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WITCHES HAVE CHASED ME OUT OF MY VILLAGE: KNOWLEDGE AND PERCEPTIONS ABOUT MALARIA IN NANUN, NORTHERN GHANA

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ABSTRACT

Various attempts at eradicating malaria in the developing world have proved futile and the prevalence of the disease continues to contribute the highest to the disease burden in Africa, both in terms of morbidity and mortality as well as the cost to economic development. This study attempted to find out the level of knowledge and perceptions people have about the disease in the Nanumba North District. A total of 200 respondents were sampled using a multi-stage sampling approach for the cross-sectional survey. Questionnaires were then administered to household heads and other respondents selected through systematic random sampling. The study revealed among others that, knowledge about malaria in terms of its real cause is low. The disease was attributed to exposure to sunshine, witch crafts, eating of certain foods, heavy rains, and mosquitoes. Superstition and attributing the cause of the disease to witch craft was also found to be high in the district. Knowledge on the signs and symptoms of the disease however was quiet high, but it did not translate into proper treatment of the disease. Herbs were found to be the most used in the treatment of malaria. The study also discovered that, the mobile drug sellers are the most common source of drugs for the treatment of malaria, but most drugs used are not anti-malaria drugs. The official health delivery system is not easily accessible to many people either due to the physical distance to health facilities or economic hindrances. Use of Insecticide Treated Nets (ITNs) is low. The study recommends that, the District Health Directorate should step up public education on the real cause of malaria, encourage people to register with the National Health Insurance Scheme (NHIS), and expand primary health care for rural communities. The mobile drug sellers should be given training and monitored to effectively serve as a conduit for drugs and information to reach the remote parts of the district.

INTRODUCTION

Malaria is a protozoan infectious disease and described as the world's most serious transmissible disease. It is mankind's most feared and serious affliction, causing more morbidity and mortality than any other human disease [1]. It is estimated that, between 300 -600 million clinical cases of malaria are reported every year, 90% of which occur in Africa. Malaria is responsible for the death of about 1.5 million people annually. About 55%

of the world population is exposed to malaria infection with pregnant women and children being the most affected.

According to the World Health Organization, over 40% of children in the world reside in malaria endemic countries. It is estimated that, between 1-2% of children in Africa die of plasmodium falciparum infection. The toll malaria is exerting on the people of the developing world is so grievous that it needs concerted effort from all angles to tackle it.



Malaria has since caught the attention of the world as a disease of serious public health concern largely in the poorer countries. It has been described as “a plague of the poor, easy to overlook”. According to the magazine, Bill Gate has referred to malaria as “the worse thing on the planet” earth. He has equally donated hundreds of millions of US dollars through the Bill and Melinda Gates Foundation to the effort of combating the disease. The George W Bush administration has also pledged 1.2 billion dollars towards the war on malaria. It is estimated that, since 2003, funds devoted to malaria management have doubled aimed at disabling malaria through a combination of various techniques.

In a statement to mark the first ever United Nations (UN) day for malaria, the UN Secretary General Mr. Ban Kin Moon, called for what he referred to as “desperate steps” to roll back malaria in Africa. He announced an initiative aimed at offering household sprays and bed nets treated with insecticides to all people at risk of malaria infection, especially women and children in Africa by the end of 2010. It is interesting to note that this initiative is not different from the Roll Back Malaria initiative that was launched in 1998. It was aimed at halving malaria deaths by the year 2010, but studies have shown that much have not been achieved, as deaths from malaria is said to have actually risen.

The agent that causes malaria is the plasmodium. The agent occurs in four distinct forms: Plasmodium malariae, phymedium vivax, Plasmodium oval and Plasmodium falciparum. Plasmodium falciparum is the most virulent of these types, with 10% cases of mortality rate.

Malaria is the leading cause of sickness and death in Africa south of the Sahara, exerting a heavy toll on especially pregnant women and children, and may partly be responsible for the unacceptable rates of infant and maternal mortality in rural Africa.

The pattern of malaria infection is the result of the interplay of many factors, including: the duration of malaria infection; the infectivity rate of mosquitoes; the extent of man-mosquitoes contact; and the degree of immunity of the population. Through the interplay of these factors, the prevalence of malaria varies in space and in time, making the disease locality specific in character. The incidence of malaria is therefore not homogenous in Ghana and Africa as a whole, and its state at any point in time and space is a reflection of the climatic, ecological and attitudinal characteristics of the people and the area. Malaria is avoidable and preventable, and the question that needs to be answered is why Sub-Saharan Africa is hardest hit by the malaria epidemic and the measures put in place to manage the disease seem not to be yielding the desired result.

The Nanumba North District is one of the 27 administrative districts in the Northern Region of Ghana, and one of the most deprived districts in the country. Malaria incidence is very high in the district according to

the district health directorate report, 2012. Malaria is the leading cause of death in the district, and majority of the people have no access to health facilities due to poor and deplorable road system and the lack of health personnel to provide services to the population. What is it that needs to be done to improve the malaria situation in this rural agricultural district? This study analyses the level of knowledge about malaria among the people in this district, and how people are coping with the disease in their various localities in order to inform policies and strategies to reduce or eliminate malaria in the district.

Malaria affects the lives of almost all people living in the area of Africa defined by the southern fringes of the Sahara Desert in the north, and latitude of about 28° in the south. About 90% of all malaria deaths in the world today occur in Africa south of the Sahara. This is because the majority of infections in Africa are caused by Plasmodium falciparum, the most dangerous of the four human malaria parasites. It is also because the most effective malaria vector - the mosquito *Anopheles gambiae* - is the most widespread in Africa and the most difficult to control.

According to the health minister, Madam Shery Ayitey, it costs Ghana, US dollars, 875.million for treatment of malaria in 2012, which is the equivalent of the entire health budget for the 2011 financial year, and about 10 % of Ghana’s GDP for 2011. She described malaria as a threat to economic growth and the survival of the infant National Health Insurance Scheme. Malaria increases poverty, impairs learning, and decreases attendance at school and work and is said to cost Africa, US12billion dollars annually.

