement to clinical diagnosis when it comes to confirming a genuine malaria case: **only detection of the parasite in the blood can confirm a malaria diagnosis.**
- In addition, laboratory diagnosis makes it possible to identify the parasite species involved (*P. falciparum*, *P. vivax*, *P. malariae* ou *P. ovale*), and measure the parasite density in the patient's blood.
- **The introduction of laboratory diagnosis into the management protocol represents a key advance in terms of patient health and malaria control.**

» **Improved treatment:** Some laboratory diagnosis methods make it possible to monitor the patient by measuring parasite density (cf. card 31).


More importantly still, for decades in numerous endemic zones health workers have tended to treat any fever as a malaria case as a precaution, given the high incidence of malaria.

Linking a fever to malaria too systematically can prevent the diagnosis of other diseases causing fever and expose patients to very substantial risks (people can also die from pneumonia if it is not treated in time). A negative laboratory result helps health workers in that it guides them to continue investigating for the presence of another disease that causes fever.

» **Reduction in the cost of drugs:** With the advent of ACTs, which are more expensive than chloroquine or Sulfadoxine-Pyrimethamine, **the use of laboratory diagnosis methods makes economic sense** since this often leads to a radical reduction in the number of antimalarial drugs prescribed (e.g.: Since the introduction of rapid diagnostic tests in public clinics in Dar-es-Salaam (Tanzania), antimalarial drug consumption has been cut five-fold (*source: Dar-es-Salaam City Council*)).

» **Reduction in the risks of development of resistance** of the parasite to drugs. Laboratory diagnosis avoids systematic administration of antimalarials in the event of fever, limiting the amount of contact between the parasite and the drugs used (cf. card 33).

» **Strict epidemiological monitoring:** Laboratory diagnosis is an important tool for monitoring a program, since it is the only way of accurately detecting changes in the incidence and prevalence of the disease (cf. cards 9 and 50).

 **One of the major roles of NGOs and associations is to support the introduction of laboratory diagnosis into management protocols.** This is particularly the case since the arrival on the market of **reliable rapid diagnostic tests at moderate prices (cf. cards 31 and 32).**

KEY POINTS

- Laboratory diagnosis, or diagnosis of a certified case, confirms and fine-tunes the clinical diagnosis by detecting the presence of parasites, identifying the species of parasites and assessing parasite density.
- The introduction of laboratory diagnosis and of rapid diagnostic tests in particular into the management protocol must be sustained (cf. cards 30 and 32).
- There are four main types of laboratory test:
 - >> thick blood smears, thin blood smears and fluorescent tests (QBC), all three of which are performed in the laboratory;
 - >> rapid diagnostic tests, the only method that does not require a microscope.

Thick blood smear

- **Principle:** a large drop of blood is taken from the fingertip and stained. Several observation fields of the slide are then examined under a microscope.
- **Equipment:** quite expensive and relatively fragile. The microscope costs at least 1000 euros (2008 price).
- **Human resources:** requires a well-trained laboratory technician (three weeks of specific training); it takes between 15 and 30 minutes to read each slide.
- **Variable costs:** low, less than 0.5 euro per test (2008 price).
- **Advantages:** reliability, when the test is performed correctly (see box), measurement of parasite density, possible to detect other diseases (filiariasis, borreliosis, etc.), relatively well-known microscope technique.
- **Drawbacks:** determination of the parasite species is not easy and takes at least 15 minutes, problems in the event of power cuts, mistakes possible if the laboratory technician's technique is not meticulous. Quality control procedures (checking of 100% of positive tests and 10% of negative tests by another laboratory technician) are essential.



Recommendations: The most widely used method in Africa and the gold standard. Suitable if there is a laboratory capable of operating according to the highest standards, with available, well-trained personnel. It should be noted that a laboratory may not be set up without the prior authorization of the Ministry of Health.

Warning: Thick smear tests are difficult to perform and a good level of training is required. Very often, the conditions in public hospital and clinic laboratories are not good enough to ensure a reliable result (old equipment, lack of time or expertise, etc.). Consequently, laboratory technicians tend to over-estimate the number of positive thick smears in case of doubt*.

Today, rapid diagnostic tests (RDTs) are a reliable alternative (cf. card 32).

* : In Dar-es-Salaam (Tanzania), only 7% of fevers are due to malaria. However, the city's public clinics report fever rates due to malaria of between 30% and 80% on the basis of microscopic examination (source: Dar-es-Salaam City Council).

Thin blood smears

- **Principle:** a small drop of blood is spread in a thin film and stained. Several observation fields of the slide are then examined under a microscope.
- **Equipment, human resources and cost per test:** as with thick blood smears.
- **Advantages:** reliability, determination of parasite species.
- **Drawbacks:** mistakes possible if the laboratory technician's technique is not meticulous, measurement of parasite density only when the density is high.

⚠ Recommendations: Same conditions and same warning as for thick blood smears. Gold standard for measurement of parasite density.

Fluorescent tests (Quantitative Buffy Coat)

- **Principle:** sampling of a drop of blood, staining of the cell nuclei and parasites, separation of white and red cells by centrifugation, detection of parasitized red cells using a UV lamp.
- **Equipment:** very expensive; microscope, centrifuge, UV examination system. Initial investment of around 10,000 euros (2008 price).
- **Human resources:** need for an experienced laboratory technician, 5 to 10 minutes per test.
- **Variable costs:** approximately 3 euros per test (2008 price).
- **Advantages:** excellent test; reliability, speed, easy to interpret.
- **Drawbacks:** no diagnosis of species.

⚠ Recommendations:
Method too expensive for the majority of NGOs and associations.

Rapid diagnostic tests (cf. card 32)

- **Principle:** application of a drop of blood to a test card containing parasite antibodies, reaction of the antibodies to the presence of plasmodium antigens (proteins produced by the parasite) indicated by the development of a test line.
- **Equipment:** no fixed equipment but a kit for each test (microlancet, test card, reagent, alcohol).
- **Human resources:** only laboratory test that can be performed without a laboratory technician.
- **Variable costs:** between 0.35 and 1 euro per test (2008 price).
- **Advantages:** ease of use, speed (reading after 10 to 15 minutes). Several types of tests exist, those which detect *P. falciparum* only, those which also detect one, two or three of the other three species.
- **Drawbacks:** no measurement of parasite density, sensitive to heat (their shelf-life cannot be guaranteed beyond a temperature of 30°C).

To find out more:

- "Malaria Diagnosis (CDC)"
www.cdc.gov/malaria/diagnosis_treatment/diagnosis.htm
Studies and links concerning the different methods

PROMOTING RAPID DIAGNOSTIC TESTS

KEY POINTS

- Highly reliable rapid diagnostic tests (RDTs) are now available, irrespective of the zone in which they are used.
- Their use must be supported, particularly in urban areas and moderate malaria transmission zones.
- Quality control and the training of clinic personnel are key requirements for the successful introduction of rapid diagnostic tests.

Laboratory diagnosis is essential to improve malaria control and the treatment of other diseases causing fever (cf. card 30). The advent of rapid diagnostic tests that are quick, reliable, inexpensive and easy to use (cf. card 31) has turned this method into one of the principal measures to be promoted.

Reliable tests

- Numerous studies conducted in the majority of endemic countries have shown that good-quality tests that are correctly transported, stored and used have an **excellent sensitivity** irrespective of the parasite strain in question⁽¹⁾.
- Their sensitivity is comparable to the most rigorous microscopic tests.
- Several countries have already adopted them as part of their management protocol (Zambia, Tanzania, etc.).

⁽¹⁾For example, *The reliability of diagnostic techniques in the diagnosis and management of malaria in the absence of a gold standard*, Ochola et al., Lancet Infect Dis., 2006, meta-analysis including all the studies conducted in endemic zones.



Avoid "local" reliability testing

The automatic reaction of physicians, nurses and laboratory technicians is to want to use a thick blood smear to confirm that the tests are efficient locally. Since thick blood smears are often not very reliable in numerous field structures (cf. card 31), frequent contradictions in the results tend to discredit the rapid tests, despite the fact that the reliability of the latter has been firmly established, irrespective of the region considered.

Context and conditions of use of rapid diagnostic tests

- The lower the number of malaria cases among patients suffering from fever, the more strategic it is to confirm cases using laboratory diagnostic methods. Consequently, RDTs are **particularly necessary in low to moderate transmission zones**.
- **Important:** In stable malaria, high transmission zones, WHO still recommends that all fevers in children under the age of 5 years be treated as malaria due to the frequency of malaria attacks among this population. However, some countries are already also recommending the use of RDTs for children under the age of 5. It is therefore important to contact the NMCP to find out which policy has been adopted.

Choice and purchase

- The choice between a test detecting *P. falciparum* only and a test that also detects one or more of the other species is made on the basis of *P. falciparum* prevalence. At present, no official conclusion has been reached with respect to this recommendation. **In zones where infections caused solely by one of the species other than *P. falciparum* are almost non-existent** (a large proportion of Sub-Saharan Africa, lowlands of Papua New Guinea), **WHO recommends the use of tests detecting *P. falciparum* only** (see box). Tests detecting several species are more suitable for low-prevalence zones where *P. falciparum* is absent or rare (e.g.: Ethiopia, where infections with *P. vivax* alone are prevalent).



In high-prevalence regions, cases of malaria due solely to one of the other species are generally very rare: even if a patient is a carrier of *P. vivax*, for example, he is usually also a carrier of *P. falciparum*. Yet these co-infections will be treated as malaria attacks due to *P. falciparum*. In such cases, the usefulness of tests detecting several species is therefore limited.

- The quality of the tests varies depending on the brands. Refer to the QHO list (cf. To find out more) and contact the NMCP to choose reliable tests that are already registered in the country.
- They may be ordered via WHO or directly from suppliers. Stress that the organization is working in a developing country in order to benefit from preferential rates, of around **0.35 euros per test** (2008 price). Remember to check first with the NMCP whether there are already stocks of the test in the country in question (donations received, public purchases, etc.): this is sometimes a way of obtaining tests free of charge or at very low prices.

Training health personnel

• It is essential to raise the awareness of personnel and train them in order to:

- >> convince them of the efficacy of rapid diagnostic tests (personnel often skeptical at the outset);
- >> ensure the tests are used correctly.

• Training lasts one day. It covers:

>> The practical use of tests and the conditions in which they should be used in accordance with the national protocol (in particular, a training session is an opportunity to stress that a rapid diagnostic test should not be used if the patient does not have a fever).

>> Actions to be taken on the basis of results (cf. To find out more / WHO decision-making algorithm):

- If the test is positive, treat the patient with antimalarial drugs;
- otherwise, continue diagnostic tests, without administering antimalarials.

>> Training also aims to **change the habits of health personnel**, often very keen on microscope tests or used to making the “fever = malaria” link. For this reason, training must go beyond the technical aspects and also include case studies and real-life scenarios. It must also give solutions to health workers to help them respond appropriately in the event of a negative result. In the absence of any technical documentation in the country, training material is available on the WHO site (cf. To find out more).

Supposed patient “pressure”

Some prescribers mention the difficulty of announcing a negative result to patients convinced that they have malaria. This is not a real problem and is often designed to justify their reluctance to use the tests. Patients normally respect the opinion of health workers as long as the latter reassure them that the tests are reliable and explain the benefits for their health.

Quality control

The use of RDTs in an operating zone requires three types of control:

- **Checking of the batch on receipt:** Make sure that the transport conditions have not damaged the tests. Ideally, a sample (120 tests) should be sent to the WHO reference laboratory for checking (one laboratory in each sub-region).
- **Quarterly checking of storage conditions:** This check is made by taking a few tests (4 randomly selected tests are enough) and checking them with blood containing the parasite and blood without the parasite (samples previously tested using a reliable microscope method).

Reminder: The temperature of the storage room must not exceed 30°C / 32°C. Stored under these conditions, tests have a shelf-life of two years.

- **Quarterly checking of health workers’ expertise:** Make sure that the tests are always performed correctly, by observing how the health worker proceeds on several patients. In particular, make sure that the right amount of blood is placed in the right hole of the rapid diagnostic test.

To find out more:

• Purchasing RDTs (WHO)

www.wpro.who.int/sites/rdt/purchasing_rdt.htm

List of available products and commercial contacts

• “Malaria diagnosis: a guide for selecting rapid diagnostic test kits” (UNICEF)

www.unicef.org/supply/files/Guidance_for_malaria_rapid_tests.pdf

Choice of tests according to zones, transportation, purchasing, etc.

• RDT Instructions and Training” (WHO)

www.wpro.who.int/sites/rdt/using_rdt/RDT+Instructions+and+Training.htm

Guide on the use of RDTs aimed at health workers

KEY POINTS

- Uncomplicated malaria can be treated effectively at a relatively modest cost.
- As long as the patient is not vomiting, an uncomplicated malaria attack can be treated orally. The most effective treatments today are combinations containing an artemisinin derivative (ACT). These effectively treat an uncomplicated malaria attack in just 3 days.
- NGOs can benefit from very low prices: as little as under 0.5 dollar (US) for children below the age of 5 years and under 1 dollar for other children and adults (*prices accessible to public, international and non-governmental organizations in 2008*).
- Severe malaria requires hospitalization for a period that will vary depending on how the clinical symptoms progress; it is usually treated with quinine, given intravenously to begin with, then orally once the patient's condition has improved sufficiently for this.

Treatment of uncomplicated malaria

! Uncomplicated malaria attacks can be treated very easily using oral medication, as long as treatment is given early enough.

· Drugs

- >> Some drugs can be used alone, such as chloroquine, mefloquine, or amodiaquine.
- >> However, in numerous endemic zones, *P. falciparum*, as well as *P. vivax*, have become increasingly resistant to these drugs, especially chloroquine (see box).

Factors leading to the development of resistance

- The widespread use of a single drug multiplies the opportunities the parasite has to adapt to it.
- If a drug persists in the body in active form for a long period, this has the same consequence.
- Incorrectly following the treatment or stopping treatment before the end of the course: only a fraction of the parasites are eliminated, promoting the selection of resistant strains.

- >> The increasing rate of treatment failure and the need to curb the spread of resistance have spurred a number of countries to adopt the combination of several drugs.
- >> The most recent and most effective combination therapies are artemisinin-based treatments, ACTs (artemisinin-based combination therapies).

The ACTs recommended by WHO (at 12/11/07) *

- artemether-lumefantrine
- artesunate + amodiaquine
- artesunate + méfloquine
- artesunate + sulfadoxine-pyrimethamine


* : The various combinations are cited by way of information. It is strongly recommended that you refer to the national policy concerning the combination chosen (cf. card 34).

· Choosing a treatment

This depends on several criteria, assessed by the physician. In multiple-resistance zones, however, it is strongly advised that the combinations recommended by WHO be used, the primary ones of which are **ACTs**. These present the following advantages:

- » **High efficacy:** there is almost no resistance to artemisinin, particularly if it is combined with another drug.
- » **Good compliance:** treatments combining two drugs - an artemisinin derivative and the combined drug - exist as coformulations. In addition, ACT treatment lasts only **3 days**.
- » **Limited risk of future development of resistance:** it is more difficult for the parasite to adapt to two drugs that attack it simultaneously from two different angles.
- » **Accessible price:** NGOs can benefit from the very low prices offered to public structures and international organizations: as little as under 0.5 US dollar for children below the age of 5 years and under 1 US dollar for other children and adults (2008 price).

In low-prevalence zones, in particular those where malaria is more often due to *P. vivax* than *P. falciparum*, other treatments - usually less expensive - can potentially replace ACT. WHO has issued precise recommendations concerning this issue (cf. To find out more).

