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Improving Africa Economy through Efficient and Effective Malaria Management and Prevention Programs

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ABSTRACT

Malaria, one of the most devastating parasitic infections, transmitted by mosquitoes, kills more than 1 million people annually. Pregnant women, children, and immune-compromised individuals have the highest morbidity and mortality, and Africa bears the heaviest burden. According to World Health Organization, malaria has slowed economic growth in endemic countries in Africa by up to 1.3 per cent per year. Africa's GDP would probably be in the region of US $100 billion higher if malaria had been tackled 30 years ago, when effective control measures first became available. Even today, half a billion cases of malaria each year lead to the loss of

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several billion days of productive work. The estimated costs of malaria, in terms of strains on the health systems and economic activity lost, are enormous. This paper discusses the possibility of wiping off malaria in Nigeria (the most populous country in Africa), which will be a plus to the African nation economy.

Keywords: Malaria, Africa, Economy, Management, Prevention.

1. INTRODUCTION

Malaria is one of the most serious health problems facing the world today. The World Health Organization estimates that over 300 million new cases of malaria arise a year, with approximately two to three million deaths resulting from contraction. Malaria is endemic in tropical Africa, with an estimated 90% of the total malaria incidence and deaths occurring there, particularly amongst pregnant women and children (Carrington, 2001). According to the World Health Organization (WHO, 2012), malaria disease is a leading cause of death and ill-health in the developing world as there were more than 219 million cases of malaria in 2010, claiming 660,000 lives. Research by the Institute for Health Metrics and Evaluation suggests that the death toll could be much higher, at 1.2 million annually (Murray C.J., 2012). Concentrated in the poorest regions of the world, notably sub-Saharan Africa, malaria not only exacts a heavy human toll in the areas where it is most prevalent, but is also highly corrosive of the broader economic fabric of these regions. In the most heavily affected regions, malaria accounts for 40% of public health spending, (Attaran A. and Narasimhan V, 2003), sapping already-scarce resources and impeding long-term human capital formation.

The high death toll resulting from the disease is only a part. Research indicates that families suffering from malaria clear only 40 percent of land for crops compared with healthy families (WHO, 2002). Therefore, the infection leads to poverty, since the affected populations are prevented from vigorously pursuing their chosen career or source of livelihood and poverty leads to infections. For every person who died, many more still lived on, but were reduced to poverty, their health and their lives affected by frequent bouts of illness.

The links between health, poverty, and long-term economic growth are powerful - much stronger than is generally understood. The burden of disease in some low-income regions, especially sub-Saharan Africa, stands as a stark barrier to economic growth and therefore must be addressed as a central component of any comprehensive development strategy (Commission for Macroecomics and Health, 2002). With existing health knowledge and technology, it is possible to prevent the great majority of these premature deaths and reduce the suffering of many millions of people. While effective prevention and treatment strategies have long been available for controlling these disease, political will, and social support are materializing to help the world go to scale in fighting this deadly epidemic (Commission for Macroecomics and Health, 2002).

Specifically, malaria is endemic in Nigeria with children under five years, pregnant women and immune- compromised persons at greater risk. This calls for attention in view of the various problems associated with it most especially its impact in HIV transmission, maternal mortality, low birth weight, and infant mortality. It is therefore expected that important health problem like malaria that grossly affect the morbidity and mortality rates, as well as the economy of a developing country, such as Nigeria, where a large percentage of its population lives in extreme poverty in rural areas, without access to potable water and adequate healthcare will be given great attention. Nigeria is also a low-income country already saddled with a huge foreign debt burden. It risks sinking further into debt as it struggles with a sick populace whose good health is essential for its economic growth (Carrington, 2001). Hence, the necessity of looking into strategies that could be employed or improving on methods already adopted to malaria management and prevention with the aim of achieving effectiveness.

2. MALARIA, THE DISEASE

Malaria affects 3.3 billion people, or half of the world's population, in106 countries and territories (CDC 2016). According to WHO (2011), 216 million cases of malaria occurred in 2010, 81% in the African region. There were 655,000 malaria deaths in 2010, 91% in the African Region, and 86% were children under 5 years of age. Figure 1 shows how African countries bear the greatest burden of malaria with transmission occurring throughout the year.

