

Risk of malaria in Pregnancy and under-five (5) children in densely populated communities in Kumasi, Ghana

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Abstract

In this study, the incidence of malaria cases for children aged below five years and pregnant women in some selected densely populated Sub metros in Kumasi was evaluated. Secondary data obtained from the Kumasi Metropolitan Health Directorate was analysed for this study. Patients who reported to the various facilities within the study area suffering from uncomplicated malaria and severe malaria confirmed with laboratory test were included in the study. Majority of under-five (5) malaria incidence was recorded in the Manhyia South sub-metro followed by the Asokwa sub metro, with Bantama sub metro having the least recorded cases. Manhyia north sub-metro generally recorded the highest incidence of uncomplicated malaria in pregnancy though not tested but treated symptomatically as malaria.

Keywords: Malaria cases, Under-five, pregnant women, sub-metros, uncomplicated malaria.

1.0 Introduction

Despite the numerous efforts and support extended to Africa by WHO and other donor institutions worldwide, malaria transmission in Africa remains high resulting in more than one million deaths annually [1]. Malaria in pregnancy also contributes significantly to miscarriages, premature delivery, low-birth-weights of neonates as well as perinatal morbidity and mortality [3]. The largest burden of malaria disease in the world is located in Sub-Saharan Africa with over 90 % of the world's malaria-related deaths (3). A study in Ghana established that 300 women delivering in rural Ghana showed higher rates of anaemia, clinical laboratory confirmed malaria and placental burden of infection [4]. The same study in Ghana also confirmed that babies born to mothers with placental malaria infection were more than twice as likely to be underweight at birth. Malaria is considered as a major threat to public health in Ghana and this has a greater challenge to child survival. Out of the 3.5 million suspected cases of malaria reported to the public health facilities in Ghana, children under the age of five accounted for 20,000 [8]. It has also been noted as the leading cause of absenteeism among children of school going age [9]. Malaria has become one of the

challenging diseases to eradicate in the Sub-Saharan Africa. It has a devastating burden on families, healthcare systems and the economy as a whole accounting for 40 % Public health expenditure, 50 % inpatient admissions and 50 % outpatient healthcare visits in the endemic regions like Ghana [4].

The four main genus of plasmodium known to cause human malaria includes *Plasmodium vivax*, *Plasmodium ovale*, *Plasmodium malariae* and *Plasmodium falciparum*. The most common and deadly malaria causing parasite among these four in the Sub-Saharan Africa is *P. falciparum* mostly found in the endemic regions [5]. Generally *P. falciparum* is recognized as the leading cause of anaemia in pregnancy [6]. Available research has shown that although, *P. vivax* is a more common cause of malaria in most parts of the tropics outside Africa, its harmful effect on pregnancy is less known. Biologically, people who are at a higher risk of acquiring malaria are; infants, young children under the age of five (5), pregnant women, immuno-compromised individuals (HIV/AIDS Patients, the elderly) and non-immune individuals such as travellers from non-endemic to endemic regions [7]. With regards to the relatively limited data availability on malaria in pregnancy and children under five (5), this current study analysed cases of malaria in children under the age of five (5) and pregnant women within the densely populated sub-metropolitan areas of Kumasi to ascertain the current trend of the disease among these important group of people. The specific objectives include; (i) determination of malaria prevalence among population of pregnant women attending antenatal clinics (ii) assessing the cases of malaria among children under five (5) attending regular clinics in health facilities within these Sub-metros.

The result from this current study will give evidence based data to policy formulators to develop policies that will help reduce the burden of malaria in children under five (5) and pregnant women.

2.0 Methods

Secondary data was obtained from the Kumasi Metropolitan Health Directorate and used for the analysis. Organised data was analysed with SPSS version 20 where mostly descriptive statistics was employed in the data analyses.