 The same compound may often exist under several different drug names. Some may be cheap but their quality may be variable, depending on their source. Drugs of guaranteed quality may be more expensive to buy, but they are always preferable to drugs of uncertain quality.

Treatment of severe malaria

- Even if an attack has progressed to severe malaria, it can still be controlled as long as treatment is begun early enough (**within 24 hours**) but it is necessary to admit the patient to hospital.
- **Quinine**, the oldest of all the antimalarial drugs, is still the gold standard when it comes to treating severe malaria.
- Quinine, mixed with glucose solution, is injected as an intravenous infusion. Treatment is continued orally once the patient's condition has improved enough to permit this.
- Alternatives to this reference treatment also exist:
 - » intramuscular administration of quinine, with precautions for use to avoid accidents linked to the injection method, if the patient cannot be hospitalized immediately. N.B.: these treatments are stop-gap measures pending hospitalization, which is essential.
 - » the administration of artemisinin-based derivatives, of proven efficacy, by injection and/or the rectal route.

To find out more:

- "Malaria treatment guidelines (WHO)"

www.who.int/malaria/docs/diagnosticsandtreatment/TreatmentGuidelines2006-fr.pdf

Treatment recommendations on the basis of parasite species

KEY POINTS

Medical care provision is a priority of any malaria control program. Depending on their capacities, the way they operate and the healthcare system in the zone in which they are working, NGOs can become involved at various levels:

- by encouraging patients to attend clinics via IEC (Information - Education - Communication) initiatives;
- in the medical care itself, by providing clinics with equipment and technical support or, for some organizations, through management of health structures;
- in the provision of treatments, via drug management support, donations and subsidies, etc.;
- by educating patients how to take their prescribed treatment properly, working closely with health workers.


The involvement of NGOs and associations in terms of medical care can take on a variety of forms, depending on their mission, their areas of expertise and the framework of the national healthcare system. **This card is designed to provide pointers for actions that could be envisaged at each stage of the care provision process.**

Encouraging patients to seek rapid medical care

- Late or inappropriate medical care, or even no care at all, represents the main problem encountered in any malaria control program: nobody would die from malaria if all cases were correctly treated early enough (cf. card 2).
- Upstream, it is therefore necessary to **conduct IEC (Information - Education - Communication) campaigns to persuade people to seek medical advice if they have a fever** rather than resorting to traditional medicine (cf. card 44) or self-medication.

Support for medical care provision

- Apart from certain organizations (in particular religious structures), which have their own clinics, the actions of NGOs and associations in this respect are often designed to support the tasks of public health personnel, rather than treat patients directly.
- NGOs and associations can:
 - >> **Compensate for a lack of resources** in clinics by improving personnel training, supporting salaries, providing beds, etc.
 - >> **Raise people's awareness of severe malaria symptoms** and the specific risks of vulnerable groups (young children and pregnant women).
 - >> **Counter the isolation** of communities too far away from health centers by promoting the mobility of health workers through the purchase of motorcycles, or by supporting community-based care provision (cf. card 36)...
 - >> **Support the use of laboratory diagnostic methods (cf. card 32).**

 Even if the organization does not have its own internal medical team, it can help train health workers in the field of malaria by organizing training sessions. E.g.: fund a visit from a trainer (public or private if recognized), help transport health workers to the training location. etc.

Provision of appropriate, financially accessible treatments

• Provision of technical and logistical support for better drug management

- » Maintenance or creation of drug depots.
- » Training and monitoring depot managers: in particular, introduction of stock cards (see box), monitoring of re-stocking thresholds (generally 1 month) to prevent stocks running out, etc.
- » Advice and checks to guarantee proper storage of drugs: at the very least, make sure that drugs are kept in a clean, closed box, off the ground (on a shelf) and in a relatively cool room.

Important note: This technical advice can also be highly beneficial for private drug depot managers, in terms of providing them with the basic know-how and ethics of pharmacists.

• Purchase of drugs to donate to depots

In order not to destabilize health workers, communities and the local drug market, it is strongly recommended that priority be given to purchasing drugs included in the national protocol from the public central purchasing unit for essential drugs (cf. card 42).

• Make treatment financially accessible to populations

- » Free distribution: a solution that may be appropriate in the event of an epidemic or for very poor populations. It is recommended that this be avoided as a long-term strategy.
- » Cost recovery system (drug price = retail price for the generic medicine + small coefficient). Beware, if patients have to cover an excessive proportion of the price themselves, they will turn to drugs sold on the streets or traditional medicine...
- » Mutual insurance system: very good system since it creates the basis for collective, organized and sustainable management of health spending. However, it is difficult to set up (complicated administration, lengthy awareness-raising and education phase)

Stock cards

A fundamental store management tool, these must be kept **up-to-date at all times for each drug** and include at least the following columns: Date, Source, Incomings, Outgoings, Stock, Ordered, Batch number and Expiry date.

Educating patients to take their treatment properly

- The last phase of medical care provision: patients' full recovery without any subsequent relapses depends on them taking their treatment properly once they get home.
- Successful compliance with treatment is often dependent on the explanations given to patients by the person dispensing the drug. Health workers must therefore bear in mind the following steps:
 - » Explain the dosage several times (how many tablets should be taken and how they should be taken, at what time of the day and for how many days).
 - » Have patients repeat the information to make sure they have fully understood.
 - » Stress the risk of relapse if patients do not complete their treatment course.



Educating patients to take their treatment correctly to limit the development of resistance

Stopping treatment before the course is completed increases the risk of the development of resistance (cf. card 33). Raising patients' awareness of the importance of good compliance with their treatment also helps maintain the efficacy of ACTs in the long term.

PROMOTING MEDICAL CARE FOR SICK CHILDREN

KEY POINTS

- The provision of medical care for children – the main victims of malaria – is a priority objective of any malaria control program.
- When treated in time, malaria in children can be treated effectively using the right treatment methods.
- Successful treatment greatly depends on the families of sick children, particularly their mothers, who play a role both before and after the intervention of health workers.
- There should therefore be a focus on systematically raising their awareness of malaria symptoms and the associated risks, along with dispensing practical advice on how tablets should be taken.

In order to address the danger to young children, WHO recommends that medical care should begin within **24 hours** following the development of symptoms in children under the age of 5 years. In reality, children are rarely treated in the right way or fast enough.

⚠ Important note: The potential involvement of NGOs and associations in the medical care of sick children falls within the scope of support to public clinics defined in card 34.

Specific forms of treatment

The majority of drugs used in adults are also used for the treatment of malaria attacks in children. However, there are two differences:

- The dosage: this is dependent on weight, so the doses in children are lower.
- The dosage form: it is sometimes difficult to give treatment orally: children do not always know how to swallow tablets, they often vomit when they have malaria, etc. Therefore other forms exist that are easier to use:
 - >> **Syrups:** suitable for uncomplicated malaria when children do not know how to take tablets. However, for reasons of cost and availability, it is often better to advise parents to crush tablets (see next part).
 - >> **Suppositories:** suitable for children who are vomiting as long as they do not have diarrhea. For remote areas with no refrigeration facilities, heat-resistant suppositories exist (rectocaps).

The intravenous route is also used for severe attacks in children. However, intramuscular injection is dangerous (see box).

⚠ The dangers of intramuscular injection of quinine in children

When equipment is lacking or personnel have not been trained in giving intravenous infusions, the intramuscular route is sometimes used for severe malaria (cf. card 33). **However, the administration of quinine by intramuscular injection should be avoided in children:** this method of administration is painful. And, above all, an incorrect injection technique can cause paralysis of the leg.

Mothers, an essential link in the provision of medical care for children

- It is mothers who notice their children's symptoms and decide to get them treated, take them to the clinic and then look after them and give them their treatment.

- It is therefore essential to **educate** pregnant women (during antenatal visits, for example) and mothers.

- The messages and advice to be given include:

- » **A child with a fever should be brought to a clinic as soon as possible:** warn that a fever may come and go (cf. card 30), and about the risks of it rapidly progressing to severe malaria.

- » **Treatments that are effective and easy to take are available at a low cost** (see box).

- » **Some simple techniques can be learned to help children take tablets:** for example, mothers are advised to crush tablets with a pestle, spoon or fork, etc. and to dilute them in sugar and water to help their child swallow them (very simple but often essential advice).

- » **Convulsions in children require emergency attention at the nearest clinic:** faced with such dramatic symptoms, people often get scared and frequently take their child to a witch doctor rather than a clinic, a response that often proves fatal for the young patient. It is necessary to constantly repeat the message that these neurological problems are caused by malaria (or other diseases) and are not caused by a spell or magic.

⚠ Educating fathers too...

Mothers are the essential link in the provision of medical care for children, but it is also necessary to persuade men to allow them freedom to act. It is important to remind them that refusing to have a child with a fever treated quickly can be fatal, whereas effective treatments exist at little cost.

⚠ Treating malaria in children with only 3 tablets for under 0.5 dollar

ACTs (artemisinin-based combination therapies, cf. card 33) have been designed to make it as easy as possible to treat malaria in children: it is now possible to treat them with 3 tablets (one tablet for 3 days containing artemisinin coformulated with another drug); the treatment costs less than 0.5 dollar (US) (2008 price).

SUPPORTING A COMMUNITY-BASED CARE POLICY

KEY POINTS

- Self-medication refers to administration, to oneself or a friend or relative, of a drug that has not been prescribed by a doctor (or nurse) and without seeking medical advice. This is a risky practice and must be the focus of awareness-raising campaigns to encourage people to go to a clinic.
- For very remote communities far away from any clinic, tackling the practice of self-medication can be based on a community-based care strategy.
- The involvement of NGOs and associations working in the field alongside health authorities is essential to:
 - » Identify and train community care workers in the symptoms of malaria, the storage of treatments, their administration, etc.;
 - » Exert regular and very strict control over their interventions.

Geographic isolation, a lack of resources, and various customs often lead people to use self-medication (or to visit the local traditional medicine practitioner (cf. card 44)) rather than to go to a clinic. It is estimated that more than 50% of malaria cases are treated by self-medication *(source: WHO)*.

Tackling self-medication

- There are several risks involved in self-medication.
 - » The medicines chosen by patients without a medical prescription may not be suitable or may not be taken at the right dosage. For these reasons, self-medication increases the risks of complications, an incomplete recovery or relapse.
 - » Self-medication makes it more difficult for a physician to make a diagnosis in the event of consultation at a later stage for an attack that has worsened.
 - » The uncontrolled use of medicines contributes to the development of resistance (cf. card 33).
- IEC campaigns (Information - Education - Communication, cf. part II, chapter I) must therefore be conducted to:
 - » **Encourage people to consult a doctor or nurse as soon as possible** rather than resort to self-medication.
 - » **Improve knowledge about treatments.** Self-medication is a natural reflex for patients, and one which no measure will completely eliminate. Therefore, in parallel with communication campaigns designed to combat this practice, better information on antimalarials and their correct use must be circulated in order to reduce the risks.

Community-based care in remote areas


- For rural communities located several kilometers from the nearest clinic, self-medication or traditional medicine are practically the only solutions available.
- **In remote areas**, the management of malaria patients by trained members of the community, supervised and integrated into the healthcare system, may be a serious alternative.
 - » In the event of an uncomplicated attack: the community care worker is capable of making a quick diagnosis and immediately dispensing the appropriate drugs.
 - » In the event of a severe attack, the community care worker's role is, above all, to persuade the patient or the patient's family to go to the nearest clinic.



Effectiveness and implementation of community-based care still under debate

A program conducted in Ethiopia, combining IEC and community-based care, has cut malaria-related mortality in children under the age of 5 by 41% *(source: Malaria Consortium 2002, Marsh et al.)*. However, another study demonstrated a reduction in the incidence and prevalence, but not in mortality. Another 2 studies did not reveal any particular impact on the health of the communities *(source: Malaria Journal 2007, Hopkins et al.)*.

- **N.B.:** Common during the chloroquine era, community-based care programs have not yet been launched on such a large scale with ACTs (artemisinin-based combination therapies, cf. card 33).
- In general, the public health authorities do not have the human and financial resources to monitor a community-based care program (or home-based care program) on a day-to-day basis. **NGOs and associations can therefore play an essential role in terms of coordination, training and monitoring of community care workers.**

 **Warning:** Community-based care can present public health risks (incorrect diagnosis, incorrectly stored medicines, etc.). **It is not up to an NGO or association alone to decide to invest in community-based care. This decision must be made by the NMCP.**

Supporting a community-based care policy

• Identification of community care workers (working closely with local health authorities). In areas where community workers already exist, it is recommended that they be used (having first of all verified that they have the necessary skills). In areas where no community workers have been appointed, it is recommended that a consultation exercise be organized:

- >> so that the community itself can appoint its own community care workers;
- >> so that the role of these community care workers is clearly defined in their presence.

• Training community care workers

The success of community-based care depends on training of community care workers. These workers must be capable of:

- >> recognizing the symptoms of uncomplicated attacks and also of severe attacks, in order to direct patients towards a clinic, irrespective of distance;
- >> provide advice on how to give medicines (hand washing, etc.);
- >> store medicines and medical consumables (cf. card 34);
- >> rigorously keep simple financial accounts.

• Set up incentive measures for community care workers


Without any payment or incentives for community care workers, there is a risk that the system will collapse.

- >> In a community-based care program, a solution can be found with the community to provide material compensation to community workers (cf. card 47).
- >> Another solution is to give the worker all or part of the margin generally made on the retail price of essential medicines.

• Guarantee constant follow-up of the system

Community-based care can only operate if the activities of each community care worker are supervised **at least once every three months** by associations working in the field (the ideal being monthly checks):

- >> monitoring of accounting, with the data recorded (number of malaria cases diagnosed, number of uncomplicated attacks treated, number of patients sent to the clinic for severe attacks, etc.);
- >> checking of the storage conditions for drugs and compliance of the stock cards kept by the community care workers with the stock cards of the local drug depot;
- >> regular observation of how the community care worker handles the patients coming to him/her;
- >> supply of drugs and consumables (rapid diagnostic tests, for example) for community care workers far away from clinics.

 To foster the selection of motivated and competent community care workers, it is useful to help the community draw up objective criteria (literate person in good health, willing to stay in the village for a long time, who has already worked on a program. etc.

The need for close supervision in order to anticipate any problem in the system

Community-based care can have unwanted effects, requiring a high level of vigilance on the part of the NGOs involved. Examples:

- Some community care workers may claim to have expertise that they do not really have, refuse to travel, are fraudulent with their accounts, etc.
 - >> Replace these people immediately in order to maintain the system's credibility.
 - >> People may have a tendency to think that the medicines dispensed by community care workers are less effective than those distributed in private drug depots (source: Malaria Journal 2007, Nsabagasani et al.).
 - >> Launch an IEC campaign to defend the quality of the treatments used.



PART III: IMPLEMENTING A MALARIA CONTROL PROGRAM

This part is designed to assist an organization in the implementation of a program by answering the following three important questions:

Which control strategy should be adopted and what measures should be implemented?

The first cards are designed to help the organization:

- analyze the impact of malaria in the intervention zone, the risk factors (in particular, the behavior of the population with respect to the disease) and the existing control measures;
- define which zone(s) and which population(s) it decides to cover on the basis of its resources, the methods proposed and the configuration of the intervention zone;
- design an action plan on the basis of an integrated malaria control vision.

Which players are likely to contribute to the success of the program and how is it possible to work together with these players?

