THE ROLE OF WORLD HEALTH ORGANISATION (WHO) IN COMBATING MALARIA IN AFRICA: ITS IMPACT AND PROSPECTS

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DECLARATION

I hereby declare that this thesis leading to the award of the degree of master of international affairs and diplomacy has been written by me, and that it is a record and production of my own work. All quotations are indicated by quotation marks and the sources of information are duly acknowledged by means of references.

To the best of my knowledge this thesis has never until now been presented either partially or wholly for any other degree nor is it being concurrently submitted for any other degree.

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CERTIFICATION

The undersigned certify that they have read, and recommended to the Faculty Board of Social Sciences for acceptance a thesis titled, "The Role of World Health Organisation (WHO) in Combating Malaria in Africa: Its Impact and Prospects", submitted by Muhammad BelloTukur in partial fulfilment of the requirements for the award of the degree of Master of International Affairs and Diplomacy (MIAD) of Ahmadu Bello University Zaria, Nigeria.

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DEDICATION

In loving memory of my late father, Mallam Muhammad Tukur Bello, who toiled very hard during his life time so that his offsprings might live a more meaningful and sublimated life.

May Allah grant him eternal rest and Al-Jannah firdaws. Amin.

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ABSTRACT

This study has revealed the grim irony that dazzling advances in biomedical science are scarcely felt in areas where need is greatest. Large numbers of people are dying of malaria, a preventable and curable disease, for lack of even the simplest measures of modern medicine. While gains in biomedical technology are important, so are developments in the methodology for analyzing complex problems, planning optimum use of resources and managing programmes.

The study has drawn the distinguishing line between the problems of providing health care, when there is a reasonable balance between numbers of people and resources available and the problems of reaching all the people of the entire world, a region, a nation or even a community. The decision to serve an entire population profoundly influences every step of planning and resource allocation. For health services to be effective it must reach across the land into communities and homes and include those who do not seek health care (but may desperately need it) as well as those who do. Every apparent medical success must be measured against the needs of all. Every effort, every cluster of resources must be divided by the total number of people.

Two major developments have brought us into confrontation with the need to serve all the people. First is the rising sense of social responsibility that each nation feels for the well being of its people. Second is an increasing capability for dealing with the problems of health care. Closely related to these trends is a sense of urgency based on such factors as finding a solution to the problem of rapid population growth and that the disadvantaged sectors of society can react in ways that are often disruptive and may be exceedingly dangerous.

The reality of the situation is that our increasing abilities to quantify the needs of people and evaluate the uses of resources are making it painfully clear that lives are lost and damaged in some places while life-saving resources are wasted on trivia in others. In individual nations, there is increasing impatience and even outrage over the failure to reach the disadvantaged, but it remains to be seen how soon these feelings will lead nations to share their resources across international boundaries.

In considering how to reach all the people with health care, it must be realized that although the medical answers to some diseases, such as malaria, are well known (getting rid of mosquitoes), the cost of providing these answers would consume all available health

resources in many countries. This realization may have influenced WHO'S decision to champion the launching of Roll Back Malaria (RBM) in 1998 - a partnership working world-wide to halve the burden of malaria by 2010.

As firmly established by this study, however, three years after its inception the RBM programme have failed to make a statistically significant impact particularly in Africa where malaria continues to ravage the continent leaving behind in its trail scores of infant and maternal deaths and retarded social and economic growth.

The solution recommended by this study Is simply a diligent application, on a large scale, of a well organised and supported malaria control programme based on the present day technologies, which the study assert have newer really been applied and sustained on a big enough scale to make much difference in malaria incidence, morbidity and mortality.

In the end the study endorses the on going researches for new malaria control technology, including malaria vaccine as a step in the right direction but point to the fact that even in a most optimistic scenario, such a product will not be available for widespread use within the next five years.

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CHAPTER ONE
1
INTRODUCTION

Malaria, the world's most prevalent vector-borne disease is endemic in 92 countries with pockets of transmission in an additional eight countries (WHO, Weekly Epidemiological Record No.72, 1997, pp.269-76). Approximately 41% of the world's population is at risk, and each year 300 million to 500 million clinical cases of malaria, more than 90% of them in Africa are reported. Worldwide, approximately 2 million deaths per year can be attributed to malaria, half of these in children under 5 years of age (Martens and Hall, 2000, p.1).

Over recent decades, the explosive spread of malaria has given the world a few close calls. Unexpected epidermics have affected countries that had been free of malaria. In much of the world especially in tropical Africa continuous malaria transmission leads to hundreds of thousands of child deaths each year. Infact a child dies every 30 seconds as a result of malaria and majority of those children that die as a result of malaria are children of Africa (UNICEF, African Summit on RBM, April 2000, p. I.).

Malaria accounts for about one million deaths annually in Africa. Malaria costs Africa more than US $ 12 Billion annually, and can be controlled for a small fraction of that amount. Those who suffer most are some of the continent's most impoverished and that malaria keeps them poor. A poor family living in malaria affected areas may spend up to 25 percent or more of it's annual income on prevention and treatment. (WHO, African Summit on RBM, April 2000, p. 16).

Malaria has undoubtedly worsens the poverty of African nations. It prevents adult from working - malaria patients can be ill for 5 to 20 days at a time. Malaria has slowed economic growth in African countries by 1.3 percent per year. As a result of the compounded effect over 35 years, the GDP level for African countries is now 32 percent lower than it would have been in the absence of malaria (Ibid).

The disease continue to spread due to a combination of factors: Weak health system; large population movements; deteriorating sanitation and in certain cases, uncontrolled development activities. This overwhelms national health services, sustains poverty and disempowers societies.

In Kenya although **AIDS** is an increasing worry malaria is the main killer and the worst health problem with over 70 percent of its population at risk of malaria which accounts for between a third and half of all childhood deaths (WHO, Promise for progress, March 2000, p. 39). The siaya region on the shores of Lake Victoria in Kenya is one of the worst malaria endemic regions in the world. Everyone living there receives an estimated 300 infectious bites a year - almost one a day. Prevalence rates are more than 50 percent and the local malarial parasite is highly resistant to chloroquine the most commonly used drug (WHO, Promise for progress, March 2000, p. 63).

Sudan was once a leader in malaria control. In the 1900s during the period of British colonisation, the Khartoum Brigade system was established and the experience gained in the country was used to study the feasibility of malaria control over the African continent. Although Sudan joined WHO's global eradication campaigns of the '50s and '60s the country's vastness, weak health infrastructure and financial difficulties hampered progress.

Serious epidemics in the mid-70's led to the establishment of the Blue Nile Health Project with contributions from the Sudan government, WHO, the World Bank, Kuwait, Japan and the *USA*. The project covered the Gezira state, an area of Central Sudan of paramount economic importance. Malaria control was a prime component of the project and the ten year programme successfully brought prevalence down from 25 to less than one per cent before it was halted by lack of funding in 1989. As often happens, malaria returned to Sudan, where people had lost their immunity during the period of low transmission, with a vengeance and dramatic epidemics occurred in 1993 and 1994 (Ibid, p.20). A newly gathered data about the Sudan and its health problems has revealed that malaria ranks first with an estimated seven million cases and 35,000 deaths a year (Ibid, p.18).

Madagascar, an Island State that lies south-east of the African continent with tropical climate and lush vegetation allows malaria mosquitoes to proliferate. Half of the islands population lives in highly endemic areas and the other half in territories prone to severe epidemics. Malaria has always been among the leading causes of death

in Madagascar (8 per cent of all deaths in 1987). In 1992, the World Bank made a significant investment in control activities through its First Health Sector Support Project. About a third of the total credit of US$31 million went to malaria control as part of the project's management component (Ibid, p. 59).

Unlike most other diseases in the world, malaria is spreading. As roads are built, forests cut down, new mining areas opened up habitats which favour the breeding of mosquitoes expand, and what starts out as economic development often unintentionally leads to an underperforming and sick workforce.

Recognizing the disease and economic burden that malaria places on hundreds of millions of Africans and the barrier it constitutes to development and alleviation of poverty, the African Heads of State signed the Harare Declaration on Malaria in June, 1997. This African initiative on malaria was endorsed in 1998 by the African Development Bank (ADB), the World Bank, UNICEF, WHO and UNDP. And in the same year WHO, UNICEF, UNDP and the World Bank launched the Roll Back

Malaria Initiative (RBM).

There is widespread enthusiasm for the Roll Back Malaria approach to reducing the burden of malaria in countries by working within the context of health sector development efforts. In this way ownership and prioritisation can be assured by the countries concerned and efforts made sustainable over the long term. National governments, and partners, that work with them are now disentangling what this means in operational terms. In practice, this reflects both health sector development efforts and the malaria situation in specific countries. Many are finding it difficult to contemplate changes to the way in which malaria control is planned and financed given the low level of human and financial resources available. To respond to pressure for rapid results they see the first priority as getting more funds into malaria control action.

For the RBM programme to remain focused it is suggested that earmarked support for malaria control action outside the context of other health actions, may not be essential unless specifically geared to

malaria epidemics. Even then action should be undertaken within the context of wider public health action (WHO, 2nd meeting of the RMB Global Partnership, July, 1999, p.6).

It is firmly believed that given the burden of disease attributed to malaria in most parts of Africa, Roll Back Malaria has the potential to initiate processes to roll back ill health. It can assist countries prioritise and plan, and mobilise political support for action to tackle high burden disease. It means that overall, Roll Back Malaria efforts have the potential to serve as a lens to view and promote the progress of health sector development efforts.

Are these convictions true? This study will attempt to find answer to this question within the context of WHO's role in the Roll Back Malaria programme.

The main factors to be evaluated in this study are briefly discussed in this chapter under sections 1.1. through 1.7. They include statement of the problem, objective of the study, justification for the study,

theoretical frame work, hypotheses, research methodology, the scope and limitations of the study. The discussion of these factors is imperative as they provide a frame work for presentation and evaluation of the study.

1.1 STATEMENT OF THE PROBLEM

This study is an examination of the effectiveness of World Health Organisation (WHO) malaria control programme in Africa from 1990 to 2000.

With accurate information on the transmission of malaria less than 100 years old, public health organisations have developed and deployed control methods with extraordinary effectiveness.

From the standpoint of techniques, malaria eradication is not in doubt except for Africa South of the Sahara. Here the habits of the mosquitoes and the people require more analysis for the design of effective campaigns. Here, too, the financial and human resources for such an effort are thin, and are required to meet many social and economic needs of recently created nations.

However the global strategy of malaria eradication is being reexamined by the World Health Organisation (WHO) for four reasons (Chanlett, 1979, p. 379):

(a) As campaigns approach success or achieve it, the urgency of malaria recedes and appropriating bodies become reluctant to continue the necessary funds. Their demands for economic proof of the developmental return cannot be met with complete and accurate data.

(b) The task of carrying eradication through its last stages is costly and tedious, with a heavy drain on organizational morale and zeal.

(c) Eradication is difficult to maintain where infected persons can move from malarious areas.

(d) With insect resistance to low-cost materials, the campaign cost escalates 20 - to 30 - fold for very expensive

substitutes, which must be imported.

Malaria eradication has been achieving its goal and has done so with an economic benefit which has been easier to demonstrate in developed areas. The reexamination will provide more complete socioeconomic data, a careful analysis of effective organizational patterns, and directions for technical adjustments. All this will be beneficial to eradication planning in underdeveloped areas where the costs are high relative to financial and human resources. Nevertheless, the move is toward less intensive efforts of malaria control rather than eradication.

This study would evaluate these problems in an attempt to establish the success or failure of the current WHO campaign to combat malaria in Africa.

The findings of the study, the conclusions drawn and the recommendations made which would be documented must be practical and of immediate application, if the current movement to

Roll Back Malaria is to succeed and be sustained.

1.2 THE OBJECTIVE OF THE STUDY

Malaria eradication had been tried some decades ago, it succeeded in some countries but failed severely in others. A study of why malaria management succeeded in some countries and failed in others might be expected to offer a useful insight into the strategies to be adopted if the current movement by WHO and its partners aimed at a concerted action to significantly reduce mortality and morbidity from malaria is to succeed.

The objective of this study therefore, is narrowly to determine the effectiveness or otherwise of WHO's role in combating malaria in Africa, and broadly to establish the route leading to correctly planned and effectively implemented malaria management programme in Africa in particular but with a possible extrapolation to other developing countries at large; and to indicate for avoidance the main pitfalls usually encountered in the execution of such programmes.

The study is being undertaken as a requirement for a Masters degree in International Affairs and Diplomacy (MIAD) at the Post Graduate School of Ahmadu Bello University (ABU) Zaria, Nigeria. Therefore the study is intended for the Department of Political Science ABU, which is the awarding body for the degree. It is envisaged that the following groups could benefit from the outcome of this study - international organisations, national governments and health personnel working in government ministries.

International organisations need help at country level in deciding what level of malaria management is needed; where it should be focused and what priority should be allocated to it having regard to the availability of material and human resources; how to make use of scarce and often unreliable statistics; and in recognising what statistics are indispensable and which are merely helpful (Kleckowski and Pibouleau, 1976, p.6).

National governments need to know all the factors that impact

upon the success of malaria management. Their understanding of all the factors that directly or indirectly affect malaria control programme will enable them provide the leadership role needed for the development of national health policies which will result in the definition of current programmes to be abandoned, strengthened and or maintained; plus those that are deemed worthy of being developed along with the identification of necessary existing, or required resources to meet the programmatic objectives.

Finally health personnel must be aware of the far-reaching implications in indulging into malaria control programme without proper planning. They should also be aware of the steps necessary for the initiation and successful execution of properly planned malaria management programme.