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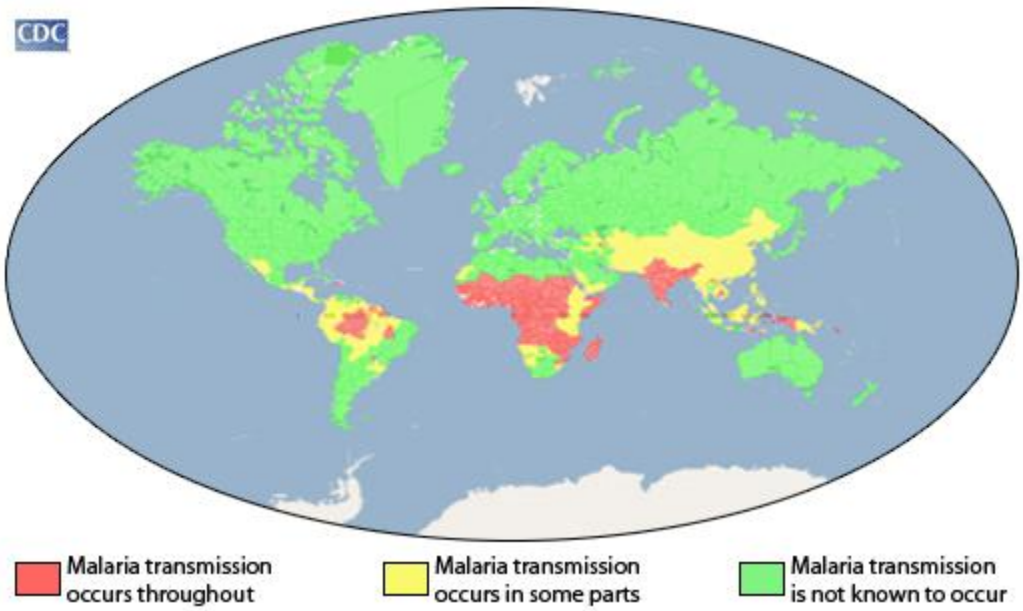

Figure 1 Map showing malaria transmission around the world (Source: CDC)

In Africa, Thirty countries in Sub-Saharan Africa account for 90% of global malaria deaths. Nigeria, Democratic Republic of Congo, Ethiopia, and Uganda account for nearly 50% of the global malaria deaths. Malaria is the 2nd leading cause of death from infectious diseases in Africa, after HIV/AIDS. Almost 1 out of 5 deaths of children under 5 in Africa is due to malaria(WHO, 2011). Children who are poor, have mothers with little to no education, and live in rural areas are more susceptible to malaria and more likely to die from it (Ingstad, B. et al., 2012).

According to CDC (2016), Africa is the most affected due to a combination of factors including:

- A very efficient mosquito (*Anopheles gambiae* complex) is responsible for high transmission.
- The predominant parasite species is *Plasmodium falciparum*, which is the species that is most likely to cause severe malaria and death.
- Local weather conditions often allow transmission to occur year round.
- Scarce resources and socio-economic instability have hindered efficient malaria control activities.

Malaria is directly related to the spread of HIV in sub-Saharan Africa(Whitworth J. et al, 2000). It increases viral load seven to ten times, which increases the chances of transmission of HIV through sexual intercourse from a patient with malaria to an uninfected partner (Hoffman I.F. et al, 1999). After the first pregnancy, HIV can also decrease the immunity to malaria. This contributes to the increase of the vulnerability to HIV and higher mortality from HIV, especially for women and infants (Rowland-jones, S.L. 2002). HIV and malaria interact in a cyclical manner—being infected with malaria increases susceptibility to HIV infection, and HIV infections increase malarial episodes. The co-existence of HIV and malaria infections helps spread both diseases, particularly in Sub-Saharan Africa (Abu-Raddad L.J. 2006).