While these figures are worrying, self-medication is a widespread phenomenon in Ghana. Majority of the malaria victims only seek medical examination and treatment from health facilities when the initial attempts have failed resulting in late presentation [3, 4]. Very often malaria treatments in Ghana occur at home with only a few of such home-based treatments being correct and complete. Accessibility to orthodox medical treatment in Ghana is low with per capita outpatient visit of 0.46 in 2010.

The literature also observed that, there is a good knowledge of malaria in terms of its symptoms among the population. There is however a contradiction, where almost 80 to 90% of the rural dwellers who manage malaria at home is not able to treat the disease properly. In a study at the Kintampo District for instance, it was found out that, while about 90% of mothers/caregivers could identify malaria by the common clinical symptoms of fever, high temperature, and body weakness and so on, only 5% out of the total sample could administer chloroquine correctly. In the light of this we still need to find out the level of knowledge people have about malaria in totality, and how that influence their health seeking behaviour, especially in the rural areas.

The Nanumba North District Health Directorate in its 2012 report, identified malaria as the most serious



health problem facing the District. Among the ten top major causes of death in the district, malaria was number one in 2012, contributing 15.3% of deaths. In 2011, malaria was responsible for 19.4% of deaths, up from 12.1% within a year. The situation of malaria is worsened by the deplorable conditions of roads in the district, majority of them not motorable in the rainy season. Worse of it all, the limited health facilities in the district lack personnel to man them, with only one doctor at post to serve the entire district. Unfortunately, literacy level in the district is among the worse in the country and in the three northern regions with only 23.3% of the population being literate. Access to health services in the district is woefully inadequate, and even very critical cases take very long time to reach the district hospital at Bimbilla. With limited access to health services, high level of illiteracy, poor road network and many other features of underdevelopment, how are the rural dwellers of the district coping with malaria? How well informed are they about the causes, prevention and treatment of malaria?

From the above situation in the Nanumba North District, malaria awareness, or knowledge of the causes, prevention, treatment and management are very crucial in fighting malaria and therefore could be responsible for the current state of the disease in the District.

This paper is therefore aimed at assessing the level of knowledge people have about malaria in the Nanumba North District, and how that together with other factors like accessibility to health facilities are affecting the kind of coping strategies being adopted to manage the menaces of the malaria disease in the District.

Malaria Parasites and their Distribution

Malaria is the most important tropical disease, remaining widespread throughout the tropics, but also occurring in many temperate regions. Malaria exacts a heavy toll of illness and death especially amongst children and pregnant women and also poses a risk to travellers and immigrants, with imported cases increasing in non-endemic areas.

Malaria is a vector-borne infectious disease caused by protozoan parasites. It is widespread in tropical and subtropical regions, including parts of the Americas, Asia, and Africa [5]. Malaria is described as an “acute infectious disease caused by protozoa of the genus plasmodium (P), which is transmitted by the bite of female anopheles mosquitoes. *P. vivax*, *P. malariae* and *P. ovale* cause chronic carrier state, *P. falciparum* causes the most severe and only life-threatening state form of malaria”. According to Whittle and Hemsroek [1] plasmodium falciparum is the most common and most virulent species of the malaria parasites as it has the capacity to multiply very rapidly as well as its power of sequestering in small blood cells, thereby causing damage to the brain and other vital organs. The other species of the parasite though difficult to cure due to their formation of cryptic forms in

liver or red cells resulting in relapses, they are comparatively less fatal.

The human parasite, *Plasmodium falciparum*, is dangerous not only because it digests the red blood cells haemoglobin, but also because it changes the adhesive properties of the cell it inhabits which in turn causes the cell to stick to the walls of blood vessels. It becomes especially dangerous when the infected blood cells stick to the capillaries in the brain, obstructing blood flow, a lethal state of malaria referred to as cerebral malaria.

It has been estimated that, each year, there are approximately 515 million cases of malaria, killing between one and three million people, the majority of whom are young children in Sub-Saharan Africa. Ninety percent of malaria-related deaths occur in Sub-Saharan Africa. The disease is seen as commonly associated with poverty, at the same time, it is accused of being responsible for poverty and a major hindrance to economic development. Malaria is a serious public health problem especially in Africa, but a devastating problem in rural Africa where majority of the people live in abject poverty. Poor people are at increased risk both of becoming infected with malaria and of becoming infected more frequently. Child mortality rates are known to be higher in poorer households and malaria is responsible for a substantial proportion of these deaths [6].

Malaria is a serious health and development problem in Africa, and a devastating problem in the rural areas. “There is a silent tsunami under way all the time in rural Africa. Every month, many children die of malaria in Africa as died in the tsunami – about 150,000 children dying every month (*Dr. Jeffery Sachs, director of the U.N. Millennium Project, Columbia University Economist, March, 2008*).” In Zambia for instance, about 20% of children do not live to see their 5th birthday due to falciparum infection (National Geographic Magazine July, 2007). The Executive Director of Zambia Malaria Foundation, Mulema Muleba, whilst acknowledging the effectiveness of the use of the Insecticide Treated Bednet in the fight against malaria, described the distribution of these nets in the remote areas as a nightmare. People according to him are reluctant to use the nets, and some people misused them as fishing gear. The observation above requires answers as to the level of knowledge people have about the malaria disease and the importance and effectiveness of the various intervention measures as seen by the beneficiary group.

Malaria, one of the major causes of poverty and low productivity in the developing world is hyper endemic in Ghana, and accounts for more than 44% of reported outpatient visits at health facilities and an estimated 22% of under-5 mortality in Ghana. Of infections detected by blood slide examination, *P. falciparum* accounts for about 90%, *P. malariae* for 9.9% and *P. ovale* for 0.1%. Of malaria cases reported at outpatient visits in public health facilities, 36–40% is typically in children under 5 years of age [7].



According to the Rollback Malaria monitoring report, reported malaria cases represent only a small fraction of the actual number of malaria episodes in the population because the majority of people with symptomatic infections are treated at home and are not reported. The questions that need to be asked are; the majority that does not report to health centers, how are they managing the disease at home? What are their sources of medication? And how effective and save are these drugs and their sources?

