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Housing Surroundings and Self-reported Cases of Malaria in two Communities in Central Region of Ghana

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ABSTRACT

Malaria remains a major health problem in Ghana. Mosquito breeding sites play significant role in malaria infection and transmission, but studies in this area are scanty in Ghana. This study assesses the association between housing surroundings with mosquito breeding sites and self-reported cases of malaria in two communities in Central Region of Ghana. In a cross-sectional study, 319 representatives of households in two communities in Central Region of Ghana provided information on self-reported malaria cases, use of ITN and some demographic characteristics. The surroundings of houses were also inspected for presence of mosquito breeding sites. Using chi square test, variables were compared between the two communities and with logistic regression analyses, the factors associated with self-reported malaria was assessed. Prevalence of self-reported malaria was 23.2%. More than half (58.6%) of the houses had surroundings that could serve a breeding sties for mosquitoes. Educational level and community were independently associated with self-reported cases of malaria. By multivariate analyses the community in the forest belt (OR=2.894; 95% CI: 1.672 – 5,010; P=0.000) remained significantly associated with self-reported malaria. Prevalence of self–reported malaria was high in the region, with the community in the forest belt having higher malaria prevalence than the community in the coastal belt. The proportion of housing surroundings with potential breeding sites for mosquito was high. The fight against malaria could intensify efforts that improve behaviors for avoiding of mosquito bites and keeping housing surroundings clean.

Keywords: Housing Surroundings, Central Region, Self-reported Malaria

1. INTRODUCTION

Malaria continues to be of great public health significance in Africa. Most African countries were included in the 91 countries and territories in the world considered as endemic for malaria in 2016[1]. Malaria is not only a public health problem in Africa, killing many people especially children under five years, but it also slows economic growth in Africa. Ghana has its share of malaria burden and negative effects. Suspected malaria cases reported at the Out Patient Departments (OPD) in Ghana in the year 2016 were 10.4 million, representing an increase of 2.5% over the suspected OPD malaria cases in the country in the year 2015. In the same year, there were 4.5 million confirmed malaria cases in health facilities in the country[2].

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Notwithstanding the current burden and negative impact of malaria, there has been a significant reduction in malaria mortality rates especially among children under 5 years globally and in Ghana[1,2]. This positive development could be attributed to the activities of stakeholders in the fight against malaria. The National Malaria Control Program in Ghana and its partner organizations undertake several key activities to help reduce malaria morbidity and mortality. These include but not limited to programs in Integrated Vector Control (including Insecticide Treated Mosquito Nets or ITN), Malaria Diagnostics, Malaria in Pregnancy (including intermittent preventive treatment in pregnancy), and Advocacy, Communication and Social Mobilization. These programs are helping people to practise the desired health behaviours in the fight against malaria[2].

Like all programs, there are challenges in the fight against malaria in Ghana and Africa. According to the WHO World malaria report 2016, forty-three percent of people in sub-Saharan Africa were not covered by insecticide-treated mosquito nets or indoor residual spraying in 2015. In the same year, 69% of pregnant women in the region did not receive the three doses of intermittent prevention treatment, the preventive therapy for malaria in pregnancy[1]. The challenge of increasing insecticide and drug resistance, as well as the lack of well-resourced health facilities in many parts of Ghana can also slow down the progress in the fight against malaria. These and other challenges call for a focus outside health facilities in the fight against malaria.