1.3 THE JUSTIFICATION FOR THE STUDY

This study is justified by multitude of reasons. First, because of a shared concern of the rising human suffering from malaria especially in Africa where this re-emerging disease represent more

than 10% of the total disease burden.

Second, because of shared concern of the severe impediment malaria is putting on the economic and social development of so many countries. Some studies indicate that malaria can hold back income by as much as 12%. Where there is malaria there is likely to be severe strains on foreign investments. Also the economic losses caused by mosquitoes (malaria vector) by making resort and recreational sites unlivable during periodic invasions are most difficult to estimate.

Third, because of a genuine desire to make contributions to the existing knowledge on malaria and malaria control so as to promote awareness among national and international agencies on the negative impact of a continuing malaria problem; and influence them in collaboration with appropriate institutions and governments to develop or strengthen the capacity and capability at all levels to provide material, financial and leadership support to the malaria prevention and control programme with a view to eradicating the disease in Africa in particular and the whole world

in general.

1.4 THEORETICAL FRAMEWORK

Theories will be employed in this section to explain the apparent luke warm attitude of the international community to the plight of Africa over the malaria scourge which have for centuries and still continue to limit the continent's human productivity and economic development. The roles or functions of international organisations such as World Health Organisation (WHO) will also be explained within the context of the international political system.

The neo-colonial dependence theory in my view adequately explain the non-chalant attitude of the international community towards global malaria eradication of which the Western World wants us to believe is not in doubt except in Africa. The proponents of this theory include scholars like Theotonio Dos Santos and Paul Baron. The theory attributes a large part of the third World's continuing and worsening poverty to the existence and policies of the industrial capitalist countries and their extensions in the form of

a small but powerful elite or comprador groups in the less developed countries. Whether because rich nations are intentionally exploitative or unintentionally neglectful, the coexistence of rich and poor nations in an international system dominated by such unequal power relationships between the center (the developed countries) and the periphery (the LDCs) renders attempts by poor nations to be self-reliant and independent in their development efforts difficult or sometimes even impossible (Baron, 1985).

Certain groups in the developing countries who enjoy high incomes, social status and political power constitute a small elite ruling class whose principal interest, whether knowingly or not is in the perpetuation of the international capitalist system of inequality and conformity by which they are rewarded. Directly and indirectly they serve (are dominated by) and are rewarded by (dependent on) special interest international power groups including multinational corporations, national bilateral aid agencies and multilateral assistance organisations which are tied by

allegiance and or funding to the wealthy capitalist countries. Underdevelopment is thus seen as an externally induced phenomenon as opposed to the linear stages and structural change theories that stressed internal constraints such as insufficient savings and investment or lack of education and skills.

How else would one explain the reluctance on the part of international appropriating bodies to continue the necessary funds needed for malaria eradication in Africa each time an eradication campaign approaches success; or how would one explain the ever escalating costs of effective insecticides needed for mosquito eradication.

Perhaps it is pertinent at this juncture to ask what happens next assuming that the current Roll Back Malaria campaign to halve the World's malaria burden by the 2010 succeeds; will the international community launch a succeeding programme and using the experiences learned from RBM to ensure total eradication of the disease, or will it look elsewhere (as it often does) and claim

its attention is being diverted by another equally or more important matter until in time malaria rebounds with a vengeance and ravages the whole African continent again?

On the other hand the contextual role of WHO can best be explained by the functional theory. The functional analysis begins by assuming that the "organismic" properties inherent in human beings have their counterparts in communities. Societies perceive and learn and can, within limits, adapt to problems. They also adjust to change by means of collective problem solving. They have a built in tendency toward integrating collective symbols, language and beliefs into the system to assert coherence.

Developed in the 40s and 50s by Talcott Parsons and influenced by Durkheim, Weber and Pareto, structural functionalism sought to incorporate behaviourism within an action scheme. Action is motivated by behaviour, and behaviour itself is determined by combinations of structural relationships. But motivated behaviour determines structure.

Parsons (1951) identified three levels of analysis, each of which has "framing" or limiting characteristics for the others, and is a function of the others as well. One is culture or learned symbols, beliefs and value orientations. Second is social system, or the interrelationships of action based on networks of roles. Third is the structure of the personality, its needs and gratifications. Each of these structures is analytically abstracted from the world of the acting individual: personality represents perceptions and motivation; social systems represent the universe of relationships; culture represents the universe of public meanings and symbols.

There are, however, many operational problems involved in the use of structural functionalism as would be seen from the roles of WHO to be discussed later. There is no standardization of functions nor precise meaning of functions. The main value of the approach is to point out contradictions and dysfunctions which societies are likely to experience when undergoing change. Therefore societies that look up to WHO and the like of such organisations for solutions to their multitude of problems had

better look elsewhere. Granted that such organisations have important roles to play and undoubtedly have been making significant contributions but complete and comprehensive solutions to national problems is unfortunately not one of them.

1.5 HYPOTHESES

The following hypotheses are proposed for this research:

(a) There is no significant relationship between WHO malaria control programme and the prevalence of malaria over a period of time.

(b) There is no significant relationship between WHO financial support for malaria control and the reported number of malaria mortality within a specified period.

(c) There is no significant relationship between WHO financial support for malaria control and the reported number of malaria cases within a given period.

1.6 METHODOLOGY

There is always a mutual interplay of problem and method.

Kerlinger noted that problems dictate methods to a considerable extent but methods - their availability, feasibility, and relevance also influence problems (Kerlinger, 1973, p. 478).

Analysis of problem can be done by several different methods. The methodology usually encompasses the technique of sourcing of relevant data, data collection, an evaluation of consistency and interpretation of the data. These techniques are briefly discussed below:

1.6.1 Types and Sources of Data

The data used in this study was collected from secondary sources mainly reports, minutes, fact sheets, press releases, text books, journals and lecture notes. A review of the literature relevant to the field of study was made. As a result theoretical models on various aspects of malaria management were established and documented.

1.6.2 Data Collection

To implement general plans for research, methods of data collection must be employed. Data collection methods can be categorised by the degree of their directness. Most of the data collection methods used in psychological and sociological research are relatively direct or moderately indirect (Kerlinger, 1973, p. 479).

Raw information obtained from sources identified in the preceding section shall be collated and properly analysed.

1.6.3 Data Presentation

Some of the data used in this study are presented in tables in order to highlight and emphasize trends and relationships.

1.6.4 Topic and Dimension

The researcher in any research work is not engaging in

completely unplanned activity (Gordon, 1969, p.27). For this reason, the topic he or she is exploring or the dimension they are measuring should be clearly defined; and they should endeavour to avoid possible influence of preconceived notions and rely mainly on objective finding of the investigations (Kerlinger, 1973, p. 481).

In concurrence I have done the best I could in ensuring that both the topic and the dimensions of this study were clearly defined and I have made no attempt to control or manipulate any of the variables in this study in order to arrive at a desired result.

1.7 SCOPE AND LIMITATIONS OF THE STUDY

This study is limited to a period of 10 years (1990 - 2000). This period is chosen because of two important considerations. First malaria eradication campaign is achievable within eight years, as such the effectiveness of any malaria control programme could

easily be ascertained within a time span of 10 years. Second the current global campaign against malaria being led by WHO, the Roll Back Malaria, was launched in 1998 which fell within the period under consideration.

The study is also limited to WHO malaria control programme in Africa only, as distinct from WHO malaria control programme in other parts of the world; as well as malaria control programmes of other international agencies and associations such as ADB, World Bank, UNICEF and UNDP.

There may, however, be need in future for some other studies to consider malaria control programmes of other agencies individually or comprehensively.

CHAPTER TWO
2
LITERATURE REVIEW

This chapter summarizes some of the findings made through reviews of literature, reports, minutes, fact sheets, press releases and studies on WHO malaria control programmes. All factors discussed in this chapter are important in understanding comprehensively the subject under consideration.

2.1 THE SIGNS AND SYMPTOMS OF MALARIA

The signs and symptoms of ordinary malaria are too well known to need any extended description. The attacks of "chills and fever" for a few hours followed by drenching sweats, every day or, more often every alternate or every third day make the typical case of the disease easily recognizable.

Other symptoms of malaria include weakness of the joints and general body fatigue.

2.2 THE NATURE AND TYPES OF MALARIA

The disease entity malaria is caused by protozoa of the genus Plasmodium. Four species of Plasmodia causing four types of malaria have been identified and recognised as follows:

2.2.1 Vivax Malaria

The first type of Malaria known as vivax malaria is caused by the parasite Plasmodium vivax. This and the second type of malaria are the common types of malaria, the mildest, and the most likely to recur. Once infection is established the paroxysms of fever typically occur every second day may occur daily in cases where there is a double brood of parasite.

2.2.2. Tertian Malaria

The second type of malaria known as tertian malaria is caused by Plasmodium ovalle. Once the infection becomes established, the paroxysms of fever typically occur every third day for the tertian. They may occur daily, however, in cases where there is a double brood of parasites, one brood segmenting on days two, four, and six and the other on days

one, three and five.

2.2.3 Quartan Malaria

The third type, quartan malaria, is caused by the Plasmodium malariae. This type is slightly more severe than vivax malaria. The paroxysms of fever occur every three days when there is a double infection. The paroxysms occur on days one and two and again on days four and five.

2.2.4 Falciparum Malaria

The fourth, falciparum malaria, is caused by the Plasmodium falciparum. This is the most serious type of malaria, the type in which the often fatal complication of cerebral malaria or black water fever occur. The paroxysms occur at regular intervals. When recognised early and treated promptly, however, this type responds well to therapy.

2.3 THE SOURCE AND SPREAD OF MALARIA

Humans are usually infected with malaria through bites by an

infected mosquito. After inoculation of humans with malaria parasite by an infected mosquito, the parasite undergoes schizogony in the liver cells. This cycle continues for various periods of time depending on the species and strain, but periodically parasites are released into the blood stream. These invade erythrocyte and another schizognic cycle ensues within the cells leading to their repture and multiple infection of other cells. This cyclical erythrocytic schizogonic processes in the cause of malaria.

Reports of malaria are increasing in many countries and in areas thought free of the disease. (Martens and Hall, 2000, p.1). Historically, population movement has contributed to the spread of the disease (Prothero, 1977, p.259). Failure to consider this factor contributed to failure of malaria eradication campaigns in the 1950s and 1960s (Bruce-Chwatt, 1968,p.272). The movement of infected people from areas where malaria was still endemic to area where the disease had been eradicated led to resurgence of the disease.

However, population movement can precipitate or increase malaria

transmission in other ways as well. As people move, they can increase their risk for acquiring the disease through the ways in which they change the environment and through the technology they introduce, for example, through deforestation and irrigation systems (Service, 1991, p. 165). Such activities can create more favourable habitats for Anopheline mosquitoes, at the same time, workers may have increased exposure to the vector. Furthermore, people can inadvertently transport infectious mosquitoes to malaria - free areas, reintroducing disease. Population movement is also increasingly implicated in the spread of drug resistance in malaria (Rajagopalan, et al., 1986, pp. 879 - 886).

The unprecedented increase in mobility in the last few decades has led to greater concern about the relationship between mobility and malaria. There are a number of reasons for increased mobility. First, sophisticated forms of transport now permit the swift movement of people over huge distances. Air travel has increased by almost 7% a year in the last 20 years and is predicted to increase by 5% a year for next 20 years (WHO, The World Health Report, 1996). Second,

in the developing world a rapidly increasing population is putting pressure on scarce resources leading to major population redistribution. This particularly involves the movement from rural to urban area. Third, natural disasters such as droughts and floods have created approximately 25 million environmental refugees (Ramlogan, 1996, p.81). Finally, conflict, often a result of population pressures and environmental degradation displaces vast numbers of people.

The decision-making process leading to population movement can best be understood in the light of "push and pull" forces (Kosinski and Prothero, 1975, pp.1-38). When their needs can no longer be met in a particular environment, people move elsewhere. The *"Push* factor" could be environmental degradation, population pressure on land, droughts, famines, conflict and loss or lack of employment. When people are satisfied with their situation but believe that a move elsewhere will provide new and attractive opportunities a "pull factor" is involved. This pull factor could be better political, economic or social opportunities or improved living conditions. Push

and pull factors can operate simultaneously for example, people can be pushed by environmental deterioration and scarce resources and pulled by economic opportunities offered by development projects.

Population movement can be differentiated by their temporal and spatial dimensions. Temporal dimensions include circulation and migration. Circulation encompasses a variety of movement usually short - term and cyclical and involving no longstanding change of residence. Migration involves a permanent change of residence (Gould and Prothero in Kosinski and Prothero, 1975, pp. 39 - 49). Circulation can be subdivided into daily, periodic, seasonal and long term (Prothero, 1977, p. 264). Daily circulation involves leaving a place of residence for up to 24 hours. Periodic circulation may vary from 1 night to 1 year, although it is usually shorter than seasonal circulation. Seasonal circulation is a type of periodic circulation in which the period is defined by marked seasonality in the physical or economic environment. This type of circulation involves persons or groups who are absent from their permanent homes during a season or seasons of the year. Long-term circulation, defined as absence

from home for longer than a year, affects groups such as wage labourers and traders, who maintain close social and economic ties with their home area and intend to return.

In terms of spatial dimensions, the movements to and from malarious areas are of epidemiologic importance. People who move can be categorized as either active transmitters or passive acquirers (Ibid, p. 264). Active transmitters harbor the parasite and transmit the disease when they move to areas of low or sporadic transmission. Passive acquirers are exposed to the disease through movement from one environment to another they may have low-level immunity or may be nonimmune, which increase their risk for disease.

In developing countries, human activities involving population movement include urbanization, colonization, labor related to agriculture, mining and conflict. In industrialized countries, the impact of population movements on malaria risk is mainly related to intercontinental travel.