Ghana's malaria control strategy, which has been adopted by the RollBack Malaria (RBM) Partnership, involves multi-sectoral and inter-sectoral partnerships working together on an agreed plan with the goal of reducing death and illness caused by malaria by 50% by 2010 from the figures of 2000. Malaria incidence varies in the country. Mr. Steve Adongo, (Northern Regional Environmental Health Officer) in a statement to mark the regional sanitation day in Walewale indicated that, Northern Region was leading the country in malaria cases, with 92% of OPD cases in the region's health facilities being attributed to malaria, typhoid, diarrhea and worms.

The malaria disease is skewed globally in its distribution towards the tropics, with variations in the dominants of the different species of the agent in different geographical locations. It has been established that, the most virulent species, *P. falciparum* is dominant in Africa, Haiti Dominican Republic, French Guinea, Surinam, parts of Asia and Papua New Guinea. The dominant species in Latin America, Turkey, the Indian sub-continent and China is that of *P. vivax*. While the *P. malariae* and *P. ovale* are largely African species.

At the end of 2004, 107 countries and territories had areas at risk of malaria transmission, and some 3.2 billion people lived in areas at risk of malaria transmission. An estimated 350–500 million clinical malaria episodes occur annually; most of these are caused by infection with *P. falciparum* and *P. vivax*. *Falciparum* malaria causes more than 1 million deaths each year. It also contributes indirectly to many additional deaths, mainly in young children, through synergy with other infections and illnesses [8].

In the Nanumba North District, malaria is the number one cause of sickness and death especially among children with its serious consequence on the rural agricultural economy as it affect productivity generally, and place much financial burden on the resources of the already poor families.

Environmental Determinants of Malaria

Malaria is largely an environmental disease. The distribution and intensity of the disease is therefore affected by both the natural environment as well as several anthropogenic factors interacting within the given space. The result is that, malaria assumes area specific characteristics, reflecting the kind of conditions, both natural and human that exists in different spatial locations.

As noted by Epstein (1995), Morse, (1995), Githeko and Ndegwa [9] and cited in the AIACC Working Paper No. 25, March 2006 [10], malaria is one of the most climate-sensitive vector-borne diseases, but that, several other factors have been identified as contributing to its emergence and spread. These include environmental and socio-economic change, deterioration of health care and food production systems, and the modification of microbial/vector adaptation.

The number one determinant of malaria is the physical environment in terms of precipitation and temperature, and their influence on the occurrence and distribution of both the agent responsible for malaria (the plasmodium) and the vector responsible for its transmission (the female anopheles mosquito). Climate and its variability are considered very important natural phenomena that result in the distributive pattern of malaria over space and time. According to Lancaster [11], the geographical distribution of mortality and morbidity shows a connection between diseases pattern and the conditions of the natural environment. In a similar vein, Agyepong et al [12] explain that, the seasonal variation in relative humidity impact heavily on the life expectancy of the malaria vector that can cause a cessation of malaria transmission even under suitable temperature regime. The transmission of malaria is the result of the combined effect of heat and moisture and therefore areas with seasonal rainfall patterns will record different regime of malaria transmission within the same year.

The factor of climate and its relationship with malaria transmission is also manifested in the spread of the disease in areas that were formally free of the disease or moderately affected by virtue of the less suitable conditions of moisture and heat in those areas. Studies in East Africa indicate that there has been a change both in severity and area extent with respect to malaria transmission in the high land area of the region. Highland malaria in East Africa has a long recorded history dating back to the 1920s and 1950s when it was first reported [13-15]. According to this study, the early highland malaria epidemics were not as severe or as frequent as they have been within the last two decades, and that, from the 1960s to the early 1980s, there were virtually no recorded malaria epidemics in the East African highlands. The resurgence of highland malaria epidemics in the last two decades has therefore been closely associated with the frequency of climate variability [16-22].

Zones of unstable malaria, such as the East African highlands according to Mouchet et al [20] are more sensitive to climate variability and environmental changes. Kilian et al [23] and Lindblade et al [24] also argued that, short-term climate extremes, such as El Niño, lead to elevated temperatures and high precipitation, which increase malaria transmission. Other arguments suggest that, the epidemiological situation with respect to malaria has worsened in Africa over the last decade, and the disease has occurred in areas previously free of malaria,



because of changes in the climate [25]. Whereas these assertions are valid to a greater extent by virtue of the role played by precipitation and temperature in promoting the breeding of the anopheles mosquitoes through the creation of surface water and the needed warmth, there are other schools of thought who seek other explanations rather than simple climatic conditions to explain the occurrence and increase in malaria transmission. In the case of the East African highland malaria situation, Hay et al [26] have disputed claims attributing an increase in malaria transmission in those highlands to climate variability. They asserted that, the available climate data analysis showed no significant changes in temperature or vapour pressure at any of the highland sites reported to have had high malaria incidences. This means that other variables, both physical and human interact in addition to precipitation and temperature to actually effect a change in the pattern and character of malaria. The West Mamprusi District is in an ecological zone with temperatures and rainfall conditions suitable for the transmission of malaria.

Anthropogenic Determinants

The role of the human factors in the prevalence and transmission of malaria cannot be underestimated as it enhances the environmental determinants of the disease. The parasite that causes malaria needs to be incubated in the human host in order to develop to its fullest life cycle. The human environment is key in modifying the physical environment either to favour the vector (the mosquito) that transmits the malaria disease or otherwise. The biological characteristics of people also influence their level of vulnerability to the malaria parasite and therefore affect the severity of the disease in different individuals and household. The pattern of malaria infection is in effect the result of the interplay of many factors, including; the duration of malaria infection, the infectivity rate of mosquitoes, the extent of man-mosquitoes contact and the degree of immunity of the population. Through the interplay of these factors, the prevalence of malaria varies in space and in time, making the disease locality specific in character.

Biologically, studies have shown that, in sickle-cell disease, there is a mutation in the *HBB* gene, which encodes the beta-globins subunit of haemoglobin. The normal allele encodes a glutamate at position six of the beta-globin protein, whereas the sickle-cell allele encodes a valine. This change from a hydrophilic to a hydrophobic amino acid encourages binding between haemoglobin molecules, with polymerization of haemoglobin deforming red blood cells into a "sickle" shape. Thus, individuals heterozygous for the mutated allele, known as sickle-cell trait, may have a low and usually-unimportant level of anaemia, but also have a greatly reduced chance of serious malaria infection.

