Malaria control strategies in the Kassena-Nankana East and West Districts of Ghana

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Abstract

This paper examines malaria control strategies adopted by households in the Kassena-Nankana East and West Districts of Ghana. Primary data was obtained through a questionnaire survey among 174 respondents, who were selected from 7 communities. In-depth interviews and focus group discussions were also conducted in these communities. Secondary data from hospital records were also analysed. The analysis shows that although several malaria control programmes have been implemented in the study area, the incidence of malaria is still very high. The poor outcomes of malaria control interventions were attributed to the failure of programme managers to implement all components of the Integrated Malaria Control strategy, which entails measures to promote environmental quality and eliminate or reduce malaria vector and parasites. The malaria programmes tend to only emphasise the use of insecticide treated nets (ITNs), but many households were not using this strategy because of poverty, inconvenience, and the belief that the strategy is not effective for controlling malaria. Most people were rather using traditional malaria control strategies, including the drinking of herbs and avoiding sweets. It is recommended that malaria control programmes should seek to enhance environmental quality as well as control malaria parasites. The cost and treatment of insecticide treated nets must also be added to the National Health Insurance premium to make them more accessible to vulnerable groups.

Keywords*:* malaria control, insecticide-treated nets; herbal medicine; poverty, Ghana.

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Ghana Journal of Geography Vol. 5, 2013 Pages 102 – 120

Introduction

Malaria continues to be one of the most serious human infectious diseases in many countries (Deressa *et al.*, 2003; Barry, 2005). Worldwide, malaria is responsible for about 3,000 deaths per day (Greenwood *et al.,* 2005). Although the disease affects people living in many geographical areas, it is more pervasive in poor countries in the tropical world (Sachs and Malaney, 2002; Muller, 2003), with 90% of malaria-related deaths occurring in the sub-Saharan Africa (WHO, 2002). Even though the prevalence of malaria within any geographical area is primarily determined by environmental factors such as mean temperature and rainfall (Carter *et al*., 2000), its high incidence in developing countries is largely attributed to poor environmental conditions and low standard of living (Klienshmidt *et al*., 2001; Muller *et al*., 2006). Given that both environmental and socio-economic factors influence the prevalence of malaria in any geographical region (Githerko, 2006; Cohen, 2008), management of the disease is shrouded in political, economic and social structures (Azabre, 2012).

In view of its debilitating effects on human beings and national economies, various programmes have been launched at the global and local levels to reduce the prevalence of malaria. Since 1998, the "Roll Back Malaria Programme", which aimed at reducing morbidity and mortality related to malaria significantly, has been implemented in many countries (Utzinger, 2002; WHO, 2005). A number of countries have also implemented national level programmes to control the disease (WHO, 2002). Despite these interventions, malaria continues to affect many people, especially in Africa (Deressa *et al.*, 2003).

As in many African countries, malaria has historically been a public health problem in Ghana(Binka *et al*., 1994).It is endemic and perennial in all regions of the country, with seasonal variations that are more pronounced in the north (Ghana Statistical Service, 2012). A number of strategies have been adopted by the government of Ghana, in collaboration with its development partners, to control the disease (Binka *et al*,. 1998). In the 1950s when Ghana obtained independence, the main strategy adopted to control malaria was indoor residual spraying with appropriate insecticides. In the late 1990s, emphasis was placed on accelerated malaria control through better case management with prompt treatment. The World Health Organisation's "Roll Back Malaria Programme", which was launched in 1998, was adopted in Ghana in the year 2000.This programme emphasised a combination of malaria preventive and curative measures. With support from international donors, Ghana has since adopted several strategies to help control the disease.

Ghana is one of the few countries benefiting from a $1.265 billion "President's Malaria Initiative", which was launched by the government of the United States of America in 2005 as a five-year (2006-2010) development assistance programme to reduce the burden of malaria in Africa (Azabre, 2012).In June 2008, officials of the National Malaria Control Programme in Ghana designed a new National Strategic Plan, which calls for a 75% reduction in malaria (morbidity and mortality) by the year 2015. The primary strategies outlined in the National Strategic Plan are: universal coverage with insecticide treated nets (ITNs); rapid scale up of indoor residual spraying (IRS) to cover one-third of the country; universal coverage of pregnant

women receiving intermittent preventive treatment (IPTp) using the drug sulphadoxine-pyrimethamine (SP); early diagnosis of malaria using microscopy or rapid diagnostic test (RDT); and prompt and effective treatment with artemisinin-based combination therapies (ACTs) (GSS 2012).Despite these efforts, malaria continues to be a very serious public health problem in Ghana (Akazili *et al*., 2007; Azabre, 2012).Available statistics show that about 3 million cases of malaria are reported in public health facilities each year, of which 900,000 cases are in children under five years (Ghana Statistical Service, 2012). The disease accounts for about 44% of reported out-patient department visits and approximately 22% of all under-five mortality in Ghana (Ghana Health Service, 2008).

