

Evaluating access to Malaria Rapid Diagnostic Test kit and Artemisinin-based Combination Therapy and the Quality of Treatment Practice among Over-the-Counter Medicine Sellers at the District Level in the Brong Ahafo Region - Ghana

Article by Mensah S.J.A¹, Addai Mensah O², Nagai. H. N³, Annani Akollor M⁴

¹MSc, Clinical Research, Texila American University, George Town, Guyana

²Ph.D, Faculty of Allied Health Sciences, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

³MD, JSI Research and Training Institute, Accra –Ghana

⁴Ph.D, Medical Sciences, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

E-mail: profhenson@yahoo.com

Abstract

Background: Accurate diagnosis and appropriate treatment of malaria with the recommended antimalarials are crucial in the fight against malaria. This study evaluated the availability and sources of ACT and RDT kits among the Over-The-Counter (OTC) medicine sellers in the Pru, Sene and Atebubu-Amantin Districts of Ghana.

Method: A cross-sectional descriptive study was conducted using a structured questionnaire. Sixty-two OTC medicine sellers were randomly selected, informed consent sought and interviewed on access to RDT kit, ACT and Training in malaria diagnosis. Data entry, editing and analysis was done using SPSS Ver 22.

Results: The study revealed that 26.2% of respondents use the RDT kits to diagnosis and confirm suspected malaria. 94.1% respondents who had malaria RDT kits at their shop purchased them from the NMCP and Pharmacy shops. 95% of respondents had in stock at least one of the 3 recommended ACT - artesunate amodiaquine, artemether lumefantrine, and/or dihydroartemisinin piperazine. 65.6% of respondents often recommend artemether lumefantrine to patients to treat uncomplicated malaria. The average wholesale and retail prices of the Affordable Medicine Facility malaria (AMFm) branded ACT were higher than the approved suggested retail prices.

Conclusion: Most OTC medicine sellers do not comply with the national antimalarial drug treatment policy. 85% of OTC medicine sellers purchase their AMFm branded ACT from second-line buyers at relatively higher price.

Recommendation: Regular training of OTC medicine sellers on malaria control and easier access to quality and affordable malaria RDT kits and ACT would help improve malaria control at the community level.

Keywords: Malaria, ACT, RDT, OTC medicine seller, Pru, Sene and Atebubu-Amantin.

Introduction

The World Health Organization (WHO) guidelines for treatment of malaria recommends parasitological testing of all suspected cases of malaria in all settings with either microscopy or rapid diagnostic test (RDT) kits (WHO malaria treatment Guidelines, 2015). Per the treatment guidelines, Artemisinin-based Combination Therapy (ACT) is the recommended medicine for the treatment of uncomplicated malaria. However access to these appropriate malaria diagnostic tools and treatment protocols remains a challenge in resource constrained settings. Treatment is further compromised by the widespread use of anti-malarial drugs for all fevers and by incorrect dosing (Danquah, 2010).

In Ghana, malaria contributes significantly to ill health in the general population and contributes to overall mortality especially in infant and maternal related deaths, accounting for about 40-50% of outpatient consultations in hospitals and clinics. It also contributes directly to low productivity, reduced school attendance and poor academic performance among school children in Ghana

(Goodman et al 2007a). As part of efforts to improve access to prompt treatment, particularly in isolated rural areas, community-level interventions which seek to strengthen home management of children with malaria are gaining importance. Private pharmaceutical facilities are the main points of call for the management of uncomplicated malaria in sub-Saharan Africa (Danquah, 2010). In Ghana the community-based drug retail outlets popularly called over the counter (OTC) medicine shops are well-known first points of call for malaria treatment.