Another well-documented set of mutations found in the human genome associated with malaria are those involved in causing blood disorders known as

thalassaemias. Studies in Sardinia and Papua New Guinea have found that the gene frequency of β -thalassaemias is related to the level of malarial endemicity in a given population. A study on more than 500 children in Liberia found that those with β -thalassaemia had a 50% decreased chance of getting clinical malaria. Similar studies have found links between gene frequency and malaria endemicity in the α + form of α -thalassaemia. As it is with many diseases, presumably these genes have also been selected in the course of human evolution.

Equally important in the biological determinants of malaria is the acquisition of partial immunity against the disease by both children and adult in endemic areas. It has been established that children gain some level of immunity derived from their mothers during pregnancy and delivery where anti-bodies are transferred from the mother to the child. This transplacental immunity transfers is capable of protecting the child from malaria infections at least in the first six months after birth. It should be noted however that, the level of immunity transferred to the child will be dependent upon the mothers own level of immunity. Moreover, people who live in endemic regions acquire a certain degree of immunity through repeated infections over a period of time. In such areas, people become tolerant to infection, resulting in the reduction in the clinical signs and symptoms of the disease within a given level of parasitemia. In such areas, the effect of plasmodium falciparum morbidity and mortality falls between one and four years of age or even earlier in areas of very high transmission. Furthermore, human socio-economic activities also influence the prevalence of malaria by creating conditions suitable or otherwise for the breeding of mosquitoes which transmit the malaria parasite. It was observed in East Africa that, increases in human population density in the highlands have led to deforestation and swamp reclamation. The presence of pools of water and increased temperatures resulting from land cover change provide ideal breeding sites for mosquitoes and therefore the potential for malaria transmission to rise [27, 28]. The construction of artificial lakes for irrigation and other domestic and industrial purposes increases the area coverage of surface water which will promote the breeding of mosquitoes. Poor sanitary conditions, bushy surroundings, lack of proper preventive measure, poor housing conditions, poor attitude towards garbage and waste disposal and inaccessibility to health facilities are all conditions that will favour the spread and serious consequences of malaria among the population.

Malaria is equally correlating very well with poverty and under nutrition. It has been suggested that, malaria is highly endemic in areas of high level of poverty. At one end, the poor are highly susceptible to the disease which exert much greater toll on them in terms of morbidity, suffering and mortality, at the same time malaria is seen to be responsible for wide spread poverty in many parts of the world as it drains meager resources of



nations and families and causes substantial loss of productive time. As noted by Weller (1978), a "malarious community is an impoverished community". In many of the western industrialized countries and the United States of America, malaria has virtually been eradicated, while it has remained a nightmare for the poorer countries especially in the developing world. Malaria is a serious public health problem in Africa, but a devastating problem in rural Africa where majority of the people live in abject poverty. Poor people are at increased risk both of becoming infected with malaria due to low immunity and deficiency in major key body nutrients resulting from malnutrition, and of becoming infected more frequently as they live in dwellings that offer little protection, and are also incapable of accessing good health care. Child mortality rates are known to be higher in poorer households and malaria is said to be responsible for a substantial proportion of these deaths.

Knowledge about Malaria

Knowledge of a disease is essential in early detection and prevention. In some situations, studies have revealed that the knowledge of malaria among the communities and local health officials especially in rural areas is embedded in myths. For example, the Public Health Act in Tanzania requires clearing of bushes around houses to prevent yellow fever. Other recent studies however have demonstrated that such bush clearing creates a favourable microclimate for anopheles mosquitoes that spread malaria.

Public perception and awareness of extreme weather events and disease are among the critical factors determining the prevention and adaptive capacity of individuals and communities to the impact(s) of climate-sensitive diseases such as malaria. A study by Wadinga and others (2006) in Tanzania, Kenya and Uganda generally established that, people have good level of knowledge and awareness of the symptoms of malaria as well as the causes and prevention of malaria in many communities. In a study in Ghana, Dunyo and colleagues established that children diagnosed with malaria by caretakers in the household were as likely to have malaria parasitaemia as those diagnosed with malaria in health facilities. This fact dismisses inaccurate diagnosis as the cause of inappropriate use of anti-malarial medicines in Ghana.

However, different communities have also developed various myths around the disease. One such myth from Kenya supposes that if one eats food cooked with an edible oil called "Chipsy," it activates malaria immediately ("*ukikula mafuta ya chipsy inaamusha` malaria mara moja*") Wadinga *et al* (2006). This brand of edible oil according to the study was introduced in 1990, a year that coincided with the El Niño rains and the malaria epidemics in the region. Another myth was that drinking water from a spring or stream source different from the one normally used cause malaria. In Muleba, Tanzania, people

believe that eating maize meal instead of bananas causes malaria and this was found to be coincidental because, maize meal is usually consumed only during periods of food shortages that usually result from above and/or below-average rains (e.g., the El Niño rains and/or La Niña droughts). These are also the periods when malaria is more rampant. Similarly, in Uganda, malarial complications, such as convulsions (neuropsychiatric events), are attributed to supernatural forces, and hence best treated with traditional medicine [22]. The result of these misconceptions and myths are delays in seeking medical care and in many instances resulting in cure failure, thereby increasing malaria morbidity, severity, and mortality. According to the report, monthly household income, gender, or levels of education had a significant correlation with the level of awareness of prevention of malaria.

In some cultures according to Speare [30] "malaria" is recognized as a distinct disease, and knowledge of symptoms and transmission through mosquito bites is high. In others, "malaria" is recognized as a distinct disease, but in the absence of understanding of the aetiology and transmission. Accurate knowledge of aetiology and transmission is often unrelated to appropriate treatment. It is important to recognize this fact so that in the design of policies note should be taken of the socio-economic elements that influence attitudes towards treatment of disease in general and malaria in particular. It is not enough to roll out programmes without taking into consideration the socio-cultural factors that influence people in accepting or rejecting some of these programmes, and for that matter the success or otherwise of these programmes. Having a better appreciation of the psychological, socio-cultural and behavioural orientation of the people is essential for the success of any management programme aimed at eradicating or controlling malaria in the society.