While malaria has attracted the attention of both researchers and policy makers in Ghana (Asenso-Okyereand Dzator, 1997, Minja *et al*., 2001; Ghana Statistical Service 2012), there have been very few attempts to assess the effectiveness of malaria control strategies within specific localities in the country. Although the National Malaria Control Strategic Plan emphasises the use of insecticide treated nets (ITNs) by households, very few studies have been conducted in specific localities on ownership and use of insecticide treated nets by households in Ghana. This paper examines the effectiveness of malaria control strategies in the Kassena-Nankana East and West Districts of Ghana. The paper also discusses the challenges associated with the use of insecticide treated nets, and examines traditional strategies for controlling malaria in the study area. The choice of the Kassena-Nankana East and West Districts is significant, given the fact that they are seriously affected by the disease. Despite the implementation of a number of malaria control programmes in Ghana, the incidence of malaria, in these districts, is still quite high. The disease accounts for over 60% of all out-patient department reports at health facilities, and 25% of under-five mortality in the two districts (Azabre, 2012). It is, therefore, hoped that findings of this paper can be relied upon to revise existing programmes and or design new strategies for controlling malaria in the study area and other places with similar settings.

Literature Review

Determinants of the incidence of malaria

It is generally acknowledged that climatic variables, especially temperature and rainfall patterns, are the main factors that determine the prevalence of malaria in any geographical area (Klienshmidt *et al*., 2001; Muller *et al*., 2006). While increased rainfall and temperatures are said to account for high incidence of malaria in certain communities in Africa (see Binka *et al*., 1998; Ghana Statistical Service, 2012), Malakooti *et al.* (1998) reported that, in the highlands of Kenya, there was no evidence to suggest that the high incidence of malaria was caused by increased temperature and rainfall.

Some researchers have also argued that socio-economic factors and local environmental conditions that operate at smaller spatial scales are more critical in explaining the incidence of malaria rather than climatic factors (Brooker *et al*., 2004; Githerko *et al*., 2006: Cohen *et al*., 2008). For instance, a study in Burkina Faso found a positive association between the type of

roof and occurrence of plasmodium falciparum, the organism that causes malaria (Ye *et al*., 2006). Similarly, in Sri Lanka, Gamage *et al.* (1991) found that there is a relationship between type of house and incidence of malaria. These researchers demonstrated that people living in improved houses, especially those that had brick or plastered walls, are less likely to be affected by malaria than those living in very poor houses.

In more recent years, some researchers have argued that both socio-economic conditions and climatic factors are responsible for the high incidence of malaria in different parts of the world (Kiszewski and Tekelehaimano, 2009). However, as a result of lack of adequate data, it is always difficult to disentangle the influence of the different factors on the incidence of malaria. Only a few researchers have examined the influence of both socio-economic and environmental landscape factors on the distribution of malaria (Asenso-Okyere and Dzator, 1997; Brooker *et al*., 2004). As a result, there is still little understanding of the degree at which risk of malaria infection varies among different households and minor ecological clusters (Brooker, 2004). Again, the role that behavioural factors and cultural beliefs play in the distribution and control of malaria is not adequately explored in many societies.

Malaria control strategies

A review of the literature shows that the serious effects of malaria on both human welfare and economic wellbeing have precipitated multiple and diverse strategies aimed at controlling the disease. Until Ronald Ross discovered that malaria was associated with mosquitoes in 1898, quinine was the only method for reducing the burden of the disease (Najera, 1994). Ross' work led to the inclusion of two malaria control measures, namely reduction of mosquito numbers through larval and adult destruction, and reduction or elimination of contacts between man and the *Anopheles* mosquito. By the end of the twentieth century, it was widely acknowledged that disease causation had microbial origin and that the quality of the environment was an important factor that must be considered in efforts to control malaria (Snow *et al*., 1998; Azabre, 2012). As a result of these insights, present malaria control strategies, in many countries, involve the following three components: control of the vector; prevention of the contact between man and the vector; and measures aimed at controlling the parasite (WHO, 2002).

The World Health Organization's proposed strategy for controlling malaria is the Integrated Malaria Management (IMM) (Utzinger *et al.*, 2002; 2005), which involves the simultaneous application of measures to enhance environmental quality, and control the vector and the malaria parasite. Indoor Residual Spraying (IRS) and the use of insecticide treated nets (ITNs) are said to be the most effective methods for controlling the malaria vector (Binka *et al*., 1998). According to Muller *et al.* (2006), insecticide treated nets usage have become the most promising tool for malaria control and prevention, as they are associated with about 50% reduction in malaria morbidity. Case management, which is a component of the Integrated Malaria Management Programme, involves the use of prophylaxis or malaria drugs to remove the malaria parasite from the human body.