3.0. Results

This section presents the results and discussion of our data analyses. Descriptive statistics was employed to analyse the various variables considered. The study analysed cases of malaria for under-five (5) children and pregnant women within five densely populated sub-metropolitan areas of Kumasi namely Bantama, Subin, Manhyia North, Manhyia South and Asokwa.

Table 1 shows the various procedures conducted to ascertain the presence or absence of malaria with respect to gender distribution and frequencies. Four procedures taken into consideration to ascertain the presence or absence of malaria were obtained from patients who visited the various major hospitals in the five sub-metros. In total, 3,839 out of the total 13,195 under five patients showed positive for uncomplicated malaria in 2015 in the Asokwa sub-metro. This represented approximately 29%. In other words, 29% of children under five (5) years showed positive for uncomplicated malaria where the male children constituted the majority. Also 54,203 reported to the facility with symptoms of uncomplicated malaria who were not tested but treated symptomatically. However out of this total number, 11, 613 of them were recorded as children under-five years, representing approximately 21.42%. Out of the total 11,613 malaria cases of children aged under-five years, 5,941 were males and 5, 672 were females. Again the Asokwa sub-metro recorded 263 under five (5) children who were laboratory confirmed as being diagnosed of severe malaria.

Bantama sub-metro recorded a total number of 20,418 patients being diagnosed of uncomplicated malaria although not tested; it was treated symptomatically as malaria. Out of this total, 2857 were children aged below five years representing approximately 14%. However 975 out of the total 5945 of the patients were children aged below five years who were diagnosed of uncomplicated malaria and as well tested positive.

Also malaria incidence for children aged below five (5) years in 2015 was recorded in both Manhyia North and South with more cases recorded in Manhyia south for the first three tests as compared to that of Manhyia north sub-metro. There were a huge number of patients who reported to the facilities with uncomplicated as well as severe malaria confirmed with laboratory test. Out of these numbers in the Manhyia North sub-metro, 1184 out of the total incidence of 5090 were found to be children aged below five (5) years representing approximately 23% of the total incidence. Further breakdown shows that, 668 were males whilst the remaining 516 were females.

Manhyia south sub-metro recorded quite a high incidence of malaria with 28347 being diagnosed of uncomplicated malaria tested positive with 4,404 of them being under five (5) years. Also 33306 of the patients were found to be suffering from uncomplicated malaria though not laboratory tested, were treated symptomatically and with this figure, 6,609 of them were under five years representing approximately 20% of the total patients.

Similarly, there were more recorded cases for uncomplicated malaria which were laboratory tested and showing positive and uncomplicated malaria cases not laboratory tested but treated symptomatically as malaria in the Subin sub-metro. However, 2695 of them representing approximately 15% tested positive for uncomplicated Malaria while about 26% of them were

treated symptomatically as malaria. However 516 of the children who were asymptomatic to severe malaria tested positive and 106 of them who showed signs and symptoms of severe malaria were also confirmed in the laboratory.

Table 1: Incidence of U-five malaria incidence for various tests

Areas/ Sub- metros	Test conducted (U-5)	Counts/frequency (U-5)		Total (U-5)	Total Malaria incidence
		Male	Female		
Asokwa	Uncomplicated Malaria Tested Positive	Male	2329	3839	13195
		Female	1510		
	Uncomplicated Malaria not tested but treated symptomatically as malaria	Male	5941	11613	54203
		Female	5672		
	Severe Malaria (Lab-Confirmed)	Male	124	263	953
		Female	139		
	Severe Malaria (Non-Lab-Confirmed)	Male	341	541	1801
		Female	200		
Bantama	Uncomplicated Malaria Tested Positive	Male	474	975	5945
		Female	501		
	Uncomplicated Malaria not tested but treated symptomatically as malaria	Male	1455	2857	20418
		Female	1402		
	Severe Malaria (Lab-Confirmed)	Male	273	603	3216
		Female	330		
	Severe Malaria (Non-Lab-Confirmed)	Male	252	556	3091
		Female	304		
Manhyia North	Uncomplicated Malaria Tested Positive	Male	668	1184	5090
		Female	516		
	Uncomplicated Malaria not tested but treated symptomatically as malaria	Male	733	1443	11050
		Female	710		
	Severe Malaria (Lab-Confirmed)	Male	66	133	1146
		Female	67		
	Severe Malaria (Non-Lab-Confirmed)	Male	36	68	774
		Female	32		
Manhyia South	Uncomplicated Malaria Tested Positive	Male	2184	4404	28347
		Female	2220		
	Uncomplicated Malaria not	Male	3130	6069	33306