Among the Dangbe of Ghana, the closest approximation of malaria is "asra", which translates best as fever and is believed to be caused by prolonged contact with heat. Mosquito transmission is not recognized, although many use modern anti-malarial drugs for treatment. A self-diagnosis of "asra" was closely related to malaria as revealed in some studies by Agyepong [31] in which about 71% of villagers who believed they had "asra" were positive for malaria as well as 47% of those who did not think they had asra. This is an indication that even when a broad term is used, malaria cases may be missed.

Lettenmaier [32] in his delivery of a Concept Paper for the First RollBack Malaria (RBM) Communication Working Group Meeting September, 2003 asserted that, knowledge of malaria transmission is an important issue for education and information. He argued that, most people know that malaria is spread through mosquitoes, but many also believe that malaria can be transmitted in other many ways including; drinking dirty water, living in unclean surroundings, exposure to sun,



witchcraft, or eating certain foods. Consequently, they do not believe they can prevent malaria by avoiding mosquito bites. He recognized that, communication through multi-faceted channels is the best way to change individual and community attitudes and practices that act as barriers to effective malaria control. Through multi-channel communication, including interpersonal, community, electronic and print media, malaria programmes can create a sense of urgency among parents and guardians about fevers in under-five year olds so that appropriate treatment is initiated within 24 hours as well as prepare parents and guardians of young children to recognize and treat fevers promptly and correctly at home. He emphasized the need for malaria communication efforts to be integrated with reproductive, maternal and child health programmes, with environmental, school, and community health programmes, and with commercial manufacturers and importers of nets, insecticides and drugs. Most according to his argument are managed by doctors with little or no training in communication.

In another development, an assessment of knowledge about malaria of some patients attending Agogo Hospital and Suntresu Polyclinic in Ashanti Region in Ghana also revealed that, basic knowledge was common among all the participants with almost 100% indentifying fever and mosquito bite with the disease. However, only 24 % of participants knew the danger signs of malaria and when to refer. The participants could not identify the signs of complicated malaria and there was no significant difference in the knowledge of participants with low educational (junior secondary education and below) attainment and those with higher educational attainment in their knowledge of malaria [33]. The symptoms of severe malaria and their contribution to mortality were also assessed in 290 children in northern Ghana. Common symptoms were severe anaemia (55%), prostration (33%), respiratory distress (23%), convulsions (20%), and impaired consciousness (19%). These are common with severe malaria, but they are not usually associated with the disease by many patients or family members especially in the rural areas. Limited knowledge about malaria in a continent where self-medication is very high could contribute to high disease burden and mortality.

The Impact of Malaria

The exact toll of malaria on the developing world and especially in Africa is not easy to quantify as many episodes are not even reported to any institution where records can be taken. Malaria attack results in morbidity, disability and in some cases mortality, the conditions of which constitute the cost of illness. Andreano and Helminiak [34] categorised the effects of tropical disease into four as: Health consumption effects, Social interaction and leisure effects, Short - term production effects and long - term production and consumption effects. These effects result in various cost components, which can be categorised into direct costs, indirect costs and intangible

costs. These various costs may be borne by an individual, the household, the health care provider and/or the economy in various forms [35].

Malaria is still responsible for up to 50% of OPD cases and 20% of admissions in the continent. It is estimated that malaria could be responsible for an average annual reduction of 1.3% in economic growth in Africa with many families spending a significant portion of their income on malaria treatment. It has been estimated that the direct cost of a single episode of malaria to a household was US dollars 10, 6.87, 4.8 and 4.5 for Nigeria, Ghana, Uganda and Mali respectively. According to this report, studies have revealed that, in these countries, the indirect cost component make up over 70% of total household malaria cost, with sick people losing one to seven days per malaria episode depending on the severity of the disease.

According to Asenso-Okyere and Dzator, on the average 3 work days is lost per fever episode by the patient and 2 work days by the caretaker. The value of these days lost to the management and treatment of fever per episode is US\$ 6.87 and this formed about 79 percent of the cost of seeking treatment in 1994. In another study by the WHO (1992), malaria accounted for 3.6 ill days in a month, 1.3-work days absent and 6.4 percent of potential income loss in Ghana for 1988/89. The disease again is responsible for 10.2 percent of all healthy life lost from diseases, making it the chief cause of lost days of healthy life in Ghana [36], cited by Dr. Felix Ankomah Asante and Prof. Kwadwo Asenso-Okyere [4], As a developing country with highly fragile economy, the high financial demand for the treatment of malaria poses a serious threat to socio-economic development. It is equally important to note that, the National Health Insurance Scheme introduced in 2005 to meet the health needs of its subscribers is seriously threatened by the high outflow of funds from its accounts for the treatment of malaria. It is against this background that the health minister, Maj.rtd Quarage Quashigah, is reported to have described malaria as a threat to economic growth and the survival of the infant National Health Insurance Scheme.

The impacts of malaria epidemics have been devastating and are increasingly exposing vulnerable groups to the adverse effects of climate change, as well as challenging their ability to cope. One of the critical factors influencing the vulnerability of human health to climate change is the extent to which the health and socio-economic systems are robust enough to cope [37]. Malaria increases poverty, impairs learning, and decreases attendance at school and work and is said to cost Africa, US12billion dollars annually in Gross Domestic Product [38], World Malaria Report, 2005). One child dies of malaria somewhere in Africa every 20 seconds, and there is one malarial death every 12 seconds somewhere in the world. According to this report, malaria kills in 1 year what AIDS killed in 15 years and if in 15 years, 5 million have died of AIDS, 50 million would have died of malaria. This is a sad situation and a gloomy picture indeed for a



common preventable environmental disease to be allowed to destroy and continue to destroy many lives in the continent of Africa. This deprived the continent the needed human and material resources for the development of its economy.

Malaria is ranked third among the major infectious diseases in causing deaths globally, after pneumococcal acute respiratory infections and tuberculosis but it is the number one in Sub Sahara Africa, and the predictions are that by the turn of the century; malaria would be the number one infectious killer disease in the world. Malaria accounts for about 2.6 percent of the total disease burden of the world and is responsible for the loss of more than 35 million disability-adjusted life-years each year.