In some regions, malaria risk may increase as a result of a combination of different forms of mobility as well as other factors unrelated to population movements. For example in the African highlands many of the issues described below act concurrently (Lindsay and Martens, 1998, p.34). The categorization of the various activities encapsulated in table 1 simplifies a complex issue but is useful for indicating major processes related to mobility and malaria risk.

TABLE 1 Typology of mobility in tropical Africa, with examples of associated activities and health hazards

Space	Time					
	Circulation				Migration	
	Daily	Periodic	Seasonal	Long-term	Regular	Irregular
Rural-Rural	Cultivating Collecting (firewood, water) (1)	Hunting (1)	Pastoralism (1) (3)	Labouring (1) (3)	Gathering (1) (3)	Planned settlement (1) (4)
Rural-Urban	Commuting (1)	Pilgrimage (1) (2) (3) (4)	Labouring (1)	Labouring (1) (2) (3) (4)	Drought victims (1) (3) (4)	Labouring (2) (3)
Urban-Rural	Cultivating (1)	Trading (2)	Labouring (1)	Trading (2) (3)	Refugees (1) (4)	Retirement (1)
Urban-Urban	Intra-urban commuting (3)	Pilgrimage (2) (4)	Trading (2)	Official/ Commercial transfer (4)	Refugees (4)	Change of residence (4)

Source: Prothero, Int. Journal of Epidemiology, Vol.6, No. 3, 1977, p.265

2.3.1 Urbanization

According to the 1996 revision of the United Nation's World urbanization prospects the world's urban population is growing at four times the rate of the rural population (United Nations, 1997). Urban pull is prevalent throughout the developing world, with rural-to-urban migration taking place faster than ever before (Knudsen and Slooff, 1992, p.1). Sub-Saharan Africa is the most rapidly urbanizing region in the world (World Bank, 1996). When accompanied by adequate housing and sanitation, urbanization can lead to a decrease in malaria through reductions in human-vector contact and vector breeding sites. However in developing countries, rapid unregulated urbanization often leads to an increase in or resumption of malaria transmission because of poor housing and sanitation, lack of proper drainage of surface water and use of unprotected water reservoirs that increase human - vector contact and vector breeding.

Although water pollution in urban areas usually leads to decreases in vector population, some vectors such as An. arabiensis in the forest belt of West Africa may adapt to breeding in polluted waters (Molineaux in Wernsdorfer and McGregor, 1988, pp. 913 - 98).

2.3.2 Colonization of New Territory

Through the interaction of a number of factors, the colonization of unpopulated or sparsely populated areas may be accompanied by an increase in malaria. Settlers who have low-level immunity or are nonimmune, may migrate into a disease - endemic area, spreading the disease. Initially, housing tends to be basic, leading to close human-vector contact. Moreover housing is often near rivers or lakes to facilitate water collection increasing the exposure of humans to mosquitoes. Activities to develop an area, such as deforestation and irrigation can increase the number of vector breeding sites, contributing to an increase in malaria. Colonization may be accompanied by major building projects,

such as dams, canals, highways, or mining activities which can further enhance malaria transmission.

2.3.3 Agricultural Labour

Swaziland provides an example of how agricultural labor has changed the spread of malaria. In the 1950s, control measures (DDT Spraying) were successfully implemented in the lowveld so that agricultural development could take place, and by 1959, malaria had been all but eradicated from Swaziland (Packard, 1986, pp. 861 - 7). However, agricultural developments in the 1950s involving an irrigation project for the cultivation of sugar cane created conditions favourable for malaria. Vector density increased, along with a high frequency of feeding on humans, as no domestic or wild animals were around the project area to serve as alternative hosts.

This resurgence of malaria was catalyzed by the reintroduction of parasite carriers in the form of migrant workers from disease - endemic areas of Mozambique, who

were involved in migration or long-term circulation to work on the sugar estates in the 1960s and early 1970s (Ibid pp. 861 - 7)

2.3.4 Refugees

The number of officially recognised refugees has steadily increased, from approximately 5 million in 1980 to over 20 million in late 1994 (US Commission on Refugees, 1994). In addition an estimated 25 million people have fled their homes but remain internally displaced in their countries of origin (Toole and Waldman, 1997, pp. 283 - 312). The displacement of large numbers of people and their circulation can favour malaria transmission. If refugees are nonimmune they could travel through or to malarious regions and acquire the infection, and if they are infectious they could disseminate the disease to other areas.

Malaria is one of the most commonly reported causes of death among refugees and has caused high rates of both illness and

death among refugees and displaced persons in disease-endemic countries, such as Sudan, Somalia, Burundi, Rwanda and the Democratic Republic of Congo (Centers for Disease Control and Prevention, Famine Affected Refugees and Displaced Population, MMWR, 1992,p.13). In recent outbreak among Burundian refugees at refugee camp in north western Tanzania, deaths from malaria and anemia in children under 5 years of age have increased 10-fold since the outbreak, reflecting the lack of immunity in this age group (Crowe, 1997, pp. 350 - 41). In the Sahel region of Africa, where civil wars and conflicts have occurred for many decades and large numbers of displaced people live in resettlement or refugee camps often located in lowland disease-endemic areas epidemics are common (Bennett, 1991).

As a result of 15 years of continuous war, which displaced hundreds of thousands of people, Luanda, the capital of Angola, underwent an unprecedented population increase in the 1980s. This population movement resulted in a shift in malaria

endemicity in Luanda from hypoendemic to mesoendemic level within 5 years (Kanji and Harpham, 1992, pp. 349 - 63). As a cause of child deaths, malaria moved from sixth to first place. Increasing parasite resistance to chloroquine also became a major problem. This situation arose because of the enormous influx of displaced people of low socioeconomic status into an environment with stagnant water reservoirs. The population movements that increased malaria transmission in Luanda were long-term circulation and migration from stable rural area to an unstable urban area.

Besides movements of large numbers of people, wars and civil unrest tend to favor malaria transmission. The disruptive effect of war on agriculture and water management can increase vector breeding sites, the destruction of housing can increase human-vector contact, the reduction in the number of cattle can prompt zoophilic vectors to become anthropophilic if their usual food supply is disrupted (Onori and Grab, 1980, p.93), and control measures can be seriously

diminished if healthcare facilities are reduced or unavailable.

2.3.5 Intercontinental Travel

Although the incidence of intercontinental transfers of malaria is low, they account for most malaria transmission in industrialized countries. These cases occur through the introduction of an infective vector into a nonendemic -disease area as in so-called airport malaria or through the movement of a parasitemic person to a nonendemic-disease area as in imported malaria.

2.3.6 Airport Malaria

Airport malaria is defined as malaria acquired through the bite of an infected local or imported tropical mosquito by persons whose geographic history excludes exposure to this vector in its natural habitat (Isaacson, 1989, p. 740). The vector is usually introduced into a non-endemic disease country on an international flight. For example, random searches of airplanes at Gatwick Airport (London) found that 12 of 67 airplanes

from tropical countries contained mosquitoes (Curtis and White, 1984, pp. 101 - 14). After a mosquito leaves the aircraft it may survive long enough to take a blood meal and transmit the disease, usually in the vicinity of an airport. In temperate climates, temperature and humidity can be favourable in the summer for the mosquito not only to survive but also to move around and lay eggs. With the enormous and continuing increase in air traffic cases of airport malaria may increase. A few such cases are described below.

In the hot summer of 1994 six cases of airport malaria were identified in and around Roissy - Charles-de-Gaulle Airport (Giacomini et al, 1995, pp. 335 - 51). Four of the patients were airport workers, and the others lived in Villeparisis, approximately 7.5km away. Anopheline mosquitoes were thought to have traveled in the cars of airport workers who lived next door to two of the patients.

Similarly in 1989, two cases of P. falciparum malaria were

identified in Italy in two persons who lived in Geneva (Majori et al 1990, pp.439-40). Another five cases of airport malaria were reported in Geneva in the summer of 1989 (Bouvier et al, 1990, pp.1217-22). High minimum temperatures were thought to have allowed the survival of infected anophelines introduced by aircraft.

In Britain two cases of P. falciparum malaria were observed in persons living 10km and 15km from Gatwick Airport (Whitfield et al, 1984, p. 1607). Hot, humid weather in Britain may have facilitated the survival of an imported mosquito. Both infections were acquired during the prolonged hot summer of 1983.

2.3.7. Imported Malaria

The world over, many countries are reporting increasing number of cases of imported malaria because of the greater increase in long-distance travel in recent decades. Documented cases imported from Africa to the United Kingdom rose from 803 in 1987 to 1,165 in 1993 and the ratio

of all imported cases of falciparum to vivax malaria rose from 0.76 in 1984 to 1.52 in 1993 (Bradley et al, 1994 pp.169 - 71). Recently a woman in Italy was infected with malaria through a bite from a local species, An. labranchiae (Baldari et al. 1998, pp. 1246-7). This species was a common malaria vector in Italy until the country was declared malaria free in 1970. Local breeding sites including isolated pools in dried-up irrigation channels, were identified, and the mosquito responsible is thought to have acquired the parasite after biting a parasitemic girl who had acquired malaria in India. Airport malaria was ruled out because of the distance from the nearest airport. This may be the first case of malaria introduced to Europe in 20 years and demonstrates the hazard of population movement (the parasite had been introduced from India) combined with human activities (providing vector breeding sites).

In the United States, recent outbreaks of presumed local mosquito - borne transmission have been reported in

California, with migration from a disease-endemic area (Zucker, 1996, p.39 - 43). The people involved were migrant workers from malaria - endemic areas. An outbreak in 1986 involved 28 cases (26 in Mexican migrant workers) of P. vivax during a 3 - month period (Maldonado et al., 1990, pp. 3 - 9). The epidemic curve indicated secondary spread, which confirmed local mosquito - borne transmission.

In the early 1990s, outbreaks were identified in neighborhoods of Houston with many immigrants from countries with malaria transmission. These outbreaks occurred when the weather was hot and humid and thus conducive to the completion of the sporogonic cycle and the survival of female anophelines (Zucker, 1996, pp. 39 - 43). Given that climate change could lead to more favourable conditions for vector survival in Europe and the United States (Martens et al, 1999, pp. 89 - 107), the increase in incidence in both airport and imported malaria is cause for concern. If temperatures increase, uninfected introduced or local mosquitoes could

survive long enough after taking a blood meal from a parasitemic person for the completion of the sporogonic cycle of the parasite, thus enabling transmission.

2.3.8 Infrastructure Projects

The health impact of other activities such as deforestation, dams and irrigation schemes can all trigger outbreaks of malaria by creating new habitats for mosquito breeding and by increasing the contact between the non-immune population and malarial parasites. Health impact assessments incorporated with appropriate risk management measures in these sectors can identify opportunities to reduce malaria.

The critical link between the environment and health has been addressed in two World Bank projects. In Ghana, where malaria is still the number one infectious disease, World Bank has set up a pilot study within its Urban Environmental Sanitation Project. This study aims to produce examples of inter-sectoral collaborations including guidelines to identify,

evaluate and priotise health problems - including malaria - outside the health sector and based on "burden of disease" assessments (WHO, Promise for Progress, March 2000, p.61).

In another project in Senegal, efforts to incorporate health objectives within the Long-Term Water Sector project has helped identify malaria as a key issue. At the moment, in the capital Dakar, market gardening practices which use water in abundance can favour malaria mosquito breeding all year round. Efforts are being stepped up to ensure that better irrigation methods using the "drip irrigation" model will reduce mosquito breeding (Ibid).

Table 2: RISK OF MALARIA TRANSMISSION IN INFRASTRUCTURE PROJECTS

PROJECT TYPE	RISK OF INCREASING MOSQUITO BREEDING SITES	RISK OF MALARIA TRANSMISSION
Roads	High	High
Logging	High	High
Urbanisation	Initially high, then low	Initially high, then low
Irrigation (rice/sugar)	High	High to Low
Irrigation (Canals)	Low to High	Low to High
Energy (dams, pipelines)	High	High
Water supply	Moderate	Low to moderate

Source: WHO, Promise for Progress, March 2000, p.62

2.4 MALARIA MANAGEMENT

There are three level of malaria management as set forth in Table 3. Of these malaria eradication held great promise and has benefitted a billion people. This vast effort seeks to apply the knowledge of malaria gained primarily in the last 75 years to achieve global control of a mosquito-borne disease which has limited human productivity and economic development for centuries. Malaria eradication extends many lives to the reproductive ages thus adding to population increases, to its productivity and to that of the land.

Three things led to the concept of malaria eradication. One

was the demonstration of its feasibility over large areas by the campaigns in Italy, the United States and Venezuela in the late 1940s. *A* second was the development of insecticidal resistance of the malaria mosquitoes, over a period of years of low-intensity control. An intensive and extensive anti-mosquito effort holds the promise of malaria eradication before resistance becomes widespread in a particular malarious area. The third *was* the comparative costs of an apparently endless annual control effort to hold down the number of malaria cases and the high annual cost of a malaria eradication campaign limited to eight years. Of these, the resistance issue was paramount. The effectiveness of the organic insecticides against anophelines must be utilised before these species acquire resistance by exposure during annual control efforts of a partial nature (Chanlett, 1979, pp. 362 -364).