Over-the-counter (OTC) medicine sellers and malaria control in Ghana

In Ghana, OTC Medicine Sellers' shops are the principal source of medicinal products for the Ghanaian rural population. A Licensed OTC Medicine seller is a private provider who has obtained the appropriate license from the Pharmacy Council, which authorizes him or her to engage in the retail of only Over-the-Counter drugs (Class C or OTC drugs) at a premise or location specified in the license (Pharmacy Act, 1994 -ACT 489). According to the Ghana National Over-the-Counter Medicine Sellers Association there are an estimated 13,000 registered OTC Medicine Sellers in Ghana. Selection exercises conducted by FHI 360 malaria team in 2015 indicated there are over 100 OTC medicine sellers in the Pru, Sene and Atebubu-Amantin districts. Studies conducted by Goodman et al (2007a), Smith (2004) and Van den Boom et al (2004), on health seeking behaviour among Ghanaians suggested that, community pharmacies and licensed chemical shops were usually the first port of call for health advice and treatment for many individuals with symptoms suggestive of malaria. The Mobilize against Malaria (MAM) project baseline report in 2008 indicated that OTC Medicine Sellers are recognized as the first-line or only source of consultation for 60 percent of people seeking health care in general. The explanation given for this observation was that, those community-based retail outlets operated for long hours, were not charging consultation fees, and patrons did not have to wait for long hours before having access to practitioners to purchase antimalarials. The retail practitioners were also perceived to be friendlier, and payments for anti-malaria services were flexible for known community members (Ahorlu et al 1997, Goodman et al 2007a, Smith 2009b). Knowledge and practice of OTC medicine sellers in malaria management, prevention and control are thus crucial to the fight against malaria at the community level. To date, little research has been done to document the knowledge and practice on malaria case management among OTC medicine sellers and its effect on malaria control in Ghana. This means the role of Over-the-Counter Medicine Sellers in Ghana has less been exploited. The objective of this study was to assess the malaria knowledge and practice among over-the –Counter Medicine Sellers in the Brong Ahafo region of Ghana.

Rapid diagnostic test (RDT) kit for malaria diagnosis

Rapid Diagnostic Test (RDT) kits are quick diagnostic tests that use antibodies to detect malaria parasite antigens in a blood sample. Prompt, accurate diagnosis of malaria is part of effective disease management (WHO malaria treatment Guidelines, 2015). The current malaria treatment guidelines strongly recommends parasitological testing of all malaria cases under all settings with either RDT (especially under resource -constrained settings) or microscopy (if available). WHO strongly advocates the policy of “Test, Treat and Track” to improve quality of care surveillance (WHO, 2015). This has been driven by several factors, including the fact that a large proportion of patients with fever are being given antimalarial medicines when they have other, potentially serious ailments which are missed (Ansah et al, 2015) and the wastage of relatively expensive antimalarial medicines on patients without malaria.

The current malaria treatment policy recommends that OTC medicine sellers use RDT to confirm suspected malaria cases before treatment of uncomplicated malaria or referring the complicated ones to the appropriate health facility. However not all OTC medicine sellers have been trained in the use of malaria RDT (unpublished information from Sene West Secretary, OTC Medicine Sellers Association). Interviews with some trained OTC Medicine Sellers indicated that most of the trained ones do not have the RDT kits. They attributed low patronage by clients, relatively high cost and lack of constant supply as the reasons for the unavailability of the kits.

Access to antimalarial medicine

Medicines are useful in promoting health, preventing and managing diseases but can be harmful when used inappropriately (Danquah, 2010). A baseline survey conducted by Health Partners Ghana in the Mobilise Against Malaria (MAM) project in five districts in Ashanti Region found that the commonest anti-malarial medicines sold in the LCS (now OTC Medicine Sellers) shops were all mono-therapies, with Sulphadoxine-Pyrimethamine being the most commonly stocked medicine (82% of LCS), followed by Amodiaquine syrup (73.9%), and then Artesunate tablets (50.9%). Combination therapy of any form was sold less frequently in the LCS shops; Artemether-Lumefantrine (37.9%); Artesunate – Amodiaquine (19.9%) – (MAM Project Baseline report, 2008). In rural areas in particular, most of the poorest often access antimalarials through the private drug retail sector, largely because of the transport cost and opportunity cost (things people could otherwise spend money on) of accessing healthcare (Ansah et al, 2015). In recognition of this, several schemes, including the Affordable Medicines Facility for malaria (AMFm) have been deployed to ensure that effective antimalarial medicines are available through private outlets that poorer patients use (Arrow et al, 2004).

Methods

Study design

A cross-sectional descriptive study was conducted in the Pru, Sene and Atebubu-Amantin districts of the Brong Ahafo Region of Ghana among Over-the-Counter Medicine Sellers to evaluate the availability and the source of Artemisinin-based Combination Therapy (ACT) and malaria rapid diagnostic test (RDT) kit.

Study area

Pru, Atebubu-Amantin and Sene districts are rural districts in the Brong Ahafo region of Ghana. They are predominately rural with large tracts of forest, many water bodies, high vector density for malaria, poor sanitation, with communities that are generally at high risk of malaria. The districts are hyperendemic for malaria with prevalence of 70-90% (NMCP report 2008). There are few Health facilities in the districts, this also accounts for high patronage of the services of the OTC medicine sellers. There are over 100 OTC sellers operating in these rural districts.

