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2 **Malaria in the Akwapim North Municipality, Ghana: A population–baseline Survey, 2012**

3

4 **Abstract**

5 **Background:** Malaria is an important cause of morbidity and mortality especially among
 6 children less than five years in the Akwapim North Municipality of the Eastern Region of Ghana.
 7 Knowledge of community members in malaria is a major factor that can influence malaria
 8 prevention and control. In 2012, the municipality was enrolled onto the home-based management
 9 of malaria programme in the region using the community based health volunteers. We Assessed
 10 the knowledge and level of understanding of the people about the disease prior to the
 11 introduction. This is to enhance the control of malaria in the district.

12 **Methods:** A cross sectional study involving 616 adults who were selected from households
 13 using a simple random selection method. Information on age, marital status, levels of education,
 14 occupation, awareness, knowledge and perceptions on malaria were obtained using
 15 questionnaire. Univariate analyses were expressed as frequencies, percentages and means.
 16 Bivariate analysis ascertained the relationship between gender, age, educational level and
 17 prevention of malaria ($p = .05$).

18 **Results:** Among the 616 respondents, 58.6 % were females. The median age was 33.0 years old
 19 (range 14-81). Respondents awareness of malaria was 96.7% but rather a poor knowledge of
 20 malaria etiology (1.6%). 64.2% of the respondents knew that mosquitoes transmit malaria.
 21 Knowledge on the classical symptoms of uncomplicated malaria was moderate (7.6 – 48.7%).
 22 The respondent’s knowledge of danger signs in severe malaria low (5.6-16.2%). Myths regarding

causes of malaria such as filth, flies were mentioned by 20.9% and 4.2% of the respondents. 81% perceived malaria is preventable and the use of an insecticide treated bed net among respondents was 39.0%. Females were more likely (p-value 0.003) to have more knowledge on prevention of malaria.

Conclusion: Although awareness of malaria in the Akwapim North Municipality is high, there is a serious knowledge gap in identifying the dangers signs associated with the disease. Many community members do agree that malaria is preventable but still harbour myths regarding its etiology. Health education should therefore be reviewed and intensified in the communities.

Key words: Malaria, knowledge, awareness, Akwapim North Municipality

1. Introduction

Malaria is caused by a parasite called Plasmodium, which is transmitted via the bites of infected mosquitoes. In the human body, the parasites multiply in the liver, and then infect red blood cells. Symptoms of malaria include fever, headache, and vomiting, and usually appear between 10 to 15 days after the mosquito bite. If not treated, malaria can quickly become life-threatening by disrupting the blood supply to vital organs. In many parts of the world, the parasites have developed resistance to a number of malaria medicines. Key interventions to control malaria include: prompt and effective treatment with artemisinin-based combination therapies; use of insecticidal nets by people at risk; and indoor residual spraying with insecticides to control the vector mosquitoes.

Malaria is still a major public health issue in sub-Saharan Africa and other parts of the developing world [1, 2, 3]. With an estimated yearly death toll of a million people principally

46 among pregnant women and children; the disease arguably still occupies the number one position
47 among disease of global public health importance [4, 5, 6]. The present burden of malaria in
48 Africa is traceable as far back as 1995 in Mexico where the WHO presented her first global
49 malaria eradication plan covering Europe, North Africa, Middle East, some Asian countries and
50 Latin America but excluding sub-Saharan Africa, [7, 8, 9]. The probable lack of adequate
51 understanding about the disease hitherto among Africans occasioned by weak or poor
52 institutionalized control and preventive methods observed in Tanzania, Sierra Leone, Ghana and
53 Nigeria are believed to have significantly contributed to monumental losses in human, material
54 and economic resources on the continent from the disease over the past six decades [10, 11, 12]

55 In Ghana, malaria has been a major cause of poverty and low productivity accounting for about
56 32.5 percent of all OPD attendances and 48.8 percent of all under five-year admissions in the
57 country [13]. The attempt to control malaria in Ghana began in the 1950s. It was aimed at
58 reducing the malaria disease burden till it's no longer of public health significance. It was also
59 recognized that malaria cannot be controlled by the health sector alone therefore multiple
60 strategies were pursued with other health related sectors. In view of this, interventions were put
61 in place to help in the control of the deadly disease. Some of the interventions applied at the time
62 included residual insecticide application against adult mosquitoes, mass chemoprophylaxis with
63 Pyrimethamine medicated salt and improvement of drainage system. But malaria continued to be
64 the leading cause of morbidity (illness) in the country.

65 Ghana then committed itself to the Roll Back Malaria (RBM) initiative in 1999 and developed a
66 strategic framework to guide its implementation. Overall, the Ghana RBM emphasizes the
67 strengthening of health services through multi and inter-sectoral partnerships and making

68 treatment and prevention strategies more widely available. The goal was to reduce malaria
69 specific morbidity and mortality by 50% by the year 2010.