Plasmodium falciparum, is known to be the plasmodium species that causes almost all the cases of malaria in Ghana[3]. The incidence of Plasmodium falciparum seems to be linked to environmental factors[4]. Sites for mosquitoes (the vectors for malaria parasites) to breed include ditches, vegetation, and rainfall[5,6] which abounds in Ghana. According to Owusu Sekeyere, Attakora-Amaniampong and Aboagye (2016)[7] mosquitoes were found more frequently in areas where there were choked drains and where waste was rampantly damped. Their study also established a link between incidence of malaria and mosquito bites. Living close to mosquito breeding sites and having poor waste disposal methods around houses increases the chances of malaria parasite infection and prevalence of the disease[8]. These unclean housing surroundings could create the conditions needed for breeding of mosquitoes and the transmission of the plasmodium parasites leading cases of malaria. Research that asses the link between housing surroundings with mosquito breeding sites and malaria infection in Ghana are however scanty, despite their potential contribution in reduction of malaria incidence and transmission in the country. Much more information in the area of mosquito breeding sites around houses and how they impact on infection and transmission of malaria in Ghana could be helpful. This study assesses the association between housing surroundings with mosquito breeding sites and self-reported cases of malaria in two different climatic zones in Ghana. The Research Committee of the Department of Biomedical Sciences, University of Cape Coast gave approval for the study. Administrative clearance was obtained from the Environmental Health Directorate of the Metropolitan and Municipal Assemblies of Cape Coast and Assin Foso. All participants gave informed consent before recruitment after the purpose of the research was explained to them.

2. METHODS

The study was a cross-sectional survey which used questionnaires and inspection of housing surroundings to collect information on self-reported cases of malaria in two study communities in Central Region of Ghana between February and March 2016.

Study Communities

Cape Coast located in the coastal belt of Ghana and Assin Foso located in the forest belt were the communities where the study was conducted.

By the 2010 Population and Housing Census, Cape Coast Metropolis had a population of 190,180 which was made up of 93,619 females (51.26%) and 89,017 males (48.74%). The Metropolis is very humid with relative humidity figures between 85% and 99% and annual rainfall between 750 mm and 1000 mm. (9). Assin Fosu is the municipal capital of the Assin North Municipal. The 2010 Population and Housing Census put the population of Assin North Municipal at 161,341 with 49.7 % being males and 50.3 % being females. The Assin North Municipal is located within the moist tropical forest of Ghana and has relative humidity figures between 60 % to 70 % (10). Figure 1 shows the location of Assin Fosu and Cape Coast in Central region of Ghana.

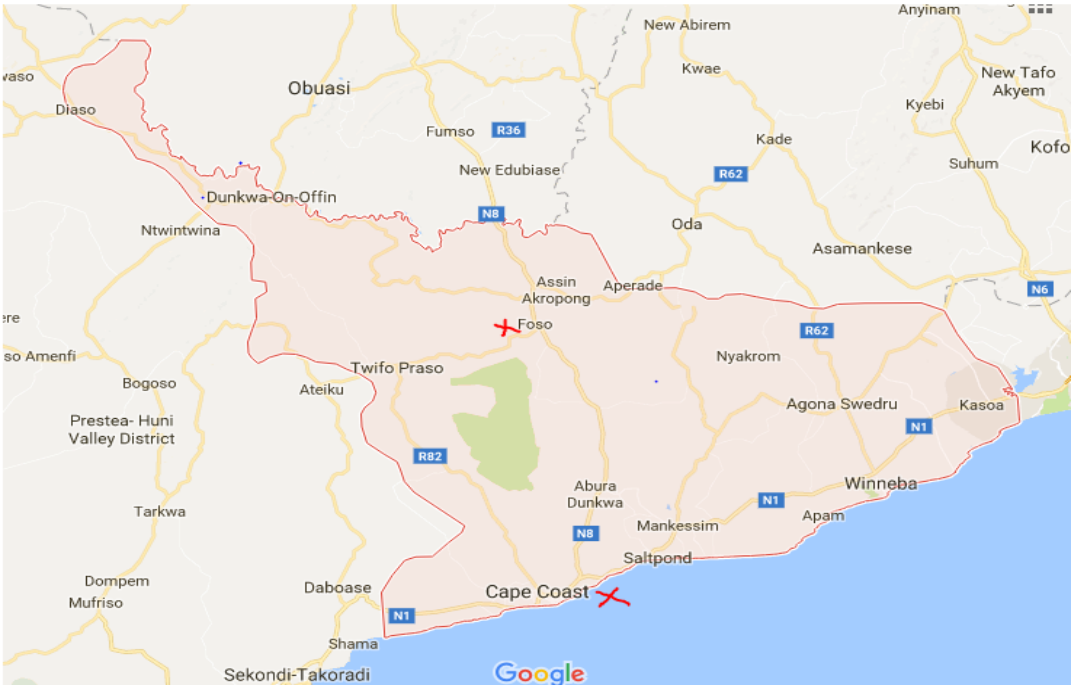

Figure 1: Map of Central Region. Source: Google Maps. (Marks inserted for easy identification of Assin Fosu and Cape Coast)