In Nigeria, Malaria accounts for more cases and deaths than any other country in the world. It is a risk for 97% of Nigeria's population. The remaining 3% of the population live in the malaria free highlands. There are an estimated 100 million malaria cases with over 300,000 deaths per year in Nigeria. Malaria accounts for 60% of outpatient visits and 30% of hospitalizations among children under five years of age in Nigeria. It has the greatest prevalence, close to 50%, in children age 6-59 months in the South West, North Central, and North West regions. Malaria has the least prevalence, 27.6 percent, in children age 6 to 59 months in the Southeast region (Malaria fact sheet 2015).

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3. THE MALARIA PARASITE LIFECYCLE

The natural ecology of malaria involves malaria parasites infecting successively two types of hosts (female anopheles mosquitoes and humans) as described in figure 2.

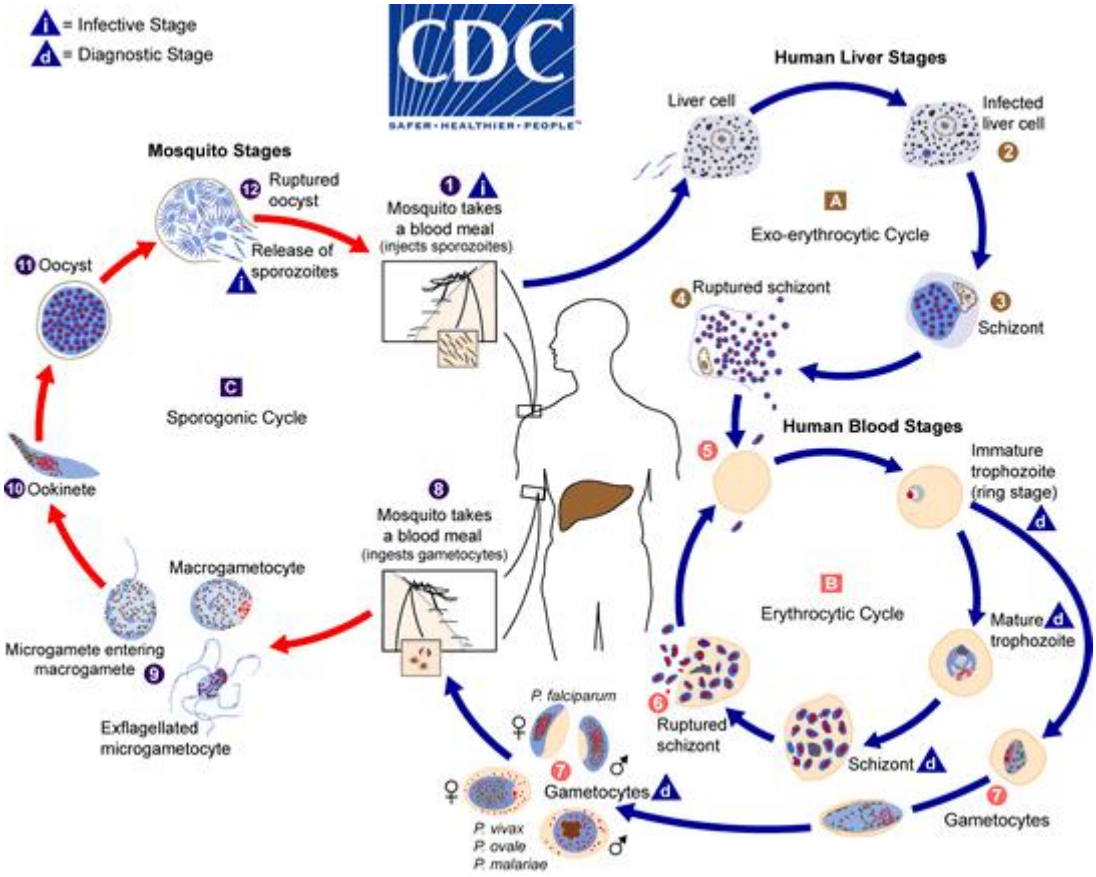

Figure 2 Malaria parasite's life cycle (Source: CDC)

During a blood meal, a malaria-infected female *Anopheles* mosquito inoculates sporozoites into the human host. Sporozoites infect liver cells and mature into schizonts, which rupture and release merozoites. (Of note, in *P. vivax* and *P. ovale* a dormant stage [hypnozoites] can persist in the liver and cause relapses by invading the bloodstream weeks, or even years later.) After this initial replication in the liver (exo-erythrocytic schizogony), the parasites undergo asexual multiplication in the erythrocytes (erythrocytic schizogony). Merozoites infect red blood cells. The ring stage trophozoites mature into schizonts, which rupture releasing merozoites . Some parasites differentiate into sexual erythrocytic stages (gametocytes). Blood stage parasites are responsible for the clinical manifestations of the disease.