70 On the 24 May 2002, an electronic media campaign on Home Based Care for Malaria was
71 launched in Accra, Ghana. The national campaign dubbed "He-Ha-Ho" which stands for Healthy
72 Happier Homes was aimed at equipping mothers and care givers with basic skills and knowledge
73 to correctly and promptly manage children less than five years of age with malaria at home.
74 Additionally, the campaign aims at ensuring that chemists provide accurate information and
75 dosage to their clients. In addition to the electronic version, the campaign also uses flip cards,
76 leaflets and posters to inform, educate the public while entertaining them to especially recognize
77 the signs and symptoms and take appropriate action in managing malaria and other childhood
78 fevers [14]

79 Perceptions about malaria illness, particularly households' perceived susceptibility and beliefs
80 about the seriousness of the disease are important preceding factors for decision making
81 concerning preventive and curative actions [15]. The understanding of the possible causes,
82 modes of transmission, and individuals' preference and decision about adoption of preventive
83 and control measures vary from community to community and among individual households [
84 16,17,18].

85 A recent dimension to the control of malaria is the use of community based health volunteers in
86 scaling-up community based treatment of malaria in all districts through the Home- Base-Care
87 programme targeting children under five years living in rural areas and areas with limited
88 access.

89 After more than 10years of probable sustained domestication of the Roll Back Malaria initiative
90 in the Akwapim North Municipality of the Eastern Region of Ghana, assessing the knowledge

and level of understanding of the people about the disease becomes imperative. The findings from the present study would help assess the local success and challenges of a key component of the RBM initiative which is health education and public enlightenment.

2. Methods

Study Area

Akwapim North Municipality (AKM) is located in the south-eastern part of the Eastern Region and is about 58 km from Accra. It has an estimated population of 122,068 with 450 km² land area and a percentage urban: rural population of about 60:40. It has a population growth rate of 1.4% and a sex ratio of 96.8 males to 100 females. It consists of 8 sub-districts and is served by 2 hospitals and 29 smaller health facilities. Malaria continues to be among the common (40%) causes of out-patient attendance. For the past 5years, there has not been any maternal death due to malaria and child mortality due to malaria has been reduced to 4/100,000 live births [19]. Interventions on malaria have been centered on case management and diverse health promotional activities.

Study Design

The study was a cross-sectional community-based design, using quantitative methods among caregivers living in the Akwapim North Municipality.

Sample size

The minimum sample size for the study was estimated to be 383. This estimation was obtained by calculation using the formula: $N = Z^2 pq / d^2$ on assumption that 50% of the respondents have knowledge about the etiology and transmission of malaria ($p = 0.5$) at 95% confidence interval (z

112 = 1.96) and 5% error of selection ($d = 0.05$). With a response rate of 80%, the estimated sample
113 size (479) was rounded-up to 616.

114 **Sampling Procedures**

115 Based on the minimum sample size of 383, we recruited 616 adult caregivers in a multi-stage
116 sampling of standard census-zones in the district over a one-month period. For each standard
117 census-zone the theoretical sample size was distributed to the thirty zones in the municipality in
118 proportionate to their population size. Within a household, one caregiver was selected by simple
119 random sampling method to participate in the survey.

120 **Data Collection Technique, Tools and Procedures**

121 Interviews were used as data collection technique, using structured questionnaire containing both
122 closed and open-ended questions. Information such as age, educational level, occupation,
123 methods of transmission and prevention of malaria, ownership/use of treated bed nets, drugs for
124 treatment of malaria, source of information and help seeking behaviour on malaria were obtained

125 **Data processing and analysis**

126 Raw data was coded using an already developed coding scheme; then edited and double entered
127 into a PC before analysis. Data was analyzed using the Epi info programme and the results
128 presented using appropriate charts and tables. The analysis included determination of basic
129 descriptive statistics. Chi-squared tests of association were conducted between age, gender
130 (male/female), level of education and prevention of malaria ($p = .05$).

131

132 **3. Results**

Among the 616 respondents, 58.6 % were females (Table: 1). The median age was 33.0 years old (range 14-81years old). Results summarized in Table 2 indicates that the respondents were aware that malaria is a disease (96.7%) but had a poor knowledge of malaria etiology (1.6%).None of the respondents could mention the four types of plasmodium species. About 64.2% of the respondents knew that mosquitoes transmit malaria. Knowledge on the classical symptoms of uncomplicated malaria such as fever, malaise, headache and loss of appetite (6.3 – 48.7%) was moderate. However, the respondent's knowledge of danger signs seen in severe malaria such as convulsion, coma, jaundice and respiratory distress (5.6-16.2%) was significantly low. Myths regarding causes of malaria such as filth, flies were mentioned by 20.9% and 4.2% of the respondents respectively (fig 1). Listening to the radio and health workers were mentioned as the major sources of information by the respondents (24.3% and 16.2%).