To be effective and durable, and because it has to be implemented within the framework of national public health policy, a malaria control program cannot be an isolated initiative.

Partnerships must be forged with the NMCP and local health structures; the project must be accepted by communities and if possible implemented by local partner associations. Partnerships can also be considered with companies that are well integrated within the intervention zone.

In addition to operational aspects, it may be beneficial for the organizations involved in malaria control to form a coalition in order to pool their respective experiences and adopt a unified and coherent advocacy strategy in favor of malaria control.

How can resources be mobilized in the long term?

The efficient operation of a program depends on project management: putting together the dossier, seeking funding, monitoring/evaluation, etc. These aspects are crucial: over and above technical aspects, the success of the initiative depends on the capacity of the program manager to motivate teams, monitor them day-to-day, meet commitments, promote the program to potential partners, both passive and active.

Chapter I: Defining an action plan

- Card 37 Assessing the situation
- Card 38 Carrying out a KAP survey
- Card 39 Defining the scope of action - target zones and populations
- Card 40 Adopting an integrated approach - combining several control measures
- Card 41 Adopting an integrated approach - incorporating malaria into development programs

Chapter II: Working in partnership

- Card 42 Integrating in the intervention zone
- Card 43 Making use of partner associations
- Card 44 Cohabiting with traditional medicine
- Card 45 Working together with companies
- Card 46 Organizing coalitions

Chapter III: Managing the program

- Card 47 Maintaining team motivation
- Card 48 Fundraising
- Card 49 Evaluation and monitoring: ensuring efficient implementation
- Card 50 Evaluation and monitoring: measuring performance and promoting the program

KEY POINTS

- Before acting to control malaria, it is first necessary to gather three types of information:
 - >> data on programs already launched locally by other organizations;
 - >> data on actions undertaken to control malaria in the past;
 - >> technical data concerning risk factors linked to the environment and the characteristics of the malaria concerned.
- The bulk of this preliminary study can be conducted internally by contacting local players competent in the subject.

An organization that decides to get involved in malaria control must necessarily:

- integrate into the existing health, social and community structure;
- adapt to local malaria characteristics.

Hence, before initiating any action, however modest it may be, information needs to be gathered beforehand so that a program can be designed that takes into account the specific characteristics of the intervention zone.

Data on the health policy and existing programs in the region

>>> **Objective: to meet the priority needs of a given region without deviating from national policy and avoiding duplication**

- The first automatic step is to contact the NMCP and public authorities: outline of national policy, agreement on priority needs by geographic zone and type of intervention (cf. card 39).
- The second step involves identifying and contacting the active NGOs and associations to identify exactly what programs are under way and determine whether it is appropriate to supplement or support their operations.

Note: The study does not concentrate solely on policies and programs launched to control malaria. It also looks at all other health issues (for example, it is possible to take advantage of a vaccination campaign to distribute mosquito nets), as well as agricultural policies, major construction projects under way, etc. (cf. card 41).

Identification of a population's priority problems

In addition to gathering technical and practical data, an inventory of the current situation must determine the way the communities in the zone view malaria and the appropriateness of an operation (KAP surveys, cf. card 38). Is malaria one of your priority problems? Do you really want to remedy it? If the answer is a negative one, it is preferable to question the relevance of the planned program in this zone or to schedule a community awareness-raising campaign aimed at demonstrating the extent of the problem.

Data concerning lessons learned from past experience

>>> **Objective: to act on the basis of lessons learned from the successes and difficulties of previous policies**

The reflection process with the NMCP, health authorities and NGOs with a long established presence is also designed to draw up an inventory of past successes and failures.

Example: The relaunch, with ACTs (artemisinin-based combination therapies), of a community-based care policy (cf. card 36) halted as a result of chloroquine resistance, raises questions concerning the reliability of existing community health workers, problems that may have emerged, the measures applied to remedy these, etc.

Medical, technical and practical data

>>> **Objective: to design actions adapted to the characteristics of malaria transmission in the zone (climate, breeding sites, mosquito species, etc.) and local lifestyles**

Note: some information can be obtained through observation and documentation. Other more scientific or technical data can be obtained from the NMCP, research institutes, consultancies, etc.

	Documentary, study, survey and observation	Information available from external structures			Reference cards
		R. inst. Univ	LHA	NMCP	
Definition of the risk related to environmental factors					
Mapping of natural breeding site	X	X		X	6
Definition of risks related to cultural factors					
Building sites, dams, market gardening, etc.	X	X		X	7
Knowledge and behavior of populations ⁽¹⁾	X	X			7
Definition of the mode of malaria transmission					
Epidemiology ⁽²⁾	X	X	X	X	8 - 9
Anopheles specie and vector behavior ⁽³⁾		X		X	3
Parasite species		X		X	1
Additional information on prevention					
Resistance to insecticides ⁽⁴⁾		X		X	17 - 21
Insecticide and mosquito net supply solutions	X			X	17 - 23
Dwelling concentration / type of dwelling	X				18 to 21
Existing methods of larva or vector control or those having already been used in the region	X	X		X	15 - 16 - 18 - 19
Additional information on care provision					
Organization, human and material resources of the health system	X		X		
Treatment combinations recommended in the country			X	X	33
Diagnostic and care protocols in clinics	X		X	X	31 - 32 - 33 - 35
R inst. : Research institutes		LHA : Local Health Authorities			
Univ : Universities		NMCP : National Malaria Control Program			

(1) **KAP surveys** (Knowledge - Attitudes - Practices, cf. card 38)

(2) **Epidemiological studies**

These usually involve monitoring the number of medical consultations due to fever, the number of diagnosed malaria cases, the number of hospital admissions, etc.

(3) **Entomological studies**

These aim to determine the characteristics of the vector (cf. card 3): the species present, breeding sites, the proportion of infecting *Anopheles* mosquitoes, behavior (exophagy / endophagy, exophily / endophily, biting times). Certain information is available from the NMCP or local research institutes. Before launching an IRS campaign (cf. card 19) or other larva or vector control operations, it is recommended that the organization contacts a research institute or university.

N.B.: This type of study is expensive, costing a minimum of 5000 euros, since it requires the intervention of a small team, made up of an entomologist and technicians, for several days.

(4) **Insecticide sensitivity tests**

The resistance of *Anopheles* mosquitoes to insecticides may be very local (zones of just a few dozen km²). It is therefore important to verify its efficacy before selecting an insecticide for larva or vector control (with the help of a research institute or university).

CARRYING OUT A KAP SURVEY (KNOWLEDGE – ATTITUDES – PRACTICES)

KEY POINTS

- A major component in terms of assessing the current situation (cf. card 37), a KAP survey is designed to guide and help monitor a program by specifying a population's knowledge, attitudes and practices with respect to malaria.
- A KAP survey, however perfunctory, is highly recommended.
- Since they require the involvement of an external service-provider, quantitative (statistical) surveys are very expensive and mostly recommended for large NGOs.

What is the purpose of a KAP survey?

- A KAP survey aims to specify knowledge, attitudes and practices with respect to malaria and support the program definition process:
 - » guide IEC campaigns (cf. card 10) to focus on the weak points identified;
 - » assess how the various actions envisaged will be received (impact felt, desire to act, etc.).
- KAP surveys are also a good monitoring and evaluation tool (cf. cards 49 and 50). When conducted regularly (e.g.: every 18 months), they help to evaluate the results of a program.

What type of KAP survey should be conducted?

“Professional” surveys: recommended for large organizations capable of outsourcing the work

• Quantitative surveys

- » A quantitative survey is based on the collection of a sufficient number of rigorous questionnaires containing questions that can be used for statistical analysis. A quantitative survey comprises 3 main phases:
 - drafting and testing a questionnaire;
 - administering the questionnaires (a sample of at least 80 people is recommended);
 - processing the questionnaires (data entry, statistical treatment, analysis).
 - » Outsourcing is strongly recommended:
- A minimum amount of expertise is required to draft a questionnaire and analyze the responses. Without this, there is a risk of ending up with results that cannot be used, or that are incorrect and misleading.
- Statistical analysis software is essential.
- Implementation can take time and requires strict compliance with certain rules, particularly for the administration of questionnaires.
 - » A KAP survey often costs several thousand euros.

Example: quantitative part of a malaria KAP survey conducted for an international NGO in Burkina-Faso, in the province of Namentenga (350,000 people):

- »» sampling: 60 clusters of 7 people (children and young mothers);
- »» human resources: 15 people (including 10 researchers for 3 days);
- »» time and cost for the quantitative part: one month of survey work, 7,000 euros (source: SERSAP 2007).

• Sampling

Selection of the people interviewed is crucial in order not to distort the results.

A widely used method is “cluster” sampling (applied notably by WHO), which aims to obtain proportional representation of the different communities in the sample, particularly isolated and small communities.

A cluster is composed of a small number of people, randomly sampled. To form a cluster of 7 mothers, for example, the first 7 mothers met when going in the same direction from a central starting point (e.g.: a village square) are interviewed. If the cluster is not complete when the researcher comes out of the village, administration of the questionnaires should be continued in the next village encountered, following the same direction chosen at the outset.

• **Qualitative surveys**

These studies, which are aimed at gaining an in-depth understanding of behaviors, require rigor and specific expertise. Specialists are generally commissioned to perform them: anthropologists, public health physicians, etc.

• **Documentary surveys**

A documentary survey conducted by a public health physician using health district data, supported by a field study lasting a few days, is a potential alternative to qualitative studies. It is necessary to allow around 1,500 euros for this type of survey

(source: SERSAP 2007).

“Qualitative-approach” surveys: the minimum required, can be conducted internally

• A qualitative-approach survey involves carrying out in-depth interviews on a small sample of people (e.g.: 10 to 20 people) on broad questions. This helps gain a better understanding of behaviors (e.g.: why do people not sleep under mosquito nets?) and identify the main trends.

N.B.: a qualitative study does not enable statistical conclusions to be drawn.

• Carrying out this type of study does not demand the same know-how or rigor as “professional” surveys. In its simplest form, it can consist of the drafting of a memo outlining the themes to be tackled, the completion of a few structured informal conversations (individual or in groups) and a rapid analysis of the results. Hence a qualitative survey can easily be conducted internally by members of the NGO or association with a little training.

• **It is strongly recommended that at least one study of this type - however perfunctory - be carried out before launching any malaria control operation (cf. card 37). This can help avoid a program being focused in the wrong direction.**

A very useful form of qualitative research: the focus group

An interview led by a moderator among a group of 6 to 12 people, a focus group enables comparison of opinions. It also reveals power relationships and latent conflicts, helping to predict potential stumbling blocks in a strategy.

Recommendations: Need for a very experienced moderator capable of recording reactions and retranscribing them. Conduct between 2 and 5 focus groups to obtain meaningful results (beyond this it will be impossible to analyze the results). Do not exceed a time limit of 1 hour 30 minutes per focus group.

Example: KAP survey focus group in Namentenga: 8 focus groups of 12 people. Cost: 2,500 euros (source: SERSAP 2007).

	Qualitative	Quantitative	Comments
Logistics / Cost	●	●	Statistical analysis of a quantitative questionnaire is very complexe
Possibility of self administration	●	●	
Representativity	●	●	
Statistical exploitability (monitoring, inventory, etc.)	●	●	
Training of interviewees	● ●	●	
Usefulness of information gathered	● ●	●	Beware of qualitative information: the information may appear to be interesting to non-profesionals wheras in reality it is very trivial.
Drawbacks	●	●	A quantitative survey is only valid if it is conducted on the entire target-population or on a sample of more than 100 people.

The aspects to be covered in a KAP survey

Knowledge:

- the transmission of malaria and biting times;
- the most vulnerable population groups;
- the effectiveness of the various protective measures;
- the symptoms of the disease (in particular severe malaria);
- malaria treatments.

Attitudes:

- feelings about malaria;

- perceptions and attitudes with respect to protective measures (mosquito nets, etc.)
- perceptions and attitudes with respect to the disease and modern medicine.

Practices:

- use of the various methods of protection;
- treatment habits.

DEFINING THE SCOPE OF ACTION

TARGET ZONES AND POPULATIONS

KEY POINTS

Defining the scope of action – an essential step in the design of a program – involves answering the following 3 questions:

- In which zone should the program be implemented? The answer depends on the degree of local presence, epidemiological criteria and populations' needs.
- Which groups of the population will be targeted? The answer depends firstly on the presence of vulnerable groups; it is then dependent on the actions envisaged.
- What area and how many people can be covered? The answer depends on the funding available, the dispersion of populations and the actions envisaged.

Consideration of the choice of intervention zone, its size (surface area and population) and the population groups to be targeted is essential:

- to ensure that the program reaches those who need it most;
- so that it can be carried out with the fewest possible difficulties and delays, without having to readjust targets downwards.

This card supports the organization in this reflection process by highlighting the various constraints in terms of defining the "scope of action".

Choice of intervention zone

· For national or international organizations with no specific presence, **the intervention zone must be chosen in liaison with the NMCP**. An objective choice is made on the basis of:

- >> the impact of malaria (cf. cards 8 et 9): give priority to regions with a high level of malaria transmission, those presenting specific risk factors (farming practices, etc. cf. card 7)...
- >> the needs of local people (particularly poor populations, populations not having benefited from any program, etc.)
- >> logistical and political factors.

· No choice needs to be made for a local organization: it will act in its own region, for obvious logistical reasons and because it has local expertise (knowledge of the land, language and culture). The same is true for an international organization whose strategy is to focus its programs in one zone in order to build on its experience.

Selection of target population groups for a program

· For IEC and mosquito net components, selection focuses primarily on vulnerable populations (pregnant women and children under the age of 5, cf. card 5). It is also an option to offer free care to these target groups.

· However, targeting is not possible for larva control or vector control operations, which concern the whole zone: for IRS, for example, it is essential to treat at least 90% of homes (cf. card 21).



A mosquito net distribution program run by ACMS (PSI) in Cameroon opted to target women of childbearing age: if they get used to sleeping under a mosquito net, it will be natural for them to continue to do so once they are pregnant or when they are sleeping with their baby.

(source ACMS)

! In unstable malaria transmission zones with a small population, WHO recommends extending distribution of mosquito nets to the entire population. In these zones, the immunity of local people is low, even in adults.

Definition of the size of the zone (area and population covered)

This depends on three main criteria:

• **The funding available:** This determines the total population that it will be possible to cover. The reflection process and calculation must take into account:

- >> the type of operation conducted and the costs generated (cf. corresponding cards in part II).
- >> the target group chosen and its weight in the zone's overall population.
- >> the percentage allocated to general costs: salaries, administrative costs, operational costs, etc.

Note: The approach is the same for drawing up a budget (only this time, it is the population covered that is a given and not the funding available; see final box).

• **Dispersion of the population:** A dispersed population is more difficult to cover. The impact of this constraint is complex to assess but it can be estimated by looking at the following objective factors:

- >> the condition of communication routes (quality of road surfaces, etc.);
- >> the number of people involved in the program;
- >> their means of transport (e.g.: a field worker on a motorcycle can travel 2 to 3 times further than a field worker on a bicycle).

• **The actions envisaged:** IEC and ITN operations or care provision operations are not associated with any particular geographic constraints. However, IRS (indoor residual spraying) or sanitation operations impose significant constraints on the surface area of the intervention zone (see box).

! Vector control: what perimeter?

The perimeter of a program incorporating vector control measures must be considered from a geographic point of view: mosquitoes travel over a limited distance.

The Anopheles mosquito does not fly more than 5 kilometers (cf. card 3). This characteristic of the vector provides a geographic framework for the operation: the perimeter of an integrated program is a zone of a few kilometers around the homes of the people to be protected.