	tested but symptomatically treated as malaria	Female	2939		
	Severe Malaria (Lab-Confirmed)	Male	257	493	2739
		Female	236		
	Severe Malaria (Non-Lab-Confirmed)	Male	27	52	325
		Female	25		
Subin	Uncomplicated Malaria Tested Positive	Male	1415	2695	18305
		Female	1281		
	Uncomplicated Malaria not tested but treated symptomatically as malaria	Male	2955	5880	23453
		Female	2925		
	Severe Malaria (Lab-Confirmed)	Male	285	516	1483
		Female	231		
	Severe Malaria (Non-Lab-Confirmed)	Male	60	106	381
		Female	46		

3.1 Comparative analysis of malaria incidence by sub-metros.

Figure 1 shows the number of patients aged under five (5) years who were tested positive for uncomplicated malaria. It can be clearly seen that, majority of the cases were recorded in the Manhyia south sub-metro, followed by 3839 under five (U-5) malaria cases in Asokwa sub-metro in the Kumasi Metropolis in the Ashanti Region of Ghana. Subin sub-metro recorded the third highest number of uncomplicated malaria incidence. However the Bantama sub-metro recorded the least cases of U-5 uncomplicated malaria incidence tested positive.

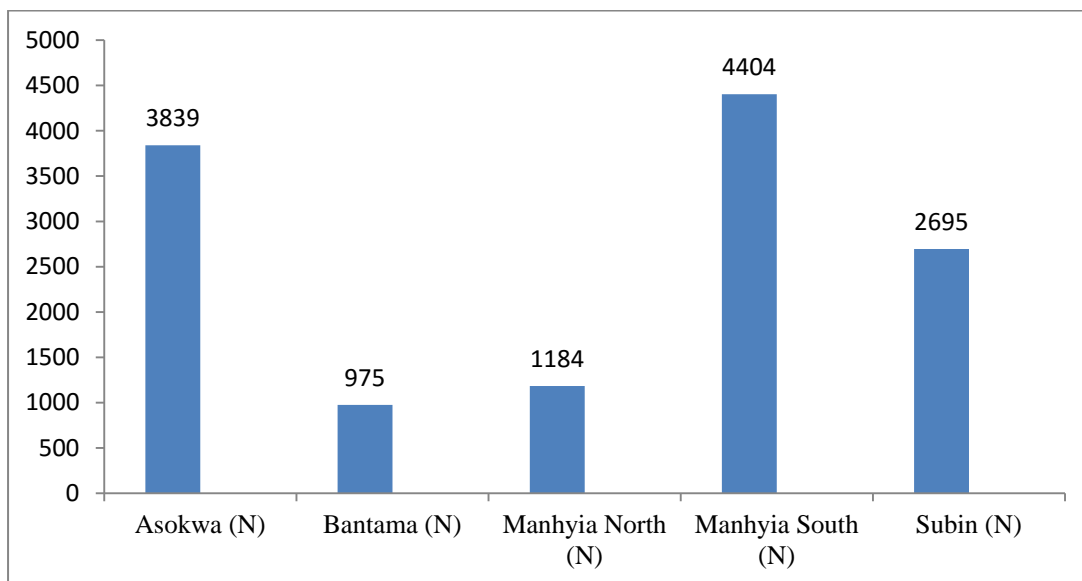


Figure 1: Uncomplicated Malaria Tested Positive

Figure 2 shows the comparative analysis of U-5 uncomplicated malaria incidence not tested but treated symptomatically as malaria. From Figure 2, Asokwa sub-metro recorded the highest incidence of uncomplicated malaria not tested but treated symptomatically as malaria with 11613 cases. Manhyia south sub-metro with 6069 cases was the second highest case recorded in the sub-metro. The least recorded case of uncomplicated malaria incidence of 1443 was indicated in the Manhyia north sub-metro.

