Community Pharmacies Treatment Practices of Malaria and Residents' Pattern of Antimalarial Drug Use in Abura Community, Cape Coast Metropolis-Ghana

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Authors' contributions

This work was carried out in collaboration among all authors. Author EAT conceived and designed the study, performed the statistical analysis, and wrote the protocol. Author EKD wrote the first draft of the manuscript, including the discussion, conclusion and abstract. Author EA performed the critical review of the study. All authors read and approved the final manuscript.

| Original Research Article |

ABSTRACT

Background: Community pharmacies are health care facilities that allows the public access to their medications, counselling, and advice about their health. Community pharmacies play critical role in the health delivery systems of several countries especially in developing countries and serve as the first point of call for the treatment and management of many ailments, including malaria. The study therefore examined community pharmacies treatment practices of malaria and residents' pattern of antimalarial drug use in Abura Community, in the Cape Coast Metropolis of the Central Region of Ghana.
Methods: We conducted a community-based cross-sectional survey involving 301 study participants from the Abura Community (Cape Coast Metropolis). A structured questionnaire was

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used to collect information from the study participants using accidental sampling technique. Descriptive statistics was performed using SPSS version 23.0 and Microsoft Excel 2010.

Results: The age range of our study was between 15 and 60 years. Females were the majority (52.5%). The self-reported use of unprescribed antimalarial drugs was 41%. The source of the drugs were mainly community pharmacies, licenced chemical shops, self-herbal preparations, and left-over antimalarial drugs.

Conclusion: A high proportion of our study participants reported self-medication of non-prescribed antimalarial drugs. These antimalarials included both orthodox and herbal medications, which were sourced from outlets like community pharmacies, licenced chemical sellers, and home herbal preparations. There is the need to intensify monitoring, public health education on self-medication and the training of staff of community pharmacies to ensure effective treatment and management of malaria at the community level.

1. INTRODUCTION

Community pharmacies play critical role in the health delivery systems of several countries especially in developing countries [1]. These pharmacies mostly serve as the first point of call for the treatment of many common ailments including malaria [1]. Likewise, community pharmacies serve as the primary source of information and counselling for most patients [1, 2]. Several reasons have been ascribed to the patronage of community pharmacies and may include convenience, shorter waiting times, less frequent drug stock-outs, longer operating hours and usually free counselling [3,4]. Malaria continues to remain a major public health threat to several countries of world with the highest burden in Sub-Saharan Africa [5]. Children, especially under age five and pregnant women are considered most vulnerable to the risk of malaria and its related complications [6]. Therefore, addressing malaria infection, transmission, treatment, and control are of essence to protect the health of the public. Previous studies on malaria infections continue to demonstrate higher trends of malaria morbidity and mortality among Sub-Saharan Africa countries. As an illustration, in 2015, the global estimates of malaria showed that about 90 and 92%, respectively, of malaria occurrences and mortalities were recorded among Sub-Saharan African countries [7,8].

In Ghana, evidence shows that malaria affects about 3.5 million persons annually with 38% and approximately 50% of malaria cases accounting for all outpatient cases, and under-five hospital admissions, respectively [5,7]. The increase in the transmission rates of malaria has predominately been reported among rural communities, owing to the conducive environments for the breeding of the causative vector [8,9]. Likewise, some previous studies have reported cases of malaria among urban centres. As maintained by some previous studies, factors including poor housing systems, low socio-economic status and poor sanitation practices significantly increases the risk of malaria transmissions in urban areas [10,11,12].

According to the Ghana Malaria Indicator Survey, 2016 report, malaria prevalence was more than twice as high in rural areas (28%) as in urban areas (11%) [10]. Regional prevalence of malaria in the Ghana Malaria Indicator Survey, 2016 showed that the Central Region of Ghana recorded the second highest (30%) of malaria prevalence [10]. This observation creates a worrying situation and therefore rings the clarion bell to find measures in controlling the increasing trends of malaria infection in the Central Region. Community pharmacies have been acknowledged to be one of the key stakeholders in the prevention and control of malaria [13]. The study was therefore aimed at examining community pharmacies treatment practices of malaria and residents' pattern of antimalarial drug use in the Abura community in the Cape Coast Metropolitan Assembly, Ghana.