Consequently, a malaria control operation that incorporates vector control measures is primarily local, restricted within a clearly defined space.

ADOPTING AN INTEGRATED APPROACH – COMBINING SEVERAL CONTROL MEASURES

KEY POINTS

- Successful malaria control goes beyond the basic provision of medical care and is dependent on the capacity to actively implement several control methods over the long term. Multiplying the measures undertaken will significantly increase the impact of a program.
- In this “integrated control” approach, the main role of NGOs and associations is to support IEC and mosquito net (or IRS) operations as part of the national policy.

Integrated control

- In numerous endemic regions, especially the most remote ones, a lack of human and material resources often reduces malaria control to treatment of patients on the basis of clinical diagnosis.
- Yet for malaria, the success of any public health policy is to a large extent dependent on the capacity to tackle the disease on several fronts and in the long term (see box).
- The role of field organizations is to support and improve existing operations, but also to supplement them in accordance with this “integrated” approach to malaria control.

Promoting integrated control means going beyond the provision of medical care and launching sustainable preventive operations supported by IEC campaigns (Information - Education - Communication, cf. part II, chapter I).

Multiplying control methods in order to roll back malaria

The organization of rigorous medical care using ACT is a priority in any malaria control program. However, by implementing IPT (Intermittent Preventive Treatment), insecticide-treated mosquito nets (ITNs) and indoor residual insecticide spraying (IRS with 95% cover of the target population) at the same time as ACT (artemisinin-based combination therapies), the results can be doubled. *(source BMJ 2005)*

The framework for priority actions

- An integrated strategy aims to meet at least 2 of the 3 objectives in terms of malaria control:
 - >> limit the number of bites;
 - >> limit the morbidity of malaria, through preventive and curative treatments.

Note: The third objective is to limit the number of mosquitoes, see the next part.

- In any endemic zone, a malaria control policy must aim to ensure:
 - >> the rapid treatment of uncomplicated cases with **ACTs** selected in the national protocol;
 - >> the rapid treatment of severe cases according to the national protocol;
 - >> the implementation of **IPT** for pregnant women;
 - >> the distribution of **insecticide-treated mosquito nets**, with priority given to children under the age of 5 and pregnant women (or the regular organization of IRS campaigns in zones where IRS can represent an effective and economically viable alternative to mosquito nets).

All these actions must be supported by **IEC campaigns**.

! Care provision usually falls within the scope of the public authorities. **The role of NGOs and associations* in malaria control predominantly involves supporting IEC and ITN operations** (or IRS operations in regions where this is used as a priority control method).

* Apart from organizations with their own clinics (e.g.: religious structures)

Complementary actions

- Some programs can be designed to meet the third malaria control objective: to reduce the number of mosquitoes, via larva control and vector control operations (cf. part II, chapter II).
- Two conditions must be met before this type of strategy can be envisaged:
 - » The implementation of priority actions is already satisfactory.
 - » The zone is suitable for larva control and/or vector control (epidemiological context, configuration of breeding sites, etc.).
- The table below evaluates the appropriateness of the different methods according to transmission zone (cf. card 8). **It is given by way of indication: it is not up to an NGO or association alone to decide to invest in one or another of these actions. This decision must be taken with the agreement of the NMCP and other partners.**

	Sanitation	Spraying / biological control	Fumigation	IRS
Stable malaria Constant high transmission ⁽¹⁾	0	0	0	+
Constant low transmission Seasonal transmission ⁽²⁾	+	+	0	++
Unstable malaria ⁽²⁾	++	0	+	++
Urban malaria ^{(2) and/ (3)}	++	++	+	++

0 : not theoretically recommended + : Theoretically possible ++ : Theoretically recommended

(1) Since breeding sites are often very numerous, complementary actions will not reduce transmission enough to have a significant impact on the incidence (cf. card 9). IRS is still relatively useful thanks to its repellent effect (cf. card 19).

(2) Breeding sites are often less numerous or more easily identifiable: larva control can be conducted in certain cases and can claim to have good results (cf. cards 15, 16 and 18).

(3) IRS and fumigation are appropriate measures for handling epidemics, particularly in urban zones where housing is concentrated (cf. card 18, 19 and 26).

! **Modestly-sized NGOs and associations can support these complementary actions in regions where the NMCP or large organizations have adopted one of them as part of their malaria control strategy.**

+ The success of an integrated program: Zanzibar (Tanzania)

The Zanzibar NMCP implements an intensive integrated malaria control program, combining ITNs, IRS (since 2006, with over 90% of the 220,000 homes covered in each campaign), IPT, rapid diagnostic tests and ACTs.

Between 2004 and 2008, the prevalence fell from around 60% to less than 2% (cf. card 9).

Keeping malaria under control in Zanzibar will now depend on the ability to sustain these control actions in the long term.

(source Zanzibar Malaria Control Program)

ADOPTING AN INTEGRATED APPROACH

INCORPORATING MALARIA INTO DEVELOPMENT PROGRAMS

KEY POINTS

Global and sustainable malaria control can only be achieved if field organizations support the incorporation of a malaria component in any health program (or development project) lending itself to this:

- Distribution of mosquito nets and IEC (Information - Education - Communication) during vaccination campaigns and at antenatal visits;
- Community-based distribution of ACTs (artemisinin-based combination therapies) in the context of programs aimed at organizing community-based health;
- Elimination of breeding grounds during major sanitation operations;
- Launch of an integrated program to support agricultural or industrial projects liable to modify transmission conditions...

A global approach to malaria control is conducted over the long term and on several fronts simultaneously (cf. card 40). Taking advantage of existing programs in other fields to tack on malaria control operations is a way of multiplying the methods implemented.

Malaria control is cross-functional due to the fact that it is transmitted by mosquitoes: malaria is not just a matter for health personnel or community health workers; it is also a matter for agriculture, sanitation services, regional development managers, etc. Consequently, having an integrated vision also means convincing these various players to add a "malaria component" to any public health initiative, and industrial, agricultural or miscellaneous development project where this might be appropriate.

Using existing health programs

• **Vaccination campaigns** for children (measles, polio, etc.) are practical and safe opportunities to distribute mosquito nets to a large proportion of young children in the target zone. This advantage of proceeding in this way is that the participation rate is increased in such campaigns as mothers obtain a mosquito net if they take their children along (cf. card 24)

>>> Organize the supply of **insecticide-treated nets** during these campaigns and monitor their distribution.


• **Antenatal and postnatal visits** are ideal opportunities to reach two priority targets: pregnant women and children under the age of 5. Health workers can take the time to provide a wealth of information on the risks of malaria and hand out mosquito nets to future or new mothers, emphasizing their effectiveness and explaining how to use them.

>>> Organize the supply of **ITNs** to maternity clinics and monitor their distribution by health workers. Provide them with **IEC** aids to illustrate their words (picture box, posters, etc.) or to be distributed to mothers (memory-aid cards, etc.).

The distribution of mosquito nets by Plan Burkina

Plan supplies clinics in its intervention zone with a stock of mosquito nets. Thus every pregnant woman attending the clinic for her first antenatal visit is given one free of charge.

(source: Plan Burkina-Faso)

 The majority of national policies now incorporate the **administration of intermittent preventive treatment to pregnant women at antenatal visits**. If this is not the case, it is very important to advocate in favor of this approach with the health authorities.

- **Community-based health programs**, aimed at making communities more responsible and giving them the capacities to address their main health problems (water, malnutrition, childbirth, etc.) are an ideal context for implementing an integrated program.

>>> Set up the community-based distribution of malaria treatments, introduce the use of mosquito nets, train community associations in IEC or IRS campaigns, etc.

Take advantage of sanitation projects

Major sanitation projects (canal cleaning, sewer construction, etc.) launched by the State and public authorities are an opportunity to eliminate a good number of existing breeding sites (cf. card 15). It may be appropriate to **work with the public authorities to guide their actions towards the elimination of these breeding sites**.

>>> Map existing breeding sites in the zone concerned by the project, argue to promote sanitation as a radical solution in terms of malaria, work with the public authorities on the strategy to be adopted to eliminate as many breeding sites as possible.

Supporting agricultural and industrial projects

- Some types of farming can encourage the transmission of malaria by increasing the number of potential breeding sites (rice-growing, irrigated market gardening, etc.). If an agricultural development plan is liable to affect the malaria transmission conditions, it is essential to anticipate the risks of this.

>>> Carry out advocacy activities with public authorities or private companies instigating these projects, promote larva control actions in these new clearly identified breeding sites (insecticides compatible with agricultural production, biological control), raise awareness and protect neighboring populations (IEC, mosquito nets, indoor residual spraying (IRS)).

- Industrial projects sometimes lead workers to live with their families in at-risk zones.

>>> Make the companies instigating these projects aware of the importance of protecting this community and offer technical support (cf. card 45). Then propose extending this program to local communities.

Construction and maintenance of the Chad-Cameroon pipeline

Cotco, the company responsible for the project, called on several local NGOs (ACODE, Masocot, etc.) to raise awareness among the communities crossed by the pipeline and distribute mosquito nets to them. Between 2002 and 2007, 60,000 mosquito nets were distributed. The program is scheduled to cover a zone of 300,000 people. *(source: Cotco / Sanisphere)*

INTEGRATING IN THE INTERVENTION ZONE

KEY POINTS

- The actions of NGOs and associations must fit into the public health system of the region in which they are operating :
 - >> to enhance the effectiveness and durability of their actions;
 - >> to avoid upsetting the balance of the public health system, particularly in terms of drug policy.
- Dialog and partnerships with public structures (NMCP, clinics, town halls, etc.) are essential for good integration into the health, political, administrative and economic structure.

Being integrated in order to support and guide

Any intervention must respect national policies and be carried out with the cooperation of the public and community structures in place. This integration into the intervention zone is a prerequisite for harmonious and sustainable development.

- **Integration makes the organization's work easier:** A high level of cooperation with public authorities leads to recognition as a development player, facilitating intervention (exemption, partnerships, etc.)...
- **Integration increases the benefits for the country in question:** Consultation with the State makes it possible to plan interventions and target zones that have the greatest need for humanitarian support, etc. (cf. card 39)
- **Integration is the main factor ensuring success and durability:** Sharing expertise with public structures and communities lays down the foundations for an organization capable of surviving once the NGO has left.

Drug policy: acting within the framework of public policy

Initiatives implemented independently of the NMCP and not integrated into the health structure can upset populations and undermine public structures. There are two recommendations for an organization wishing to supply clinics with drugs or purchasing them for its own clinics (religious organizations, etc.):

- **Adopt the treatments included in the national list:** Drugs not included in this list are prohibited in the zone.
- **Obtain supplies from public central purchasing units for essential drugs** and drug depots set up by the State. Doing so helps these structures to operate and contributes financially to their durability (margins made on essential drugs, in accordance with the Bamako initiative, to pay the manager, maintain the premises, etc.). It is also a way of guaranteeing the quality of the drugs purchased. If drugs are purchased from other sources, there is a real risk of:
 - >> discrediting the drugs usually distributed by the State in the eyes of the population;
 - >> putting health workers in an awkward situation if they agree to distribute them (risk of tensions with their managers) or encouraging the development of a black market otherwise (informal supply of these drugs by health workers).

Liaising with the various authorities

It is essential to contact or cooperate with the following authorities:

- Public health authorities and structures:
 - >> centrally, the **NMCP** and the health authorities in the intervention zones chosen;
 - >> locally, **the physician or nurse responsible for the zone.**

In particular, a large NGO must ensure that the Ministry of Health (or its regional representative) is kept regularly informed of its activities on the ground. The health authorities can only assess the quality of the work carried out if they have precise knowledge of its nature.

- Political and administrative authorities: **town hall, prefecture**, etc.
- Traditional authorities and community organizations.

Example: The integration of CARE in Lagdo (Cameroon) was achieved in two phases:

- a discussion phase with each of the authorities (health, political, traditional), taken individually, to outline the project and demonstrate the value of collaborating;
- a large public meeting organized in the town center of Lagdo to detail the roles of the various parties: responsibilities, scope of expertise, schedule of operations *(source: CARE Cameroun / Iresco).*

Some advice for successfully integrating into the intervention zone

· **Work in a transparent manner:** Annual meetings with the political authorities to present the results obtained; quarterly meetings with the health authorities concerning the operational implementation of programs.

· **Respect the policies in place:** An NGO's approach should not be to impose new malaria control strategies but to suggest new ideas and possible improvements to existing policies.

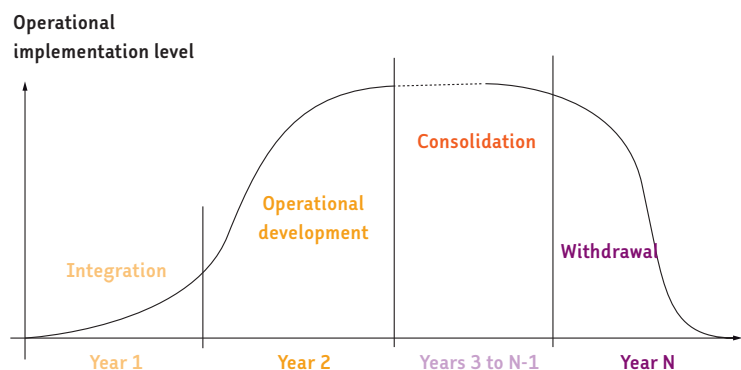
· **Understand the specific cultural characteristics of communities:** Communities are never

identical. Before launching the implementation of a preconceived strategy, it is essential to allow a period for learning about local cultural and religious customs and reactions, etc. Consequently, it is rarely possible to be effective over a short period: **it is strongly recommended that organizations be present for a period of at least 2 or 3 years in an intervention zone** to ensure the success of a malaria control program (see graph).

· **Adopt a participation-based approach when defining projects:** Participation-based approaches have been shown to be much more effective than vertical approaches. In this case, the NGO plays the role of facilitator: it helps the community to identify priorities, guides the reflection process, selects projects, estimates their cost and feasibility, etc. This consultation often leads to the program receiving the support it needs to be successful.

· **Delegate implementation of projects to communities (cf. card 44):** The main role of a field organization is to reinforce the capacities of communities themselves (management committees, community workers, women's associations, etc.) to make them autonomous and active.

The ideal rhythm for a program



Plan's approach is to ask the community to contribute 10% of the total cost of a project so that its members feel truly involved. *(source Plan Cameroun)*

KEY POINTS

- The implementation of a program depends on the creation of partnerships with community structures and local associations.
- These types of partnerships form the backbone of any NGO's "community" work: it is through them that NGOs can pass on their know-how and expertise to communities and lay the foundations for durable and autonomous development.
- The emphasis must be on training with a view to "reinforcing capabilities" and making communities aware that they have the resources to tackle malaria.

Involving community structures in the program: an essential approach

Making use of local associations to implement malaria control actions is crucial to the success of any long-term action.

- **Zone coverage:** These associations are already established in the zones targeted by the program and have grassroots knowledge.
- **Support of local people:** Their members know the language and culture, something which is essential to reach the community.
- **Sustainable action:** Associations that have been trained in NGO methods are then capable of carrying out the work themselves, along with public structures (see box).



Assembling local members within subcontracting associations

Investing effectively in a zone also means planning the point of future withdrawal. To this end, it is recommended that associations be created over time with NGO members recruited on-site and that their autonomy be improved by encouraging them to work as partners.