The gametocytes, male (microgametocytes) and female (macrogametocytes), are ingested by an *Anopheles* mosquito during a blood meal. The parasites' multiplication in the mosquito is known as the sporogonic cycle. While in the mosquito's stomach, the microgametes penetrate the macrogametes generating zygotes. The zygotes in turn become motile and elongated (ookinetes) which invade the midgut wall of the mosquito where they develop into oocysts. The oocysts grow, rupture, and release sporozoites , which make their way to the mosquito's salivary glands. Inoculation of the sporozoites into a new human host perpetuates the malaria life cycle.

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4. SOCIAL AND ECONOMIC BURDEN

Malaria is increasing in many countries, partly because of deterioration in public health infrastructure, but also because of climatic and environmental changes, conflict-related human migration, widespread poverty, and the emergence of drug resistant parasites. Africa's GDP would probably be in the region of US $100 billion higher if malaria had been tackled 30 years ago, when effective control measures first became available. Even today, half a billion cases of malaria each year lead to the loss of several billion days of productive work. The estimated costs of malaria, in terms of strains on the health systems and economic activity lost, are enormous. In affected countries, victims of malaria occupy as many as 3 in 10 hospital beds. In Africa, where malaria reaches a peak at harvest time, and hits young adults especially hard, a single bout of the disease costs an estimated equivalent of 10 working days. Research indicates that affected families clear only 40 per cent of land for crops compared with healthy families (WHO, 2011).
According to CDC (2016), Malaria imposes substantial costs to both individuals and governments.

Costs to individuals and their families include purchase of drugs for treating malaria at home; expenses for travel to, and treatment at, dispensaries and clinics; lost days of work; absence from school; expenses for preventive measures; expenses for burial in case of deaths.

Costs to governments include maintenance, supply and staffing of health facilities; purchase of drugs and supplies; public health interventions against malaria, such as insecticide spraying or distribution of insecticide-treated bed nets; lost days of work with resulting loss of income; and lost opportunities for joint economic ventures and tourism.

Direct costs (for example, illness, treatment, premature death) have been estimated to be at least US$ 12 billion per year. The cost in lost economic growth is many times more than that.

5. CAUSE AND EFFECT RELATIONSHIP BETWEEN MALARIA AND ECONOMY GROWTH

The level of socio-economic development in a country usually affects how much is invested in health care, which in turn affects the health outcomes and severity of diseases like malaria. Like a vicious cycle, the health outcomes affect income and capital, which in turn affects the economic development of the country.

Nigeria has enjoyed a period of economic growth with the Gross Domestic Product rising from 2.5% in the 1990's to 6% during the period 2004 – 2007 with average annual inflation rates falling from 20.6% to 11.6% over the same period (Central Bank of Nigeria , 2008), though in recent times, the economic recession has adversely affected the country's economy. Nigeria has the potential of being a key player on the African continent, however in spite of her potentials; development shortfalls remain pervasive as evidenced by low earnings for individuals, poor social indicators and significant disparities by income, gender and location. It is also estimated that more than half of Nigerians (54.4% or 76 million) live in poverty with 70.8% of this living below the poverty line of less than $1 per day (United Nations Development Program, 2007). Furthermore, Poverty is found to be predominant in the rural areas than urban areas and deepens from the southern to the northern part of the country. Coupled with the above, the current economic recession as a result of fall in oil revenues also continues to pose a risk to the availability of resources to the health sector.