Data Collection

Using simple random sampling, a number of houses in Cape Coast and Assin Fosu were selected for the study. Two hundred household representatives in Cape Coast and 119 household representatives in Assin Foso accepted to participate in the study, giving a total of 319 household heads as participants.

The purpose and method of the study were explained to the participants after which they were assisted to answer the questions in the questionnaire. Questions included use of intermittent treated mosquito net (ITN) the night before the survey, educational level, age group, sex, and occupation. Respondents also self-reported of any malaria case based on the diagnosis received from a health facility visited in the past 6 months. After providing responses in the questionnaire, the housing surroundings were inspected for mosquito breeding sites. A house surrounding was considered to have a mosquito breeding site if it was situated close to choked gutters, stagnant water, marshy areas, bushes, or refuse dump site. A housing surroundings was classified as not having mosquito breeding sites if it had none of the features mentioned above.

Statistical Analyses

The data was analysed using SPSS, version 22. We performed descriptive statistics for frequencies and percentages of variables between the two communities using Chi squared analysis. Bivariate analyses were performed between self-reported cases of malaria and socio demographic characteristic (sex, age, education and occupation), use of ITN, and having mosquito breeding sites around housing surroundings. In the multivariate analyses, we assessed the adjusted relationship between variables and self-reported cases of malaria. In the multivariate analyses, we entered variables that showed significant association with self-reported malaria in the bivariate analyses(educational level and community) as well as age, use of ITN and housing surrounding (since literature suggest these factors could be associated with malaria infection). Odds ratios were generated. A p values < 0.05 at 95%CI was considered significant.

3. RESULTS

Majority of the respondents were females (70.2%) and had formal education below secondary level (69.0%). The personal characteristics of the participants (sex, age, education and occupation) and their housing surroundings did not differ significantly between the two different communities used for the study. The two communities did not also differ in the use of ITN. The detail characteristics of respondents are shown in Table 1.

Table 1: Characteristics of respondents by community

Characteristics	TOTAL		COMMUNITY				P value
			ASSIN FOSO		CAPE COAST		
	N	%	N	%	N	%	
Sex							
Female	224	70.2	84	70.6	140	70.8	0.912
Male	95	29.8	35	29.4	60	30.8	
Age (years)							
40 and below	176	55.2	74	62.2	102	51.0	0.052
Above 40	143	44.8	45	37.8	98	69.0	
Formal Education							
Below secondary	220	69.0	82	68.9	138	69.0	0.986
At least Secondary	99	31.0	37	31.1	62	31.0	
Occupation							
Farming	49	15.4	17	14.3	32	16.0	0.273
Petty Trading	106	33.2	34	28.6	72	36.0	
Others	169	51.4	68	57.1	96	48.0	
Housing Surroundings with mosquito breeding sites							
No	132	41.4	46	38.7	86	43.0	
Yes	187	58.6	73	61.3	114	57.0	0.446
Used ITN							
Yes	173	54.2	68	57.1	105	52.5	
No	146	45.8	51	42.9	95	47.5	0.421

Abbreviations: ITN, Insecticide Treated Mosquito Net

In all, 74 out of the 319 respondents self-reported of cases of malaria in the past 6 months based on the diagnosis they received from a health facility. This gives a prevalence of malaria of 23.2% (Table 2). The proportion of self-reported cases of malaria was greater for the community in the forest belt (Assin Foso) than the Coastal community (34.5% vs. 16.5%, p=0.000).