Table 3: *A* comparison of three levels of malaria management: Malaria Control, Malaria Eradication, and Species Eradication

Comparative points	Malaria control	Malaria eradication	Anopheline species eradication
Objective	Hold down incidence to 10 cases/10,000 people	Eliminate the reservoir of infective cases in man	Eliminate the species down to the last female
Time span	Continuous	3-5 years for attack Phase, and 3 years for Consolidation phase; then Maintenance phase for Indefinite period	Determined by geographical spread and intensity of effort
Area of control	Selective in accord with disease incidence	Complete coverage of all malarious areas	Complete coverage wherever vector appears
Costs	Constantly recur	High; definable for period of campaign	Very high; not definable, as determined by vector behavior
Vector	Continues to be present	"Man-mosquito contact is greatly reduced but may return to original levels after insecticide pressure and reservoir of infection is gone without risk of renewed malaria transmission"	Eliminated
Imported	Of no importance	Must be controlled, as vector and susceptible present.	Of no importance as there is no vector
Surveillance required	Of disease incidence only and to keep it manageable	Of human case recurrence, and ability to control immediately	Of reintroduction of the vector, and ability to control immediately

Source: Chanlett, 1979, p.363

Table 4 records the accomplishments of antimalaria work in the world conducted from 1960 to 1975 led by the World Health Organsiation through technical advice and training manned by nationals, and funded by the home countries. In the face of enormous difficulties of budgeting, logistics, procurement, supervision, and above all increasing mosquito resistance to a lengthening list of insecticides, it is a tremendous achievement to double the number of protected people from 0.8 billion to 1.6 billion in 15 years. Two areas left outside that effort were about one-quarter billion in Africa and about 50 million in Indonesia. It was argued then that the strategies and tactics used were not adaptable to their situations.

The risk in malaria eradication is the reintroduction of a sufficient number of infected persons among immigrants, transients or repatriates from malarious areas and possibly by isolated long-term relapses, to reestablish transmission. The consequences, are great as the population is largely without any acquired immunity and an active anopheline population is present to transmit the parasite. The reality of reintroducing

malaria has already been discussed in section 2.3.7 above. There must therefore be prompt and zealous attention to maintain eradication. The issue is one of administration and management. The difficulty of creating and maintaining such organisations, the continued increase of insect resistance to a widening spectrum of insecticides, the very much greater cost of alternative insecticides, the extremely difficult training and logistical needs in some countries as in West Africa, above all non-challant attitude of international community has slowed malaria eradication to a near halt.

Table 4: The number of people protected from malaria by malaria eradication, malaria control, and chemical prophylaxsis from 1960 to 1975 by activities spearheaded by WHO

	People in millions			
	1960	1965	1970	1975
Areas protected by:				
Malaria eradication	298	535	727	824
Malaria surveillance	55	370	298	437
Extensive malaria Control or chemical prophylaxsis	526	265	352	411
Total under control: Activities	879	1,170	1,377	1,672
No special anti-malaria measures in use	457	405	437	343
Grand total	1,336	1,575	1,814	2,015

Source: Chanlett, 1979,p.364

2.5 GLOBAL MALARIA INITIATIVES

Over the last two decades we have learnt the hard way that malaria is an ever-moving target. The parasite which causes malaria adapts to survive and we must always be one step ahead if our goal is to reduce disease suffering and death. The race is on to find new cost-effective tools which can be used,

not only to treat malaria, but to improve its diagnosis.

The need for malaria prevention and the spiralling rate of resistance to first-line antimalarial medicines could be reduced by an effective vaccine. But the challenges of vaccine development are formidable. Control requires new drugs but the industry has little incentive to invest in research and development for new affordable drugs.

If something is not done soon, then Africa or indeed the world could be faced with a real emergency in the not-too-distant future, where malaria would become untreatable because of lack of drugs. This problem *has* now been recognised by both public sector agencies and industry together with the critical need to settle on some ambitious, yet realistic goals. This has led to the establishments of several global malaria initiatives which are discussed briefly in this section.

2.5.1 Roll Back Malaria (RBM)

The RBM initiative was announced by WHO in May, 1998. It is a global strategy to improve health systems with the goal of a 50% reduction in malaria deaths by 2010. This will be achieved by increasing speedy access for people to effective treatment and means of protection from mosquito bites; enabling national authorities and non-governmental organisations to combat malaria by intensifying efforts to developing new products for the prevention and treatment of malaria.

2.5.2 Malaria Vaccine Iniative (MVI)

The MVI was created through a grant of the Bill and Melinda Gates Foundation to PATH (Program for Appropriate Technology in Health). The objective of the MVI will be to significantly accelerate the clinical development of promising malaria vaccine candidates. The MVI is expected to lead to field trials of one or more vaccine candidates, coordinate its effort's with malaria vaccine programs at various

organizations and agencies, and identify gaps in current research efforts and apply resources to advance promising malaria vaccine candidates.

New discoveries have led to many different approaches to a malaria vaccine, with many of the possibilities already undergoing human trials. However scientists estimate that it will take 7-15 years before an effective malaria vaccine is ready.

Vaccines taking advantage of DNA research may provide one of the best hopes. One possibility is being developed by the US Naval Medical Research Institute, the US Agency for International Development and partners in Ghana, Australia, France and the US private sector. "Our work in relationship to WHO objectives is focused on producing multi-gene DNA vaccines designed to reduce morbidity and mortality of malaria in young children in sub-Saharan Africa," says Dr. Stephen Hoffman, of the Naval Medical Research Institute.

The major project is entitled MuStDO 15.1 (multi-Stage DNA vaccine operation), which is a 15-gene malaria DNA vaccine.

Researchers hope to initiate clinical trials of this new vaccine within 18 months. Dr. Hoffman has just published the first proof of the principle that DNA vaccines are immunogenic in normal, healthy humans.

Another promising vaccine candidate has begun field trials in The Gambia. This new recombinant protein vaccine, RTS,S, developed by SmithKline Biologicals, would prevent the malaria parasite infectious stage from entering or developing within liver cells of human beings. Such vaccines would prevent the severe and life-threatening consequences of malaria in non-immune individuals.

Another approach is *to* develop a vaccine that prevents transmission of the malaria parasite from one infected person to another person. This type of vaccine would block the

development of the parasite in the mosquito, thus preventing the parasite from infecting someone else. This transmission blocking vaccine is under development by scientists at the US NIH, in collaboration with WHO/TDR. The NIH has recently initiated a major Malaria Vaccine Development Programme aimed at ensuring the production of clinical grade materials for use in clinical trials.

A different asexual blood stage vaccine type is based on a cocktail of antigens. One such synthetic peptide vaccine, SPf 66, developed by Manuel Pattaroyo working at the Instituto de Inmunologia in Bogota, Colombia, has been tested in field trials in South America, Africa and Southeast Asia. It has only been partially effective to date. Dr. Pattaroyo is using sophisticated biochemical methods to improve its potency.

The leading scientific journal Nature published a research from Kenya, Thailand and Malawi which shows that pregnant women living in malarious areas develop a unique immunity

which protects them from malarial infection. Professor Bernard Brabin of the Liverpool School of Tropical medicine, who is a co-author of the paper, and has worked for 20 years on the subject of malaria in pregnancy says that it is the most exciting scientific development in this field for decades and could open the way for developing a vaccine to protect pregnant women from malaria.

2.5.3 Medicines for Malaria Venture (MMV)

WHO's new MMV is a joint public-private sector initiative which aims to develop antimalarial drugs and drug combinations for distribution in poor countries.

MMV's mission statement is, "through public/private partnership to foster and finance the discovery and development of new, affordable antimalarial medicines to regulatory approval at a rate of one new registered product every five years and to facilitate their commercialisation" (WHO, Promise for Progress, March 2000, p.65).

MMV is an independent foundation, although still closely linked to WHO. It has received funding promises of over US$ 8 million and has selected its first three drug projects from over 101 applications. It is a successful example of harnessing greater public and private sector collaboration to produce new antimalarial products for developing countries.

MMV's major donors and sponsors include: RBM, WHO/TDR, IFPMA, Global Forum for Health Research, World Bank, Rockefeller Foundation, Netherlands Minister for Development Cooperation, Swiss Agency for Development and Cooperation and DFID (Ibid, p.66).

2.5.4 Multilateral Initiative on Malaria (MIM)

The MIM is an alliance of organisations and individuals concerned with malaria. It aims to maximise the impact of scientific research against malaria in Africa by facilitating global collaboration and coordination.

"A number of scientists are trying to make the mosquito

resistant to the parasite" says Fotis Kafatos, Director General of the European Molecular Biology Laboratories in Heidelberg, Germany. "Using the most sophisticated techniques in molecular genetics we are discovering an array of novel possibilities (WHO, Press Release WHO/77, 30 October 1998, p.4).

2.5.5 P.falciparum Genome Squencing Consortium

The P.falciparum Genome Squencing Consortium is a collaboration among 3 squencing centres. The Sanger centre (U.K.), The Institute for Genomics Research/Naval Medical Research Institute (U.S.A.) and Stanford University (U.S.A.).

2.5.6 Malarone Donation Program (MDP)

Glaxo Wellcome announced the initiation of a controlled donation program for Malarone a highly effective new antimalarial, in partnership with the Task Force for Child Survival and Development. The purpose of the Malarone Donation Program (MDP) is to help combat the problem of

drug resistant malaria in endemic countries where cost often limits access to new medicines.

2,5,7. African Initiative on Malaria (AIM)

In the past decade African leaders have called for concerted action to address the impact of malaria on their people. In June, 1997 African Heads of State and governments under the auspices of the OAU, signed the Harare Declaration on Malaria. This was followed by the African Initiative on Malaria (AIM), which was endorsed by the African Region of the WHO in 1998.

In April 2000 a summit of African Presidents and Heads of State was held in Abuja, Nigeria to commit to the goals of Roll Back Malaria, there by demonstrating the political leadership required to move RBM forward. (WHO, Press Release April 25, 2000, P.1). The summit partners were Federal Republic of Nigeria, African Heads of State, Heads of 10 international and bilateral agencies, United Nations agencies particularly WHO,

UNICEF, UNDP, and the World Bank and Development and Health Ministers of the Organisation for Economic Cooperation and Development (OECD).

2.5.8 Malaria Foundation International (MFI)

The MFI is a global networking against Malaria. Its mission is to facilitate the development and implementation of solution to the health, economic and social problems caused by malaria.

2.6 THE ROLL BACK MALARIA

The Roll Back Malaria (RBM) is the current global partnership working to halve the burden of malaria by 2010. The programme was launched in July, 1998, but the formal UN basis for the Global Partnership was formally established between UNDP, UNICEF, WHO and the World Bank in New York on October 31st 1998.

The partnership already included representation of endemic countries and was quickly expanded to include bilateral

government agencies, the private sector and NGOs. The birth of this culminated in the 1st Global Partnership Meeting to Roll Back Malaria hosted by WHO Geneva on 8-9th December, 1998. The work of Roll Back Malaria builds on previous experience and existing malaria control efforts in 15 African states, 11 Middle and Near East countries, seven Far Eastern countries and some nine American States. It has grown in response to government concerns in more than 30 countries and poorest communities. (WHO, March 2000, p.7). The challenges are enormous but so are the rewards; saving lives, reducing poverty, boosting school attendance, and making life better for millions of people living in poor countries especially in Africa.

The movement depends on up-to-date technical systems and expertise for surveillance, for controlling mosquitoes, for using effective medicines, for integrated management of childhoold illnesses (IMCI) and for encouraging the development of new diagnostic treatment and preventive measures.

Maximum emphasis is given to results and to ensuring that malaria suffering and death are reduced. This requires concerted and coordinated action by a broad range of private and public sector organizations at all levels of society. RBM help countries to develop such actions where they are needed and across a range of sectors (education, agriculture and environment).

People, especially children and pregnant women, are at the centre of RBM programme. The programme aims to secure a 30 - fold expansion in the proportion of people who can get effective treatment, ideally within two hours travel of the onset of symptoms, and in those who use treated bednets.

2.6.1 RBM's Six Elements of Action

RBM's six critical elements work together to help break the cycle of malaria transmission, cure infected persons and support development. The elements are:

i. Evidence - based decisions, using surveillance, appropriate response and building community awareness.

ii. Rapid diagnosis and treatment, supporting home care, direct access to effective medicines and wide availability of health services.

iii Multiple prevention using insecticide-treated nets, environmental management to control mosquitoes and making pregnancy safer.

iv. Focused research to develop new medicines, vaccines and safe insecticides.

v. Well-coordinated action for strengthening existing health services, policies and providing technical support.

vi. Harmonised action to build a dynamic global movement.

2.6.2 RBM's Objectives

Roll Back Malaria (RBM) is as an opportunity not only finally to beat a devastating disease, but also to develop endemic countries health systems and build new means of tackling global health concerns. Thus the goals of RBM will include (WHO, Fact Sheet No 203,October 1998, p.1):

- Support to endemic countries in developing their

national health systems as a major strategy for controlling malaria;

- Efforts to develop the broader health sector (i.e. all providers of health care to the community - the public sector health system, civil society and non - governmental organisations, private health providers [including drug vendors and traditional healers] and others);
- Encouraging the needed human and financial investments, national and international, for health system development.

RBM's implementation at country level will provide an indicator of the effectiveness of these health systems,
while the programme will also serve as a model for WHO in developing both other global health and development initiatives and new methods of controlling infectious diseases (Ibid, p.2).

2.6.3 RBM: *A* New Approach to Malaria Control

WHO has established a functioning partnership with a range of organisations at global, regional and country levels, aimed at developing a sustained capacity to address malaria (and other priority health problems). WHO's partners in RBM includes malaria endemic countries, other UN organisations (on 30 October 1998, the United Nations Development Programme (UNDP), UNICEF, the World Bank and the World Health Organisation announced that the four agencies were launching RBM jointly and that they would cooperate in all aspects of its activities), bilateral development agencies, development banks, non-governmental organisations and the private sector (Ibid).

2.6.4 RBM's First Focus: Africa

The Roll Back Malaria campaign will focus first on Africa (Ibid, p.4). It *is* aimed at:

- upgrading health delivery systems at both the local and national levels in malarious countries;
- intensifying use of bedneting (nets coated with insecticide) to

prevent night-time biting by malaria-carrying mosquitoes;

- mapping of malaria regions and of medical facilities to better direct health resources;
- developing new drugs for victims already infected with malaria;
- coordinating the development and testing of new malaria drugs and vaccines;
- developing methods to address malaria in emergencies, (e.g. refugee and post-war situations).