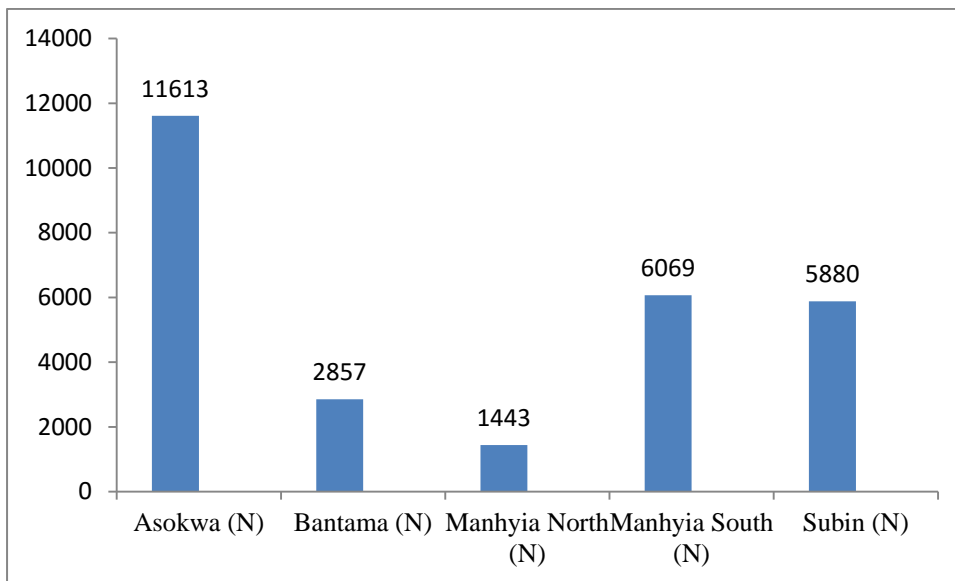


Figure 2: Uncomplicated Malaria not tested but treated symptomatically as malaria

Figure 3 below shows the total number of recorded cases of severe malaria (lab confirmed) incidence for children aged below five years. Here, Bantama sub-metro recorded 603 U-5 severe malaria cases (laboratory confirmed) followed by 516 cases in the Subin sub-metro whiles Manhyia south sub-metro showed 493 cases.