Operating in partnership with local associations

• **Selection of partners:** In endemic zones, which are often poor, numerous associations are formed with no particular objectives by people primarily seeking an additional source of income. It is therefore crucial that associations be carefully selected in order to find structures that have genuine competence (see box).

Note: In some regions, people are not accustomed to forming associations. In this case, there will be a greater focus on working with peer educators and community health workers (cf. card 47).

• **Preparation of activities:** While continuing to hold the initiative in terms of general strategy, it is important to involve partners in the preparation of activities: this fosters their commitment and contributes to experience-sharing (always with a view to encouraging their autonomy).



Selection criteria

It is recommended that associations with the following characteristics be selected:

- associations composed of literate members and leaders, speaking the local language and living in the community for a long period;
- recognized and appreciated by communities and local health workers;
- women's associations or those composed predominantly of women (as mothers, women often have a more responsible approach to health problems).

Note: Age is not really a selection criterion. In some regions, older people tend to be more willing than young people...

• **Training of partners:** This is an essential phase, upon which the quality of partners' interventions and their commitment to populations will depend (a well-trained field worker will be keen to pass on what he knows). A standard training program involves training field workers in IEC operations (Information - Education - Communication) and, in particular, home visits. For cost reasons, it is recommended that on-site training be favored.

» **Themes:** At the very least, malaria transmission and biting times, risks to humans, methods of protection and their effectiveness, symptoms and automatic reflexes for effective treatment, malaria treatments.

Note: It is extremely important to train partners in keeping accounts and basic financial skills (e.g.: reinvest the capital made from selling a batch of mosquito nets in new batches).

» **Preparation:** The training content must be as closely adapted as possible to the level of knowledge of populations and to the questions they are likely to ask field workers. It is therefore advisable to perform a small KAP survey in advance (Knowledge - Attitudes - Practices, cf. card 38) among local people to assess their knowledge and specify their concerns with respect to malaria.

» **Evaluation:** At the end of the training, schedule a test to assess what participants have learned in an entertaining format.

» **Follow-up:** Organize refresher courses (a few hours) every 6 / 12 months.

• **Follow-up of partners:** The best method of follow-up is to regularly observe partners in their workplace (e.g.: accompany field workers during home visits)

• **Contract with partners:** To maintain a good level of control over partners, it is advisable to sign short contracts with them (for a maximum of a few months) and to require documentation for all costs incurred (beware of any daily expenses discrepancies, cf. card 47).



Duration of an IEC training course

Malaria training for a literate field worker accustomed to making home visits (or with good people skills) takes between 2 and 3 days. For illiterate field workers, 3 to 5 days should be allowed.



Training adults

It is sometimes difficult to hold the attention of adults. Below are a few tips:

- make frequent eye contact;
- ask questions;
- do not give the impression of lecturing.

In addition, it is essential that they be able to make a clear link between the training and their activities as a field worker.

Hence the importance of frequent situation scenarios (demonstrations, case studies, role playing, etc.). A good exercise is to go out into the village and get the trainees to identify problems themselves.

KEY POINTS

- Recourse to traditional medicine is very common in Africa.
- In the case of malaria, the view of traditional medicine can diverge greatly from the information generally circulated. Furthermore, no traditional treatment forms exist that have been officially approved as being effective against the parasite.
- Recourse to traditional medicine can therefore be dangerous, particularly for the treatment of severe malaria.
- It is necessary to set up dialog with traditional medicine practitioners and the population so that the different types of medicine can coexist. The priority objective is to avoid certain fatal situations.

Traditional medicine” refers to a very broad spectrum of forms of medicine, mainly characterized by:

- the use of traditional remedies containing plants and natural substances;
- the presence of a supernatural dimension, in terms of the causes of the disease and the remedies for it;
- a tradition of oral knowledge transmission.

People often consult traditional practitioners or healers: it can be estimated that half of the population consults them with varying degrees of frequency.

Reasons for using traditional medicine

- **Traditional medicine practitioners, important figures in the social structure:** traditional healers have always played both a medical and a social role in communities. Their natural authority means that people automatically consult them.
- **The “confusion” between the disease and the supernatural:** for local populations, the disease is often believed to have a “supernatural” cause on top of the “natural causes”: they may believe that the intervention of a traditional practitioner, sometimes in addition to that of a modern doctor, is essential for a full recovery.
- **Distance from health structures:** in remote areas, traditional practitioners are sometimes the only medical authority people have access to.

Comment: the cost of medical consultations is not enough in itself to explain why people resort to traditional medicine, since traditional medicine is sometimes more expensive than official health structures.

The dangers of traditional medicine in terms of malaria

- Traditional medicine is not devoid of real expertise. Some genuine successes have been documented, for example in the fields of infectious diseases, gynecology, the treatment of behavioral disorders, etc.
- However, traditional medicine is extremely heterogeneous:
 - >> The level of competence and expertise varies greatly from one traditional practitioner to another.
 - >> The same traditional practitioner with established expertise in a given disease may be totally incompetent when it comes to treating another condition.

- Traditional medicine has never demonstrated any results in the treatment of malaria. Although the treatments proposed may sometimes help to bring down a fever, the numerous studies conducted to date have demonstrated that the remedies used have no effect on the parasite.
- Traditional medicine therefore poses a real danger as it can be an obstacle to the correct treatment of malaria and wrongly give people the impression that they are using effective remedies.
- For the treatment of severe malaria cases, which are a medical emergency, this obstacle can be fatal.

Working together to prevent fatalities in populations at risk

Given the role played by traditional medicine today, the first objective is to set up a process for working alongside it in order to avoid situations in which recourse to traditional medicine could represent a fatal obstacle to rapid treatment (as a priority, severe malaria in children).

This coexistence depends on dialog being opened with traditional practitioners and awareness-raising among local people.

• The priority objectives of dialog with traditional practitioners:

- » Provide them with basic knowledge about malaria, particularly in terms of clinical diagnosis (uncomplicated and severe cases).
- » Convince traditional practitioners of the need to immediately refer a child with symptoms of severe malaria to a doctor or nurse.



Malaria: a different reality for traditional medicine

- Dialog with traditional practitioners is complex because the term "malaria" for them does not clearly designate malaria as such, but can sometimes be used for extreme tiredness, a headache, etc.
- In addition, traditional practitioners sometimes see malaria as having supernatural causes (a spell has been cast on the patient, etc.), immediately placing the disease on a different level and making communication between the two types of medicine difficult.

• Raising people's awareness:

- » Improving local people's knowledge of the causes of malaria and the ways to protect themselves against it to help counter incorrect beliefs. This is crucial, particularly in the event of convulsions, which are interpreted as being the result of witchcraft, justifying recourse to traditional medicine.
- » Encouraging people to automatically consult a doctor or nurse directly in some circumstances (e.g.: convulsions).



Involving traditional practitioners in community-based distribution policies (cf. card 36)

There is no contraindication to selection of a traditional practitioner as a community health worker. This solution can offer several advantages:

- facilitate dialog within the framework of cooperation between modern medicine and traditional medicine;
- enable better monitoring of the practices of traditional practitioners by incorporating them into a public health policy (which involves training and follow-up);
- facilitate acceptance of this policy by the community by respecting existing relationships of authority.

The decision should be taken on a case-by-case basis, having ensured that the traditional practitioner is willing to cooperate properly.



Avoid challenging traditional medicine too radically

It is essential not to challenge the "value" of traditional medicine or its legitimacy within the natural hierarchy of the community.

A possible strategy, with the agreement of the medical authorities and all health workers, is to coexist with traditional medicine, proposing a form of "sharing" of fields of expertise, thus allowing traditional practitioners to keep face.

KEY POINTS

- In addition to being potential funding partners, companies can also become health players in their own right by launching malaria control programs aimed at their employees and their families and, in certain cases, surrounding populations.
- Close partnerships can therefore be forged: technical and operational support provided to companies by NGOs and associations; use of a corporate program by an NGO for the purposes of extending it to a broader target.
- The involvement of companies depends primarily on the capacity to persuade them that it is economically viable to invest in a malaria control program.

In addition to relationships forged with traditional public health players (State, international organizations, etc.), it is in the interests of NGOs and associations to diversify their partnerships, by turning, in particular, to the economic world and companies: the latter are often particularly inclined to act since malaria affects their employees and therefore their business.

Options for beneficial cooperation:

- **Financial partnership:** Companies are often asked to fund programs proposed by NGOs. Their financial participation here is mainly linked to the benefit, in terms of image, of their involvement in the program considered (see next part).
 - >>> Propose a program that is in line with the company's communication strategy.
- **Technical partnership:** Companies can get more directly involved in malaria control by launching a program aimed at employees and their families.
 - >>> Propose an intervention adapted to the level of education of the target population and the company's organization for one or more aspects of the program (IEC (Information - Education - Communication), distribution of mosquito nets, etc.).
- **Scale-up:** Some companies are already actively involved in protecting and ensuring care provision for employees and their dependants. There is sometimes a real opportunity to work on the basis of this existing organization to reach a wider population.
 - >>> Propose an action plan to these companies, along with technical and logistical support, to help extend their malaria control actions to surrounding communities.



3 examples of partnerships

Financial: in 2006, Total Gabon (oil), long established in Port-Gentil, donated \$200,000 to Unicef to fund the purchase and distribution of mosquito nets.

Technical: in 2005, the NGO Enda Santé in Senegal spent a year working on a project to mobilize communities (50,000 people) living around the Industries Chimiques du Senegal site in Mboro.

Scale-up: in 2007, Hima Cement (Lafarge Group, cements) decided to launch a large-scale program in the district of Kasese (Uganda). The objective is to cut uncomplicated and severe malaria cases by half in a population of around 26,000 people (in addition to its 500 employees and subcontractors) living around its factory. However, the program launch has been delayed due to the difficulty of identifying partners capable of carrying out preparatory studies (entomology, epidemiology, etc.), designing the strategy, organizing follow-up and measuring the impact of the program.

(source: Sanisphere)

Persuading companies to get actively involved in malaria control

- The involvement of companies is often limited to sponsorship or funding of programs implemented by traditional public health players (State, international organizations, etc.).
- Companies that proactively launch their own malaria control program (IEC / prevention / medical care provision for employees and their families) are relatively rare. They need to have their awareness raised of the possibility of taking their involvement further than simply treating malaria cases among their employees.



Who to contact within a company?

Since it is difficult to gain access to the head of a company, an NGO can also contact a company's occupational health officer, the personnel manager or the Health, Safety, Environment manager (where this post exists). It should be noted that it is a particularly good idea to contact a company when it intends to initiate a "risky" industrial project (e.g.: creation of a new facility within a zone with a high number of malaria cases).

- The success of this awareness-raising depends on the use of arguments that take into account the economic principles of companies. It is essential to highlight the financial viability of a program (see box) along with the spin-offs in terms of image, employee loyalty, etc.



Setting up a malaria control program is a profitable investment for the company

- Emphasize the fact that in endemic zones, malaria is often the disease with the greatest economic impact on the company's business as it is:
 - >> the leading cause of absenteeism (e.g.: 26% of sick leave in Cameroon (source: Cotco));
 - >> the leading reason for consulting a doctor;
 - >> one of the main areas of medical spending (e.g.: 31% of spending in Cameroon (ditto)).
- Help the company assess the economic impact of malaria using the following grid*:

<i>Absenteeism</i>	Number of days of absence due to malaria x Average daily salary costs	
<i>Diagnoses</i>	Number of diagnoses x Cost per diagnosis	
<i>Treatments</i>	Number of intermittent preventive treatments x Cost per IPT	
	Number of chemoprophylactic treatments x Cost per treatment	
	No. of treatments for uncomplicated malaria x Cost per treatment of uncomplicated malaria	
	Number of treatments for severe malaria x Cost per treatment of severe malaria	
<i>Hospital admissions</i>	Number of hospital admissions for severe malaria x Cost per hospital admission	
<i>Health personnel</i>	% of working time for malaria x Average salary costs for health personnel	
<i>Other costs</i>	Number of evacuations x Cost of an evacuation / Cost of repatriation	
	Total economic cost of malaria	

* When the figures are not available, the managers concerned (occupational health officer, HR manager, etc.) are often able to provide entirely satisfactory estimates to give an idea of the impact of malaria on the company.

- Outline the methods that make it possible to protect and effectively treat employees (and their families). Stress the fact that their implementation leads to truly significant results (fall in the number of severe cases, number of uncomplicated cases halved or reduced three-fold, etc.).
- Demonstrate that these methods are not necessarily very expensive (in particular ITNs, ACTs, rapid diagnostic tests).
- On the basis of the assessment of potential savings and estimation of the cost of the program, conclude by stressing the fact that investing in a program is usually economically profitable.

To find out more:

- "Practical guidebook for the corporate fight against malaria (Sanisphere)"

www.total.com/static/fr/medias/topic848/2007-paludisme-guide.pdf

Guide aimed at any party liable to implement a malaria control project within a company

KEY POINTS

- Joining a coalition enables an NGO to:
 - >> Adopt a unified and coherent advocacy strategy in favor of malaria control: participation in the development of control policies, awareness-raising among other NGOs of the importance of acting, etc.;
 - >> Foster experience-sharing;
 - >> Submit requests for funding to major financial backers.
- The formation of a coalition is a legitimate approach when several organizations have common objectives and are willing to take the time required to work together transparently.

Why create a coalition?

As close observers of successes and failures in terms of malaria control, NGOs often have a desire, or even a need, to influence health policy. The formation of a coalition makes it possible to **take part in the definition of control strategies**, working in consultation with public authorities and international organizations:

- >> Setting up of a structure that has the skills – and above all the time – to lead the advocacy strategy.
- >> Development of coherent arguments, based on the experiences of several active NGOs.
- >> Reinforcement of the weight of NGOs in discussions (arguments of a coalition, rather than the specific arguments of one organization alone).



“The key factor in the formation of a coalition is often the definition of a clear advocacy objective. It is then quickly realized that it is impossible to achieve this objective alone and the benefit of joining forces with other players becomes obvious” Dr. Esther Tallah (Cameroon Coalition Against Malaria)

- In order to persuade other players to tackle malaria, NGOs can carry out lobbying activities. The existence of a coalition makes it possible to **increase awareness of the problem and raise the profile of actions undertaken** (press articles and conferences, organization of forums, etc.).
- Some NGOs lack the expertise and know-how required to be able to implement malaria control actions. A coalition makes it possible to **foster experience-sharing** between NGOs active in the field of malaria **and transmission of skills**. Joining a coalition is a way of benefiting from the experience of other coalition members (see box).



Cameroon Coalition Against Malaria (CCAM) and African Action on Aids (AAA)

African Action on Aids is an NGO that has been active in the field of Aids since 1990. Its activities have gradually led it to realize that the long-term battle against Aids, especially in rural areas, cannot be separated from malaria control (one of the main opportunistic infections to which a person infected with the Aids virus is susceptible).

AAA decided to join forces with CCAM to incorporate a malaria component in its actions. CCAM provided malaria training to members of AAA and the community associations on which its programs depend (in particular, retreatment, hanging nets, etc.).

Since then, AAA has distributed several hundred mosquito nets. .

(source: African Action on Aids / CCAM)

· Obtaining funding, particularly from major sponsors, requires real expertise. Some coalitions help **structure the search for funds**, facilitating access to major financial backers for their members.

Practical advice for advocacy activities

· Development of the arguments and organization of advocacy generally involves the following process:

- >> Identification of a problem on the basis of quantitative data;
- >> Definition of a theme, followed by an objective (changing a given aspect of the policy implemented, etc.);
- >> Analysis of the audience (who does the advocacy target?);
- >> Development of arguments;
- >> Making contact with the selected audience.