2. STUDY AREA AND METHODS

2.1 Study Area

The study was conducted in Abura community within Cape Coast Metropolis, Central Region of Ghana. According to Ghana's 2010 Population and Housing Census, the population of Cape Coast was 169,894 which represents 7.7% of the region's total population. Females represented

51.3% and males constitute 49.7% of the total population. The Cape Coast Metropolis has 19 settlements, including the Abura community. The estimated population of Abura community according to the 2010 Population and Housing Census was 9,414 [14]. The Cape Coast Metropolis serves as a home to several important senior high schools and tertiary schools, including the University of Cape Coast. The metropolis is also known for its tourist attraction sites, including the Cape Coast Castle and Kakum National Park. This attracts individuals from all over the country and other countries to pursue various levels of professional education and for purposes of tourism.

2.2 Study Design

The study was a community-based cross-sectional study. Data collection was within a period of three months, December 2018 to February 2019. The data was collected through the administration of structured questionnaires to inhabitants of the Abura community using a multiple sampling approach. First, the Abura community was divided into four clusters, (namely cluster A, B, C and D) based on the distributions of community pharmacies in Abura. The second stage involved the use of simple random sampling approach to select the households for the study. Third, an accidental sampling technique was used to recruit the study participants. Participants were asked if they have knowledge on malaria and its related complications to satisfy the basic inclusion criteria. The accidental sampling approach was preferred as it was fast, low-cost, and equally the study participants were readily available to attempt the items on the questionnaire. The structured questionnaire was developed to ascertain the pattern of anti-malarial drug use among the individuals and the malaria treatment practices at community pharmacies within the Abura community. The structured questionnaire designed for the community (household) survey consisted of four sections, including the socio-demographics of the participant, knowledge on malaria, pattern of anti-malarial drug use, and factors influencing the use of non-prescribed anti-malarial drug.

Participants, both males and females who had treated for malaria in the past months were recruited onto the study. Participants who did not have any idea of anti-malarial drugs and had not received treatment for malaria in the past months were excluded from the study.

2.3 Sample Size Determination

The estimated sample size was determined by using the Cochran formula for sample size estimation. With a confidence interval of 95%, precision of 5% and prevalence of malaria of 28% from a previous study, [15] the estimated sample size for the study was 309.

$$n = \frac{Z(1-\alpha)^2 p(1-p)}{e^2}$$

where;

n= the sample size
Z= the abscissa of the normal curve that cuts off an area α at the tails
(1-α) = desired confidence interval which is 95% for this study; hence the Z value is 1.96 for 95% level of confidence.
p= 28% prevalence of malaria from previous study.
e= the desired level of precision which is 5% for this study

$$\text{Therefore } n = \frac{(1.96)^2 \times 28(100-28)}{5^2}$$

n=309

2.4 Data Management and Analysis

The data was coded, entered, and analysed using IBM SPSS version 23 software. Descriptive statistics involving percentages, frequencies and pie chart were performed.

3. RESULTS

The response rate of the study was 97.4% (301). The ages ranged from 15 to 60 years and above. The highest age group was among 16-30 years (71.1%). The males were highly dominated (52.5%). About 72.1% of the participants were single with 46.2% in the informal job sector. The highest educational level recorded was tertiary level with a frequency of 34(11.3%). For religion, 59.1% were Christians with Muslim religion been the second highest 39.2% as shown in Table 1.

Out of the 301 study participants, about 41.2% practice anti-malarial drug self-medication as shown in Fig. 1. The decision to self-medicate included personal decision (53.2%), recommendation by drug dispensers (45.2%) and recommended by friends and family based on their own experiences (1.6%). The source of

the antimalarial drugs included the pharmacy (56.5%), licenced chemical shop (25.8%), and traditionally self-prepared anti-malarial drug (herbs) at home (15.3%). Individuals who took left-over anti-malarial drug from previous prescription, anti-malarial drug from friends and drug from family members represented 1(0.8%), 1(0.8%) and 1(0.8%) respectively. For those who got their drugs from the pharmacy, 67(95.7%) bought orthodox anti-malarial drugs (ACT) and 3(4.3%) bought herbal anti-malarial drug named 'Taabea'. Also, for individuals who bought from the licenced chemical shop, 31(96.8%) requested for ACT and 1(3.2%) requested for 'taabea'. Individuals who took left-over medication and drugs from friends and family also took ACT. Individuals who took self-prepared traditional drugs gave it various local names ('Abowanba', 'Abrodo', Adesikankye', 'Hijami bitters' and 'Nim tree mixtures) as shown in Table 2.