The intangible cost of malaria involves the health consumption and social interaction as well as the leisure

A great deal of epidemiological and ecological factors play a vital role in determining the effect of malaria on human health and in the intensity of the disease transmission. To understand the nature of malaria in any environment, you need to appreciate the conditions necessary for its transmission. For any given space, the three epidemiological factors required for malaria to exist are: the disease causing organism or agent, the media of transmission or vectors and its victim, and the environmental conditions, both natural and human. The existence, characteristics/kind and interaction of these factors explain the character of malaria at any given point in time and space.

The agent is the disease parasite which causes malaria. Four species of protozoan parasite of the plasmodium (P) genus - *P. falciparum*, *P. vivax*, *P. ovale*, and *P. malariae* - cause malaria in humans. Though malaria bought on by *P. vivax* is the most common, it is, however, malaria caused by *P. falciparum* that is most lethal. In this respect, what Warrell in 1993 [39] tried to put across is that, depending on which of these parasites existing in a given society, the rate of transmission, severity and fatality will differ in accordance with the qualities of the agent involved. This will explain why malaria in the Nanumba North District will differ from that of Accra or Kumasi or Cairo. In Sub-Sahara Africa, malaria is very endemic and lethal because of the presence of the plasmodium *falciparum* which is the most efficient and fatal among the human malaria agents.

The female anopheles mosquito is the medium and temporal host through which the parasite gets access to its main victim, the human host. Usually, people get malaria by being bitten by an infective female Anopheles mosquito. Only Anopheles mosquitoes can transmit malaria in human, and they must have been infected through a previous blood meal taken on an infected person. When a mosquito bites an infected person, a small amount of blood is taken, which contains microscopic malaria parasites to be injected into a new host when the next blood meal is to be taken. Without the anopheles mosquito

effects of the disease. When people are infected with the disease it leads to diminished and/or shortened enjoyment (in economic terms) of good health. This manifests itself in the form of pain, suffering, anxiety and grief associated with the death of a family member. It also includes the loss of leisure time due to illness and the cost of not participating in societal activities. Though the intangible cost associated with a disease could be very substantial, the human capital approach fails to capture the costs of pain, suffering and the psychosocial consequence of illness and premature mortality [40]. There is also a cost to households, which may modify their social and economic decisions in response to risks of contracting malaria. This may include the fact that high malaria prevalence in an area may compel households to cultivate crops that require less labour or may migrate to less malarious regions which may result in net output losses.

therefore, the malaria parasite will not have access to the human blood and related organs like the liver where the parasite is nourished and multiply to cause pain and death in human population.

Findings

Knowledge and the Causes of Malaria in Nanumba North District

A clear understanding of a disease is a necessary first step towards its appropriate control and management. Several factors come into play in affecting the way people perceive malaria in terms of its causes and control which then affect the prevalence rate. In the Nanumba North District, a combination of factors interact to influence peoples knowledge about malaria which then inform their perception, and consequently impact on the magnitude of the disease in the district. This chapter will examine the prevalence level of malaria in the Nanumba North District using data from the District Health Directorate and field information. It will also examine how the socio-economic characteristic of the people of the study area might contribute to the state of malaria. The section also examines the level of knowledge about malaria using data from the field. The underlying physical and socio-cultural factors contributing to the disease shall also be examined in this chapter.

The Prevalence of Malaria in the Nanumba North District

Malaria has been captured in the District Medium Term Development Plan, 2011-2012 as the most serious developmental challenge confronting the Nanumba North District. It is the number one disease in terms of OPD cases, admissions and death in the district's health institutions, with an average OPD case of over 44%. Table 3.1 gives a picture of how malaria was recorded in the Out Patient Departments in the district's health institutions between 2004 and 2008. From table 3.1, it is very clear that, malaria is a major problem in the district, accounting for over 43% averagely of total OPD attendants at the



health facilities in the district. It will be observed that, malaria OPD cases has been on the ascendency from 2004 to 2006 when it recorded the highest percentage share of about 53% of the OPD attendants. Before then, it contributed less than 50% in 2004 and in 2005 with a slight increase in 2005 over the 2004 figure. This increase was both in absolute terms and percentage. In 2006, there was a general decrease in hospital attendants from 30,451 to 24099, but that of malaria increased in percentage terms from 43.6% to almost 53%. Although in percentage terms the disease decreased in 2008 and 2009 as compared to the previous years, in absolute terms, it has been hovering around 11000 and 13000 from 2004-2007, with a huge increase in 2008 when over 15000 cases were reported. The possible reason for the unstable character of the disease may be due to the relative influence of rainfall on the disease. 2008 might have recorded heavy cases malaria because of the flood that affected the region, making more surface water available for the breeding of mosquitoes which transmits malaria.

Table 3.2 indicates that, the Bimbilla sub-district has the highest number of malaria cases at all times. This is not surprising because, it harbours about 40% of the district population while the remaining four sub-districts, including the Bakpaba sub-district together contains the remaining 60%. It also has the district hospital which is a referral centre for the other sub-districts in which case even the cases recorded in the other districts some of them might have been transferred to the Bimbilla hospital. In 2004, the Bimbilla sub-district recorded over 62% of the reported malaria cases in the district as against 37% for all the other sub-districts combined. In proportion to their total OPD cases however, the Bakpaba sub-district had the highest of 64.5% of total OPD accounted for by malaria, followed by Juanaayili with 52.3%, Lipusi with 42.5% and Bimbilla with 39.3%.

Figure 1 indicate that, there was a persistent increase in malaria cases in the Bimbilla and Bakpaba sub-districts for three consecutive years from 2008 to 2011 while that of Lipusi recorded a declining trend in the malaria cases. Juanaayili recorded a marginal increase in 2009 after which there was a substantial decline continuously up to 2012 when it recorded the lowest OPD cases in the district in both general cases and malaria (194 and 98) respectively. While all the other sub-districts experienced declines in reported malaria cases after 2006, the Bimbilla sub-district recorded a huge rise in malaria cases in 2008 perhaps due to the severe floods that affected the northern part of the country in that year. Perhaps, more people patronize official health delivery system in the Bimbilla sub-district because it has a medical doctor and other skilled staff as against the other sub-districts which all experienced a drastic fall in not just reported malaria cases but also general reported OPD attendants as shown in table 3.3. It might also be due to the fact that people do not go the health facilities with minor malaria cases, and therefore when the condition is critical, it is only the

district hospital where they will be rushing patients, in most cases ending up in admission.