Although, 93% of the respondents were of the view that malaria is a fatal disease and 81% also thought it is preventable only 39.0% could identify insecticide treated bed nets as one of the preventable methods. Whenever any of the respondents were sick, majority (73.2%) would go to the nearest health facility, 20.7% to the chemical seller or pharmacy and 1.4% had no idea as to where to seek help (Fig. 2). An association was sought between age, gender (male/female), level of education and prevention of malaria. Females were more likely (p-value 0.003) to have more knowledge on prevention of malaria.

Table 1: Demographic and Socio-economic characteristics of the respondents, AKNM-2012 (N = 616)

Characteristics		N (%)
Sex	Male	255 (41.4)
	Female	361 (58.6)
Age, years (mean +SD)		

Male	37.5 ±14.1
Female	34.9±13.0
Total	36.0±13.6
Formal Education	
JSS	237 (38.5)
No education	119 (19.3)
others	17 (2.8)
primary	99 (16.1)
SHS	75 (12.2)
tertiary school	38 (6.2)
Vocational/technical	31 (5.0)
Occupation	
Artisan	94 (15.3)
Civil/Public Servant	43 (7.0)
Farm Worker	159 (25.8)
House Wife	22 (3.6)
N/A	13 (2.1)
Servant	1 (0.2)
Student	29 (4.7)
Trader	166 (26.9)

153

154 Table 2: Evaluation of Knowledge and Perception of Malaria among the Respondents, AKNM-
155 2012

(i) Awareness of malaria and symptoms pronounced by the respondents (N = 616)	N (%)
Awareness of malaria	588 (96.7)
Uncomplicated malaria	
Loss of Appetite	47 (7.6)
Headache	180 (29.2)
fever	300 (48.7)
Nausea	50 (8.1)
Vomiting	39 (6.3)
Complicated malaria	
Severe Anaemia	100 (16.2)
Coma	35 (5.6)
Convulsion	50(8.1)
Jaundice	50(8.1)

(ii) Perception on malaria			
Whether malaria infection can cause death			
(a) Yes		572 (93.0)	
(b) No		8 (1.2)	
(c) Don't know		36 (5.4)	
Whether malaria can be prevented			
(a) Yes		500 (81.0)	
(b) no		20 (3.2)	
(c) Don't know		96 (15.6)	
Prevention of malaria			
(a) Use of ITN		241(39.0)	
(b) Use Mosquito coil		90 (14.6)	
(c) Weeding and de-silting choked gutters		59 (9.6)	
(d) Use of mosquito spray		99 (16.1)	
(e) Use of anti-malaria drugs		50 (8.1)	
(f) Avoidance of oily foods		67 (10.1)	
(g) Don't know		10 (1.6)	
(iii)Test of association between selected variables and malaria prevention			
Age	n	%	p-value
10-29	239	38.8	
30-39	164	26.6	
≥40	213	34.6	.259
Gender			
Male	255	41.4	
Female	361	58.6	.003*
Education			
Formal Education	417	67.7	
No education	199	32.3	.445

*Significant association

Fig. 1

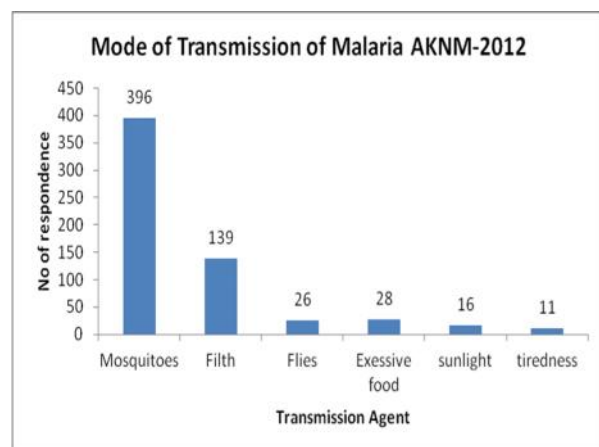
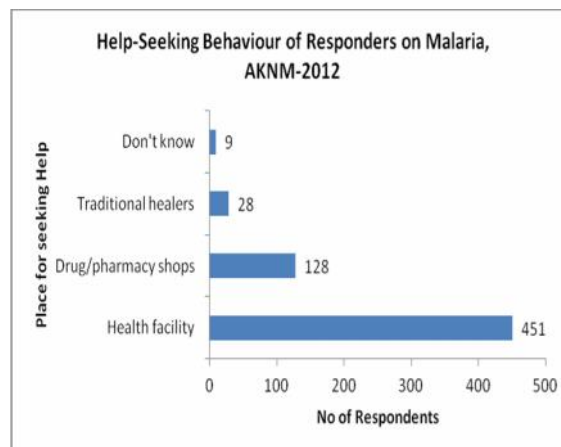


Fig. 2



4. Discussions

In this study, we assessed community awareness and knowledge about cause, mode of transmission, symptoms, treatment, and prevention of malaria as well as perception of malaria in the Akwapim North Municipality of Ghana.