Meanwhile any nation desiring a buoyant economy requires a healthy populace. Indeed health is wealth and therefore for great economy development it is essential to invest in health in a sustainable manner. The centrality of health to national development and poverty reduction is self-evident, as improving health status and increasing life expectancy contribute to long-term economic development. The legitimacy of any national health system depends on how best it serves the interest of the poorest and most vulnerable people, for which improvements in their health status gear towards the realization of poverty reduction goals (NCH, 2009).

In view of the dwindling economy state of the nation, where diversification is proposed and agriculture is a major option, it is expedient that sustainable investment is made towards the eradication of malaria through effective and efficient preventive and management programs. This is because, as malaria's incidence increases, so too will morbidity and mortality rates. Along with malarial morbidity and mortality come economic losses. Social and economic consequences are directly related to the severity of the malaria's increased morbidity and mortality.

More so, children spending days away from school and adults lose workdays In the cause and effect relationship between malaria and economic growth, it is also possible that the severity of malaria leads to poor health outcomes which in turn leads to a low gross national income and poor economic growth.

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6. SUGGESTED STRATEGIES TO SCALING UP MALARIA PREVENTION

According to the report of the National Strategic Health Development Plan Framework (2009-2015), the following strategic objectives were provided to the prevention and management of malaria.

- To provide clear policy directions for health development: Improve Strategic Planning at Federal and State levels
- To facilitate legislation and a regulatory framework for health development : Strengthen Regulatory Functions of government
- To strengthen accountability, transparency and responsiveness of the national health system; Improve Accountability and Transparency
- To enhance the performance of the national health system by Improving and maintaining Sectoral Information base to enhance performance
- To ensure universal access to an essential package of care
- To increase access to health care services
- through Improved geographical equity and access to health care services
- Ensure availability of drugs and equipment at all levels
- Establish a system for the maintenance of health facilities and equipment at all levels
- Strengthen referral system
- Foster collaboration with the private sector
- Strengthen professional regulatory bodies and institutions
- Develop and institutionalize quality assurance models
- Institutionalize Health Management and Integrated Supportive Supervision (ISS) mechanisms
- To improve the quality of health care services
- To increase demand for health care services by creating effective demand for services
- To provide financial access especially for the vulnerable groups (e.g. Pregnant women, under fives, orphans and the aged)
- To formulate comprehensive policies and plans for human resources for health development
- To provide a framework for objective analysis, implementation and monitoring of human resources performance
- To strengthen the institutional frameworks for human resources management practices in the health sector
- To strengthen the capacity of training institutions to scale up the production of a critical mass of quality, multipurpose, multi skilled, gender sensitive and mid-level health workers
- To improve organizational and performance-based management systems for human resources for health
- To foster partnerships and networks of stakeholders to harness contributions for human resource for health agenda

The Commission for Macroeconomics and Health estimates a cost of about US$34 per person per year (per capita) to deliver an essential package of interventions to meet the Millennium Development Goals (MDGs) Commission for Macroeconomics and Health (2001)

Peletiri I.C. (2013) suggested practical solutions to surmounting the seven major obstacles he observed hindered the eradication of malaria in Nigeria. This obstacles includes:

- The environment
- Human behaviour (Patients' attitude)
- Clinical diagnostic inadequacies (Medical doctors' attitude)
- Medical Laboratory diagnostic inadequacies
- Therapeutics inadequacies
- Drug resistance
- Government policies

The Lagos state ministry of health some time came up with strategic plan to malaria eradication. The highlight of their program is as follows:

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Table 1 highlight of Lagos malaria control program

Goal	Objective	Target	Methodology	Method of implementation
To halve the burden of malaria	• To reduce by 50%, the mortality and morbidity due to malaria, in children under the age of 5 years. • To reduce the malaria prevalence from 50% population having at least one attack to 25% population having one attack. • To lead to a reduction in all cause child mortality by 20%	- 80% coverage for effective case management. - 80% coverage of population at risk for ITN - 100% coverage for Intermittent Preventive Treatment for pregnant women.	1. Promotion of Effective case management of Malaria 2. Control of Malaria in Pregnancy 3. Promotion of the use of Insecticide Treated Nets 4. Integrated Vector Management 5. Behavioural Change and Communication 6. Monitoring and Evaluation 7. Building Partnership 8. Operational Research	• Training and capacity building for Health workers • Sensitization and capacity building for caregivers at the community level. • Public enlightenment programmes. • Advocacy. • Free distribution of Insecticide treated nets. • Free Treatment of Malaria cases. • Field epidemiological research. • Data tracking and analysis.