· The following principles contribute to the success of advocacy actions:

- >> Base the advocacy strategy on figures in order to identify problems; perform follow-up and data retrieval actions to support the strategy defended with figures and field data.
- >> Propose a constructive argument: do not simply raise problems and warn about the limitations of a policy, but propose improvement solutions that are ready to be tested (potential partners, service-providers, etc.).
- >> Have a cross-disciplinary vision of malaria control: forums on poverty, on Aids or on fair trade are opportunities to draw attention to malaria.



>> **Problem:** Not enough NGOs active in the field of malaria.

>> **Objective:** To persuade other NGOs to get involved.


>> **Targets:** NGOs active in the field of Aids, fighting poverty, etc.

>> **Arguments:** Aids-sufferers are the first victims of malaria (cf. card 5) / Malaria is one of the leading expenses in poor households, etc.

Forming coalitions and making them work

· It is always beneficial for structures working in the field of malaria to join forces in the form of a coalition, at whatever level (country, region, district). Be sure to identify potential members in advance and to contact them: organizations that are “missed out” could be offended by being excluded from the project.

· However, a coalition can only work if its members share common values and the same goals and if they have decided to put in the effort required. Otherwise, it is a waste of time and energy.

 “More so than financial resources, the essential factors are the **commitment of coalition members** and **transparency**.

A coalition then becomes active as a result of the actions of its members; the administration simply coordinates and delegates work.”

Beatrice Minja (Tanzania NGO Alliance Against Malaria)

· On a practical level, a coalition needs at least one person dedicating some or all of their time to making it work (organization of meetings, contact with potential members, advocacy actions, etc.). A member subscription system (dependent on size) can help cover operating costs.

· **Beware:** When organizations of equivalent sizes join forces, there is a risk that the coalition will not achieve its full potential due to difficulties making final decisions. A coalition needs to be united around a leader (a permanent member recognized for its experience, an NGO with unparalleled expertise, etc.); if there is no obvious leader, it is important to set up a clear governance system.

MAINTAINING TEAM MOTIVATION

KEY POINTS

- The motivation of technical workers, field workers, etc. recruited for specific operations is linked to a payment incentive.
- However, in long-term programs to reinforce a community's own capabilities and to encourage them to take over responsibility for their own problems, it is possible to avoid a financial reward system.
- The motivation of associations and community workers is therefore primarily dependent on management practices that value achievements:
 - >> recognition of the quality of the work;
 - >> transmission of skills and know-how;
 - >> provision of equipment and aids to facilitate their work, etc.

The effective implementation of programs depends on the quality of the work carried out by teams and local workers (technical workers, partner associations (cf. card 43), community workers). The main difficulty resides in successfully motivating them all and at the same time limiting financial rewards, which are expensive and, in the case of some interventions, go against the principle of making communities take responsibility for their own health problems.

Maintaining motivation in the context of intensive operations

• **Field workers or technical workers** recruited for a specific operation (e.g.: home visit campaign, IRS operation, etc.) must be paid for the time they devote to non-profit making welfare actions.

>> As with any employees, they will only work properly if they are paid properly: **the key is to pay them a little more than they would earn doing their usual job for the same number of hours.**

>> It is also recommended that a small proportion of the budget be kept for distribution in the form of bonuses to the most hardworking recruits.

• **Partner associations** whose members are "permanent" operate according to a system of individual contracts for each specific service (cf. card 43).



Recruiting a limited number of peer-educators (or technical workers) in order to:

- encourage them to take responsibility (each peer-educator must account for his own actions individually, not as a group, when the responsibilities of the various members are spread);
- provide them with substantial pay. It is better to give a few workers a large amount of work to do and reward them well, rather than give a small amount of work to a large number of workers for less pay.

Maintaining motivation in the context of community-based programs

• **In the case of a community-based program**, in which the organization is working within a community to reinforce the latter's own capabilities and encourage it to take over responsibility for the various problems encountered, **it is possible to operate without financial compensation** (see final box). Note: This comment and the whole of this section only concern actions requiring a limited investment from the people involved in terms of time (less than one day a week).

· If the members of the community are accustomed to working together in associations, the tasks may be carried out by community associations (e.g.: women's associations); otherwise, it will be necessary to use community health workers.

· In both cases, it is preferable to avoid a payment system (idea of encouraging communities to take over responsibility to

ensure the sustainability of the action). The key is to reinforce the capabilities of the structures and people involved and to facilitate their actions.

• **Facilitating the work of teams involves:**

>> **Supplying appropriate material resources** (training aids, awareness-raising material, adequate means of transport, etc. - funds must first and foremost be used to finance the working tool).

>> **Allow the people involved to freely organize their own timetables** in order to disrupt the rhythm of their professional and private lives as little as possible (source AMREF).

• At the same time, non-financial reward forms must be used to maintain the motivation of community players:

>> **Recognition of work accomplished** (importance of "**positive**" supervision, cf. card 49);

>> **Acquisition of skills** (provide the keys to succeed and satisfy the thirst for knowledge) and recognition of the training given (see box);

>> **Allocation of a fulfilling role and clearly defined objectives;**

>> **Benefits in kind:**

>>> loan of equipment (bicycle, motorcycle, etc.); it is better to lend than to give, in order to maintain the right to take back the bicycle or motorcycle if the work is not done;

>>> inexpensive gifts liable to improve motivation (T-shirts, baseball caps, etc.);

>>> closely monitored coverage of costs (beware of frequent discrepancies in daily expenses);

>>> mutual aid solution **chosen** by the community (a fraction of the harvest for the field worker, cultivation of a communal field, modest contribution of households receiving mosquito nets, etc.).



CARE gives trained educators a training certificate signed by its director. An official and gratifying reward, this certificate also provides real added value if the educator then wants to join other structures.

(source: CARE Cameroun)



The success of a community program relies on voluntary work (AMREF)

The Mkuranga program (Tanzania) is an integrated program covering a zone of 32,000 people and focusing on reproductive health, child survival, water and sanitation. Its implementation relies on volunteers from the communities involved.

Voluntary work by members of the community has lasted despite the absence of any financial reward. In the program's 4 years, less than 4% of volunteers have given up their position.

This motivation is due to several factors: good training, role giving them value in the community, clear definition of the voluntary work, encouraging supervision, flexibility given to individuals to organize their own timetables, small material rewards (T-shirts, bags, etc.)...

This program has achieved excellent results for the various components: for the malaria component, for example, the percentage of households possessing at least one ITN increased from 5% in 2002 to 85% in 2007.

(source: AMREF)

KEY POINTS

- Obtaining funds usually depends on the agenda of fund providers.
- Small NGOs and associations must keep themselves informed about programs conducted by the NMCP and large NGOs and be capable of presenting a clear action plan in the event of calls for bids.
- It may also be in their interests to canvas companies by proposing a program liable to enhance their image with their employees or the community (cf. card 45).

Meet a need

· A company will only be able to sell a product to a customer if the product meets a particular need at the right time. Generally speaking, an NGO or an association will “only sell its activities” if, at the same time as being capable of meeting the needs of populations, it is also capable of meeting the needs of financial backers in accordance with their action schedule.

· **Meeting the needs of fund-providers means proposing rigorous programs in line with their strategy, at the right time:** fund-providers, especially public or international ones, have an agenda and generally only finance activities that pursue objectives included in this agenda.

Comment: This agenda constraint is less of an issue with companies, especially those which have no specific communication program. A relevant proposal may attract their interest (cf. card 45).



NGOs and associations can launch an action in two ways:

- Either they fall within the scope of a strategy defined by the NMCP (which launches calls for bids to implement it) and receive State funding.

In 2003, the proposal of the Cameroon NMCP accepted by the Global Fund incorporated an interpersonal communication component. This led to 1500 associations selected following calls for bids by the NMCP being funded for two years.

- Or they decide to launch an independent initiative: they will be able to receive technical support from the NMCP but they will have to seek their own funding.

(source PNL du Cameroun)

Keeping up to date with current developments relating to malaria and potential financial backers

· The need to be in line with a financial backer’s agenda in order to obtain funding makes it necessary to:

- » conduct intelligence-gathering activities with potential financial backers;
- » identify networks (joining a coalition, cf. card 46) and key people;
- » participate in malaria events (conferences, meetings, etc.).

· For the biggest NGOs, this involves monitoring the latest developments, with respect to the Global Fund, international organizations, etc. For the smallest ones, it mainly consists in monitoring current developments with respect to the NMCP and large NGOs.



Working for large NGOs as a subcontractor

International NGOs usually call on the services of local associations to implement their programs (cf. card 44). These represent one of the main funding opportunities for small associations.

Persuading potential fund-providers

- It is essential to **submit a bid application** in order to win the trust of a financial backer. A structured, well-presented application is a reflection of the applicant's organizational and reflective capacities. Below is some advice:
 - » Follow a clear plan when putting together the application (cf. card 50).
 - » Present a **budget that is consistent with the action plan**: sometimes structures propose good projects but budgets are unrealistic.
- Financial backers are sensitive to detailed and realistic budgets, **accounting transparency** and the ability to keep rigorous accounts.
- **Experience** is often an advantage; but having no experience with malaria is not necessarily an excluding factor (e.g.: an association that has experience of home visits in the field of Aids).
- The **formation of a committee** inspires confidence (financial backers are skeptical about associations in which the chairman and treasurer are husband and wife, etc.).

The benefits of rigorous fund-seeking are not only financial

- Fundraising, which is vital for the material operation of the organization, can be considered to be a direct way of controlling and improving the way it operates.
 - » The seeking of funds forces the organization to draw up a rigorous action plan (objectives, priority, budget, etc.), which will be useful even if the application is rejected.
 - » It forces it to provide accounts concerning the use of funds already obtained.
 - » Financial backers make a contribution that goes beyond the purely financial: credibility, expertise, network, etc. They are often valuable partners, wishing to invest more than merely financial support.
- It is thus in the interests of NGOs and associations to dedicate resources to this activity, taking the view that a rigorous approach to fund-seeking puts them on the road to virtuous development.

EVALUATION AND MONITORING: ENSURING EFFICIENT IMPLEMENTATION

KEY POINTS

- The purpose of evaluation and monitoring is to enhance the impact of the program by:
 - >> ensuring its efficient implementation (compliance with action plan, maintaining motivation, etc, cf. card 49);
 - >> ensuring its promotion and improvement thanks to an objective assessment (involvement of partners and financial backers, identification of corrective measures, etc. cf. card 50).
- Evaluation and monitoring involves:
 - >> regular observation of a series of relevant indicators;
 - >> compliance with a clear evaluation and monitoring procedure;
 - >> striving to perform evaluation operations using a constructive approach ("positive supervision").

Managing the program on the basis of implementation indicators

- A program, especially when it includes several components, must be managed on the basis of monitoring indicators in order to assess the progress of the various operations.
- The table below provides an inventory (non-exhaustive) of indicators that the program manager can monitor for each component of the program. They are divided into basic indicators (obtained by simple, immediate information gathering) and more advanced indicators (obtained by more sophisticated monitoring operations: home visits, KAP surveys (Knowledge - Attitudes - Practices, cf. card 38).

	Basic indicators	Advanced indicators
IEC (Information - Education - Communication)	Number of households reached by home visits, of people reached by plays or talks, of women having had their awareness raised during the course of antenatal visits, etc.	% of people possessing basic knowledge of malaria, etc.
Mosquito nets	Number of mosquito nets distributed	Coverage rate, rate of actual mosquito net use, rate of correct mosquito net installation, etc.
Sanitation	Monitoring table or map of treated sites and homes, frequency of operations	Coverage rate (treated sites / existing sites)
Biological control		
Spraying		
Fogging		
IRS	Rate of homes treated in the target zone, frequency of operations	
IPT (Intermittent Preventive Treatment)	Number of pregnant women taking IPT	
Care provision	Number of uncomplicated malaria cases treated by ACT (artemisinin-based combination therapies) number of patients treated for severe malaria, etc.	% of patients treated within 24 hours, % of patients following the dosage instructions, etc.



It is important to monitor the various indicators **at least every quarter** and for each population group (children under the age of 5, pregnant women, rest of the population).

Respect monitoring procedures

Evaluation and monitoring activities must be:

- **regular:** monthly or quarterly updating of monitoring indicators (see above), monthly checking of accounts, quarterly steering committee meetings, quarterly or six-monthly supervision visits, etc.;
- **clear and known to all** in order to meet deadlines and avoid the perception of arbitrary monitoring;
- **conducted at all levels:** the steering committee led by the program manager monitors the indicators and determines corrective actions, team leaders provide a summary of reports from their workers to provide data relating to indicators, etc.

Adopt a “positive supervision” approach when monitoring

• Trusting partners and players in the program does not exclude the need to monitor them. However, this monitoring must be carried out in an intelligent manner to avoid the perception that the NGO is “policing” them. To ensure this, the following recommendations are made:

- » **Have members of the community perform the monitoring**, for reasons of language and to ensure comments are more readily accepted.
 - » **Make program players take responsibility** by asking them to provide reports (monthly or quarterly) on their activities themselves: progress reports, stock cards, visit logs, distribution logs, accounts, etc. and encouraging them to improve their standards (via competitions, for example).
 - » **Adopt a diplomatic and educational approach** so that evaluations are perceived primarily as information and dialog opportunities.
- More than simply a monitoring exercise, **supervision is an extremely effective way of sustaining the level of commitment to a program**. Supervision activities are opportunities to have direct contact with populations, to thank them for their cooperation, to answer any questions they still have, etc.
- It is important that the program managers make regular visits, even to the most remote zones. When the program manager travels several dozen kilometers to speak to public health workers himself, to award a prize to a competition winner, to raise awareness among people, etc., it:
- » demonstrates his interest in the communities. The latter are generally very sensitive to this and are then motivated to act.
 - » makes the actions of local associations look important to the community.



Supervision in the Akonolinga region with Plan Cameroon

The members of the Plan team are welcomed as guests of honor in the village. The few words spoken by the program manager are listened to very carefully. He is aware that his visit is an important event for the community, during which his actions can have a big impact. In each village visited, the manager thanks the people for their assistance after having greeted the chairwoman of the community association.

He asks the people visited a few questions to evaluate what has been retained and uses any errors or omissions as opportunities to repeat the essential messages.

When the mosquito nets distributed have still not been put up, he comments that if it was not essential for pregnant women to sleep under mosquito nets, he would not have made a 2-hour journey to come and meet the community.

(source Sanisphere)

EVALUATION AND MONITORING: MEASURING PERFORMANCE AND PROMOTING THE PROGRAM

KEY POINTS

- Monitoring a program also means measuring its performance on the basis of objective and quantitative results.
- Performance measurement makes it possible to:
 - >> correct malfunctions;
 - >> maintain motivation on the basis of concrete and quantitative results;
 - >> identify best practices to be able to duplicate the program more efficiently;
 - >> demonstrate the value of the program, making it easier to win the support of partners and financial backers for future actions.
- Communication on the program (actions undertaken and impact) plays a decisive role, both in terms of promoting the NGO and sharing best practices with other organizations, an approach that makes a broader contribution to malaria control.

A program can be correctly implemented and still not fulfill its basic mission of reducing malaria. At the same time as monitoring its implementation (cf. card 49), it is essential to measure the overall performance of the program. This makes it possible to:

- encourage all the players involved, by presenting them with concrete results;
- convince partners and financial backers of the quality of the strategy adopted.