Table 2: Factors associated with self-reported malaria in bivariate analyses

Factors	N	Cases (high)	Prevalence	OR	95% C.I	P. value
Sex						
Female	224	55	24.6	0.765	0.427 – 1.383	0.378
Male	95	19	20.0			
Age (years)						
40 and below	176	35	19.9	0.662	0.393- 1.116	0.120
Above 40	143	39	27.3			
Formal Education						
Below secondary	220	59	26.8	2.052	1.098 – 3.834	0.022
At least Secondary	99	15	15.2			
Occupation						
Fishing	49	13	26.5			0.835
Petty Trading	106	24	22.6	-	-	
Other Occupations	166	37	22.6			
Housing surroundings with mosquito breeding Sites						
Yes	187	47	25.1	1.306	0.763 – 2.233	0.329
No	132	27	20.5			
Used ITN						
Yes	173	38	22.0		0.691 – 1.957	
No	146	36	24.7	1.163		0.570
Community						
Assin Foso (Forest)	119	41	34.5		1.564-	0.000
Cape Coast (Coastal)	200	33	16.5	2.660	4.525	

Abbreviations: ITN, Insecticide Treated Mosquito Net

With bivariate analysis, educational level and community showed significant association with self-reported cases of malaria (Table 2). Sex, age, use of ITN, and housing surrounding with mosquito breeding sites did not show significant association with cases of self-reported malaria.

By multivariate analysis, community in the forest belt (Assin Foso) (OR=2.894; 95% CI: 1.672 – 5,010; P=0.000) remained significantly associated with self-reported cases of malaria. Education level, did not show significant association under multivariate analysis (Table 3).

Table 3: Factors associated with Self-reported Malaria in Multivariate Analyses

Variables	OR	95% C.I	P. value
Housing Surrounding (With Mosquito Breeding Sites)	1.200	0.684 –2.105	0.524
Community (Forest)	2.894	1.672-5.010	0.000
Educational Level (Below secondary)	1.913	0.991– 3.694	0.053
Age (40 years and below)	0.656	0.375 – 1.148	0.140
Use of ITN	1.101	0.637- 1.904	0.730

Abbreviations: ITN, Insecticide Treated Mosquito Net

4. DISCUSSION

The 23.2% prevalence of self-reported malaria obtained in this study was high but it was lower than the proportion Out Patient Department Cases attributable to malaria in Central Region of Ghana in the first quarter of 2016, which was 37.4 %[(2)]. The comparatively lower prevalence reported in this study may be due to the fact that, both Assin Foso and Cape Coast where the data was collected were urban areas, whereas, the data used by the Malaria Control Programme included both urban and rural areas. Again, the study was conducted between February and April, 2016 and the 6 months period within which participants were to report of malaria cases did not include the major rainy season of the region. Evidence exist that urban areas in Ghana have significantly lower malaria burden than smaller communities and most malaria transmission cases occurs during the major rainy season[(11)].

In malaria endemic areas, younger age may be associated with higher risk of malaria infection[(12,13,14)] and this may be due to increase immunity with age in such areas. Our study did not find association between age and self-reported cases of malaria, and this may be attributed to the fact that the age differences among the household representatives we interviewed were not much. Again, the sites where this study was conducted fall within malaria endemic areas.

Like our studies, there are a couple of studies that could not find significant positive association between the uses of insecticide treated nets and reduction in risk of malaria infection[(13,14)]. On the contrary, numerous evidence support that use of ITN significantly reduces incidence of malaria infection[(13,15,16)]. Further studies in this area are required. The challenges associated with proper use and maintenance of the nets could have influenced their infectiveness in reducing malaria infection. Those who reported that they used ITN might not be using them irregular because of popular complaints associated with sleeping under ITN including the feeling of heat and discomfort.

Our findings suggest that respondents with less than secondary education were more likely to report of cases of malaria than those with secondary education and above. A high education may reduce the risk of malaria infection[(17)]. In the midst of other factors that also influence malaria infection, formal educational level may not significantly influence malaria infection as the association did not persist in multivariate analyses. People tend to get more knowledge about the causes and preventive measures of malaria through formal education in schools. However, with the current active media education and other malaria campaign programs which also inform and educate people of all educational levels on malaria in Ghana, lower formal educational level may not be a major factor for malaria infection.