2,7 WHO's ROLE IN THE ROLL *BACK* MALARIA PROGRAMME

WHO's role in the global partnership for combating malaria will be to (Ibid):

- Provide strategic direction and catalyze actions;
- Provide an RBM secretariat of approximately eight to 10 people in Geneva headquarters;
- Work to build and sustain country and global partnerships;
- Arrange the provision of technical endorsement, directly or through approved resource networks, for

both a collective strategy and for individual partners' actions;

- Ensure that all aspects of progress of RBM are monitored;
- Provide global accountability for RBM;
- Broker technical assistance and finance on behalf of those who need it;
- Undertake responsible advocacy for the RBM approach to reducing malaria - related suffering.

2.7.1 WHO's Financial and Technical Support for RBM

WHO, through the Roll Back Malaria project, offers limited technical and financial resources to help countries conduct productive consensus building and inception processes, and seed-corn funding for action to Roll Back Malaria. It also offers technical support with specific actions that are critical to the success of efforts to roll back malaria as part of the wider effort to build capacity for RBM action. This is best provided when a country level partnership exists and partners

are able to agree on the most appropriate inputs required of different partner agencies. Hence it is desirable that all partners under the leadership of the national authorities - are fully involved in the inception process to the best of their ability. They should do their best to work together in response both to health sector development issues - including the roll back malaria effort and acute worsening of the malaria situation difficulties associated with epidemics, population movements, instability and conflict and/or climate variation (WHO, RBM Action at Country Level, August 13, 1999, p.13).

It is estimated that it will cost US $2 billion to implement World Health Organisation's Roll Back Malaria (RBM) project over the next 10 years (WHO, Press Release; 6 July, 1999, p.1)

2.8 THREATS TO MALARIA CONTROL

The African Region has the largest number of people exposed to stable malaria transmission and the greatest burden of malaria morbidity and mortality in the world (Snow et al.,

WHO, 1999, 77 (9), pp. 624 - 40).

The problems associated with malaria control in Africa can be expected to increase the rates of severe illness and death substantially. This may already have occurred in several African countries. These problems can also be expected to contribute to epidemics and to the expansion of the disease into previously malaria-free areas (Malakooti et al. Cited in WHO, 2000, 78 (12), p. 1378).

The problems of malaria control in Africa is exacerbated by general poor access to health care, chronic underfunding of public health services, and deficient training of health workers, who are inadequately motivated, equipped and supported (Van Lerberghe et al., cited in WHO, 2000, 78 (12), p. 1378). Other problems associated with malaria control in Africa are briefly discussed below.

2.8.1 Drug Resistance

The development of resistance to drugs poses one of the greatest threats to malaria control. In Africa, the efficacy of readily affordable antimalarial drugs is declining rapidly while highly efficacious drugs tend to be too expensive.

Since the emergence of chloroquine - resistant falciparum malaria in the United Republic of Tanzania (Kihamia et al., cited in WHO, 1999, 77 (9), p.740) there has been an upward trend in the frequency and degree of the resistance (Fowler et al., cited in WHO, 1999, 77(9), p.740). Nevertheless, chloroquine remains the official first-line antimalarial drug in the United Republic of Tanzania, while neighbouring Malawi and Kenya have already replaced chloroquine with sulfadoxine pyrinethanine as first-line treatment for non severe malaria in young children (Bloland et al., cited in WHO, 1999, 77 (9), p.740).

Antimalarial drug resistance has previously been assessed

mainly by determining parasite clearance in asymptomatic children (WHO Technical Report Series, No 529, 1973 cited in WHO, 1999, 77 (9), p. 740). However, resistance rates based on parasite clearance only are inadequate for making decisions about drug efficacy; evidence of a lack of clinical response is also needed. A 14-day protocol which takes into account both symptomatic resolution and parasite clearance has therefore been proposed by WHO (Premji et al., WHO, 1999, 77(9), p. 740).

2.8.2 Untargeted Interventions

Malaria transmission is strongly associated with location. This association has two main features. First, the disease is focused around specific mosquito breeding sites and can normally be transmitted only within certain distances; in Africa these are typically between a few hundred metres and a kilometre and rarely exceed 2-3 kilometres. Second, there is a marked clustering of persons with malaria parasites and

clinical symptoms at particular sites, usually households. (Carter et.al. WHO, 2000, 78(12), p.1401).

In localities of low endemicity the level of malaria risk or case incidence may vary widely between households because the specific characteristics of houses and their locations affect contact between humans and vectors. Where endemicity is high, differences in human/vector contact rates between different households may have less effect on malaria case incidences. This is because superinfection and exposure - acquired immunity blur the proportional relationship between inoculation rates and case incidences.

Accurate information on the distribution of malaria on the ground permits interventions to be targeted towards the foci of transmission and the locations and households of high malaria risk within them. Such targeting greatly increases the effectiveness of control measures. On the other hand, the inadvertent exclusion of these locations causes potentially effective control measures to fail.

2.8.3 Insecticide Resistance

Insecticides play a central role in controlling the mosquito vectors of malaria and will continue to do so in the foreseeable future. However, the ubiquitous use of a limited number of insecticides for both agricultural pests and vectors of human diseases has led to insecticide resistance (Ibid, p.1414). By 1992 more than 55 different species of anopheline mosquitoes were found to be resistant to one or more of the commonly used insecticide (WHO, Technical Report Series No 818, cited in Ibid).

To prolong the effectiveness of the currently available insecticides and thereby prevent control failure, it is vital to detect the emergence of resistance at an early stage so that appropriate action can be taken. Traditionally, detection has been based on insecticide susceptibility tests with WHO test kits, accompanied by biochemical assays to identify the underlying resistance mechanism where available. Recently, several polymerase chain reaction (PCR) - based detection

methods have been developed to detect target site resistance, but further work is urgently needed to identify the primary resistance alleles conferring metabolic resistance to insecticides.

2,8,4 Untargeted Public Spending on Health Care

Health care is a basic essential in any effort to combat poverty, and is often subsidized with public funds to help achieve that aim. A WHO study on public spending on curative health care in several African countries found that this spending favours mostly the better-off rather than the poor (Castro-Leal et al; WHO, 2000, 78(1), p.66). While it is true that other elements in health budgets directed at preventive health and public health services are likely to favour the poor more than curative subsidies, there are grounds for considering that the results of the WHO study has underestimated the true inequality in curative care (Ibid, p.72).

Furthermore, income, quality, access, and price interact with social relationships to produce sharp inequalities in the distribution of health benefits by gender. As depicted in table 5 below females in the top quintiles in Cote d'Ivoire and Ghana, for example, typically use publicly funded health facilities more than do their male counterparts (Ibid. p.71).

Table 5: Benefit Incidence of Health by Gender

Country		% Share	
	Quintile	Female	Male
Cote D'Ivoire	Poorest	52.9	47.1
(1995)	Richest	55.0	45.0
Ghana	Poorest	44.3	55.7
(1992)	Richest	65.0	35.0

Source: WHO, 2000, 78(1), p.72

2.8.5 Counterfeit Drugs

Counterfeit drugs is a public health hazard whose soaring

profits are directly linked to the suffering and death of Africa's most vulnerable victims. This US$ 21 billion industry is already claiming the lives of malaria victims whose health, livelihoods and families would have been spared with proper antimalarial drugs and the necessary controls (WHO, Promise for Progress, March 2000, p.67).

This burgeoning problem poses a serious threat, not only to the health of those living in malaria - affected countries, but also the developed world through the global phenomenon of drug resistance. Drug resistance is exacerbated by the misuse and abuse of drugs dispensed at levels lower than treatment guidelines dictate.

Between 1992 and 1994, as many as 51 percent of counterfeiting cases uncovered by WHO (70 percent of which were in the developing countries) revealed that "knock-off" drugs carried no active ingredient whatsoever. Yet another 17 percent, of counterfeits contained the wrong ingredient, while

an additional 11 percent contained weaker than recommended concentrations of the active medication. Today no one knows for sure to what extent the problem of counterfeiting has grown or spread. What is clear however is that, in the wake of globalisation and the increasing power of organised crime, the problem is becoming even more acute (Ibid).

2,9 FACTORS INFLUENCING MALARIA EPIDEMICS

Malaria epidemic occurs, in general, in areas where malaria is unstable and subject to marked fluctuations; and is defined as an exacerbation of the disease in an area where malaria was, or still is, usually of low or moderate endemicity (Onori and Grab, Op. Cit., p.91).

Many factors may precipitate epidemic: they act by altering directly or indirectly a pre-established equilibrium. Although these factors do sometimes overlap they can be classified into 6: entomological, parasitological, immunological, meteorological, environmental (Ibid, p. 92) and socio - economical factors. We shall

limit our discussions in this section to the first five factors only since the sixth and the last factor has been extensively discussed under section 2.3.

2.9.1 Entomological Factors

A modification of one or more of the following entomological parameters beyond certain limits lead to changes in any epidemiological equilibrum which can be expected or observed (Ibid. p. 92):

- vector density in relation to man (m)
- daily survival rate of vector (p)
- man-biting frequency (a)
- length of the sprogonic cycle (n)
- proportion of anophelines with sporozoites that are actually infective (b)

2.9.2 Parasitological Factors

The species of the Plasmodium influences the timing of the

outbreaks and the development of the epidemic curve: while P. vivax gametocytes appear practically at the same time as the asexual erythrocytic forms, those of P. falciparum appear 10-15 days after the occurrence of the initial parasitaemia. In areas where the two plasmodium species coexist, there are usually two epidemic waves the first one due to P. vivax and the second to P. falciparum (Macdonald, 1953, p. 871).

The principal parasitological factors are (Onori and Grab, 1980, p. 92):

- parasite rate (x)
- proportion of parasite carriers with gametocytes (g)

2.9.3 Immunological Factors

The degree of human immunity plays a large role in the occurrence and severity of malaria epidemics. A low immune status of the community can favour the resurgence of malaria epidemic, while the immunity produced by epidemics may

partially suppress transmission or even terminate it.

2.9.4 Meteorological Factors

The climatic events that may modify and influence any of the entomological direct factors involved in the transmission cycle are:

(a) **Rainfall**. The influence of rainfall on breeding habitats is well known. The catastrophic malaria epidemic in Ethiopia in 1958 was associated with unusually high rainfall over an extended period as well as with elevated temperatures and relative humidity (Fontaine, et. al., 1961, pp. 795-803). Also, the 1940 outbreak in Nairobi Kenya, resulted from heavy rains which followed 2 years of low rainfall (Roberts, 1949, pp. 160-169). One of the major causes of the variation in annual rainfall in Africa is the El Nino-Southern Oscillation (ENSO), a meteorological phenomenon that occurs every 2-10 years and tends to exaggerate the extremes of climate in

specific regions of the world (Ropelewski and Halpert, 1987, pp. 1606 - 1626).

(b) **Temperature and Relative Humidity:** As the temperature drops so does the risk of infection, and there is a typical threshold below which transmission ceases. Below 16°C the aquatic stages of tropical anophelines fails to develop (Leeson, 1939, pp. 103-301) or breed (De Meillon, 1934, pp. 199-248), while P. falciparum fails to develop between 16°C and 19°C (Molineaux, 1988, pp. 913-998). However the major vectors of malaria can avoid these extreme temperatures by resting in more favourable microclimates; for example, inside occupied houses the temperatures can be 3-5°C warmer than outside (Garnham, 1945, pp. 45 -47).

On the other hand the effect of increased humidity on mosquito longevity appears to be a prominent cause of many outbreaks. In Southern China, an average relative humidity of 70 - 80%, together with a temperature between 18°C, and

of its usual source of food. Deviation to man may be due to (i) reduction in the number of cattle, for example, following a war as described in Okinawa (Downs, 1949, pp. 652-655), or (ii) invasion of towns by normally zoophilic anophelines as documented in New Delhi (Conell, & Jaswant 1943, pp. 87- 106).

(c) **Spatial Characteristics of Malaria Transmission and Malaria Risk.** Malaria transmission is strongly associated with location (Carter, Mendis and Roberts, 2000, p.1401). This association has two main features. First, the disease is focused around specific breeding sites and can normally be transmitted only within certain distances from them: in Africa these are typically between a few hundred metres and a kilometre and rarely exceed 2 - 3 kilometres. Second, there is a marked clustering of persons with malaria parasites and clinical symptoms at particular sites, usually households. In localities of low endemicity the level of malaria risk or case incidence may vary widely between households because the specific characteristics of houses and their locations after

contact between humans and vectors. Where endemicity is high, differences in human/vector contact rates between different households may have less effect on malaria case incidences.

2.10 FORECASTING OF MALARIA EPIDEMICS

In the study of communicable disease dynamics, it has been found advantageous to express the level of incidence in terms of a comprehensive parameter called "force of infection", which represents the total impact of all the factors involved in transmission of infection (Cvjetanovic, et al. 1978, pp. 1-143).

Concerning malaria transmission, the force of infection is usually measured by the parasitological inoculation rate, **h**. This rate, defined as the mean daily number of bites inflicted on one individual by mosquitos whose salivary glands contain sporozoites that are actually infective, takes the algebraic form:

$$h = mabs \qquad (1)$$

where **ma** is the daily man - biting rate, **b** the proportion of anophelines with sporozoites that are actually infective, and **s** the sporozoite rate.