Only 30 individuals out of the 124 had their malaria tested before drug was sold out or traditionally self-prepared anti-malarial drug was taken. Eighteen (18) individuals representing 60.0% had their test done at the pharmacy, 10.0% had the test done at the chemical shop and 30.0% tested themselves at home. Test was done using the rapid diagnostic test (RDT) as shown in Table 3.

The main factors that influenced the selection of a particular anti-malarial drug included experience of relieve of symptoms with using that drug (52.4%). About 21.8% of the participants selected a drug based on past use of the drug. Others also considered the price of the drug (25.0%) before purchasing and use. Those who considered the side effects of the ant-malaria drugs represented 3.2% as shown Table 4.

Factors accounting for the use of non-prescribed anti-malarial drugs comprised perceived non-seriousness of illness (78.2%), cheaper cost than hospital treatment (44.4%). Hospital factors such as long queues and long waiting times also influenced the reason why participants preferred self-medicating than seeking treatment at the health facilities (34.7%) as shown Table 5.

Table 1. Demographic profile of the study participants at Abura community, Cape Coast, Ghana

| Characteristics	Categories	Number (n)	Percentage (%)
Age range	0-15	5	1.7
	16-30	214	71.1
	31-45	53	17.6
	46-60	22	7.3
	>60	7	2.3
Sex	Male	158	52.5
	Female	143	47.5
Occupation	Formal	139	46.2
	Informal	11	3.7
	Unemployed	37	12.3
	Pensioner	3	1.0
Marital status	Single	217	72.1
	Married	72	23.9
	Co-habiting	10	3.3
	Divorced	2	0.7
Religion	Christian	178	59.1
	Muslim	118	39.2
	Traditional	3	1.0
	No-religion	2	0.7
Educational level	Primary	61	20.3
	Junior high school	98	32.6
	Senior high school	95	31.6
	Tertiary	34	11.3
	No education	13	4.3
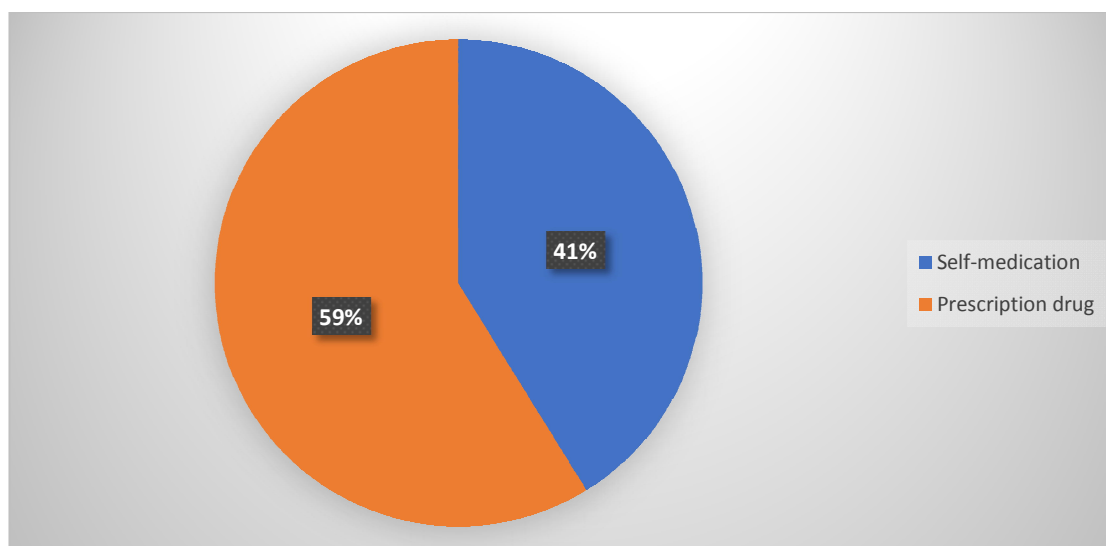
Fig. 1. Prevalence of self-prescribed antimalarial drug use