Sampling method

A list of Over-the-Counter Medicine sellers was obtained from the Association Executives and also FHI 360 OTC Medicine sellers identification exercise indicates a total of 106 OTC Medicine sellers (Pru -21, Sene -34 Atebubu-Amantin-51). Sixty-two (62) OTC Medicine Sellers was randomly selected, informed consent was sought and interviewed.

Data collection tools, processing and analysis

Structured questionnaire and inform consent form

Informed consent was sought from the OTC Medicine sellers after which structured questionnaires were administered to the respondents at the OTC Medicine Shop. The interviews were conducted by four trained data collectors from March 5 to 12, 2016. The interviews sought to elicit information on the knowledge and skills of the OTC medicine sellers in malaria transmission and prevention, tools or criteria for diagnosis, treatment regimen, availability of Rapid Diagnostic Test kit, sources and availability of Artemisinin-based Combination Therapy in the shop and malaria training participated within the past two years.

Data processing and analysis

The raw data was initially captured in Microsoft excel and Statistical Package for Social Sciences (SPSS) version 22 was used to clean/edit and analyze the data quantitatively. The necessary plots and tables were prepared and inferences drawn from the analysis.

Ethical considerations

Ethical approval (CHRPE/AP/038/16) was sought from the Committee on Human Research, Publication and Ethics (CHRPE) - the Kwame Nkrumah University of Science and Technology (KNUST). Permission was also sought from the Pru, Sene West and Atebubu-Amantin District Directors of Health Services, and the Districts OTC medicine sellers Associations. The research participants were OTC medicine sellers who gave their informed consent and voluntarily participated. Privacy, confidentiality and anonymity were assured and ensured. Participants were not compensated for the information provided.

Results

Demographic characteristics of respondents

Sixty two (62) respondents consented and were interviewed. About 47% of the respondents were shop owners and 53% were shop assistants. Majority of the respondents were males, 52 (83.9%). The females constituted 16.1% (10) of the total respondents, and accounted for 27.3 % (9) of the shop assistants and 3.4 % (1) of the shop owners. Most of the respondents were within the age group 20 – 39 years (58.1%). There was no OTC medicine seller under 18 years of age. 23 of the respondents, representing 37.1% were within the age range 40 – 59 years, with only one person (1.6%) been above 60 years (62 years). 39 respondents (63%) had participated in at least one malaria training workshop organized by the Pharmacy council and/or its partners within the past two years ;2013, 2014 and 2015., (Table 1)

Table1: Demographic characteristics of respondents; the respondents were grouped according to age and gender and into whether or not they had participated in a malaria training program

	Sex		Age group (years)				Training in Malaria control participated in within the past 2 years	
	Male	Female	18 - 19	20 – 39	40 - 59	≥60	Trained	Non-Trained
Frequency (N=62)	52	10	2	36	23	1	39	23
Percentage	83.9%	16.1%	3.2%	58.1%	37.1%	1.6 %	63%	37%

Malaria diagnosis practice

Malaria diagnosis

54.1% (33/61) and 26.2% (16/61) of respondents use clinical symptoms and Rapid Diagnostic Test (RDT) kits *respectively* to diagnose malaria. About 5% (2) use “Malaria Job Aid” *to* diagnose malaria and almost 8% (3) use “Assumption” *to* diagnose malaria. Over 30% (7 out of 23) of the respondents who had not participated in any malaria training within 2013 and 2015, use Assumption *to* diagnose malaria. None of the respondents who had never participated in malaria training within 2013 and 2015 used *Malaria Job aid* to help diagnose malaria. There was a significant difference ($p = 0.009$) between the responses of respondents who had participated in malaria training within 2013 and 2015 and those who had not in relation to the following methods of diagnosing malaria; “RDT” “Assumption” and “Malaria Job aid” See Table 2 for details.

Rapid diagnostic test kit (RDT) training, possession, source and price

Sixty-one (67.2%; n=61) had been trained on how to use malaria RDT kit to diagnose malaria. Out of the 61, only 27.9% (17) had malaria RDT kit at the Shop at the time of the interview. Some reasons

given for the unavailability of the malaria RDT kits at the time of the interview included: “low stocks”, “low patronage of the RDT by client due to price concerns”, and “the inconsistency in the supply of RDT by the suppliers”. 94.1% (16/17) respondents who had RDT bought their malaria RDT kits from Pharmacy shops and the National Malaria Control Program (NMCP). Only one person procured the kit through the District OTC Medicine Sellers Association. The average whole sale price per cassette of a malaria RDT kit was One Ghana cedi forty five pesewas; GHC 1.45±0.16 (equivalent to USD \$ 0.37±0.04) and the average retail price per cassette of a malaria RDT kit was Two Ghana cedi four peswes GHC 2.04±0.13(USD \$ 0.53±0.03) -. See table 2 [Exchange rate GHC 3.85 = USD \$ 1.00]