Taking into account the mathematical expression of the sporozoite rate (Macdonald, 1957, p.52) one can write:

$$h = \frac{ma^2bgxp^n}{agx - \log_e P} \qquad (2)$$

This equation shows that the parasitological inoculation rate results from a combination of all the entomological and parasitological direct factors referred to in the previous section. They are all measurable by field and laboratory observations, except the factor **b**, the proportion of anophelines with sporozoites that are actually infective. This factor, however, is affected little, if at all, by changes in the direct factors, at least so long as the immunity level has not been substantially modified

in the population.

It would, therefore, be convenient to refer entomological inoculation rate **h'** defined by the equation (Pull and Grab, 1974, pp. 507-516).

$$h' = \frac{h}{b} \qquad (3)$$

or

$$h' = \frac{ma^2gxp^n}{agx - \log_e p} \qquad (4)$$

after replacing **h** by its expression given in equation (2).

Furthermore, the feeding habit of the vector on man, **a**, can be considered as constant for a given mosquito species and for a limited period of time, it is, therefore made equal to one-third. Hence equation (4) becomes:

$$h' = \frac{magxp^n}{gx - 3\log_e p} \qquad (5)$$

From this equation it is clearly seen that changes in the

entomological inoculation rate, **h'** will result from any modification in at least one of the following individual or combined direct factors:

- the daily man-biting rate, **ma**
- the daily survival rate of vector(s), **p**
- the length of the sporogonic cycle in days **n**
- the rate of gametocyte carriers, **gx.**

In order to appreciate the risk of epidemic development, it would be useful to know the quantitative impact on the inoculation rate of common changes in these basic parameters.

In table 6 the direct factors are listed in the order of increasing sensitivity to the entomological inoculation rate, together with the corresponding most important indirect factors amongst those that have an influence on them.

Precise knowledge of the relationships existing between indirect

and direct factors would evidently be of considerable interest for forecasting the epidemiological development that might be expected from modifications detected in the indirect factors through an adequate monitoring system.

Simple mathematical formulations have already been established for expressing some direct factors in terms of indirect factors. For instance the length of the sprogonic cycle as a function of the mean air temperature has been determined by Oganov (1969). In other cases, an important direct factor can itself be a function of another direct factor, as for example the daily survival rate of the vector usually calculated from the parity rate and feeding rhythm peculiar to the biting mosquitos (Garrett - Jones and Grab, 1964, pp. 71-86).

The promising potentiality of new mathematical modelling approaches and computerised simulation techniques, with particular reference to their application to the epidemiology and control of malaria has been discussed by Bailey (1975).

A model usable as a tool for the planning of malaria control has been constructed by Dietz el. al. (1974) and actually tested in the African savanna. The ability of the model to simulate the epidemiology of P. falciparum under different conditions was further tested by Molineaux et. al. (1978).

In general, with few exceptions, quantitative changes in direct factors and precise estimates of critical levels cannot be derived, at present, from observed values of the indirect factors that influence them. (Onori and Grab, 1980 p. 96). Therefore, permanent surveillance and recording of such indirect factors would constitute only a warning system, which at the appropriate time, would trigger the monitoring of the direct factors that have a recognized bearing on the possible development of malaria outbreaks and that, as already mentioned, can be measured directly in the field.

Table 6. Direct Factors and Main Indirect Factors Influencing Them.

Direct factors	Indirect factors with the greatest impact
Man-biting rate (ma)	Rainfall drought incorrect maintenance of irrigation systems and changes in feeding habits of mosquitos.
Rate of gametocyte carriers (gx)	Importation of malaria parasites, and migration of non-immune people
Length of sporogonic cycle (n)	Air temperature
Daily survival rate of ventor(s) (p)	Air temperature and relative Humidity

Source: Onori and Grab, 1980, p.95

2.11 PREVIOUS STUDIES ON THE ROLE OF WHO IN COMBATING MALARIA IN AFRICA

Although a number of studies on WHO's activities including those on malaria control through out the world were and are still being carried out under different topics; no study specifically on WHO's role in combating malaria in Africa to my knowledge was previously carried out not is it concurrently being carried out for presentation and award of a degree of any kind by any institution of learning.

CHAPTER THREE

3

WHO MALARIA CONTROL EFFORTS IN AFRICA

Malaria is a significant impediment to human development in African countries. The malaria burden could be significantly reduced through evidence - based decisions, detection of - and rapid response to - epidemics, the use of insecticide - treated bednets, early diagnosis, and prompt effective treatment of malaria cases. Sustained availability of these interventions requires effective health sectors, able to empower communities to tackle a range of priority health problems.

Inveiw of the above it will be appropriate at this point to determine the various efforts made or is being made by WHO to control malaria in Africa, beginning with the launching of the Roll Back Malaria (RBM) global partnership in October 1998 to date and evaluate their impact.

WHO's role in the partnership is to provide strategic support to the global movement. A 5-year project has been established to ensure a unified WHO - wide contribution to the global effort - to contribute to

health sector development and poverty reduction and to suggest means of reducing the burdens of other diseases in poor communities (WHO, Communicable Diseases, 2000, p.5). The first 18 months up to end of 1999 were a preparatory phase.

3.1 PREPARATORY PHASE

The first 6 months of the preparatory phase were spent developing the underlying concepts and principles of RBM through discussions between WHO headquarters, regional and country staff, personnel from other partner organizations, legislators and officials from countries affected by malaria, researchers and other interested parties.

The following progress was made during the preparatory phase (Ibid, p.6):

i. widespread commitment to the global partnership and movement;
ii. an outline strategy for RBM action agreed within WHO and many partner organizations;
iii. an advocacy plan based on the principles of the movement and its strategy, with particular emphasis on encouraging community - and country - led initiatives;

iv. statements of intent and plans of action developed by numerous countries affected by malaria;

v. support from development agencies for RBM action throughout the world;

vi. over 20 countries actively mobilizing resources and implementing RBM action;

vii. an additional 30 - plus countries negotiating their plan to roll back malaria;

viii. special emphasis on rolling back malaria during complex emergencies;

ix. mechanisms for consistent technical support established in priority technical areas, with full involvement of WHO regional offices;

x. effective research on new malaria treatments and a public private partnership (MMV) for new product discovery established, with support from the project;

xi. an innovative information system for partners world wide based on the web;

xii. imaginative approaches established to bring commercial entities into the partnership;

xiii. establishment of the outline of a mechanism for monitoring RBM progress.

Six key planned outputs have evolved through the preparatory phase (Ibid, p.7):

(a) Communication of the RBM concept, strategy, approach and progress and advocacy to mobilize political commitment and resources.

(b) National authorities, development partners and other groups supported as they establish country - level partnerships in support of action to roll back malaria.

(c) Technical guidance for action to roll back malaria ensured, through help to develop in-country capacity (for operational research and evidence - based decision - making) and provision of consistent, good - quality advice as appropriate

(d) Applied research to develop new (or modify existing) interventions to roll back malaria supported, and new products (for diagnosis, treatment and/or prevention) developed.

(e) Intensifying outcomes of RBM action through social movements for health (development of a medium - term strategy).

(f) National authorities enabled to track progress, monitor actions to roll back malaria - and evaluate their impact.

3.2. CONSOLIDATION OF THE GLOBAL PARTNERSHIP

The global partnership was consolidated at the first meeting of global partners held in December, 1998. Concensus on key concepts, issues and solutions was obtained at the second meeting in Harare in June, 1999. The meeting considered how best to take forward RBM action in Africa.

The World Bank, UNICEF, UNDP and WHO have conducted rapid assessments in 6 African countries (Ethiopia, Kenya, Malawi, Mozambigue, Uganda, United Republic of Tanzania), in consultation with national government officials. These missions were responses to requests for support, to give an overview of country - specific and inter country need and opportunities and to explore collaborative role's for each agency at field level. The missions emphasized: (1) the need to institutionalize operational procedures for working in partnerships. (2) the opportunities to address malaria control through non-health sectors; and (3) how to prioritize a leading health concern within the context of health sector reform and sector wide approaches.

In addition, the assessment also revealed a significant demand for opportunities to collect lessons and share experiances between countries (Ibid, p.7).

3.3 CONSENSUS BUILDING

African subregional consensus - building and inception meetings held in 1999 in Cameroon, Cote d'Ivoire, Kenya and Mozambique with the participation of high-level country delegations, UN and bilateral agencies, development banks, non governmental organizations and private corporations. With over 300 participants from more than 40 countries, they were an excellent opportunity for dialogue and discussion, and provided a platform from which country teams with support from the national officials of development agencies, could work on their plans at the country level.

There were several requests for the project to provide resources to priority malaria control actions in countries. It was agreed that existing initiatives would be focused with Roll Back Malaria and taken forward as Roll Back Malaria Africa (Ibid, p.*8).*

3.4 INTENSIFYING THE EFFORT

Partners have made RBM project staff aware of the need for a massive intensification of effort (Ibid, pp. 8-9):

i. to ensure that persons with malaria, particularly children in endemic areas, and all those affected by malaria epidemics,

can access effective diagnosis and treatment - ideally within 8 hours of onset of symptoms, and certainly within 24 hours;

ii. to prevent those at risk from being affected by malaria, through better access to (and use of) insecticide - treated mosquito nets and - where appropriate - control of mosquitos through focused insecticide spraying and environmental control measures;

iii. to protect pregnant women in highly endemic areas through intermittent treatment with anti-malarials;

iv. to ensure that in all communities at risk of malaria epidemics, outbreaks are detected and responded to effectively within 1 week of onset.

This scaling up (up to 60% coverage) will need to be undertaken through effective movements involving a range of organizations active at community level, building on existing initiatives (such as the Integrated Management of Childhood Illness), supported through better functioning health systems and intersectoral development. To make it possible, significant additional human and financial resources will be required. Ideally resources will be made available within the context of health sector action, or through other pro-poor development strategies.

3.5 POLITICAL COMMITMENT

The heads of state in many countries and the chief executives of several international agencies have indicated their full commitment to Roll Back Malaria. The challenge is to ensure that the commitment is maintained, with continued attention, on the part of all concerned, to check progress at regular intervals and following up with all those involved to, ensure that the extra effort is being made. To encourage sustained commitment, partners need to ensure sustained, focused and effective advocacy.

There has been particular interest in the potential for promoting social movements. This should increase as a result of the additional political commitment and advocacy undertaken by partners. However, several national governments and other partners have indicated that additional human and financial resources are needed to initiate movements, given that many of the organizations wishing to participate lack the necessary resources to do so.

Development agency partners are starting to mobilize additional resources for country level RBM action, but they want to be sure that the strategies and action plans being developed by country -

level partnerships offer a responsible likelihood of contributing to effective RBM action and, in the longer term, desired outcomes. They have a particular interest in the kinds of strategies and plans that are being developed by country-level partnerships (Ibid, p.9)

3.6 RESEARCH PRIORITIES

In recent years the malaria research community has sought to establish effective networks which help ensure that the strategies of research - funding organizations and the units they support match the needs of communities affected by malaria.

The success of the Roll Back Malaria partnership will depend on the research endeavours delivering their expected, results. The challenge for the partnership, is to maintain effective links with the research community and to help mobilize the funds needed to support them. (Ibid, p.10)

3.7 TRACKING PROGRESS

To make the most effective contribution to rolling back malaria, governments and other partners need to be able to track the progress of country partnerships - to confirm that they are moving forward as planned, or to identify difficulties and attempt

to overcome them. They need evidence that their actions are having an impact on the malaria burden, and to assess the impact. The challenge is to ensure that systems for tracking progress are effective and are used by all partners and to seek opportunities for obtaining information on the agreed minimum group of indicators relevant to rolling back malaria. At the same time, reliable systems for monitoring impact have to be put in place (Ibid, p.10)

3.8 TECHNICAL GUIDANCE FROM WHO

WHO as an institution and as a secretariat to the RBM global partnership is expected to establish technical standards and provide technical support. This support must be effective and responsive and takes account of the new concepts, approaches and strategies associated with the RBM movement. Effective WHO technical support to country action is based on the following elements (Ibid, pp. 10-13):

3.8.1 Capacity

The lack of human capacity and adequate training within countries has repeatedly been identified as a major constraint in moving forward efforts to roll back malaria. To this end, WHO's communicable diseases cluster (CDS)

has been involved in the development and production of a number of malaria - related training materials targeted at most categories of health workers. Areas of expertise covered include diagnosis, case management, vector control, programme management and epidemiology.

3.8.2 Guidelines

WHO develops and disseminates guidelines based upon best - available evidence. Guidelines are reviewed and modified based on findings of operational research and adapted as necessary to reflect technical, institutional and political realities.

3.8.3 Situation Analysis

Situation analysis instruments with particular reference to Africa have been developed by a multi-disciplinary group of experts supported by WHO. The instruments focus on analysing the malaria situation and the response of the health sector, particularly at community level. In 1999, the instruments were pretested at national, district and community levels in 4 African countries and made available to endemic countries in Africa. The methodology is now being adapted and used by many, African countries as part

of their national process of RBM strategy development.

3.8.4 Mapping of the Malaria Burden and Access to Health Care

New techniques for detailed mapping of malaria risk using mathematical models for malaria transmission, climate information and satellite imagery have recently been developed. In addition, a network has been created to collaborate with several universities, UNICEFF through the Health Map project which includes the Mapping Malaria Risk in Africa Project (MARA).

3.8.5 Improving Health Systems Response

Roll Back Malaria action will be sustained if it is incorporated within health sector development action. Technical support in this areas draws on the experiance of WHO. It calls for a fusion of the concepts of communicable disease control and health system reform

3.8.6 Malaria Surveillance and Epidemic Response

A technical support network was established in 1998 with a number of institutions and agencies. The network links

surveillance information from countries and regional surveillance systems and establishes the means of routine and rapid analysis of information. It was formed to develop methodologies and support countries in two complementary areas: (1) forecasting and prevention, and (2) early detection and control of malaria epidemics.