Table 2. Source, types and enablers of antimalarial drugs self-medication

Characteristics	%(n)		
Source of Antimalarial Drugs		**Type of Antimalarial Drug Used**	**%(n)**
Pharmacy	56.5 (70)	ACT	95.7 (67)
		Herbal drug	4.3 (3)
Licenced Chemical shop	25.8 (32)	ACT	96.8 (31)
		Herbal drug	3.2 (1)
Self-prepared herbs	15.3 (19)	Herbal preparations	
			100.0 (19)
Left-over antimalarial prescriptions	0.8 (1)	ACT	100.0 (1)
Family	0.8 (1)	ACT	100.0 (1)
Friendly	0.8 (1)	ACT	100.0 (1)
Enablers of Self-medication			
Personal decision	53.2 (66)		
Dispensers' advise	45.2 (56)		
Friends advise	1.6 (2)		
Total	**100.0 (124)**		

Herbs used for the preparation's local names (Abowanba, Abrodo, Adesikankye, Hijami bitters and Neem tree mixtures)

Table 3. Confirmation of presence of malarial parasite before commencement of treatment

Test Performed	Percentage % (n)	Place Performed	Percentage n (%)
Yes	24.2 (30)	Pharmacy	60.0 (18)
		Chemical shop	10.0 (3)
		Home	30.0 (9)
No	75.8 (94)	-	-

Table 4. Factors influencing the preferred anti-malarial drugs

Characteristics	Responses	%(n)
Drug affordable	Yes	25.0 (31)
	No	75.0 (93)
Gets better with it	Yes	52.4 (65)
	No	47.6 (59)
Easy dosing pills	Yes	16.1 (20)
	No	83.9 (104)
Fewer pills at once	Yes	10.5 (13)
	No	89.5 (111)
Past use of drug	Yes	21.8 (27)
	No	78.2 (97)
Recommended to me	Yes	64.5 (80)
	No	35.5 (44)
Side effects	Yes	3.2 (4)
	No	96.8 (120)

Table 5. Factors influencing the non-prescribed use of anti-malarial drugs

Factors	Responses	% (n)
Financial constraints to attend hospital	Yes	44.4 (55)
	No	55.6 (69)
When the illness is not very serious	Yes	78.2 (97)
	No	21.8 (27)
To avoid long queues and waiting times in the hospital	Yes	34.7 (43)
	No	65.3 (81)
I have anti-malarial from previous prescription of similar illness	Yes	4.0 (5)
	No	96.0 (119)
I have a friend who is a pharmacist or doctor	Yes	8.1 (10)
	No	91.9 (114)
I am a medical student/ health worker	Yes	4.8 (6)
	No	95.2 (118)
Inaccessible and inconvenient governmental health facility	Yes	10.5 (13)
	No	89.5 (111)

4. DISCUSSION

Our study described community pharmacies treatment practices of malaria and residents' pattern of anti-malarial drug usage in Abura, a community within the Cape Coast Metropolis. Our study found the prevalence of non-prescribed use of anti-malarial drug among participants to be 41.2%, comparable to the finding of a similar study conducted in Bolgatanga (Ghana) with 43.4% of non-prescribed anti-malarial drug use [16]. Other related studies including that of Agueh et al. [17] reported a 54.7% of non-prescribed anti-malarial drug use. Sex wise, some previous studies have given varying reports among males and females use of non-prescribed anti-malarial drugs. For example, males (59.6%) usage of non-prescribed anti-malarial drug was found to be higher than that of females (40.4%) [17]. These findings contradict the report by Osemene et al. [18] where prevalence of females engaging in self-medication was shown to be higher than those of the males. The observation of self-medication of anti-malarial drugs in our study and the previous studies portrays a worrying situation and may contribute to the ever-growing anti-malarial drug resistance. The decision to self-medicate involved personal decision, recommendation by drug dispensers, friends and family based on their own experiences. This observation should be a focus for public health education to discourage self-medication. The role of drug dispensers in malaria treatment has been acknowledged elsewhere [16,17,18]. In as much as these dispensers offer some important services, their work has been acknowledged to have some limitations. Past studies have reported that many of the dispensers practising in community pharmacies are characterized with poor knowledge, and unskilled to manage complicated malaria cases [19-21,22,23].

Our study findings also showed that both orthodox and traditional herbal medications were used by participants for the treatment of malaria. Our study findings are consistent with the findings of Awuah et al. [5] who reported of orthodox medication, and herbal medicine as the first responses to malaria treatment. The sources of these drugs were found to include pharmacies, licenced chemical shops, home preparations and leftover anti-malarial drug use. The main factors that influenced the selection of a particular anti-malarial drug included experience of relieve of symptoms with using that drug and the price of the drug. These observations are similar to other studies that have reported the use of both orthodox and herbal preparations for the treatment of malaria, especially in developing countries [1,24,17]. This further highlights the need to integrate herbal medicine into the conventional medicine. This may help to characterize most of the herbal antimalarial drugs, improve standard and reduce the side effects of self-medication. Again, the public should be educated on the use of leftover anti-malarial drugs, especially in the areas of drug safety, storage, and expiration.