Table 2. OTC medicine sellers' response on malaria diagnosis and access to RDT kit

	Malaria diagnosis practice				Trained in how to use malaria RDT		Had Stock RDT at shop at time of interview		Source of RDT kit *N1 = 17		Price per RDT cassette (GHC ± SD)	
	Use Clinical symptoms	Use RDT kit	Presumptive/assumption	Use Malaria job aid	Yes	No	Yes	No	NMCP/ Pharmacy	OTC association	Whole sale	Retail
Number of respondents (N=61)	33	16	10	2	41	20	17	44	*16	*1	1.45± 0.16	2.04± 0.13
Percentage	54.1%	26.2%	16.4%	3.3%	67.2%	32.8%	27.9%	72.1%	*94.1%	*5.9%	-	-

Malaria treatment practice

92% (57/62) of the respondents mentioned ACTs as the recommended drugs for treating uncomplicated malaria. Apart from ACTs, respondents also stock and dispense other antimalarial medicines. 43.5% (27/62), 38.7% (24/62), 30.65% (19/62) and 26% (16/62) indicated/reported they stock and dispense quinine (syrup for infants, tablet for adult), monotherapies (specifically amodiaquine syrup for infants), Sulphadoxine-Pyrimethamine (SP) and herbal antimalarial mixtures for treating uncomplicated malaria respectively. No respondent indicated Chloroquine for treating malaria (Table 3). About 65.6% (40/61) of respondents often recommend AL as the first choice for treatment of uncomplicated malaria. Reasons attributed to this included, greater tolerance by patients in comparison to other ACTs, clients' preference, effectiveness, availability and accessibility on the market. 24.6% (15/61) of respondents often recommend AS/AQ to patients due to its effectiveness in treating uncomplicated malaria. 6.6% (4/61) often recommend SP for treating uncomplicated malaria. Attributable reasons included; non-availability of subsidized ACTs and the high cost of available ACTs and insistence by some clients on SP usage for malaria treatment (Table 4).

69.4% (43/62) of respondents dispense antimalarial based on the patient's age, 19.4% (12/62), 4.8% (3/62) and 4.8% (3/62) of respondents dispense antimalarial based on patient's weight and age, actual weight of patient and on Clinicians' prescriptions respectively (Table 4).

Fifty-five (90 %) of 61 respondents who often recommend ACTs for patients, described the treatment regimen of both AL and AS/AQ as; "4 tablets twice daily (morning and evening) for 3 days for adults" and "2 tabs twice daily (morning and evening) for 3 days for children". Barely 4 out of 61 respondents stated that "the first dose of AL for day one should be taken 8 hours interval"

Four (4) respondents who often recommend SP to patients, described the treatment regimen of SP as "3 tablets single dose".

Table 3. Antimalarial medicine stock and sell by respondent

	ACT (AS/AQ, AL and DP)	Quinine	Monotherapies (Artesunate, Artemether, Amodiaquine, Lumefantrine)	SP	Herbal Preparation
Number of respondents N = 62	57	27	24	19	16
Percentage	92%	43.5%	38.7%	30.7%	26%

Table 4. Responses on deciding on dosage of medicine for treating malaria

Decision on dosage of medicine for treating malaria	Number of Respondent (N=62)
Base on patient's age	43 (69.4%)
Base on estimated weight and age of patient	12 (19.4%)
Base on actual weight	3 (4.8%)
Base on Clinician's prescription	3 (4.8%)
None of the above	1 (1.6%)

Artemisinin-based combination therapy (ACT) stock, sources and prices

Type of ACT stocked at shop

At the time of the interview 58 (95%) respondents had at least one of the three ACTs (AS/AQ and/or AL and/ or DP) in stock. Over 44% (27) of respondents had only AL. 42.6% (26) had both

AS/AQ and AL, 3.2% (2) had all the three recommended ACTs (AS/AQ, AL and DP). Three respondents had only AS/AQ and 3 respondents (1 trained OTC Medicine seller and 2 non trained OTC medicine sellers) had none of the three ACTs. No shop had only DP in stock (Figure 1)