More than half (58.6%) of the houses inspected in the study had surroundings that could serves as potential breeding sites for anopheles mosquitoes, including choked gutters, stagnant water, and bushes. The results of this study however did not establish a link between surroundings with potential mosquito breeding sites

and higher self-reported cases of malaria. Unclean surroundings can lead to production of mosquitoes including those that transmit malaria parasites, but the presence of mosquito breeding sites along may not be a very important factor for transmission of malaria. Probably, what is very important is to avoid coming into contact with the mosquitoes even if one lives in environments with high density of mosquitoes. The need for efforts to reduce the proportion of houses that are surrounded by mosquito breeding sites in Ghana cannot be overemphasis in the light of the other health implications of such conditions.

The findings of this study suggest that self-reported malaria prevalence for communities in the forest belt of Ghana could be significantly higher than the prevalence for communities along the coastal capital belt. The respondents in the forest belt community were 2.9 time more likely than those in the community in the costal belt to self-report of cases of malaria. The results agrees with findings of Owusu Agyei and others[18] who reported that malaria transmission in the forest-savanna region of central (forest) area of Ghana is high. Forest areas provide the conditions needed for production and survival of anopheles mosquitos, the vector for malaria parasites[19]. The thicker vegetation, hotter temperature, and more rainfall in the forest belt than the coastal belt, promoted faster production and distribution of mosquitos. The community might have not been given a deserving special attention in the fight against malaria, hence the result. In the light of the conducive environment that such communities provide for mosquitos to breed, it will take only a special attention of malaria control efforts in such areas to reduce malaria prevalence.

5. LIMITATION OF THE STUDY

One of the limitations of this study is the use of self-report cases of malaria. This method of assessment of malaria prevalence was used for its affordability as resources could not be gathered for use of laboratory investigation. The results of this study should therefore be interpreted with caution. Nevertheless, self-reports have been used in many epidemiological studies of malaria prevalence, and they could provide accurate estimates[20]. Again, malaria and its symptoms are well known by many people in Ghana with many Ghanaians being able to mention the most common malaria symptoms such as fever, nausea, fatigue, body pains, headache, and vomiting. The 6 months recall period within which respondents were to recall and report of cases of malaria for which they visited health facilities was a short period for possible accurate self-reporting of cases of malaria.

6. CONCLUSION

Self–reported cases of malaria was high in Central Region of Ghana, with the community in the forest belt having more cases of malaria than the one in the coastal belt. The proportion of housing surroundings with potential breeding sites for mosquito was high even though this was not associated with increasing self-reported cases of malaria. The fight against malaria should continue and could intensify efforts that improve healthy behaviours that help people to avoid mosquito bites, use good waste disposal practices and keep housing surroundings clean to reduce the number of potential breeding sites for mosquitoes. Areas with special conditions for malaria could also be given special attention.

REFERENCES

1. WHO (World Health Organisation), “World malaria report 2016,” p. 186, 2016.
2. National Malaria Control Programme, “Malaria 1St Quarter Bulletin - 2016: National Malaria Control Surveillance Bulletin – Issue 5,” Ghana Heal. Serv., no. 5, pp. 1–10, 2016.
3. E. D. A. Owusu, C. A. Brown, M. P. Grobusch, and P. Mens, “Prevalence of Plasmodium falciparum and non-P. falciparum infections in a highland district in Ghana, and the influence of HIV and sickle cell disease,” Malar. J., vol. 16, no. 1, p. 167, 2017.
4. A. Stefani, E. Roux, J. Fotsing, and B. Carme, “Studying relationships between environment and malaria incidence in Camopi (French Guiana) through the objective selection of buffer-based landscape characterisations,” no. Ea 3593, pp. 1–13, 2011.
5. T. Dejenie, M. Yohannes, and T. Assmelash, “Characterization of Mosquito Breeding Sites in and in the Vicinity of Tigray Microdams,” Ethiop. J. Health Sci., vol. 21, pp. 57–66, 2011.
6. P. M. De Silva and J. M. Marshall, “Factors contributing to urban malaria transmission in sub-saharan Africa: A systematic review,” J. Trop. Med., vol. 2012, 2012.
7. E. Owusu-sekyere, E. Attakora-amaniampong, and D. Aboagye, “Wealth , Health , and Inequality : Households Exposure to Environmental Hazards,” vol. 2016, 2016.