Our study revealed that awareness of malaria among the respondents was very high. The awareness of the respondents that malaria is caused and transmitted by a bite of mosquito is usually a common knowledge in malaria endemic countries such as India, Turkey, Nepal, Haiti, Latin America, Sudan and Ghana [20,21,22,23,24]. However, only a tiny fraction of the respondents could accurately state the correct causative agent and the types. There was also a moderate knowledge level of the classical signs and symptoms of uncomplicated and complicated malaria. The serious gaps in knowledge are also revealed in the respondent's knowledge of danger signs seen in severe malaria such as convulsion, coma, jaundice and respiratory distress (5.6-16.2%). This obviously has a direct link with malaria mortality. Malaria threatens the lives of 3.2 billion people globally and leads to over one million deaths annually [25]. Malaria is hyper-endemic in Ghana, accounting for 44% of outpatient attendance, 13% of all hospital deaths, and 22% of mortality among children less than five years of age [25, 26]. Though malaria is responsible for 9% of overall mortality in Ghana, at least 40% of malaria deaths occur among infants and children under the age of five [27]. Health education interventions should be designed according to the existing knowledge and awareness level of vulnerable population as well as their current treatment-seeking practices, and should be implemented for a sufficient length of time to be effective [22].

The baseline study also revealed that myths regarding causes of malaria such as filth and flies were still held up in the minds of many of the respondents in our study area and are very similar to those reported about 20 years ago in southern Ghana with similar socio-cultural settings [28].

183 It is however encouraging to note that majority of the respondents currently associate malaria
184 transmission with mosquitoes. The massive educational campaigns about malaria and its control
185 measures adopted as part of the Roll Back Malaria strategies throughout Ghana including the
186 Akwapim North Municipality may have contributed to this as evident by a significant increase in
187 ITN use in recent years in the study area, from 10% to 39%, although it falls short of the 60%
188 utilization coverage target of the Roll Back Malaria initiative. Similarly in India, mosquito net
189 was found to be a preferred method to avoid mosquito bite [21]. Matta et al. reported 34%
190 respondents mentioned mosquito net as a prime preventive measure against mosquito bite [29].
191 Prevention of the disease through better knowledge and awareness is the appropriate way to keep
192 the disease away and remain healthy as illness, confusion and health-seeking behaviour may
193 enhance or interfere with the effectiveness of control measures [30].

194 Majority of the respondents were of the view that malaria is preventable. This corroborates a
195 study in Nepal [31] and in India [32] where 98.6% and 51% of the respondents shared a similar
196 view. However, again in Nepal Parajuli and Ghimire [33] demonstrated that 17.6% of the
197 respondents in their study did not know whether malaria can be prevented.

198
199 In terms of sex, it was found that more females than males knew malaria as preventable. It can
200 therefore be said that females have higher knowledge of malaria than males. Since females
201 normally take care of children in times of sickness, they might get into contact with information
202 on malaria more than males. Frequent visits to the clinic and drug stores can lead to knowledge
203 acquisition, thus females are more likely to have higher knowledge of malaria. There was
204 however no differences in terms of educational levels of respondents and the knowledge of
205 whether malaria is preventable. Both the less educated and highly educated had the knowledge
206 that malaria can be prevented. This might mean that knowledge of malaria is not only acquired

through formal education. Other sources such as non-formal education might contribute a larger percentage to one's knowledge of the disease. A similar observation was made by Isaac Appiah-Darkwah and Samuel Kofi Badu-Nyarko in a semi urban community in Accra, Ghana [34]. While designing interventions, pro-active measures should be undertaken by malarial prevention and control programmes to reduce this gender gap. This is all the more necessary because experiences show that even women-focused interventions may not increase access of quality health care for women, if the gender issues are not explicitly addressed by the programme [35].

5. Conclusion

The present study has demonstrated that although awareness of malaria in the Akwapim North Municipality is high, there is a serious knowledge gap in identifying the dangers signs associated with the disease. Many community members do agree that malaria is preventable but still harbour myths regarding its etiology. Health education should therefore be reviewed and intensified in the communities. Although knowledge is one aspect of a complex interplay of factors, it is an important prerequisite for instigating behavior change and could likely inform attitudes about malaria health-related behaviors. With the global efforts to achieve universal coverage by 2010 [36], programs should not only focus on delivery of goods, but packaging that with effective IEC/BCC messages.

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232 Competing interests

233 The authors declare that they have no competing interests.

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