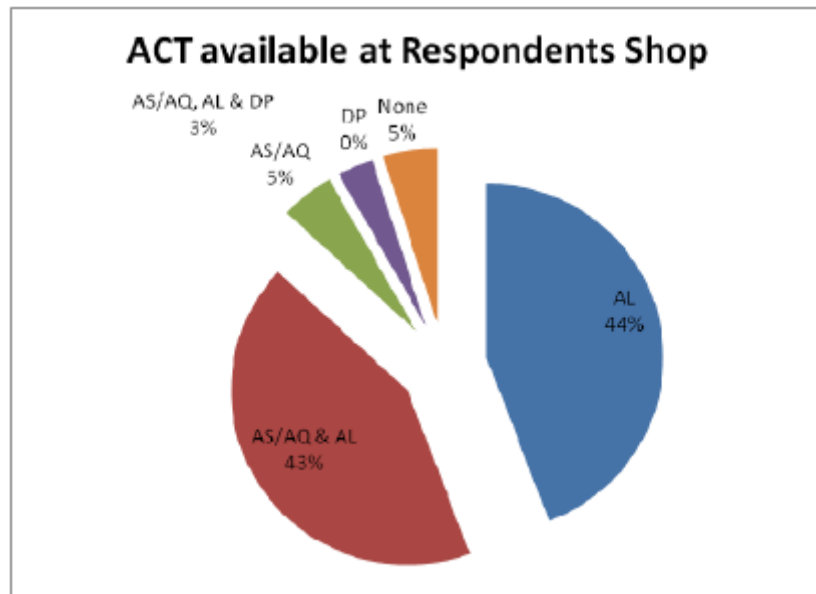


Figure 1. ACT available at Respondent's shop

The figure shows the response of OTC Medicine sellers on relative stock of Antimalarials in the shop at the time of interview. 95% respondents had at least one of the three ACTs (AS/AQ and/or AL and/ or DP) in stock. 44% of respondents had only AL. 42.6% 26 had both AS/AQ and AL, 3.2% had all the three recommended ACTs (AS/AQ, AL and DP).

AS-Amodiaquine syrup; AL - Artemether-Lumefantrine; DP- Dihydroartemisinin Piperazine

Sources and suppliers of ACT

Fifty-two respondents, representing 85.2% (52/61) purchase their ACTs from Pharmacies and Pharmaceutical Companies in Kumasi, the capital city of the Ashanti region - Ghana. 10 out of the 52 (19.2%), 7 out of the 52 (13.5%), 5 out of 52 (9.6%), another 5 out of the 52 (9.6%) and 2 out of the 52 (3.8%) respondents buy their ACTs from PokuPharma Limited, Oson's Chemist Limited, Tobinco Pharmaceuticals Limited, Dannipharma Limited and Kinapharma Limited respectively. Twenty-three of the 52 (44.2%) respondents did not mention the name of the Pharmacy or Pharmaceutical Company they buy their ACTs from in Kumasi. Reasons given was that "they do not have one particular Pharmacy in Kumasi they buy their ACTs from. Also sometimes the shop owners buy them from Kumasi". Five (8.2%) and two (3.3%) respondents purchase their ACTs from the Kwapong Pharmacy at Atebubu, Atebubu-Amantin district and Rhema Pharmacy at Yeji, the Pru districts respectively (Figure2). Per the Affordable Medicine Facility-malaria (AMFm) list of first-line buyers in Ghana (AMFm First-line buyer list, 2013) Oson's Chemist Limited and Tobinco Pharmaceuticals Limited are among the accredited first line buyers of the affordable ACTs in Ghana. The remaining Pharmacies and pharmaceutical companies are not; therefore their wholesale prices and retail prices of ACTs may be quite higher than that of Oson's Chemist and Tobinco Pharmaceuticals Limited. According to Global Fund August 2010 Report, the Suggested Retail Price (SRP) of the AMFm branded ACTs was no more than GHC1.50 (equivalent to USD \$1.00 then).