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8. A. Abate, A. Degarege, and B. Erko, "Community knowledge, attitude and practice about malaria in a low endemic setting of Shewa Robit Town, northeastern Ethiopia.," BMC Public Health, vol. 13, no. 1, p. 312, 2013.
9. Ghana Statistical Service, "2010 Population and Housing Census. District Analytical Report, Cape coast municipality," p. 85, 2013.
10. GSS, "2010 Population & Housing Census, District Analytical Report, Assin North Municipal," p. 67, 2014.
11. JSI Research & Training Institute, "Report of the Ghana Urban Malaria study," p. 1 to 112, 2013.
12. I. Carneiro, A. Roca-Feltrer, J. T. Griffin, L. Smith, M. Tanner, J. A. Schellenberg, B. Greenwood, and D. Schellenberg, "Age-patterns of malaria vary with severity, transmission intensity and seasonality in sub-Saharan Africa: A systematic review and pooled analysis," PLoS One, vol. 5, no. 2, 2010.
13. C. O. Agomo and W. A. Oyibo, "Factors associated with risk of malaria infection among pregnant women in {Lagos}, {Nigeria}," Infect. Dis. Poverty, vol. 2, no. 1, p. 19 PMID-- 24001135, 2013.
14. N. Sarpong, E. Owusu-Dabo, B. Kreuels, J. N. Fobil, S. Segbaya, F. Amoyaw, A. Hahn, T. Kruppa, and J. May, "Prevalence of malaria parasitaemia in school children from two districts of Ghana earmarked for indoor residual spraying: a cross-sectional study," Malar. J., vol. 14, no. 1, p. 260, 2015.
15. K. A. Lindblade, D. Mwandama, T. Mzilahowa, L. Steinhardt, J. Gimnig, M. Shah, A. Bauleni, J. Wong, R. Wiegand, P. Howell, J. Zoya, J. Chiphwanya, and D. P. Mathanga, "A cohort study of the effectiveness of insecticide-treated bed nets to prevent malaria in an area of moderate pyrethroid resistance, Malawi," Malar. J., vol. 14, no. 1, p. 31, 2015.
16. N. J. Govella, F. O. Okumu, and G. F. Killeen, "Short Report : Insecticide-Treated Nets Can Reduce Malaria Transmission by Mosquitoes Which Feed Outdoors," vol. 82, no. 3, pp. 415–419, 2010.
17. C. Donovan, B. Siadat, and J. Frimpong, "Seasonal and socio-economic variations in clinical and self-reported malaria in Accra, Ghana: evidence from facility data and a community survey.," Ghana Med. J., vol. 46, no. 2, pp. 85–94, 2012.
18. S. Owusu-Agyei, K. Asante, M. Adjuik, G. Adjei, E. Awini, M. Adams, S. Newton, D. Dosoo, D. Dery, A. Agyeman-Budu, J. Gyapong, B. Greenwood, and D. Chandramohan, "Epidemiology of malaria in the forest-savanna transitional zone of Ghana," Malar. J., vol. 8, no. 1, p. 220, 2009.
19. N. P. Kar, A. Kumar, O. P. Singh, J. M. Carlton, and N. Nanda, "A review of malaria transmission dynamics in forest ecosystems.," Parasit. Vectors, vol. 7, p. 265, 2014.
20. M. Maheu-Giroux, M. Casapía, and T. W. Gyorkos, "On the validity of self-reports and indirect reports to ascertain malaria prevalence in settings of hypoendemicity," Soc. Sci. Med., vol. 72, no. 5, pp. 635–640, 2011.

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