Measuring overall performance using epidemiological indicators

	Basic indicators	Advanced indicators
Prevalence		% of individuals carrying the parasite in the target population
Transmission		Number of bites per person over a given period (cf. card 8)
Incidence (uncomplicated malaria)	Number of consultations	
	Number of fever cases	
	Number of uncomplicated malaria cases	Number of positive laboratory diagnoses (confirmed uncomplicated malaria cases)
Severe malaria and mortality	Number of severe cases (hospital admissions)	
	number of days of hospitalization	
	Number of deaths	

⚠ Important: the use of laboratory diagnosis, and, in particular rapid diagnostic tests, is essential to provide reliable data (cf. cards 30, 31 and 32).

Constructing a progress report

An effective presentation plan often consists of the following parts:


- **Introduction:** short section explaining the reasons for compiling the dossier.
Example: Response to a call for bids launched by an international organization.
- **Overall objective:** paragraph of a few lines outlining the nature of the program.
Example: To reduce morbidity and mortality related to malaria in the central district for children under the age of 5.
- **Specific objectives:** description of the various components of the program.
Example: To have 50% of the 1,000 children under the age of 5 counted sleeping under insecticide-treated nets by the next rainy season.
Achieve 100% coverage in the second year.
- **Project partners:** outline of the roles of public clinics and other structures involved in the implementation of the program.
- **Planned or completed activities:** description of activities, each time emphasizing the number of beneficiaries, the content of the activities, organization of follow-up, the difficulties encountered.
- **Results obtained:** details (possibly in table form) of results per activity and comparison with the targets set
Example: 300 mosquito nets, i.e. 60% of the target, have been distributed and installed.


Activity	Time frame	Achieve year N	Target Year N	Deviation	Explanations
Mosquito nets	Distribution of 1000 mosquito nets in 2 years	300	500	200	Supplier ran out of stock

- **Funding** (amount spent and funding requirements).

The need for objective evaluation

- **For partners and financial backers:** The figures obtained, and ultimate achievements are the most convincing arguments in terms of maintaining their confidence. An objective evaluation also leads to better experience-sharing: in particular, it is important to report the successes and failures of a program to the NMCP in order to ensure wider dissemination of the lessons learned.
The choice of performance indicators plays a decisive role (see above).
- **For target populations:** The definition of quantitative targets encourages them to act. Presenting them with concrete results shows them that it is worthwhile continuing their efforts (see box) and highlights the difficulties that remain.

 One way of promoting a program is to have its synopsis published in a scientific journal. Examples: Malaria journal, Médecine tropicale, The Lancet, Tropical Medicine & International Health, etc.
This involves additional work for NGOs and is thus too frequently assumed to be secondary to “operational” activities. However, it makes an important contribution to malaria control worldwide and is a way for the NGO to extend its influence.

 African Action on Aids (Cameroon) asks every woman in the community to keep a card on which they add up how much they spend on health over the year. One of the objectives is to show that spending on consultations and treatment for malaria has fallen since they have been sleeping under a mosquito net with their youngest child. (source: African Action on Aids)

- **Internally:** Rigorous evaluation makes it possible to highlight the successes achieved, but also the failures of a program: it is therefore an essential phase to improve the strategy and its implementation. Hence it is important to pay particular attention to the development of relevant indicators (e.g.: advanced indicators, card 49) and the monitoring of epidemiological indicators, which measure the real impact of the program.

Evaluation also makes it possible to build on past experience with the aim of duplicating a successful program or not losing sight of the lessons learned from the program once its manager leaves.

Aedes: a genus of mosquito, the vector of yellow fever (card 18)

Anemia: abnormal reduction of haemoglobin content in the blood (card 2)

Anopheles: a genus of mosquito, the vector of malaria (card 3)

Antibodies: proteins synthesized by plasma cells in response to the presence of antigens in the body: an antibody binds its antigen and inactivates it (card 31)

Biological control: a larva control method using living organisms like fish or bacteria (card 14)

Breeding site: the place where a mosquito lays its eggs and where the larvae develop (card 6)

Cerebral malaria: a severe malaria attack caused by obstruction of the cerebral vessels by parasitized red blood cells and characterised by neurological symptoms (convulsions, coma) (card 2)

Chemoprophylaxis: use, as a preventive measure, of certain chemical substances (drugs) to prevent disease (card 29)

Chloroquinization: a vast public health program implemented up to the end of the 1980s, aimed at providing chloroquine to children in endemic zones as a chemoprophylactic measure (card 29)

Clinical diagnosis: identification by a doctor of the cause of a disease from its signs and symptoms (card 30)

Culex: a genus of mosquito (card 18)

Endemic: constant or regular presence of a disease in a given region (card 26)

Endophagous: used to describe the behavior of mosquitoes which feed (bite) inside the house (card 3)

Endophilic: used to describe the behavior of mosquitoes which live and feed (bite) inside the house (card 3)

Epidemiological facies: a set of places where malaria has similar characteristics vis-à-vis transmission, the development of immunity and pathological manifestations (card 8)

Exophagous: used to describe the behavior of mosquitoes which feed (bite) outside the house (card 3)

Exophilic: used to describe the behavior of mosquitoes which live and feed (bite) outside the house (card 3)

Fogging: controlling adult mosquitoes by spraying insecticides into the air at the time when the mosquitoes come out to bite (card 18)

Haemorrhage: loss of blood caused by bursting of a blood vessel (card 2)

Hypoglycemia: an abnormally low concentration of sugar in the blood (card 2)

Immunity: partial, slow to acquire and unstable. To a greater or lesser extent, the immune response inhibits multiplication of the parasite in the body, and therefore controls the likelihood of occurrence and the severity of paroxysms (card 4)

Incidence (of a disease): an indicator based on the number of new cases identified over a given period (card 9)

Indoor Residual Spraying (IRS): a vector-control method which involves spraying the inner walls of houses with insecticides (card 19)

Laboratory diagnosis: identification by a doctor of the cause of a disease from biological tests – usually used to confirm clinical diagnosis (card 30)

Naive (subject): applies to someone who has never been bitten by an infective mosquito and who consequently has no immunity (card 4)

Outdoor spraying: a larva control method which involves spraying insecticides on breeding sites (card 18)

Plasmodium: the malarial parasite. 4 species can cause malaria in humans, namely *Plasmodium falciparum*, *P. vivax*, *P. malariae* and *P. ovale* (card 1)

Prevalence: an indicator based on the number of infected subjects in a population at a moment in time (whether the infection is recent or longstanding). Cf. *incidence* (card 9)

Red cell: a mature, anuclear blood cell which is responsible for carrying oxygen around body (card 31)

Remanence: the length of time that an insecticide remains active against *Anopheles* (card 17)

Self-medication: the use of drugs which have not been personally prescribed to the patient by a doctor (card 36)

Stable: used to describe malaria or its transmission when the disease regularly breaks out every year with the same characteristics (card 8)

Traditional practitioner: traditional doctor, as opposed to a doctor practising modern medicine (card 44)

Unstable: used to describe malaria or its transmission when the disease breaks out in some years but not in others (card 8)

ACRONYMS

ACT: Artemisinin-based Combined Treatment.

IEC: Information Education Communication.

IPT: Intermittent Preventive Treatment.

IRD: Institut de Recherche pour le Développement.

IRS: Indoor Residual Spraying.

KAP: Knowledge Attitudes Practices.

MEWS: Malaria Early Warning System.

MARA: Mapping Malaria Risk in Africa.

WHO: World Health Organization.

NGO: Non Governmental Organization.

NMCP: National Malaria Control Program. The NMCP is a department of the Ministry of Health.

RBM: Roll Back Malaria. *The partnership Roll Back Malaria was launched in 1998 under the aegis of the WHO to coordinate the various stakeholders in the malaria fight under a common strategy in order to "reduce by half the burden represented by malaria by 2010".*

WHOPES: World Health Organization Pesticides Evaluation Scheme.

- > Academy for Educational Development and The Manoff Group / USAID, *Spot on Malaria*, 2005.
- > AMREF, *Replicable Models of Good Practices in Community Based Health Care*, 2007
- > Baudon D, *Les faciès épidémiologiques*, 2000.
- > Besnard P, Foumane V, Foucher JF, Beliaud P, Costa J, Monno N, Le Mire J, Carnevale P, « Impact de la création d'un laboratoire de diagnostic parasitologique du paludisme sur le diagnostic et le coût du paludisme dans une entreprise : une expérience angolaise », *Médecine tropicale*, 66(3), 269-272, 2006.
- > Darriet F, *La lutte contre les moustiques nuisants et vecteurs de maladies*, Karthala-Orstom, 1998.
- > Fillinger U, Kannady K, William G, Vanek M, Dongus S, Nyika D, Geissbühler Y, Chaki P, Govella N, Mathenge E, Singer B, Mshinda H, Lindsay S, Tanner M, Mtasiwa D, de Castro M, Killeen J, « A tool box for operational mosquito larval control : preliminary results and early lessons from the Urban Malaria Control Programme in Dar es Salaam, Tanzania », *Malaria Journal* 2008, 7:20 doi: 10.1186/1475-2875-7-20.
- > Hopkins H, Talisuna A, Whitty CJM, Staedke SG, « Impact of home-based management of malaria on health outcomes in Africa: a systematic review of evidence », *Malaria Journal* 2007, 6:134doi:10.1186/1475-2875-6-134.
- > Keiser J, Singer BH, Utzinger J, « Reducing the burden of malaria in different eco-epidemiological settings with environmental management : a systematic review », *Lancet Infect Dis* ; 5 ; 695-708, 2005.
- > Kouznetsov RL, Beales PF « Malaria, a manual for community health workers », WHO, Geneva, 46pp, 1996.
- > Kiszewski A, Johns B, Schapira A, Delacollette C, Crowell V, Tan-Torres T, Ameneshewa B, Teklehaimanot A, Nafo-Traoré F, « Estimated global resources needed to attain international malaria control goals », *Bulletin of the World Health Organisation* 2007;85:623-630.
- > Marsh V, Kachur SP, « Malaria Home and Management, Policy to Strategy and Implementation Series», *Malaria Journal* 2002.
- > Morel CM, Lauer JA, Evans DB, « Cost effectiveness analysis of strategies to combat malaria in developing countries », *BMJ*, doi:10.1136/bmj.38639.702384.AE, 2005.
- > Mouchet J, Carnevale P, Coosemans M, Julvez J, Manguin S, Richard-Lenoble D, Sircoulon J, *Biodiversité du paludisme dans le monde*, John Libbey Eurotext, 2004.
- > Navy Environmental Health Center, *Navy Medical Department pocket guide to malaria control and prevention*, 2000.
- > Nsabagasani X, Jesca-Nsungwa-Sabiiti, Källander K, Peterson S, Pariyo G, Tomson G, « Home-Based Management of fever in rural Uganda : community perceptions and provider opinions », *Malaria Journal* 2007, 6:11doi:10.1186/1475-2875-6-11.
- > Ochola LB, Vounatsu P, Smith T, Mabaso ML, Newton CR, « The reliability of diagnostic techniques in the diagnosis and management of malaria in the absence of a gold standard », *Lancet Infect Dis*. 2006 Sep;6(9):582-8.
- > Okrah J, Traoré C, Palé A, Sommerfeld J, Müller O, «Community factors associated with malaria prevention by mosquito nets: an exploratory study in rural Burkina-Faso», *Tropical Medicine & International Health* 7(3), 240-248. doi:10.1046/j.1365-3156.2002.00856.x, 2002.

BIBLIOGRAPHY

- > OMS, *Guidelines for the treatment of malaria*, WHO/HTM/MAL/2006.1108.
- > OMS, *Indoor Residual Spraying*, 2006.
- > OMS, *Supplies for monitoring insecticide resistance in disease vectors*, WHO.USM/00.1.
- > OMS, *Manual for indoor residual spraying*, WHO/CDS/WHOPES/GCDPP, 2000.
- > OMS, *Space spray application of insecticides for vector and public health pest control*, WHO/CDS/WHOPES/GCDPP. 2003.
- > OMS, *The Use of Malaria Rapid Diagnostic Tests* (2nd edition), 2006.
- > Robert V, Boudin C, « Biologie de la transmission homme-moustique du *Plasmodium* », *Bull Soc Pathol Exo*, 96, 1, 6-20, 2003.
- > Rogier C, Ly AB, Tall A, Cissé B, Trape JF, « *Plasmodium falciparum* clinical malaria in Dielmo, a holoendemic area in Senegal : no influence of acquired immunity on initial symptomatology and severity of malaria attacks », *Am. J. Trop. Med. Hyg.*, 60(3), pp 410-420, 1999.
- > Roll Back Malaria, *Global Strategy and Booster Program*, The World Bank, 2005.
- > Sabatinelli et al, « Dispersion d'*Anopheles gambiae s.l.* dans une zone urbaine de Ouagadougou (Burkina faso) », *Parassitologia* 28:33-39, 1986.
- > Samé-Ekobo A, Fondjo E, Eouzan JP, *Grands travaux et maladies à vecteurs au Cameroun*, IRD éditions, 2001.
- > Trape JF, Lefebvre-Zante E, Legros F, Ndiaye G, Bouganali H, Druilhe P, Salem G, « Vector Density gradients and the epidemiology of urban malaria in Dakar, Senegal », *Am. J. Trop. Med. Hyg.*, 47(2), pp 181-189, 1992.
- > Trape JF, Rogier C, « Combating Malaria Morbidity and Mortality by Reducing Transmission », *Parasitology Today*, 1996.
- > Trape JF, « Les limites des moustiquaires imprégnées dans la lutte contre le paludisme en Afrique Tropicale », *Bull Soc Pathol Exot*, 94, 2 bis, 174-179, 2000.
- > Trape JF, « The public Health Impact of Chloroquine Resistance in Africa », *Am. J. Trop. Med. Hyg.*, 64(1, 2)S, pp 12-17, 2001.

ACKNOWLEDGEMENTS

This guide was compiled drawing on concrete experience observed in the field. A number of case studies were carried out, in Burkina-Faso, Cameroon, Congo, Gabon, Kenya, Senegal and Tanzania.

In order to cover all fields of expertise, the authors met numerous players active in the field of malaria control, from a variety of different backgrounds:

Representatives of public authorities: NMCP managers and advisors, civil servants from the Ministry of Health, etc.;

Heads of large international institutions;

Heads and members of NGOs;

Researchers from major research institutes;

Technicians, IEC coordinators, etc.