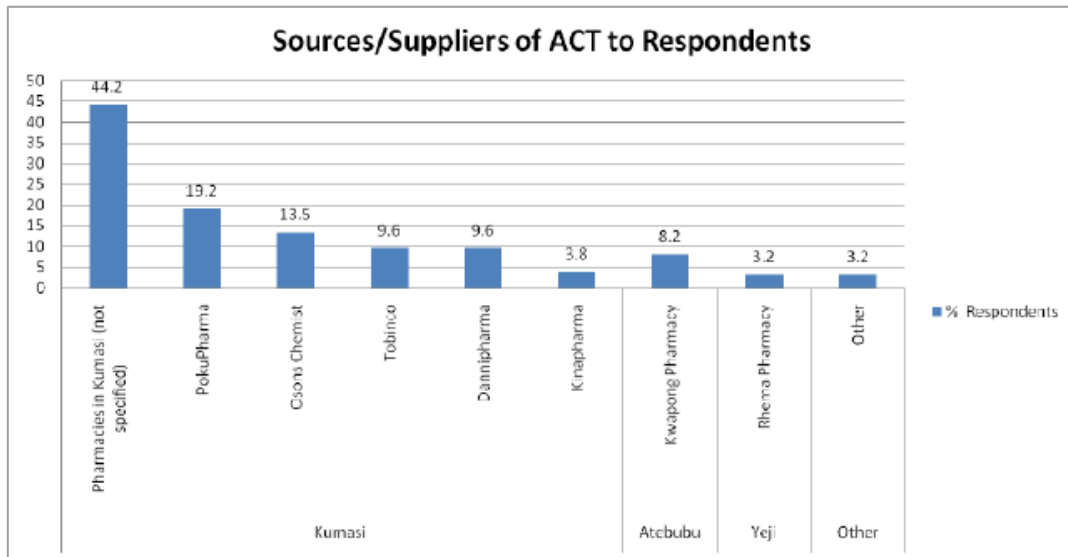


Figure 2. Sources/Suppliers of ACTs to OTC medicine sellers

85.2% of respondents purchase their ACTs from Pharmacies and Pharmaceutical Companies in Kumasi, 19.2%, 13.5%, 9.6%, and another 9.6% and 3.8% respondents buy their ACTs from PokuPharma Limited, Oson's Chemist Limited, Tobinco Pharmaceuticals Limited, Dannipharma Limited and Kinapharma Limited respectively. 44.2% respondents did not mention the name of the Pharmacy or Pharmaceutical Company they buy their ACTs from.

Average wholesale and retail prices of ACTs

The wholesale price range and retail price range of AS/AQ were GHC1.50 - 7.00 (USD \$0.39 -1.82) and GHC3.00 -12.00 (USD \$0.78-3.12) respectively. The average wholesale and retail prices of AS/AQ by respondents were GHC2.85 ±1.28 (USD \$0.74±0.33) and GHC5.18±2.18 (USD \$1.35±0.57) respectively. The wholesale price range and retail price range of AL were GHC1.00 - 7.00 (USD \$0.26 -1.82) and GHC3.00 -12.00 (USD \$0.78-3.12) respectively. The average wholesale and retail prices of AL by respondents were GHC2.97±1.23 (USD \$0.77±0.32) and GHC5.51±2.21 (USD \$1.43±0.57) respectively. The wholesale price range and retail price range of DP were GHC5.00 - 8.00 (USD \$1.3 -2.08) and GHC9.00 -14.00 (USD \$2.34 -3.64) respectively. The average wholesale and retail prices of DP by respondents were GHC6.50±2.12 (USD \$1.69±0.55) and GHC11.5±3.54 (USD \$2.99±0.92) respectively. While there were no significant differences between wholesale prices of AS/AQ and AL and retail prices of same, DP showed a nearly 56% difference between the wholesale price and retail price (Figure 3)