Our study found relatively small proportion of participants who tested for malaria parasite using a rapid diagnostic test kit before self-medicating with anti-malarial drug. This observation is in consonance with the WHO recommendation for the treatment of all suspected cases of malaria (WHO, 2010). This observation should be encouraged among the public to reduce the threat of emergence of malaria parasite resistance. As maintained by Kamal-Yanni et al. [25] presumptive treatment of malaria has the potential to cause an upsurge in the emergence of malaria parasite resistance and incorrect treatment and management of malaria, both complicated and uncomplicated.

Factors accounting for the use of non-prescribed anti-malarial drugs comprised perceived non-seriousness of illness, and cheaper cost than hospital treatment. Similarly, other factors such as long queues and long waiting times at the hospitals influenced participants preference for self-medication. Another previous study reported of similar factors, including poor service delivery among healthcare facilities as propellers to opt for other alternative treatment for malaria, including the patronage of community pharmacies, self-medications, and others [26]. As acknowledged in other previous studies, the patronage of other alternative treatment sources

as a first point of call for malaria treatment and management involve misdiagnosis, under-medication, over-medication, late medical treatment, and anti-malaria resistance [22,27].

5. CONCLUSION

Most of our study participants reported self-medication of non-prescribed anti-malaria drug use. These antimalarials included both orthodox and herbal medications, which were sourced from outlets like community pharmacies, licenced chemical sellers, and home herbal preparations. There is the need to accord community pharmacies with the needed attention, in terms of education, training and monitoring to ensure effective treatment and management of malaria at the community level.

CONSENT

As per international standard or university standard, Participants' written consent has been collected and preserved by the author(s).

ETHICAL CONSIDERATIONS

This study was approved by the University of Cape Coast School of Medical Sciences Internal Review Board. Information from participants was kept confidential.

Participating in this study was voluntary and participants were at liberty to continue or discontinue from the study at any point in time during the data collection period.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Malik M, Hassali MA, Shafie AA, Hussain A, Aljadhey H, Saleem F. Case management of malaria fever at community pharmacies in Pakistan: a

threat to rational drug use. Pharm. Pract. 2013;11(1):8–16.

DOI: 10.4321/s1886-36552013000100003

2. Buabeng KO. The role of the pharmaceutical sector in mlalaria control in Ghana; 2010.

3. Ayanful-Torgby R, Quashie NB, Boampong JN, Williamson KC, Amoah LE. Seasonal variations in *Plasmodium falciparum* parasite prevalence assessed by varying diagnostic tests in asymptomatic children in southern Ghana. PLoS One. 2018;13(6): 1–14.

DOI: 10.1371/journal.pone.0199172

4. Puspitasari HP, Aslani P, Krass I. A review of counseling practices on prescription medicines in community pharmacies. Res. Soc. Adm. Pharm. 2009;5(3):197–210.

DOI: 10.1016/j.sapharm.2008.08.006

5. Awuah RB, et al. Factors associated with treatment-seeking for malaria in urban poor communities in Accra, Ghana. Malar. J. 2018;17(1):1–8.

DOI: 10.1186/s12936-018-2311-8

6. Diema Konlan K, Amu H, Konlan KD, Japiong M. Awareness and malaria prevention practices in a rural community in the Ho Municipality, Ghana. Interdiscip. Perspect. Infect. Dis; 2019.

DOI: 10.1155/2019/9365823

7. Prah JK, Yeboah-Sarpong A, Pinkrah R, Ewudzi-Acquah E. Assessment of the knowledge, attitude and practices of prescribers regarding malaria diagnosis: A cross sectional study among ghanaian prescribers. Pan Afr. Med. J. 2019;34: 1–10. ,

DOI: 10.11604/pamj.2019.34.207.19940

8. Elhag EAA, Sulaiman SAS. Community pharmacists' knowledge and practice regarding malaria and its treatment in Sudan: a cross-sectional survey. Int. J. Clin. Pharm; 2020.