The authors would like to thank all those people who, by answering the many questions put to them, have been kind enough to share their knowledge and experience:

- > Doctor Dorothy ACHU, Advisor, Cameroon NMCP (Yaoundé)
- > Doctor Valérie d'ACREMONT, Infectious Diseases specialist, Institut Tropical Suisse (Dar-es-Salaam, Tanzania)
- > Doctor Jean AKIANA, Researcher, Centre Pasteur, Brazzaville (Congo)
- > Doctor Petas AKOGBETO, Advisor, NMCP of Benin (Cotonou)
- > Doctor Abdullah S. ALI, Manager, Zanzibar Malaria Control Program (Zanzibar, Tanzania)
- > Khamis AMEIR, Vector Control Officer, Zanzibar Malaria Control Program (Zanzibar, Tanzania)
- > Charles AOUDOU, Consultant, IRESKO (Yaoundé, Cameroon)
- > Doctor Frédéric ARIEY, Research Manager, Institut Pasteur, Phnom Pen (Cambodia)
- > Doctor Ibrahima Mamadou BA, Technical Advisor, Ministry of Decentralized Cooperation (Dakar, Senegal)
- > Doctor Yamar BA, Chargé de Recherche, Institut Pasteur de Dakar (Senegal)
- > Doctor Leonardo BASCO, Research Director, IRD, Yaoundé (Cameroon)
- > Cécile BELOUM, Chairwoman of the AMMIE Association (Ouagadougou, Burkina-Faso)
- > Jean BIAKATH, Commercial Director, Plant Health Department, Jaco SA (Yaoundé, Cameroon)
- > Doctor Abel BICABA, Director of SERSAP, Société d'Etudes et de Recherche en Santé Publique (Ouagadougou, Burkina-Faso)
- > Jean-Pythagore BIYIK, Coordinator of health programs, CARE Cameroon (Yaoundé)
- > Doctor BONITO NINTERETSE, Senior doctor, Albert Schweitzer Hospital (Lambaréné, Gabon)
- > Jean BOOH, Human Resources Director, Alucam (Douala, Cameroon)
- > Oriane BOYER, Health Programs manager, CARE France (Paris)
- > Shoo BRYSEON, City Surveillance Officer, Dar-es-Salaam Urban Malaria Control Program (Tanzania)
- > Professor Clément CHACHA, Entomologist, Ministry of Health (Dar-es-Salaam, Tanzania)
- > Doctor CISSE, Doctor at SAR, Chairman of the Association des Médecins du Travail Senegalais (Senegal Occupational Physicians Association) (Dakar)
- > Doctor Paul Ignace COLY, Doctor at Sonacos (Kaolack, Senegal)
- > Vincent CORBEL, Medical Entomologist, Research Manager, IRD, Montpellier (France)
- > Gabrielle COUAILLAC, SCAC / Service de Coopération et d'Action Culturelle (Cooperation and Cultural Initiatives Department), French Embassy in Ouagadougou (Burkina-Faso)

- › Frédéric DARRIET, Entomologist, Research Manager, IRD, Montpellier (France)
- › Damien DESJONQUERES, Sustainable Development Coordination, in charge of social issues, Total (Paris, France)
- › Doctor Ibrahima DIA, Entomologist, Research Manager, Institut Pasteur, Dakar (Senegal)
- › Astou DIOP, Marketing Manager, Palu-net (Dakar, Senegal)
- › Doctor Amadou DIOP, Doctor at the Dakar Port Authority (Senegal)
- › Doctor Louis-Régis DOSSOU-YOVO, Researcher, Centre Pasteur, Brazzaville (Congo)
- › Cécile DUPERRAY, Training and Multimedia Engineer, Agence de Médecine Préventive (Paris, France)
- › Ruth Bamela ENGO, Founding Chairwoman, African Action on Aids (Yaoundé, Cameroon)
- › Doctor Clément ESSAGA, Director, Kribi Hospital (Cameroon)
- › John ESSOBE, Health Coordinator, Protestant Churches of Cameroon (Yaoundé)
- › Doctor Paul ESSOMBA, Doctor at Cotco (Douala, Cameroon)
- › Rebecca ESSOMBA, Remuneration and Benefits Manager, BAT (Yaoundé, Cameroon)
- › Professor Oumar FAYE, Dakar Cheikh Anta Diop University (Dakar, Senegal)
- › Doctor Etienne FONDJO, Assistant Director, Cameroon NMCP (Yaoundé)
- › Doctor Félix FOTSO, Head of the Traditional Medicine Department, Cameroon Ministry of Health (Yaoundé)
- › Doctor John GIKAPA, Malaria Specialist, Assistant Coordinator, Malaria Manager, PMURR (Kinshasa, Democratic Republic of Congo)
- › Doctor Abdou GOUDJO, Technical Assistant, French Embassy (Brazzaville, Congo)
- › Julien GROUILLET, Corporate partnerships and health projects in the workplace, CARE France (Paris)
- › Ghislaine GRYPONPREZ, Program Manager, PSF / Pharmaciens Sans Frontières (Ouagadougou, Burkina-Faso)
- › Abdou GUEYE, Director, Palu-net (Dakar, Senegal)
- › Doctor Alfred IBOUANGA, National Manager, PASCOP (Brazzaville, Congo)
- › Doctor Issoumaïla KABA, Health Coordinator, Plan Burkina-Faso (Ouagadougou)
- › Simon KABORE, Chairman of RAME / Réseau Accès aux Médicaments Essentiels (Network for Access to Essential Medicines) (Ouagadougou, Burkina-Faso)
- › Khadija KANNADY, Manager, Dar-es-Salaam Urban Malaria Control Program (Tanzania)
- › Doctor Joseph Silvére KAPTUE, Doctor at Sogea-Satom (Douala, Cameroon)
- › Germain Luma and Mbock Philippe KEKE, Coordinator and Supervisor, Asademir (Yaoundé, Cameroon)
- › Professor Maryvonne KOMBILA, Libreville Faculty of Medicine (Gabon)
- › Doctor Joseph KOMWIHANGIRO, Head of Programs, AMREF (Dar-es-Salaam, Tanzania)
- › Dominique KONDJI, Director, BCH Africa (Yaoundé, Cameroon)
- › Doctor Abderamane KONE, Doctor at ICS (Mbao, Senegal)
- › Doctor Amadou KOUMARE, Director, Department of Pharmacy and Drugs (Ouagadougou, Burkina-Faso)
- › Jean-Louis LAMBORAY, Coordinator of the Malaria Competence project (Belgium)
- › Doctor Léopold LEHMAN, Epidemiologist, Parasitologist, University of Douala (Cameroon)
- › Brigitte LEMEN, Jean-Pierre TANGA, Berline TCHUENGUIA, CASS (Yaoundé, Cameroon)
- › Doctor François LIBAMA, Director, Congo NMCP (Brazzaville)
- › David LOMPO, Protestant Churches Representative in the Burkinabé CCM (Ouagadougou)
- › Doctor Francis LOUIS, Coordinator, WHO Cameroon (Yaoundé)
- › Patrice MANDENG, Traditional Doctor (Yaoundé, Cameroon)
- › Doctor Théodat MANGA, Hysacam Doctor (Douala, Cameroon)
- › Doctor Léonard MBAM MBAM, Country team advisor, WHO Cameroon (Yaoundé)
- › Doctor Ibrahima MBENGUE, Doctor at Shell (Dakar, Senegal)

- › Beatrice MINJA, National Coordinator TaNAAM, Tanzania NGO Alliance Against Malaria (Dar-es-Salaam, Tanzania)
- › Damaris MOUNLOM, Director, FESADE (Yaoundé, Cameroon)
- › James MSAMI, Coordinator, Dar-es-Salaam Urban Malaria Control Program (Tanzania)
- › Simon NDJELL KOO, Traditional Doctor (Yaoundé, Cameroon)
- › Alain NJIGNET, Chairman of CAAV (Yaoundé, Cameroon)
- › Doctor Bernard MONTAGUT, Senior Doctor, Centre Médical des Entreprises de la Sanaga (La Sanaga Corporate Clinic) (Edéa, Cameroon)
- › Doctor Antoine MOUANGUE, Senior Doctor, Unité Provinciale du Littoral (Coastal Provincial Unit), Cameroon NMCP (Douala)
- › Doctor Jean-Paul MOULIA-PELAT, Technical Advisor, Ministry of Public Health (Libreville, Gabon)
- › Doctor Jean-Romain MOUROU, Director, Gabon NMCP (Libreville)
- › Professor Roger MOYOU, Center Manager, Centre de Recherches Médicales (Medical Research Center), Yaoundé (Cameroon)
- › Doctor Christine MULANDI, Doctor at KPRL (Mombasa, Kenya)
- › Doctor Alex M. MWITA, Manager, National Malaria Control Program (Dar-es-Salaam, Tanzania)
- › Doctor Matthieu NDOUNGA, Researcher, CREV (Brazzaville, Congo)
- › Jean NGOMSI, Sanitation Officer, Kribi District Preventive Health Department (Cameroon)
- › Doctor Chea NGUON, Project Manager, Ministry of Health (Phnom Penh, Cambodia)
- › Doctor Jane N MUNYI, Chief Medical Officer, Kenya Ports Authority (Mombasa, Kenya)
- › Souleymane NIKIEMA, Director, AGEREIL (Ouagadougou, Burkina-Faso)
- › Doctor Thierry NOEL, Doctor at Schlumberger (Douala, Cameroon)
- › Doctor NYA, Doctor at Sénélec (Dakar, Senegal)
- › Professor Marie-Thérèse OBAMA-ABENA, Yaoundé Faculty of Medicine (Cameroon)
- › Rose OBEN, Occupational Health Nurse, Shell (Douala, Cameroon)
- › Doctor Raphaël OKALLA, Director, Cameroon NMCP (Yaoundé)
- › Blandine OLINGA, IEC and Partnerships Manager, Cameroon NMCP (Yaoundé)
- › Doctor Jean-Eric OUEDRAOGO, Director, Burkina-Faso NMCP (Ouagadougou)
- › Oumarou OUEDRAOGO, Coordinator of the Child Survival project in Boulsa (Burkina-Faso)
- › Mr. OUEDRAOGO and Mrs. SOME, ABBEF / Association Burkinabé pour le Bien-Etre Familial (Burkinabé Family Welfare Association) (Ouagadougou)
- › Michelle PERROT, Program Manager, Plan France (Paris, France)
- › Doctor Jean-Loup REY, Public Health physician, Caritas (Paris, France)
- › Vincent ROBERT, Entomologist, Research Manager, Institut Pasteur, Paris (France)
- › Doctor Albert SAME-EKOBO, Assistant Director, Cameroon NMCP (Yaoundé)
- › Doctor SAWODOGO, District Chief Medical Officer, Boulsa (Burkina-Faso)
- › Doctor Sefrin SEBORU, Chief Medical Officer, Bamburi Cement (Mombasa, Kenya)
- › Abbé François SEDGO, Catholic Churches representative in the Burkinabé CCM (Ouagadougou)
- › Doctor Rashid SEIF, Director of Health, Tanzania Red Cross Society (Dar-es-Salaam, Tanzania)
- › Doctor Frédéric SIMARD, Research Manager, IRD, Yaoundé (Cameroon)
- › Doctor Jean-François SOME, Program Director, PAMAC / Program d'Appui au Monde Communautaire Associatif (Support Program for Associations and Communities) (Ouagadougou, Burkina-Faso)
- › Professor TAKOUGANG, Yaoundé Faculty of Medicine (Cameroon)
- › Doctor Adama TALL, Research Director, Epidemiology Unit, Institut Pasteur, Dakar (Senegal)
- › Seynabou Samb TALL, Head of the Environment Section, SAR (Dakar, Senegal)

- > Doctor Esther TALLAH, Director, Cameroon Coalition Against Malaria (Yaoundé)
- > Doctor Bruno TENGANG, Chief Medical Officer, La Trinité Hospital (Douala, Cameroon)
- > Adama THIOMBIANO, Coordinator of the Child Survival project, Plan Burkina-Faso (Ouagadougou)
- > Professor Félix TIETCHE, Director of the Mother and Child Center, Chantal Biya Foundation (Yaoundé, Cameroon)
- > Doctor Fernand TOE, Assistant Health Project Administrator, UNICEF (Ouagadougou, Burkina-Faso)
- > Doctor Ephraïm TOH, Health Program coordinator, Plan Cameroon (Yaoundé)
- > Doctor Alexis TOUGORDI, National Malaria advisor, WHO Cameroon (Yaoundé)
- > Doctor Abdoul Kader TOURE, Doctor at Sodefitec (Tambacounda, Senegal)
- > Martin YABA, Sectorial Response Manager, CNLS (Brazzaville, Congo)
- > Chrestien YAMENI, Malaria Project Coordinator, ACMS (Yaoundé, Cameroon)
- > Doctor Bernabé YAMEOGO, Boulsa Program Coordinator, Plan Burkina-Faso (Ouagadougou)
- > Doctor Maxime YAMEOGO, Health Coordinator, Burkinabé Red Cross (Ouagadougou)
- > Doctor Jean-Christian YOUMBA, Assistant Director, ACMS (Yaoundé, Cameroon)
- > Mahmadou ZE, Logistics Director, Plan Burkina-Faso (Ouagadougou)
- > Eric ZOMA, Coordinator, SPONG / Permanent Secretariat for NGOs (Ouagadougou, Burkina-Faso)

The authors would like to express their special thanks to the following:

- > Doctor Valérie d'ACREMONT, Infectious Diseases Specialist, Swiss Tropical Institute (Dar-es-Salaam, Tanzania)
- > Philippe BAETZ, former Vice-President of sanofi-aventis, Access to Medicines (Paris, France)
- > Orianne BOYER, Health Program Manager, CARE France (Paris)
- > Julien GROUILLET, Corporate Partnerships Manager, CARE France (Paris)
- > Ghislaine GRYPONPREZ, Program Manager, PSF / Pharmaciens Sans Frontières (Ouagadougou, Burkina-Faso)
- > Doctor Ephraïm TOH, Health Program Manager, Plan Cameroon (Yaoundé)
- > Doctor Bernabé YAMEOGO, Boulsa Program Manager, Plan Burkina-Faso (Ouagadougou)
- > Doctor Jean-Christian YOUMBA, Assistant Director, ACMS (Yaoundé, Cameroon)

Finally, the authors would like to express their particular gratitude to the individuals at sanofi-aventis and Total who were closely involved throughout the project (particularly during the review phase) and who helped make this guide a reality:

For sanofi-aventis,

- > Doctor François BOMPART, Director, Access to Medicines (Paris, France)
- > Doctor Jean-Marc BOUCHEZ, Medical Manager, Impact Malaria (Paris, France)
- > René CAZETIEN, Director of Commercial Operations, Access to Medicines (Paris, France)

For Total,

- > Catherine FERRANT, Managing Director, Total Foundation (Paris, France)
- > Coline LAPORTE, Social and Health program, Total Foundation (Paris, France)
- > Doctor Gérald STEENMAN, Co-Director of the International Medical Department (Paris, France)

And for her informed review of the guide on behalf of Total,

- > Nyriam VAN-DUNEM

This guide was produced by Sanisphere, a research consultancy specializing in health in developing countries, in Africa, Asia and South America.

Sanisphere provides its services to financial backers and international organizations for studies on access to healthcare and project appraisal.

Sanisphere also provides support to companies for the definition, analysis and evaluation of health programs aimed at their employees and their families and at surrounding communities. The production of the Practical Guide for the Corporate Fight against Malaria in 2006, upon which the current guide is based, forms part of this support process.

Finally, Sanisphere also provides services to pharmaceutical companies (strategic marketing, market research, projects on access to drugs).

Sanisphere

thomas.miklavec@sanisphere.com

www.sanisphere.com

Practical guidebook for the fight against malaria aimed at NGOs and communities

This guide is aimed at any organization wishing to get involved in the implementation of malaria control initiatives in the field. It is specifically designed for heads and members of local associations and NGOs: it is a source of practical ideas and a training tool for international NGOs and organizations.

Comprehensive and practical, it helps organizations gain an in-depth understanding of malaria and its risks as well as acquire knowledge and know-how with respect to existing control methods. It also guides them through the various aspects of management of a control program, from diagnosis to evaluation and monitoring.

The ultimate objective of this guide is to provide any organization - even one which has never before been involved in malaria control - with the

knowledge and pointers required to effectively support national malaria control policy through actions appropriate to its resources and the health and social environment within which it is working.

This copy is not for sale.

This guide is brought to you courtesy of sanofi-aventis and Total. It was produced by Sanisphere, a research consultancy specializing in health in developing countries.

With the support of