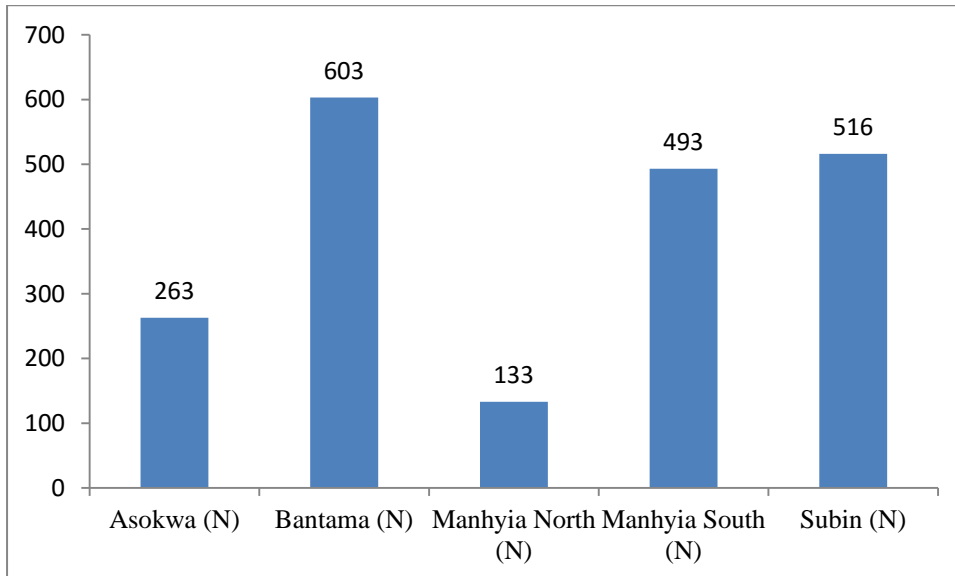


Figure 3: Severe Malaria (Laboratory-Confirmed)

For severe malaria cases which were not confirmed through laboratory test, almost the same number of cases (U-5 incidence) was recorded in both Asokwa and the Bantama sub-metros.

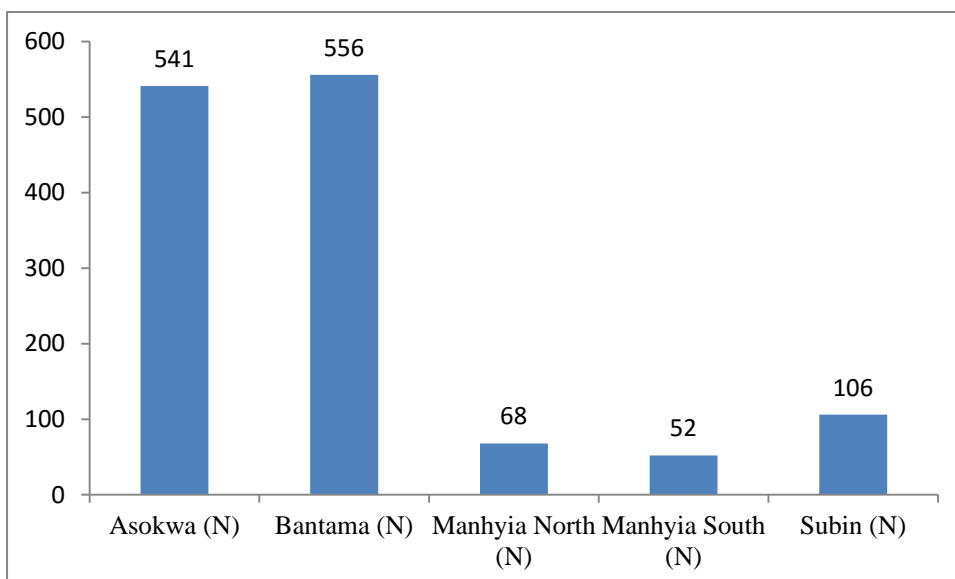


Figure 4: Severe Malaria (Non-Laboratory-Confirmed)

3.2 Malaria Incidence in Pregnant women

This section indicates the results of malaria incidence in pregnant women within the study area. Table 2 shows the results of the various cases of malaria established in this study. The

analysis was based on two tests. In the Asokwa metropolis, 546 cases of uncomplicated malaria in pregnancy not tested but treated symptomatically as malaria was recorded. Also 372 pregnant women were tested positive for uncomplicated malaria. Bantama sub-metro recorded quite similar results with 426 cases of uncomplicated malaria in pregnancy not tested but treated symptomatically as malaria. Three hundred and fifty-three (353) pregnant women were tested positive for uncomplicated malaria incidence.