Research Methodology

Features of study districts and selection of communities

The study area, Kassena-Nankana East and West Districts, formerly belonged to the Kassena-Nankana District in the Upper East Region of Ghana. The area covers a total land area of about 1,674 sq km of Sahel and Guinea savannah. The landscape is characterised by isolated hills rising up to 300m.The area is drained by the rivers Sissili, Asibelika and their tributaries. A large reservoir (i.e. Tono Dam) and 90 small dug outs also provide water to people living in the area. The population of the two districts is about 156,090. Majority of the populace are engaged in agriculture (69%), while about 11% are traders.

In order to select some communities for this study, all settlements in the area were first clustered into seven zones, based on the Ghana Health Service sub-district demarcations. One study community was purposively selected from each of the seven zones for the collection of both secondary and primary data. This strategy was to ensure variability in the micro-ecological conditions of the data collection sites. The selection of the communities was also guided by preference for communities in which a health facility exists. This was necessary for the collection of secondary data regarding the reported cases of malaria. As shown in Figure 1, the communities selected included Navrongo and Paga (as urban areas), Sirigu and Kandiga (as peri-urban areas), Naaga and Biu (as rural areas) and Wuru as a special case because of its closeness to the Tono irrigation project.

Figure 1: Map of Kassena-Nankana East and West Districts showing study communities

Techniques of data collection and analysis

The research employed a combination of qualitative and quantitative strategies. A questionnaire survey was used to collect data from 174 household heads. The number of

households chosen from each community was proportional to the population in that community (see Table 1). The purposive sampling of household heads was based on the belief that they could provide relevant information by virtue of their knowledge or experience pertaining to their households. The household heads provided responses regarding common household and individual practices on malaria control and prevention.

The selection of respondents was based on a multistage sampling technique. After the selection of study communities, a systematic sampling technique was used to select the required number of houses in each community. Each selected house was visited by research assistants, and one household head was asked to complete the questionnaire. In cases where there were more than one household in the house, a simple random sampling was used to select only one of them for the questionnaire survey. In situations where the household head was absent, any knowledgeable adult found in the house completed the questionnaire on behalf of the household.

Table 1: Selected communities and number of households sampled in each community

Community	Population	Number of Households	Average Household Size	Sample size
Navrongo	17870	3356	4	70
Paga	8725	1334	6	32
Wuru	1658	243	5	10
Kandiga	6754	1284	6	29
Sirigu	5066	601	8	13
Naaga	1789	252	9	10
Biu	3202	501	6	11
Total number of respondents (Household heads)				175

Source: Ghana Statistical service, 2000

**Population figures were projected based on the growth rate of 2.9%, using 2000 Population and Housing Census figures.*

In addition to the questionnaire survey, in-depth interviews were conducted with 11 of the survey participants and 16 key informants. These 11 participants were interviewed to clarify some responses given during the questionnaire survey. The key informants included nurses in charge of the various Community Health Improvement Planning and Services (CHIPS) compounds; resident community representatives of the Navrongo Health Research Centre; and

an epidemiologist. These interviewees provided useful information on disease prevalence and control strategies in the area.

Additionally, one focus group discussion was held in each of the seven communities. The participants for the focus group discussion were pregnant women and mothers of under-five children. These groups were targeted because of their perceived high vulnerability to the disease. The focus group discussions were conducted to acquire in-depth knowledge regarding coping strategies and household conditions that could impact on the incidence of the disease.

Secondary data on reported cases of malaria in each of the communities were collected from health facilities that were located in the study communities. While the Statistical Package for Social Sciences (SPSS) was used to analyse the quantifiable data from questionnaire, content analysis was performed on the qualitative data.