Malaria cases in the district is generally on the decline according to the district disease control officer because of intensive campaign in the communities and also the introduction of indoor spraying of rooms district wide which started in May, 2008. This project is under the sponsorship of USAID covering a 3 year period with the possibility of extension. It should however be noted that, the figures available to the District Health Directorate is just an insignificant amount of the actual malaria cases in the district since many of the communities do not have access to health facilities and therefore malaria cases are perhaps managed at home using herbs and drugs from mobile drug sellers. For instance, the Bakpaba and Lipusi sub-district has one health centre each to cater for population of about 18,650, and 20,085 respectively. Not only are the facilities inadequate, but accessing them is made difficult by the poor road network in the district. Even where the health facility is available, people do not patronize them due to a combination of factors including poverty, ignorance, and superstition.

Table 3.3 indicate that, malaria is very serious problem in the district, and the people have identified it as the leading health problem facing their households. In all, about 125 (62.5%) of the respondents see malaria as the most common disease in their communities. Convulsion which is a complicated form of malaria is significant in the district and when added to the clinical state of malaria it placed the magnitude of the disease at 159 (79.5%). The spatial picture indicate that, convulsion is very high in the Juanaayili and Bakpaba sub-districts, with 33% and 27% of the respective respondents from these districts identifying it as the most common disease. The lowest cases of convulsion were reported at the Bimbilla and Lipusi sub-districts where only 9% and 9.4% respectively mentioned convulsion as the most common disease. The high incidence of convulsion in Juanaayili and Bakpaba districts could mean that, people do not report early to health facilities for treatment either due to inaccessibility to health facilities or attitudinal and inappropriate treatment at home resulting in the complication. It might also be the reason why superstition as cause of malaria is high in these sub-districts since the complicated state of malaria is mostly attributed to supernatural forces requiring treatment at the traditional level.

Knowledge about the Causes of Malaria

Knowing the correct cause of malaria is crucial in the management of the disease. Since 1880 the Plasmodium parasite was found to be responsible for malaria. In 1898 the anopheles mosquito was established as the vector that transmits malaria in human. A century after this discoveries however, people still have wrong understanding of the cause of malaria, resulting in the high prevalence of the disease, especially in rural area.



Table 5 shows that the respondents were allowed to state more than one factor they thought could cause malaria. From the responses, knowledge about the relationship between transmission of malaria and mosquito bite is very high among the people, with about 180 (90%) of the respondents attributing malaria to mosquito bite. This at a momentary look is refreshing and gives hope about the level of awareness of mosquitoes causing malaria in the district. However, it was quite clear that people do not really know the real cause of malaria, as many of the respondents who attributed the disease to mosquito bite also believed that, malaria is caused by many other factors including witch craft, when people are beaten by rains, eating of the early foodstuffs and others. Out of a total of 439 responses, those who see these other factors as causing malaria far outweighs the responses for mosquitoes (259/59.8% as against 180/41% respectively.). These findings support the argument made by Lettenmaier [32] that, many people know that mosquitoes cause malaria, but many also believed that, malaria can be transmitted in many other ways such as, witchcraft eating certain foods. As many as 157 persons constituting 79% of respondents and 35% of total responses, while pointing at the mosquito as the cause of malaria also believe that one can get the disease through witch craft. During the focus group discussions in the Juanaayili community, a male participant made a remark that, *“if you really want to avoid malaria then be prepared to dress like a mad man so that the witches in the village will see you as a useless human and unproductive person”*. To him, malaria cannot be avoided because; it is the witches which causes the disease and many of the participants shared in his view. *“You cannot live in a village full of witches and avoid malaria especially those who are bless with farm produce”*. You can only avoid the witches if you don't want to make it in life, and that will mean not having food to eat and a motor bike to ride. Equally important a factor identified by 68 (34%) of respondents and 16% of responses is eating of early maize (especially the yellow maize--from focus group discussion at Bakpaba). They believe that, when they begin harvesting and children in particular eat the new foods they get sick of malaria. The findings fit well with the work of Wandinga et al. 2006 in Kenya and Tanzania where malaria was attributed to food cooked with *Chipsi*, (edible oil) and maize meals respectively. These perceptions about other factors causing malaria is a real threat to the success of intervention measures aimed at combating the disease.

The wrong perception about malaria was also manifested when respondents were asked about how they feel about mosquitoes in their houses. They were allowed to state more than one effect. One hundred and ninety-three (96.5%) were much concerned about the irritation of their body when the mosquitoes bit them, while 129 (64.5%) were equally concerned about their noise. Only 36 (15%) of respondents directly related the mosquitoes to malaria transmission. This finding is closer to similar finding by

Rodríguez et al (2003) in Southern Mexico that, the perceived benefit of indoor residual spraying was associated to a reduction of mosquitoes, cockroaches and rats, but only 3% associated it directly with the prevention of malaria transmission.

Superstition and Knowledge about Malaria: Role of Witchcraft and Evil Spirits

Superstition is informed by limited knowledge about the real cause of the disease and therefore has a great impact on the way malaria is handled at the household level. This study revealed that, there is a significant level of superstition about the causes of malaria as depicted by table 3.7.

There is no doubt that, some people in the society still attribute malaria to supernatural forces. This attitude and believe placed a limitation on the proper diagnoses and treatment of malaria. The perception of the respondents on the importance of evil spirits and witchcraft in the prevalence of malaria is summarized in table 3.7

From table 3.7, it is quite clear that, there is high level of superstition among the people with respect to malaria. Overall, as much as 46% of respondents actually believed that, malaria can be caused by evil spirits or witchcraft. In terms of spatial dimension of this problem, the Janga sub-district has the highest belief in this perception with 56.7% of respondents believing that, evil spirits and witches can cause malaria. Janga is followed surprisingly by the Walewale sub-district with 48%, then by Kubore 47% and Kpasenkpe with the lowest of 31.3%. The high level of superstition revealed in the study is really worrying as it has a negative effect on attitude towards both prevention and treatment of malaria. The high superstition may be accounted for by the high level of illiteracy in the district.