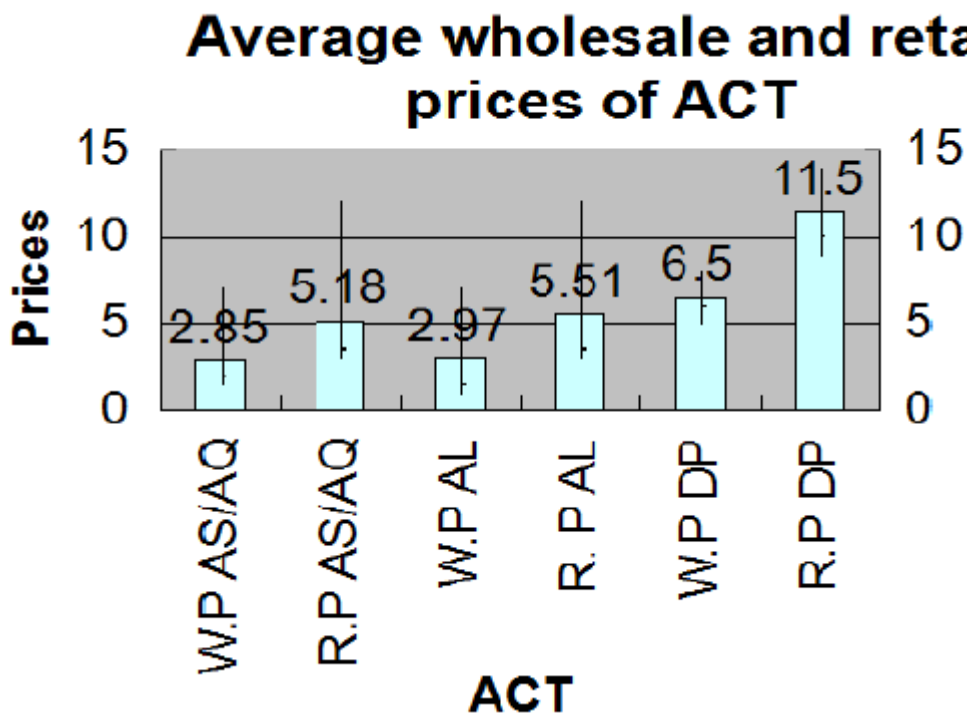


Figure 3. Average prices of ACTs

Key: W.P -Wholesale Price R.P - Retail Price Exchange rate GHC 3.85 = USD \$ 1.00 The figure exposes the cost implications of particular antimalarials. While there is little difference between AS/AQ and AL pricing at the wholesale and retail level, DP show nearly 56% difference between the wholesale price and retail price of DP

Most patronized ACT by patients

Fifty (50) respondents, representing 86.2% (50/58) of the respondents indicated that AL is the most patronized ACT. Reasons for the high patronage of AL include comments like “it is very effective”, “it is always available” “it works fast” “it is affordable” and “patient tolerate the strength of AL”. 13.8% (8/58) also said AS/AQ is preferred because it very efficacious” and “cures malaria faster” (figure 4). 32.8% (20/61) respondents buy and stock ACT as and when it is stocked out, hence has no particular trend of stocking ACT at shop. 29.5% (18/61), 21.3% (13/61), 8.2% (5/61) and 3.3% (2/61) of respondents stock ACTs weekly, monthly, bi-weekly and everyday respectively.

Most Patronized ACT by Patients

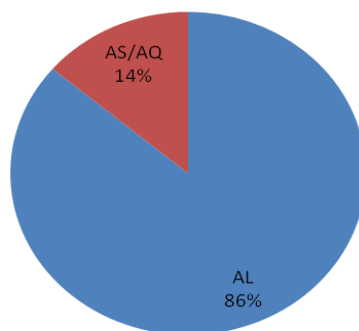


Figure 4. Most patronized ACT by patients

The figure indicates the high patronage of AL at 86% of respondents.

Discussion

Malaria diagnosis and treatment practice

This study revealed that about 74% of the OTC medicine sellers use either clinical symptoms or presumption/assumption of “trial and error” to diagnose malaria, with only 26.2% of them using the rapid diagnostic test (RDT) kit to diagnosis and confirm suspected cases of malaria. This is not in compliance with the WHO Guidelines for Treatment of Malaria, (2015). This guideline recommends that in all settings all cases of suspected malaria should be confirmed with a parasitological test i.e. microscopy or RDT. Danquah, 2010 made similar conclusions from a study conducted in the Ashanti Region. There was a significant difference ($p < 0.05$) between the malaria diagnosis of OTC medicine sellers who had participated in malaria training within the past 2 years and those who had not. An OTC medicine seller who has participated in malaria training within past 2 years was more likely to use RDT to diagnose malaria than an OTC medicine sellers who has not.

This study revealed that majority (69.4%) of OTC medicine sellers decide on the dosage of antimalarial medicine for treatment based on the patient’s age. Only 19.4% and 4.8% of them decide on dosage based on the estimated weight and age rather than the actual weight of the patient. This is attributed to the fact that most OTC medicine sellers do have weighing scale. Hence very few treat malaria according to the recommended guidelines.