Results and Discussion

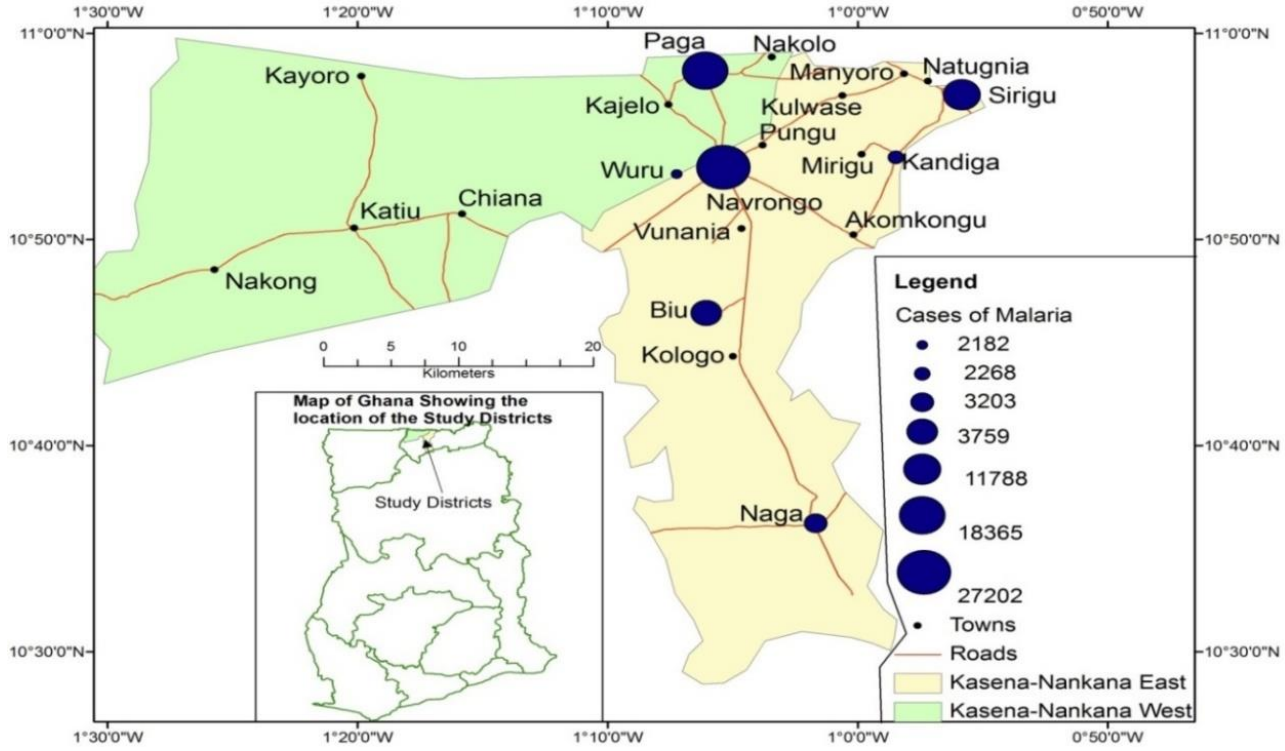
Prevalence of malaria in selected communities

Although this paper primarily focuses on malaria control strategies, this section briefly discusses the prevalence of the disease in the study area. This section is intended to provide a context for understanding the strategies adopted by households to manage the disease. An analysis of data obtained from health facilities indicated that a total of 46,064 malaria cases were recorded in the health facilities within the seven study communities in the year 2010 alone. Given that many malaria cases in Ghana and elsewhere in the developing world are not reported at the hospitals (Mwenesi *et al.*, 1995; Binka *et al*., 1998; Tarimo *et al.*, 2000), it is clear that prevalence of the disease is still high in the study area. The high incidence of clinical malaria cases means that malaria control strategies are not achieving very good results.

As shown in Figure 2 and Table 2, there were spatial variations in the prevalence of malaria within the study districts. In absolute terms, Navrongo which is the largest town in the area, recorded the highest number of cases (27202), while Wuru (an irrigation community) has the lowest number of reported malaria cases (2182) in 2010. The actual prevalence of malaria for each locality was obtained by expressing clinical malaria cases in that locality as a percentage of its population (see Table 2). These figures show that the prevalence of malaria was highest at Sirigu, which had a population of 5066but recorded 11788 malaria cases, resulting in an average episode rate of about 2.3 cases per person in the year 2010.Kandiga, with a population of 6754, had the lowest malaria prevalence of 0.3 cases per person. While mean temperature and vegetation cover have long been identified as accounting for spatial variations in the incidence of malaria in the tropics (Malakooti*etal.*, 1998), the fact that all the communities lie within the same agro-climatic zone is an indication that socio-economic factors that operate at smaller spatial scales (see Brooker *et al*., 2004; Cohen *et al*., 2008) are more critical in explaining spatial variations in the prevalence of malaria in the study area. Although the discussion of these factors was not the main focus of this paper, some key informants revealed that malaria prevalence has always been slightly lower in communities where households tend to use malaria control strategies, especially the use of ITNs.

Attempts by the research team to establish the relationship between presence of potential mosquito breeding grounds and clinical malaria cases did not produce any clear patterns. Prevalence of malaria in Wuru (an irrigation community) and two rural communities (i.e. Biu and Naaga) with many potential mosquito breeding sites did not appear to be significantly higher than the prevalence of the disease in other communities. Thus, clinical malaria cases did not provide any evidence to support the claim that irrigation schemes *per se* increase the prevalence of malaria (Carter*et al*., 2000). The focus group discussions and key informant interviews revealed that personal habits and adoption of malaria control strategies among people living in malaria risk communities may explain why prevalence of the disease is not significantly higher than prevalence in other communities. Again, as argued elsewhere, adults in endemic areas may sometimes develop immunity to the disease over time. Consequently, they may not develop severe episodes as compared to people in marginal malaria areas (Brooker *et al.,* 2004). During the focus group discussions and interviews, it came out clearly that adults in some of the 'high risk' communities successfully treat their malaria attacks at home. In such cases, hospital records may only represent cases reported by children and pregnant women who are said to have lower immunities. This is consistent with the assertion of Teyssou *et al*. (2007) that in endemic areas, malaria may be seen as a common disease to which no special attention is paid.