3.8.7 Complex Emergencies

A technical support network to roll back malaria in complex emergencies has been formally established by WHO. This network consists of experts from WHO, UNHCR, UNICEF, the Centers for Disease Control and Prevention (United States), Malaria Consortium, Medecins sans frontieres (MSF) and Medical Emergencies Relief International (MERLIN). The network addresses issues arising in complex emergency situations, including: inadequate technical knowledge of malaria among operational agencies; lack of information on drug resistance; delays in access to supplies; poor coordination among the multiple organizations providing health care; gaps in research; and a lack of data on the burden of malaria in these situations. Currently, the network is targeting 16 countries, of which 12 are in Africa. Case-studies have been undertaken in 8 countries and the

epidemiological profiles of 7 countries have been developed.

3.8.8 Insecticide - Treated Materials

In 1998, a technical support network on insecticide - treated nets (ITNs) was established between WHO and UNICEF. RBM is working closely with the WHO Regional Office for Africa to establish baseline data on the susceptibility of the major vectors in the African region to a number of insecticides.

3.8.9 Home Management of Malaria

Consultations are currently ongoing to develop a strategy for strengthening community - based interventions in the African region. The priority activities identified are: development of a database on individuals and institutions involved in community - based interventions; advocacy and mobilization at all levels to strengthen sustainable community - based interventions; development of a communications strategy; and improved contact between health care personnel and families.

3.8.10 Diagnostics

Rapid diagnosis and prompt treatment are essential elements of the RBM strategy. A joint RBM/USAID informal consultation on malaria diagnostics at the turn of the century was convened in 1999 to: define the rational use of microscopy and of rapid diagnostic tests (RDTs) for malaria control; identify factors that determine the choice of malaria diagnostic approaches; define desired specifications for new malaria diagnostic tests and outline outstanding research questions; plan a research agenda; and discuss future action to ensure the optimal deployment of RDTs in the global campaign to roll back malaria.

3.8.11 Drug Resistance

A network on antimalarial drug resistance and treatment policies was set up in 1999, based in the WHO Regional Office for Africa. The network has been working with 88 sentinel sites in 34 countries in Africa and has received reports from 13 countries on sensitivity. The sensitivity results have led to national meetings in Eritrea, Mozambique, United Republic of Tanzania and Zimbabwe to discuss findings and their policy implications. They have resulted in decisions to update antimalarial treatment

policies in Botswana, Ethiopia and Kenya. Quality control of the data has been carried out in the Gambia and Nigeria. The economic implications have also been discussed and this has resulted in operational research.

3.8.12 Community Training on Appropriate Use of Antimalarials

In Africa although antimalarial medicines can be obtained from health centres and pharmacies, many medicines are purchased from shops, markets and street vendors. People bargain with vendors to buy the drug of their choice but neither buyer nor vendor know how much of the medicine to take. There is serious concern that these routine practices, which are so linked to people's lives, might lead to at least 70 percent of children's fevers receiving inadequate or even dangerous treatment. To make matter worse these examples represent a missed opportunity to fight malaria and reduce suffering and death.

One promising project which addresses these issues has taken place in Kilifi, a rural district of coastal Kenya. Supported by the Kenya Medical Research Institute in partnership with DFID, UNDP, WB and WHO the project

set out to train shopkeepers in the use of antimalarial so that they could make the best out of their existing retail practice. Forty-six shopkeepers from 23 shops selling a wide variety of goods including medicines were selected for training.

During the nine - day workshop the shopkeepers were trained in giving out information on using the most commonly bought antimalarial medicines. They were supplied with dosage chats for chloroquine and aspirin or paracetamol and sets of rubber stamps showing the correct way of using chloroquine for children of different ages. They were also trained in recognising severe malaria symptoms, which would point to a need for treatment by health staff.

The training project had a dramatic impact on the Kilifi community. Not only did it stop dangerous practices but had an overwhelming effect on chloroquine sales. The percentage of drug sales which included an antimalarial drug for children with fever rose from 34 to 84 percent in three months. Chloroquine sales nearly tripled in six months and appropriate use of over-the-counter medicines increased by 62 percent. The successful approach of this project shows

how malaria control can benefit by harnessing human inclinations to resources that are already in play (WHO, Promise for progress, 2000, pp. 29-30).

8.0 MONITORING IMPACT

One of the key roles WHO plays in the partnership is to ensure that progress is monitored and to provide global accountability for RBM. As the Roll Back Malaria movement represents a new way to working, in the field of public health, it is vital that successes and failures are monitored and analysed both quantitatively and qualitatively. This requires a mechanism for ensuring that information is shared with partners both at global and country level. Critical areas for monitoring the impact and out comes of RBM were identified and include: (1) impact on the malaria burden; (2) improvements in malaria prevention and treatment; (3) related health sector development; and (4) technical support and development of partnership (WHO, Communicable Diseases, 2000, p.13).

CHAPTER FOUR

4

DATA PRESENTATION AND ANALYSIS

Having extensively discussed in the preceding chapter, the various roles played by WHO and still playing in the current campaign to roll back malaria particularly in Africa; it will be closely followed in this chapter by an evaluation of their effectiveness or otherwise. This will be achieved by analyzing the current malaria situation in Africa and its trend in the last few years, especially since the launching of RBM movement in 1998, to ascertain if there had been a decrease or increase in malaria incidence, morbidity and mortality. Such analysis would enable us to establish if the RBM campaign being led by WHO have contributed in slowing down, halting or even reversing the ever rising malaria morbidity and mortality in Africa.

4.1 DATA ANALYSIS

Analysis of data is achieved through categorizing, ordering, manipulating and summarizing data, with the purpose of reducing the data to intelligible and interpretable form so that the relations of research problems can be studied and tested (Kerlinger, 1973, p. 134).

Interpretation makes inference pertinent to the research relations studied from the results of analysis and draws conclusion about these relations. This is done in two ways. One, the broad meaning of the research data is sought by comparing the results and the inferences drawn within the data to theory and other research results. Two, the relations within the research study and its data are interpreted. This is the narrower and more frequent use of the term interpretation, in which interpretation and analysis are actually closely intertwined. One almost simultaneously interprets as one analyses. Thus, when one calculates, say, a coefficient of correlation one almost immediately infers the existence of a relationship and draws out its significance for the research problem as one analyses the data (Ibid).

4.2 ROLL BACK MALARIA - THE FIRST THREE YEARS

Evidence has been presented in the previous chapters to the effect that in response to the socioeconomic challenge caused by malaria, particularly in Africa south of the Sahara, the Roll Back Malaria partnership was launched in 1998 as a broad coalition by four international agencies - WHO, UNICEF, World Bank, UNDP - but rapidly grew to include malaria - endemic countries and a large number of multilateral, bilateral, non-governmental and

private - sector organizations.

The RBM partnership promotes malaria as a pathfinder for health sector reform as well as its integration into sector-wide approaches and poverty - reduction strategies. RBM has also been active in developing public - private partnerships for malaria, ranging from local support for health systems strengthening by companies with economic interests in endemic countries, to the development of improved technologies for the manufacture of insecticide treated nets and the brokering of preferential pricing agreements for antimalarial drugs.

As sub-Saharan Africa is the region with the largest burden of malaria the major focus of RBM's efforts is on this area. The RBM Secretariat has been successful in catalyzing development of country strategic plans for "going-to-scale" with proven interventions. These plans include evidence - based technical strategies, estimates of resource gaps and absorption capacities, defined and transparent resource distribution mechanisms, and agreed monitoring and evaluation schemes. To date, 12 countries have completed their strategic plans whilst 10 additional countries are due to complete theirs by the end of 2001.

The estimated resource gap (US$ 150 million) for the first year of implementation for the 12 countries with completed strategic plans is projected only for the short term. These estimates are based on current health systems constraints and the countries own assessment of their adsorptive capacities. Consequently, these are conservative estimates underlining the truly acute need for significant additional resources. Using estimates based on these plans, an additional US$500 million per year will be needed to fill the resource gap for scaling up strategies in Africa, south of the Sahara, when all countries have completed plans (WHO, CDS/MIP, Report, 21-22 June, 2001, pp. 10-11).

In the short to medium term, significant resources are needed to support funding gaps identified in country strategic plans as well as procurement of essential commodities. Malaria - endemic countries are now well positioned to utilize a malaria component in the proposed global AIDS and health fund. In the longer term, the inclusion of malaria in poverty - reduction strategies favours the long - term sustainability of action against malaria.

4.3 NUMBER OF REPORTED MALARIA CASES, 1990 - 2000

Since 1962, the annual number of reported malaria cases has averaged 13.5 million ranging from 3.3 million in 1962 to 35.1

million in 1989. Table 7 shows the number of malaria cases reported by WHO Region over the last 10 years. In 1994 34.8 million cases were reported of which 27.6 million cases were reported by countries in the WHO African Region, i.e 79% of reported cases

The WHO African Region consists of 46 countries, and includes Algeria plus all of Africa South of the Sahara, with the exception of Djibouti, Somalia and Sudan which come under the Eastern Mediterranean Region. Only 2 countries, Lesetho and the Seychelles, have no local malaria transmission. In Mauritius there is P. vivax transmission only. The remaining 43 countries are at risk of P. falciparum transmission in all or part of their territory.

Available epidemiological information on malaria in the African Region is based on national reporting of malaria cases and deaths. In addition, some countries provide annual reports of programme activities and health statistics. Most countries report clinically diagnosed malaria cases only. This explain the apparent decline in the number of reported malaria cases early in the 90's which by no means represent the true malaria situation of this Region in those years. This view is further reinforced by the rather high figure reported in 1994. Even at that the 1994 data were received from only 22 countries, i.e. half of the endemic

countries in the Region. These 22 countries reported 27.6 million malaria cases, and 24, 326 deaths. Four countries accounted for 81% of the reported cases: the United Republic of Tanzania (29%), Kenya (22%), Malawi (17%) and Zambia (13%). Over half of the reported malaria deaths occurred in Zaire (7,567) and Angola (7,136). Reported incidence ranged from 0.01 per 1,000 population in Algeria to 501 per 1,000 in Malawi with an average of 120 per 1,000 for all reporting countries combined (WHO, WER, No 36, 5 September 1997, pp. 272 - 274). Undoubtedly therefore the number of reported malaria cases in the African Region has been on the increase despite the launching of the Roll Back Malaria movement in 1998. We shall discuss some of the reasons that has attributed to this in the succeeding chapter.

but a caveat was introduced. In the ecological studies described it is not possible to prove that any one factor has resulted in this increase, since correlation does not prove causality. Moreover, the risks of increasing endemicity and of more epidemics are dependent not only on environmental factors but also upon the vulnerability of highland communities and the capacity and capability of local health services. One of the major reasons for increases in malaria incidence in recent years has probably been a decline in the control and treatment of the disease.

While inadequate health care makes communities vulnerable to malaria, the factors that precipitate epidemics are often climatic in origin including sharp increases in rainfall, temperature and humidity. Rainfall provides the breeding sites for mosquitos, and higher temperature and relative humidity increase mosquito survival and parasite development. It seems likely that epidemic - prone areas are those which experiance marked differences in inter-annual climate and where the thresholds required for malaria transmission are exceeded every few years. Outbreaks can, however, occur in years that have a similar climate to others when epidemics did not occur. This study have briefly highlighted how mathematical models can be used to explore the ways in which global warning could change future malaria patterns

Table 7: Number of Malaria cases reported by WHO Region (thousands), 1990 - 2000

WHO Region	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Africa	12,302	8,994	8,384	2,590	27,644	31,017	30,690	30,953	30,929	32,716	33,615
Americas	1,058	1,231	1,188	984	1,115	931	911	951	1,019	1,120	1,144
Eastern Mediterranm	586	541	309	292	321	335	391	610	566	602	531
Europe	14	16	22	50	91	60	32	45	28	24	21
South East Asia	2,970	3,087	3,087	3,077	3,514	3,084	2,521	3,689	3,823	3,718	3,815
Western Pacific	1,037	968	733	674	2,121	1,361	1,060	786	830	704	709
Total	17,963	14,837	13,713	7,667	34,806	36,788	36,605	37,034	37,195	38,884	39,835
Total (excluding Africa)	5,661	5,843	5,329	5,077	7,162	5,771	5,915	6,081	6,266	6,168	6,220

Source: WHO, WER No 36,5 Sept. 1997, p.272

CHAPTER FIVE

5

SUMMARY AND RECOMMENDATIONS

5.1 SUMMARY

The emphasis of this study is on controlling malaria mortality and morbidity, for which Africa bears the bulk of the world's burden. The evolving biodiversity of the continent includes man, his most pathogenic malaria parasite, Plasmodium falciparum, and its most anrthropophilic mosquito vector, Anopheles gambiae. The breeding of this mosquito, as demonstrated by this study, is favoured by man - made edological changes ranging from Neolithic agriculture to local practices of deforestation and irrigation. The outcome is an exceptionally close human - vector association which produces mean parasite inoculation rates exceeding 100 infective bites per year per person in most rural villages of sub-Saharan Africa, whereas less than one infective bite per person is recorded in most residual endemic areas of South-East Asia and South America.

The study have discussed the many reasons for a rise in malaria incidence in Africa, mostly in relation to environmental changes

but a caveat was introduced. In the ecological studies described it is not possible to prove that any one factor has resulted in this increase, since correlation does not prove causality. Moreover, the risks of increasing endemicity and of more epidemics are dependent not only on environmental factors but also upon the vulnerability of highland communities and the capacity and capability of local health services. One of the major reasons for increases in malaria incidence in recent years has probably been a decline in the control and treatment of the disease.