Among the reasons given for the role of witches and evil spirits were the claims that, when the family heads failed to make regular sacrifices to their gods and ancestor they get angry and inflict them with the disease as a punishment and also to remind them of their responsibilities towards them. While 21(23%) of the respondents who believe in evil spirit causing malaria held this view of ancestors and their gods punishing them for irresponsibility towards them, 70 (77%) of these respondents held the view that witches or wizards are capable of inflicting families, individuals or entire communities with diseases when they are offended or when they are jealous about other people's prosperity in the society. In focus groups discussions, many women participants held the view that, if you quarrel with a witch, she attacks your children with diseases or even kill them to cause you pain. It was claimed that witches can buy any disease from the spiritual world to do whatever they like. The unfortunate aspect of this perception is the negative effect it will have on the attitude of the people towards treatment of malaria. People are likely to go to herbalist and traditional healers for treatment instead of the health



centres which may result in high fatalities or complications. This finding is in line with the findings of Nuwaha, (2002) in Uganda, which indicated that malarial

complications, such as convulsions (neuropsychiatric events), are attributed to supernatural forces, and hence best treated with traditional medicine.

Table 1. OPD Attendants from 2011-2012

	Year/ number of cases				
	2008	2009	2010	2011	2012
Total OPD attendants	24,513	30,451	24099	31807	38763
Malaria Case	11,110 (42.1%)	12,914 (43.6%)	12,762 (52.9%)	11,837 (37.2%)	15358 (39.6%)

SOURCE: District Health Directorate, 2012

Table 2. Prevalence of Malaria by Sub-districts in Relation to Total OPD Cases (2008-2012)

Sub-district	OPD	Year/OPD attendants				
		2008	2009	2010	2011	2012
Bimbilla	All OPD	18,717	22027	16300	24261	34269
	Malaria	7,362	9165	12427	8224	13890
Bakpaba	All OPD	2,460	1603	1049	1125	703
	Malaria	1,586	856	651	622	434
Lipusi	All OPD	2,053	2079	1239	1027	194
	Malaria	1,073	1098	643	416	98
Juanaayili	All OPD	4,120	3931	5164	6064	2558
	Malaria	1,750	1795	2468	2281	600

SOURCE: NNDHD, 2012

Table 3. The Most Common Diseases by Respondents in Order of Importance

Sub Districts	Malaria	convulsion	Stomach pain	Cholera	Waste pain	Pneumonia	others	Total
Bimbilla	56	8	11	4	3	2	6	90
Bakpaba	14	10	3	1	1	0	1	30
Lipusi	28	3	1	0	0	0	0	32
Juanaayili	27	13	5	1	0	2	0	48
Total	125	34	20	6	4	4	7	200

SOURCE: Field Survey, 2012

Table 4. Multiple Responses about the Causes of Malaria

Sub-district	Mosquito Bite	Witch craft	Beaten by Heavy rain	Eating early foodstuffs	Total Response
Bimbilla	82	72	18	31	203
Bakpaba	25	25	4	13	67
Lipusi	29	22	4	7	62
Juanaayili	44	36	8	17	105
Total	180 (41%)	157 (35.8%)	34 (8%)	68 (16%)	439 (100%)

SOURCE: Field Survey, 2012

Table 5. Perception about Evil Spirits/Witchcraft Causing Malaria

Sub-district	Can malaria be caused by evil spirits or witches			
	Yes	No	Total	Percentage yes
Bimbilla	43	46	89	48%
Bakpaba	17	13	30	56.7%
Lipuhi	10	22	32	31.3%
Juanaayili	22	25	47	47%
Total	92	106	198	46.5%

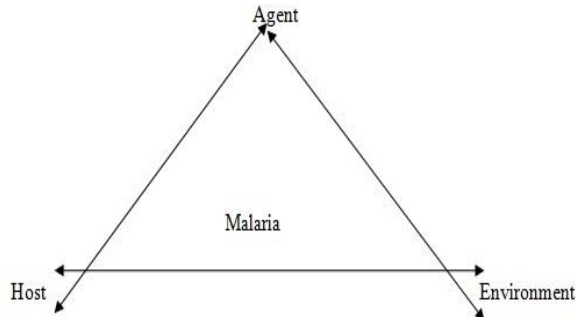
SOURCE: Field Survey 2012



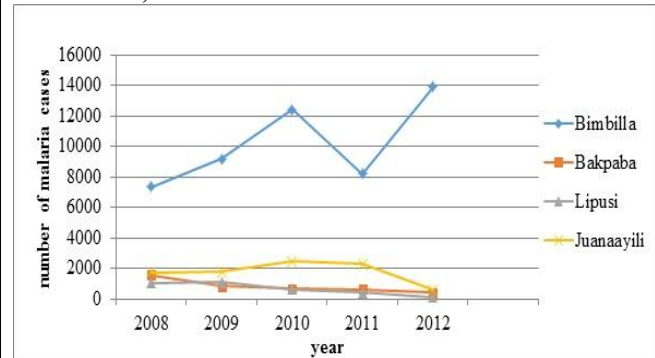
Table 6. Reasons Given for Evil Spirits and Witchcraft in Malaria

Sub-district	Not making sacrifice to the gods and ancestors	Use it to punish people who offend them	Buy it to punish communities	If you quarrelled with a witch
Bimbilla	8	13	11	11
Bakpaba	5	5	5	2
Lipusi	0	2	2	5
Joanaayili	8	3	6	5
Total	21	23	24	23

SOURCE: Field Survey, 2012

Figure 1. Epidemiological factors determining the transmission of malaria

Source: Warrell, 1993

Figure 2. Spatial and Temporal Distributions of Malaria OPD Cases, 2008-2012

SOURCE: Nanumba North District Health Directorate, 2012

CONCLUSION

It is clear from this discussion that, knowledge about the signs and clinical symptoms of malaria in the Nanumba North District is quite high with respect to the disease, but knowledge is low with respect to the actual causes of the disease. Although many are aware that mosquito bite causes malaria, the weight placed on other factors including exposure to sun, food, heavy rain and evil spirits and witches definitely is a cause for concern.

Also, there is some significant difference in the level of knowledge about malaria between urban dwellers and their rural counterparts, with more urban dwellers having an appreciable level of good knowledge about malaria than the rural people.

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