Figure 2: A map illustrating the spatial pattern of malaria cases reported in health facilities in study area in 2010



Source: Health facilities in respective communities

Table 2: Malaria cases in selected communities, 2010

Community	Population	Malaria cases	Malaria cases as a percentage of population of community
Navrongo	17870	27202	152.2
Paga	8725	18365	210.5
Sirigu	5066	11788	232.6
Kandiga	6754	2268	33.5
Biu	3202	3759	117.4
Naaga	1789	3203	179.0
Wuru	1658	2182	131.6

Source: Based on records from health facilities in selected communities.

'Orthodox' malaria control strategies

Majority of respondents were aware of orthodox methods for preventing malaria infection. The results indicate that of 174 survey respondents, 123 (70.7%) were aware of at least one orthodox malaria prevention strategy. As shown in Table 3, the strategies mentioned include the use of insecticide treated nets (ITNs); environmental sanitation/clearing of bushes; anti-malarial drugs; mosquito coils and sprays (indoor residual spraying). The use of ITNs is the most common malaria strategy available in the study area. It was mentioned by 62%of the respondents. The popularity of ITNs may be explained by the fact that it is a major component of national malaria control strategy. Insecticide treated nets are sometimes freely given to pregnant women who go to health facilities in the study area. While some respondents mentioned environmental sanitation as a strategy for controlling malaria, observations showed that there were still many potential mosquito breeding grounds (e.g. stagnant water, bushes etc.) in most of the communities. Some key informants noted that it is the duty of municipal assemblies to ensure that surroundings are neat, but laws on environmental cleanliness are not strictly enforced. The housing environment and living arrangements in the area may also contribute to the high incidence of malaria. Only a few households (27%) have nets on their doors and windows to prevent mosquitoes from entering the rooms. About 81% of households have deep cracks on the walls which are usually made of mud. These housing conditions ease house-entry by mosquitoes and aggravate the risk of malaria infection. Again, about 77% of households have open water storage containers, while stagnant pools were seen around the houses of 47% of households. The data also showed that the use of mosquito coils and sprays was the least known strategy in the area. During in-depth interviews, it came out that mosquito sprays are only popular in urban areas where they are produced.

It is generally acknowledged that the use of insecticide treated nets (ITNs) is one of the most effective strategies for preventing malaria. Indeed, ITNs (bed nets) have been shown not only to reduce malaria transmission by as much as 90%, but also to reduce the indoor vector population (Binka *et al*., 1998). The current national malaria control strategy targets 100% of household ITN ownership by 2015. In the study area, the Navrongo Health Research Centre is

responsible for the distribution of ITNs to households. In view of current emphasis on the use of ITNs and the fact that majority of the people reported knowing about this strategy, we examined the use of ITNS by households. The data showed that despite the fact that about 62% of household heads had adequate knowledge of ITNs, nearly half of the respondents (47%) indicated that no member of their households sleeps under ITNs. About 24% of the respondents stated that *all* their household members were sleeping under ITNs, while 29% had *some* of their household members using ITNs. In some households, only pregnant women as well as nursing mothers and their babies were using ITNs. This is because these vulnerable groups are sometimes given ITNs by NGOs, the Navrongo Health Research Centre and the government. The low usage of ITNs supports argument that mere knowledge of malaria control measures does not always translate into utilization (Deresa *et al.*, 2003). Indeed, utilisation of strategies is shaped by several socio-political factors including income levels and cultural beliefs.

Table 3: Knowledge of 'orthodox' malaria control strategies (Multiple responses, n=174)

Malaria Control Strategy	Frequency	Percentage
Use of ITNs	108	62.1
Mosquito nets on doors and windows	47	27.0
Use of anti-malarial drugs	24	13.8
Environmental sanitation/clearing of bushes	82	47.1
Mosquito coils and sprays	14	8.0

Source: Field Survey, 2011

Usage and effectiveness of insecticide treated nets

Respondents who reported that they were aware of ITNs but were not using the strategy were asked to give reasons for non-use of the strategy. In response, some respondents explained that they prefer to rely on traditional herbs which are free of charge. Consistent with findings elsewhere (see Adongo *et al*., 2005), a few respondents also explained that they were not comfortable sleeping under ITNs because the nets generate extra heat. Some respondents also reported that they were not using ITNs because the strategy is ineffective for controlling malaria. Unexpectedly, nearly 34% of even respondents who were using ITNs had reservations about the efficacy of this strategy. Those who claimed that the strategy was not effective cited several factors to support their assertions. It was argued, for instance, that the use of ITNs does not preclude mosquito bites. The argument here is that mosquitoes are everywhere (e.g. in kitchens, bed rooms, bath houses etc.) and so whether one sleeps in the bed nets or not, there is no guarantee that he/she will not be bitten by the mosquitoes. Some respondents gave evidence that household members who slept under ITNs still got infected with the malaria. In

view of this situation, some respondents do not bother so much about using bed nets to prevent mosquito bites. A male respondent at Wuru, an irrigation community, expressed this frustration when he stated:

"People who use bed nets still get malaria because they cannot use it [the nets] on the farms or when sitting in their houses. Mosquitoes bite us everywhere we go in this community so malaria is normal with us. It only kills those it is meant to kill and nothing can be done about that"

A female respondent echoed the same sentiments when she stated:

"Most of us here [in this community] know about these nets, but we are not using them because we live with the mosquitoes and I don't think there is any single effective measure as of now that can prevent them from biting us".

Again, these statements support the argument that the endemicity of malaria and the mosquito vector makes it a normal disease to which no special attention is paid (Teyssou *et al*, 2007).Non-utilisation of bed nets could also be explained by the perception that malaria is not only caused by mosquitoes, but also through eating habits, spiritual factors and some social activities (Asenso-Okyere, 1994; Toe *et al.,* 2009).Indeed, some respondents believe that people who are destined to have malaria cannot prevent it by using ITNs. The health workers who were interviewed as key informants and a few respondents, however, believed that the ineffectiveness of ITNs to help reduce malaria infections is related to the fact that the strategy is not appropriately used by many people. Some ITNs users, for instance, do not regularly treat their bed nets. Only 28% of respondents who were using ITNs reported that they treated their bed nets once or twice since acquiring them some years ago.

Another reason why ITNs were ineffective is the fact that even people who own them cannot use them always due to changes in the weather conditions and sleeping arrangements. Some household members sleep outside their rooms during hot days and often do not use their bed nets. Indeed, our results show that the availability of sleeping space and the number of persons living together determine the effectiveness of ITNs. In large households, many people sharing a common bed room sleep under the same bed net. This makes it difficult for the net to effectively provide the needed protection against mosquito bites. The size of the ITNs was also cited as a challenge to their use. During a focus group discussion in Biu, it was revealed that the bed nets were too small to accommodate all members sharing a room (e.g. a couple and their younger children). Consistent with findings in the Solomon Islands (see Atkinson *et al.*, 2009), the ITNs could not fit the size of the traditional mats/beds. Again, similar to findings reported elsewhere in Africa (see Okra *et al*, 2002), the study revealed that low income levels makes it difficult for users of ITNs to replace torn nets or even buy enough of bed nets for all members of their households. These findings show that several socio-economic factors affect the use of ITNs in the study area.

Traditional strategies for controlling malaria

The study found that in addition to the orthodox strategies discussed above, some traditional strategies were also adopted by households and individuals to control malaria. In the absence of best practices, even what otherwise is a mistake could become the most feasible option. People in the study area, out of desperation, have had to face the challenges of maintaining their health in their own way in the face of the high incidence of malaria. This is captured in the statement by a 54 year old male respondent: "*we have had to battle malaria our own way, because malaria has become our neighbour and we have had to deal with it any way that is convenient*".

Table 4: Traditional strategies for controlling malaria (multiple responses, n=174)

COPING STRATEGY	**Number**	**Percentage**
Wearing of long cloths/booths	77	44.3
Avoiding standing in the sun for long hours	72	41.4
Avoiding sweets (food; drinks and fruits)	90	51.7
Drinking of herbal preparations	53	30.5
Sacrifices to the gods (ancestors) for protection	55	31.6
Use of fans to drive mosquitoes away	21	12.1
Burning of weeds as traditional repellent	58	33.3

Source: Fieldwork, 2011

As shown in Table 4, the majority of respondents (51.7%) indicated that some members of their households try to prevent malaria by avoiding sweet drinks and foods that contain a lot of sugar. They explained that sweets can reduce the body's ability to fight malaria. This belief is based on the fact that rising malaria cases which incidentally coincide with the ripening of the Shea butter fruits and mangoes in the early part of the rainy season, is wrongly attributed to the eating of these fruits. This situation is consistent with the assertion that people still attribute malaria to the wrong causes (Asenso-Okyere et al, 1994). In this case, people in the study area failed to link the coming of the rains, moist or wet environmental conditions in and around their homes to the prolific breeding of mosquitoes, increased vector density, and consequently rising incidence of the disease. Conversely, some respondents thought that drinking bitter alcoholic drinks can help prevent malaria. For instance, a household head from Sirugu, responding to a question that sought to find out about the age and gender groups that usually suffer malaria, started by saying: "*who else, my son, it is the women and their children, for we the alcoholics, our blood is bitter and can kill the malaria without drugs".*

A significant number of respondents also explained that members of their households relied on mechanical measures, such as putting on extra-long cloth or wearing long booths to protect themselves from being bitten by the mosquitoes. A 42 year old mother captured this very clearly in the statement below:

"In the night I put my own cloths on my children so that their whole bodies are covered and by that the mosquitoes cannot bite them while they are sleeping. Sometimes I wear long dresses myself and this helps me to stay for some months without getting malaria".