While inadequate health care makes communities vulnerable to malaria, the factors that precipitate epidemics are often climatic in origin including sharp increases in rainfall, temperature and humidity. Rainfall provides the breeding sites for mosquitos, and higher temperature and relative humidity increase mosquito survival and parasite development. It seems likely that epidemic - prone areas are those which experiance marked differences in inter-annual climate and where the thresholds required for malaria transmission are exceeded every few years. Outbreaks can, however, occur in years that have a similar climate to others when epidemics did not occur. This study have briefly highlighted how mathematical models can be used to explore the ways in which global warning could change future malaria patterns

in Africa.

This study has also revealed that the eradication of this extremely stable African population of P. falcilparum could be rather difficult in the absence of new tools. This being so, the strengthening of disease control is the only realistic short-term strategy. Despite increasing drug resistance, malaria is still a curable disease, and the commitment to fight it, clearly expressed both by the Roll Back Malaria global partnership spearheaded by WHO and by African political leaders in the recent Abuja summit, should make it possible to mobilize financial and human resources urgently needed to control the disease. Guidance for this multisectoral effort is provided by specific operational research such as analysis of the logistic, cultural and economic causes for delayed, inadequate or dangerous treatments, which are still major factors of malaria mortality.

On the other hand, combating the disease must be distinguished from combating the infection and this latter activity should be seen within a long-term strategy aiming at the interruption of transmission even where P. falciparum reaches its highest stability. In these holoendemic and hyperendemic areas particularly in West African Guinea and the Sudan savanna belts,

indoor residual spraying or impregnated mosquito nets are not enough. If successfully applied, they may bring about a temporary reduction in vector capacity but they will not lower it below its critical level. Thus, the possibility of achieving a cost - effective, sustainable equilibrium that is more favourable to the human host is a matter for careful evaluation. It must take fully into account the risk that reduced inoculation rates may result in unstable malaria conditions that may worsen the clinical picture and out come of the disease. Vector control measures, which are the rule in tropical Asia and South America are limited in Africa to areas selected according to epidemiological data, historical records and available resources. The focus should be on hyperndemic or endemic prone zones of the continent (such as high altitude areas), where local vector population, of An. gambiae and An. funestus are so dependent on indoor resting that indoor spraying of residual insecticides has proved crucial for their reduction or even eradication.

Research on new antimalarials presently concentrate on the development of vaccines, new drugs and drug combinations. A multi-stage vaccine plus a monodose antimalarial treatment with gametocytocidal effect in addition to the already available impregnated mosquito nets could turn the dream of eradicating

P. falciparum malaria in sub-Saharan Africa into a reality. Further anti-vector measures could be integrated to sustain the antimalaria compaigns and forestall re-infestation of mosquito free zones.

Finally, it must never be forgotten that social and economic instability has helped to perpetuate the burden of malaria. Poor people tend to inhabit the areas of highest malaria risk because they cannot afford to live in low-risk areas due to corresponding high prices of land. Moreover, their houses are usually of inferior construction and this makes poor people even more vulnerable to malaria. The health needs of the poorest in society are usually also the least addressed by health systems. Health care centres tend to be located at considerable distances from high - risk areas, and the cost of purchasing antimalarial drugs and other interventions precludes the poorest people from using them. But where conditions are stable, the prospects for disease control are greatly improved. This underscores the importance of intersectoral collaboration.

5.2 RECOMMENDATIONS

Having drawn a complete picture of the malaria situation in Africa and its delimitating effects on the continent, the next logical

thing to do is to firm up on critical actions to be undertaken by partners to control or even eradicate the scourge.

The first point of importance that has emerged from this study seems to me to be the desirability for general planning activities for health sector development in African countries to be based and progressively so on detailed research and analysis. Only then should the countries be able to produce a health system which is reasonably well suited to the functions is intended to serve. The development of blueprints for action must however be avoided. Instead, guiding tenets must be developed but these must remain adaptive, incremental and country specific.

To ensure that such guiding tenets for actions are target oriented they must be formulated around core objectives that would facilitate the accomplishment of the main task. In this case four core objectives were identified and they are listed below:

- How can partners contribute to a sustained capacity to control malaria within the context of health sector development efforts.
- Potential private sector and intersectoral collaboration at

country level to control malaria

- Function and challenges for country partnerships to support and catalyse community level action
- Financing issues for controlling malaria at country level and country resource mobilisation in different settings.

I now bring forth the various recommendations for critical actions or guiding tenets for actions synthesised under each of these four broad areas.

5.2.1 Sustained Capacity to Control Malaria Within the Context of Health Sector Development

The country context in controlling malaria is crucial. It assures ownership and prioritisation by countries concerned and efforts made sustainable over the long run.

Recommendations

i. Effective communication within and between partners is essential. National authorities need to be in a position to lead country partnerships action to control malaria.

ii. Concerted country action that demonstrates the effectiveness of partnership work within the context of health sector development should take priority at the initial stage.

iii. Human and financial resources need to be mobilised to support a transition from "isolated" malaria control to sector-wide efforts to control malaria - and to support these activities in the long term.

iv. Where necessary assessments (locally generated) must take place and access to technical support must be made available.

v. Globally and regionally there is a need for wider understanding on the roles and responsibilities of different partners on ways in which partners action is coordinated, and means through which countries can access support.

vi. Emphasis on roll back malaria in the context of health sector development should result in partners agreeing to work differently and more effectively: this may be best started in a few countries with an opportunity for learning and adaptation.

5.2.2 Private Sector and Inter-sectoral Collaboration at Country Level

A set of priority actions for the RBM partnership was given to inform and catalyse public private partnerships and intersectoral collaboration.

<u>Recommendations</u>

Recommendations to enhance private sector involvement includes:

- Globally - Establish an informal network to continue dialogue on the issues.
- Document exemplary case studies.
- Identify major global consumer product distributors and develop outreach strategies.
- Work with private sector to develop incentives for improved skills and quality of services
- Promote adjustments in legal regulatory frameworks that create opportunities for more investment by private manufacturers.
- Country action - Develop national strategies for advocacy and an enabling environment.
- Develop national regulatory framework for public private partnerships.

For inter-sectoral action at country level the followings are recommended:

- Build national capacities (policy framework, procedures and skills in intersectoral planning) in health impact assessment and health risk management.
- Strengthening environmental health services in light of new approaches to health and environment against the backdrop of health sector reform (decentralisation).
- Realise new essential regulatory functions (e.g. health impact assessment), and strategic alliance between health and environment sectors, both which are dealing with crosscutting issues.
- In the context of health sector wide approaches a strengthened environmental health services can play a regulatory role in inter-sectoral malaria transmission risk reduction.

5.2.3 Function and Challenges for Country Partnerships to Support and Catalyse Community Action

Efforts to address malaria in Africa were hitherto

fragmented. Uncoordinated efforts and initiatives, despite their number and scope, could not meet the challenges for effective action against malaria in Africa. As a result, potential partners especially at country and community levels, were inadequately engaged in process. This lead to sub-optimal use of available resources.

Potential community partners includes government, other national country partners, international organisations, national organisations (i.e research institutes), NGOs, civil society and community level partners including focused groups, traditional and private practitioners, local health systems, local industries, and community based distribution systems (i.e. drug vendors).

Recommendations

- The structures for coordination, potential mechanisms, the synergistic linkages between different actors and identification of structure that reach the community need to be mapped out.
- Building on the capacity of the primary health worker to work with communities.
- Developing options for effective funding mechanism

of community activities.

- Developing precise process indicators to measure whether community work is indeed functioning and seeing targets so we know if we are getting there.
- Community participation in planning, implementation and evaluation of programs.
- Identification and sharing of lessons learned.
- Understanding and building upon the critical role of women.
- Building on experiences from different communities, sectors and countries.
- Reinforcing the supervision and monitoring of health services with the community.
- Regular negotiation and consultation with communities.
- Ensure adequate assessments of resource needs at community level, both human and financial.
- Make account of potential partners and identify their possible roles.

5.2.4 Financing Issues for Rolling Back Malaria at Country Level and Country Resource Mobilisation in Different Settings.

It is generally accepted that there is an absolute shortage of resources for health action at country level. However the resources that do exist, both government and those from donor agencies are often underutilised or not utilised efficiently as they could be. A variety of resources are available at country - level that could be mobilised. National budgets for health and non health sectors, additional funding from development agencies, non-governmental organisations and the private sector were seen as essential to advancing overall objectives. It is largely accepted that specific funds for roll back malaria should not be mobilised at country level, rather that additional resources should be mobilised for health sector development efforts and action to reduce malaria morbidity and mortality prioritised by government, with the help of other partners, should be planned and budgeted within these overall efforts.

Recommendations

- Consolidation of resources, advocacy, integration of

strategies to roll back malaria, organisation of inception and launching of RBM concepts at national and district level.

- The medium terms should see the development of national inter-sectoral collaboration, enhancement of national capacity to manage resource and empowerment of community structures.
- Clarification of strategy globally and regionally that includes guidance on incorporation of malaria control intervention into sector development plans and strategies.

5.3 CONCLUSIONS

Malaria kills a child somewhere in the world every 30 seconds. The majority of the deaths it causes occur in Africa. Malaria is a major factor in Africa's high rate of infant and maternal mortality, of low birth weight, of school absenteeism and of low productivity in farming and other work. It afflicts primarily the poor, who tend to live in malaria - endemic areas and in dwellings that offer little or no protection against mosquitoes. By sapping peoples health, strength and productivity, malaria further maginalizes and impoverishes them.

Africa's future development is therefore inextricably linked to the prevention and control of malaria. At last there are strong signs of major new international political commitment to tackling malaria. This is seen in the discussions at the Abuja summit on Malaria in April.

There is now a real possibility that the resources available to tackle malaria will increase substantially, perhaps tenfold, during the next few years. Some of these new resources must be invested in the search for new and better technologies. An effective vaccine would certainly be a breakthrough, but even in the most optimistic scenario, such a product will not be available for widespread use within the next five years. The question is what to do in the meantime.

We have today a number of reasonably effective and cheap technologies which if widely applied could result in a major reduction of the burden of malaria. None of them are perfect, but technical limitations are not the main problem. The most pressing need now is for mechanisms which allow the majority of the most affected families to use the available technologies in the near future. When such mechanisms exist, it should be relatively simple to add to the technologies in use or replace

them with new ones as they become available.

In highly endemic situations found in sub-Saharan Africa, three interventions could be introduced within a year or two, even where the health infrastructure is very poor. These are distribution and use of insecticide - treated bednets, rapid first-line treatment of all suspected malaria cases, and routine intermittent presumptive malaria treatment of all pregnant women. These combined could halve the burden of malaria in the most vulnerable population groups. If they were linked to improvements in mosquito control and in the diagnosis, treatment and referral of complicated malaria cases, the burden of poor health and death due to this disease could be reduced even further.

Most of these highly cost effective interventions have been available for over a decade, but, with the exception of a very small number of countries in South - East Asia and Africa, none of them has yet been applied on a big enough scale to make much difference in malaria incidence, morbidity or mortality. There have three main obstacles.

First, the network of public sector health facilities, largely

focused on curative care, has tended to play a conservative and restrictive role rather than empowering the full range of potential actors and partners to take action on a large scale. Government health agencies have a proper and necessary function in setting standards and monitoring epidemiology and the effectiveness of control measures. Public sector hospitals and health facilities are likewise indispensable. But it is unlikely that the public sector alone will be able to make bednets and insecticides available to all who need them, or to ensure that all children have access to an effective first - line drug to treat malaria. New ways of using the energy and skills of communities, and new ways of harnessing the power of the private sector will have to be used to achieve these objectives.

Second, during the 1990s there has been a concentration of effort in the poorest countries on health sector reform, with a shift away from what was seen as the vertical disease - oriented approach.

Health sector reform and sector wide approaches were certainly needed, but they do not appear to have had much impact on malaria. Reductions in malaria and other diseases which are undermining social and economic development must be key

outcomes by which the effectiveness of health systems and health reforms are measured.

Third, the last decade of malaria control in most poor endemic countries can be characterised as one of testing the effectiveness and feasibility of various interventions on a small or medium scale. These activities were supported mainly by ministries of health and non governmental organizations. There are too few models of large scale public/private partnerships in which the strengths of both sectors are harnessed to bring effective malaria control technologies to entire populations.

A tenfold increase in resources will not translate into a tenfold improvement in malaria control unless there are major changes in organisation and approach. At present there is thought to be insufficient capacity to absorb in a transparent and accountable way a large increase in resources at local level. Qualified human resources are either scarce or inappropriately deployed. One solution is to train more health workers and ensure that they are appropriately deployed and properly paid.

At the same time, new ways must be found to channel resources for malaria control to where they are needed by using the

energies and talents of the people living in the areas concerned. Two possibilities hold great promise. One is to make intensive and creative use of new information technology for training local people in delivering selected malaria control activities and documenting and sharing information on their impact. The other is to set up a franchise system to channel funds and supplies efficiently to local communities, this would provide ways of both financing the necessary activities and ensuring their quality.

All said and done the conclusion that can be drawn from the outcome of this study is that the Roll Back Malaria movement despite all efforts made by WHO and other partners to keep it on track in its over three years of existence have had little if any impact on countries of Africa south of the Sahara where the miseries caused by malaria is the worst in the world. Malaria morbidity and mortality in this region continues to escalate at an alarming rate with catastrophic effects on the health of its population and on the social and economic aspects of their lives. There is the urgent need, therefore, for the partnership to review the RBM programme to make it more effective if it were to remain focused and to achieve its stated goal. For now, to quote Mr. D. Alnwick who himself quoted a partner from East Africa: "without significant resource mobilization and soon, all our

efforts are simply another glossy policy report that will gather dust". (WHO, MIP/01/CDS.6, 2001, p.11)

From the programme briefly outlined above it is quite clear that malaria control could be achieved within the bounds of present day technologies if adequately organised and supported.

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