Bangladesh adopted the World Declaration of Malaria Control in 1994, and in 1999, with the launch of the Global Roll Back Malaria Initiative embarked on a course of enhanced malaria control. The National Malaria Control Programme pursued its malaria control interventions with a view to its long-term goal of reducing the malaria morbidity and mortality until the disease is no longer a public health problem. The malaria control partnerships with various donors and organizations, and WHO have been key to the successful implementation of various strategies and interventions, including Long Lasting Insecticide Nets distribution(LLIN), early diagnosis and effective treatment using Rapid Diagnostic Tests(RDTs) and Artemisinin-based Combination Therapy (ACT) and information, education and communication campaigns for mass awareness of the community.

From 2007 onwards, Bangladesh has vastly expanded health services for malaria prevention and treatment in endemic areas, to people at risk of malaria. This has been achieved as a collaboration between the Ministry of Health & Family Welfare(MOH&FW) and a Consortium of 21 Non-Governmental Organization (NGOs) led by Bangladesh Rural Advancement Committee, by establishing an effective network of community level intervention delivery programmes. These community operations are based on:

1. the use of rapid diagnostic tests supplemented by microscopy for diagnosis of patients, and effective medicines for the treatment of malaria;
2. providing long-lasting insecticidal bed nets to people living in endemic areas; and
3. implementing Advocacy, Communication and Social Mobilization (ACSM) programmes for creating impact.

The country is now well on its way to reaching population coverage targets set by the programme. These intervention scale-up efforts, which began in 2007-2008, are beginning to show impact and according to national surveillance data, the malaria incidence has decreased from 84,690 cases in 2008 to 26,891 cases in 2013, having a 68.2% reduction in case incidence. Malaria deaths have also decreased countrywide, as has the case fatality rate of *P.falciparum* malaria, indicating that early diagnosis and effective treatment of *P.falciparum* at the community level is having an impact.

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According to Carington (2001), the following are important in ensuring efficient and effective malaria management

1. Primary health care centres: this must be accessible and affordable
2. Epidemiological surveillance, which is an essential guide in developing multi-dimensional approach in control strategy
3. Chemoprophylaxis
4. Vector control through barrier method, which includes the wearing of light-colored protective clothing that covers the whole body, bed nets acting as a mechanical barrier and prevent the mosquito from biting humans, and most importantly is the long lasting insecticide treated mosquito nets which has been proved to be highly effective against mosquito bite.
5. Training of health workers especially those in the rural areas is highly essential since they are in the position of teaching people how to use their bed nets during the night and how to keep them from being torn.
6. Direct attack method through the use of DDT is an effective means of keeping houses and environments free of mosquitoes. However, workers should be trained on all the necessary safety precautions that should be taken when on a spraying mission.
7. Control through local vegetation: Anti-mosquito plant species
8. Health education

7. CONCLUSION

The available technology and innovations with examples of countries with good record of great impact of malaria prevention programmes, gives confidence, that the eradication of malaria is not impossibility. With the right people in government, who see investment in health as laying foundation for economy buoyancy not only provide finance but set up policies that could mobilize nongovernmental organizations who will be willing to collaborate in bringing end to this terrible surge which appears put the poor at the receiving end.

RECOMMENDATIONS

Recommendations for health as force for economic growth and social progress

1.African countries should come together and improve coordination between countries, while also involving local organizations and other stakeholders in the decision-making process.

2.Generate new sources of revenue to complement prior health commitments.

3.Making use of natural resources and increasing the private sector's investment in health care.

4.Make smart investments for greater health returns by making use of the newest technology and models to deliver the best care to the greatest number of people while also improving the efficiency of national health systems.

5.Strengthen Africa's human health resources by training more health workers and by training them better.

6.Furthermore, countries that share similar health challenges – especially those in the African Union – should participate in more knowledge sharing. Different countries have different strengths and experiences they can share with each other.

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