About 41.4% of respondents stated that they and their household members also prevent malaria by avoiding standing in the sun for long hours. The use of herbs is another common strategy for controlling malaria. About 33% of households reported that they burn weeds in their rooms and this serves as traditional repellent to drive away mosquitoes. For the people of Naaga and Biu, for instance, a particular weed locally called *kwalata* was commonly burnt as a traditional repellent against the mosquitoes. Similarly, about 31% of respondents reported that members of their households drank herbal preparations to prevent and cure malaria. There was a high rate of self medication among adults because they have more confidence in the traditional herbs than medicines from modern health facilities. During the focus group discussion in one of the communities, for instance, a participant stated:

"For me, I know when I have malaria and I can treat it better on my own at home than going for hospital medication. The malaria drugs from the hospitals do not help much like the herbs that I use".

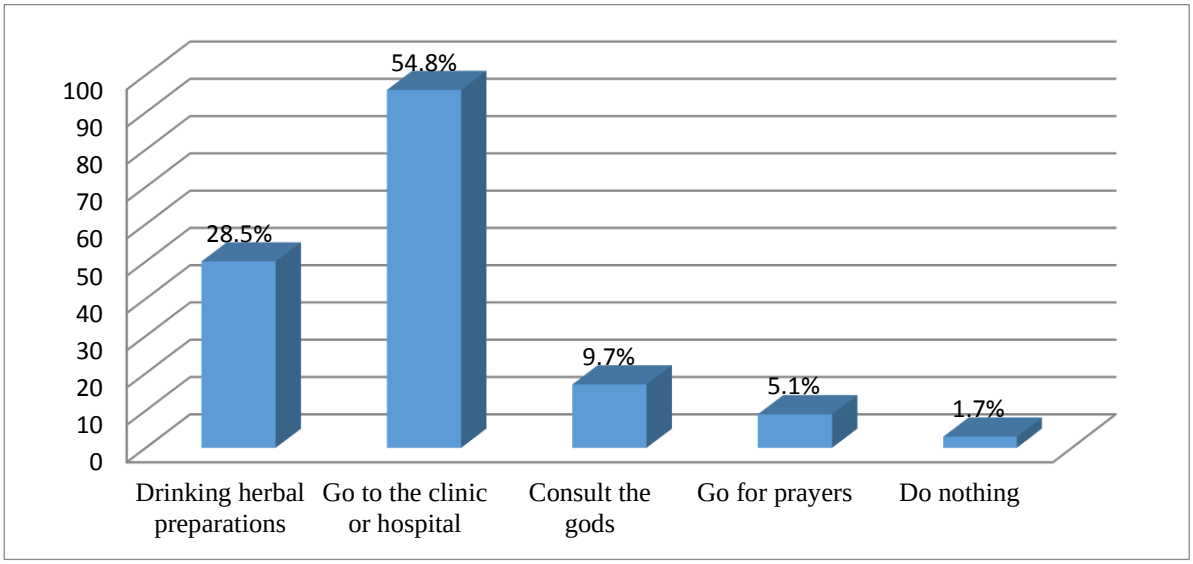
Health officials in the study area confirmed the high level of self-medication and the usage of herbs. An official of the Navrongo Health Research Centre revealed that although the herbs used by the local people may be effective in treating their malaria fever, these herbs may result into other health repercussions. He commented: *"If the neem tree [a particular herb) is powerful enough to be used as insecticide on farms, no one should underrate the harm it can cause to the human system especially when taken for a long time"*. He also explained further that although not scientifically proven yet, the high level of usage of herbs may be contributing to the increasing incidence of liver-related ailments in the area. About 32% of respondents also reportedly control malaria by offering sacrifices to the gods and ancestors for protection, and this is another indication that people still have misconceptions about the causes of malaria.

The study revealed that one factor that influences the choice of strategy for controlling malaria is place of residence. Urban settlers tend to use more orthodox measures, especially indoor insecticide sprays and ITNs. On the other hand, rural dwellers tend to depend more on traditional strategies. This does not suggest that urban dwellers do not use traditional strategies at all. The difference is that whereas some rural people may depend solely on the traditional strategies without using any orthodox method, urban dwellers tend to use the traditional strategies to compliment the orthodox strategies. For instance, participants of a focus group discussion explained that even though they use ITNS and malarial drugs, they still drink herbal preparations to help clean their systems of the malaria parasites.