Table 2: Malaria incidence in pregnant women

Areas/Su bmetros	Test conducted	Frequency/Co unts
Asokwa	Uncomplicated Malaria in Pregnancy tested positive	372
	Uncomplicated Malaria in Pregnancy not tested but treated symptomatically as malaria	546
Bantama	Uncomplicated Malaria in Pregnancy tested positive	353
	Uncomplicated Malaria in Pregnancy not tested but treated symptomatically as malaria	426
Manhyia North	Uncomplicated Malaria in Pregnancy tested positive	417
	Uncomplicated Malaria in Pregnancy not tested but treated symptomatically as malaria	581
Manhyia South	Uncomplicated Malaria in Pregnancy tested positive	95
	Uncomplicated Malaria in Pregnancy not tested but treated symptomatically as malaria	239
Subin	Uncomplicated Malaria in Pregnancy tested positive	192
	Uncomplicated Malaria in Pregnancy not tested but treated symptomatically as malaria	67

In all, Manhyia north sub-metro recorded the highest incidence of uncomplicated malaria in pregnancy not tested but treated symptomatically as malaria with 581 cases. The same sub-metro also recorded the highest incidence of 417 cases of pregnant women who were tested positive by laboratory confirmation for uncomplicated malaria.

3.3 Discussion

The findings of this study were compared with existing literature on incidence of malaria cases among under-five (5) children and pregnant women. However our study looked at the

incidence of malaria with respect to the various procedures used to ascertain the presence or absence of malaria among symptomatic or asymptomatic individuals within these two groups [7]. It was obvious in this study that, generally people report to the various hospitals with uncomplicated malaria which is not proven by laboratory test but are always treated as malaria through the administration of anti-malaria drugs to the said patients [10]. According to the World Health Organisation (WHO), infants, young children under the age of five, pregnant women immuno-compromised individuals (HIV/AIDS Patients), the elderly and non-immune individuals such as travellers from non-endemic to endemic regions all have a higher risk of acquiring malaria. It was revealed in this study that, those densely populated communities earmarked for this study were all within the urban centres of Kumasi; incidence of malaria was still appreciably high. This establishes the fact revealed during the observational survey within the communities of the study area of the poor sanitation and seemingly unaware attitude towards the cause of malaria transmission which agreed with the study similarly conducted by [11] within urban communities in Sub-Saharan Africa. Although, other studies showed that, with the presence of more people within a community with an associated high urbanization, the human mosquito biting rates are reduced [12] not recognising other confounding factors such unplanned housing designs typically associated with low income and poor sanitation. The Sub-metros indicating high incidence of malaria cases within the study area are highly urbanized and densely populated. Additionally these are the Sub-metros established with almost all the confounding factors mentioned earlier. However, quiet a number of patients reported to the facilities with uncomplicated malaria as well as severe malaria supported with laboratory confirmations [12, 13]. Other research findings have indicated that, pregnant women who report to health facilities with uncomplicated malaria have been found to have the highest level of immunity resulting in minimal maternal symptoms but unassumingly higher fetal complications [13]. Based on this information, this current study therefore is justified by including all the pregnant women and the under-five (5) years children within the study area who presented both with severe and uncomplicated malaria. The study also revealed that, with the children under the age of five (5) which was adopted by this study, parent most often present them to the health facility with the exhibition of signs and symptoms of severe malaria rather than with uncomplicated malaria with the exception of few parents. However, research has alluded to the fact that, during laboratory investigations, pigmented neutrophils (PMNs) and monocytes have been related to cerebral malaria leading to deaths in most cases among children under-five (14).

4.0 Conclusion

This study reveals that, although much effort and resources have been channelled into lowering or at best eradicating malaria which have been described as the disease of poverty, it still remains high especially among the pregnant women and the under-five (5) years children. This is probably as a result of low income, poor sanitation and low level of education among others which policy makers and implementers should focus on to reduce the burden of malaria and other infectious diseases as well.

Acknowledgement

Authors are greatly indebted to the Kumasi District Health Directorate, Institute of Research and Innovation, Kumasi Polytechnic and finally the Department of Laboratory Technology, Faculty of Health Sciences, Kumasi Polytechnic, Kumasi for their valuable contribution and support to this work.

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