DOI: 10.1007/s11096-020-01149-3

9. 2015 Annual report NMCP. 2015 annual report national malaria control Centre for Health Information Management. 2016; 1–70.

10. G. Statistical Service Accra. Ghana Malaria Indicator Survey 2016 Final Report. Accra, Ghana, Rockville, Maryland, USA GSS, GHS, ICF; 2017. Available:www.DHSprogram.com

11. Prevalence and Management of Malaria in Ghana: A Case Study of Volta Region Chuks J. Mba 1 and Irene K. Aboh 2.

12. Byrne N. Urban malaria risk in sub-Saharan Africa: Where is the evidence?. Travel Med. Infect. Dis. 2007;5(2)SPEC. ISS.:135–137.

DOI: 10.1016/j.tmaid.2006.04.003

13. Ladner J, Davis B, Audureau E, Saba J. Treatment‐seeking patterns for malaria in pharmacies in five sub‐Saharan African countries. Malar. J. 2017;1–13.

DOI: 10.1186/s12936-017-1997-3

14. Cape Coast Municipality.

15. Ampomah P. University of cape coast malaria: Epidemiology and herbal treatment options in some selected areas of central region of Ghana a thesis submitted to the Department of Molecular Biology and Biotechnology of School of Biological Sciences, University of Cape; 2008.

16. Aborah S, Akweongo P, Adjuik M, Atinga RA, Welaga P, Adongo PB. The use of non-prescribed anti-malarial drugs for the treatment of malaria in the Bolgatanga municipality, northern Ghana. Malar. J. 2013;12:266.

DOI: 10.1186/1475-2875-12-266

17. Agueh V, et al. Prevalence and determinants of antimalarial self-medication in Southern Benin. Int. J. Trop. Dis. Heal; 2016.

DOI: 10.9734/IJTDH/2016/27862

18. Osemene KP, Lamikanra A. A study of the prevalence of self-medication practice among university students in southwestern Nigeria. Trop. J. Pharm. Res; 2012.

DOI: 10.4314/tjpr.v11i4.21

19. Malik M, Hassali MA, Shafie AA, Hussain A, Aljadhey H, Saleem F. Manejo de casos de malaria en farmacias comunitarias de Pakistán: Amenaza al uso racional de medicamentos. Pharm. Pract. (Granada). 2013;11(1):8–16.

DOI:10.4321/S1886-36552013000100003

20. Hetzel MW, et al. Malaria treatment in the retail sector: Knowledge and practices of drug sellers in rural Tanzania. BMC Public Health. 2008;8.

DOI: 10.1186/1471-2458-8-157

21. Buabeng KO, Duwiejua M, Matowe LK, Smith F, Enlund H. Availability and choice of antimalarials at medicine outlets in Ghana: The question of access to effective medicines for malaria control. Clin. Pharmacol. Ther. 2008;84(5):613–

619.
DOI: 10.1038/clpt.2008.130

22. Marsh VM, et al. Improving malaria home treatment by training drug retailers in rural Kenya. Trop. Med. Int. Heal. 2004;9(4): 451–460.
DOI: 10.1111/j.1365-3156.2004.01223.x

23. Rusk A, et al. Does anti-malarial drug knowledge predict anti-malarial dispensing practice in drug outlets? A survey of medicine retailers in western Kenya," Malar. J. 2012;11(1):1.
DOI: 10.1186/1475-2875-11-263

24. Molina Gómez K, et al. Characterizing the malaria rural-to-urban transmission interface: The importance of reactive case detection. PLoS Negl. Trop. Dis. 2017; 11(7):1–15.

DOI: 10.1371/journal.pntd.0005780

25. Kamal-Yanni MM, Potet J, Saunders PM. Scaling-up malaria treatment: A review of the performance of different providers. Malar. J. 2012;11:1–10.
DOI: 10.1186/1475-2875-11-414

26. Paintain LS, et al. Intermittent screening and treatment versus intermittent preventive treatment of malaria in pregnancy: Provider knowledge and acceptability. PLoS One. 2011;6(8):1–10.
DOI: 10.1371/journal.pone.0024035

27. Tavrow P, Shabahang J, Makama S. Vendor-to-vendor education to improve malaria treatment by private drug outlets in Bungoma District, Kenya. Malar. J. 2003; 2:1–10.
DOI: 10.1186/1475-2875-2-1

Peer-review history:
The peer review history for this paper can be accessed here:
http://www.sdiarticle4.com/review-history/66912