Health seeking behaviour upon suspecting malaria attack

In many societies, malaria is diagnosed by health professionals based on laboratory results and symptoms (Adongo *et al*, 2005). However, in the study area, malaria is diagnosed in and out of the health centres by both professionals and people without any medical training. At home, malaria is detected by the observation of certain stereotyped symptoms, notably yellowing of urine and the eye; headaches; high body temperature; bitterness in the mouth; loss of appetite; convulsion in infants and children; and skin disorders. The association of malaria with some of these symptoms has been reported in other researches in Ghana, Nigeria and Thailand (Erhun *et al*, 2005; Adongo *et al*, 2005; van Benthem *et al*, 2006). Unlike the findings of some earlier studies that suggested that local people could not recognise the association between malaria and convulsion (Mwenesi *et al*, 1995; Winch *et al*, 1996), many of our respondents spontaneously mentioned convulsion as a symptom of malaria in children. This may be attributed to increased health education.

Figure 3: Health seeking behaviour upon suspecting malaria attack



Source: Fieldwork, 2011

In response to a question on the first action they normally take upon suspecting malaria, majority of the respondents reported that they tend to seek treatment at a hospital or community health centre (54.8%). Another 28.5% of respondents reported that they usually drink herbal preparations to treat suspected malaria attack. This again suggests that a significant proportion of the people have more confidence in herbal preparations than modern medicine. Other strategies for curing malaria include consultation made to the ancestors or gods for help (9.7%) and prayers (5.1%). Further discussions during the focus group discussions and interviews revealed that most people combine both orthodox and traditional remedies for their suspected malaria bouts. Some of the respondents who seek help from the health facilities also use traditional herbal preparations. According to respondents, malaria cases involving convulsion are usually treated by local herbalists This scenario of relying on different strategies to cure

malaria resonates with the concept of "multiple health seeking behaviour "observed in other African countries (see don de Savigny *et al*, 2004; Burton *et al*, 2011).

Conclusion

The findings show that although a number of malaria control programmes have been implemented in Ghana since the 1950s, the incidence of malaria in the Kassena-Nankana East and West Districts is still very high. It is therefore concluded that that malaria control programmes are still not achieving desirable results. The poor outcomes of malaria control interventions in the study communities can be attributed to the failure of the programmes to address all the factors that account for the high prevalence of the disease. While the World Health Organisation's Integrated Malaria Management strategy emphasises the simultaneous application of measures to enhance environmental quality, and control the malaria vector and parasites (Utzinger *et al.*, 2002; WHO, 2002), most of the strategies adopted to control malaria have been focusing on the control of malaria vector and parasite. There is very limited emphasis on enhancing environmental quality. There were several potential mosquito breeding grounds in and around many houses.

Although the malaria control programmes emphasise the use of orthodox strategies, such as ITNs, anti-malarial drugs and indoor residual sprays, to reduce contact between people and the malaria vector, only few households are able to use these strategies. While the current national malaria control strategy targets 100% of household ITN ownership by 2015 (Ghana Statistical Service, 2012), only 24% of respondents stated that all members of their households sleep under ITNs. Nearly half of the respondents indicated that no member of their households sleep under ITNs. Contrary to findings elsewhere in Africa that suggest that the low usage of ITNs is a result of lack of knowledge about the strategy (see Minja *et al*., 2001; Oguonua *et al*., 2005), many of our respondents were aware of the benefits of ITNs. However, non-use of ITNs is attributed to several factors, including poverty, high room occupancy; excessive heat; and the belief that ITNs cannot offer full protection against malaria. Consequently, many people also use traditional strategies, such as the drinking of herbal concoctions, wearing of long cloths, and consulting ancestors to control malaria. Hence, most people combine both orthodox and traditional remedies for their suspected malaria attacks. This scenario of 'multiple-health seeking behaviour' can be related to their perception of the causes of the disease. As some researchers have noted, people who believe that diseases have supernatural causes are more likely to seek spiritual intervention. On the other hand, people who believe that diseases are caused by organisms are likely to seek treatment to eliminate such agents (Asenso-Okyere, 2004; Adongo *et al*., 2005; Toe *et al*., 2009). Most of our respondents believe that malaria is caused by both supernatural forces and organisms, and this explains why they depend on multiple strategies to deal with the disease.

In view of these findings, it is recommended that malaria control programmes must emphasise strategies to enhance environmental quality, as well as control the malaria vector and parasite. District assemblies and communities can be tasked to ensure that potential mosquito breeding grounds are cleared. Additionally, the cost and treatment of insecticide treated nets must be

added to the National Health Insurance premium to make them more accessible to vulnerable groups such the poor, pregnant women and their children. It is also important to identify and develop local resources as alternative strategies for achieving a significant reduction in malaria incidence. Studies must be conducted to identify useful plant materials and best practices that could ensure their proper integration and utilisation alongside the orthodox strategies. This will certainly help reduce the cost of malaria control, especially in rural areas.

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