Antimalarial medicine stock and dispense to patients by OTC medicine sellers

Per the national antimalarial drug policy and the WHO Guidelines for Treatment of malaria, 2015, ACT is the recommended drug for the treatment of uncomplicated malaria. Monotherapies (artesunate, artemether, amodiaquine and lumefantrine), Sulphadoxine-Pyrimethamine (SP), quinine and herbal preparations are not recommended for the treatment of uncomplicated. This study showed that 95% of respondents stock and sell ACTs. Among the ACTs, Artemether Lumefantrine (AL) is the most (65.6%) respondents recommend to patient for malaria treatment, followed by Artesunate Amodiaquine (AS/AQ). However, as high as 43.5%, 38.7%, 30.7% and 26% of respondents stock and sell quinine, monotherapies, SP and herbal preparations respectively to treat uncomplicated malaria. Reasons stated by most of these OTC medicine sellers included the fact that whiles “some clients/patients insist on using the SP, monotherapies, herbal and the quinine”, “others could not afford ACT” and “they often run out of stock of the affordable medicines - facility-malaria (AMFm) branded ACT and are left with no option than to sell these ones”. This implies that the availability of ACT in an OTC medicine shop does not guarantee its use. This finding concurs with that of Danquah 2010, where 71.9% of Licensed Chemical Sellers’ (LCS) shops had only monotherapies among which 28.1% had only SP. There is therefore the need for effective and strong pharmacovigilance system and monitoring by the Pharmacy council and District Health team to ensure compliance. There is also the need to strengthen the existing systems and build effective structures that would ensure easier access to quality and affordable ACTs at the community level.

This study revealed that 90% of OTC medicine sellers could not explain appropriately the treatment regimen of the ACTs, especially the treatment regimen of AL. Most of them describe the treatment regimen of AL in the same way AS/AQ is taken. Barely 4% of OTC medicine sellers stated “the first dose of AL for day one should be taken 8 hours interval”.

ACT Stock, sources and prices

The study revealed that 95% of OTC medicine sellers had in stock at least one of the 3 recommended ACTs - AS/AQ, and/or AL and/or DP (See figure 1). A similar study by Danquah 2010 indicated that 94.1% of Pharmacies and 28.1% of LCSs had the recommended anti-malarial (ACT) available at their shops. 32.8% of respondents had no particular time schedule of re-stocking their shop with ACT. They stock ACTs as and when stocks are low. 65% of the respondents re-stocks their shops with ACTs at least every month. 44% and 43% of OTC medicine sellers indicated that AL and AS/AQ respectively are the most patronized ACT by patients.

According to the Global Fund August 2010 Report, the Suggested Retail Price (SRP) of the AMFm branded ACTs was no more than GHC1.50 (equivalent to USD \$1.00 then). The study revealed that

the average retail prices: GHC5.18±2.18 (USD \$1.33±0.56) and GHC5.51±2.21 (USD \$1.42±0.57) (Figure 3) of the AMFm branded AS/AQ and AL respectively are far higher than the suggested retail price (SRP) of GHC1.50 (USD \$1.00) in August 2010.

85.2% of OTC medicine sellers purchase their ACT from Pharmacies or Pharmaceutical companies in Kumasi about 4 to 5 hours of 240 -250 km journey by public transport from Pru, Sene and Atebubu-Amantin districts.

This study also revealed that only two of the Pharmaceutical Companies who supply ACTs to the OTC medicine sellers were AMFm First-line buyers of ACTs (AMFm first-line buyers list Ghana, 2013) hence the disparities in the wholesale and retail prices of the ACTs in the four districts (Figure 2 and 3).

Conclusion and recommendation

Majority of the OTC medicine sellers in the Pru, Sene and Atebubu-Amantin districts do not comply with the national antimalarial drug treatment policy. Only 26.2% of the OTC medicine sellers use RDT kit to test before treating malaria with over 94% (out of the overall 26.2%) buying their RDT kits from the National Malaria Control Program and Pharmacies.

Majority (85%) of OTC medicine sellers purchase their AMFm branded ACTs from second-line buyers at relatively high wholesale prices hence the high retail prices. Quite a high number (26% - 43.5%) of OTC medicine sellers still sell non-recommended antimalarial. This means that the physical availability of the ACT in an OTC medicine shop does not guarantee access to effective therapy.

Regular training of OTC medicine sellers on malaria control and easier access to quality and affordable malaria RDT kits and ACTs would help improve malaria control at the community level.

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References

- [1]. Affordable Medicine Facility-malaria (AMFm) first-line buyers list, Global Fund, September, 2013.
- [2]. Ahorlu CK, Dunyo SK, Afari EA, Koram KA, Nkrumah FK: Malaria-related beliefs and behaviour in southern Ghana: implications for treatment, prevention and control. *Trop Med Int Health* 2: 488–499,1997
- [3]. Ansah E.K, Narh-Bana.S , Affran-Bonful H, Bart-Plange C, Cundill B., Gyapong M, Whitty C. J .M, The impact of providing rapid diagnostic malaria tests on fever management in the private retail sector in Ghana: a cluster randomized trial, *BMJ* 2015;350:h1019 doi: 10.1136/bmj.h1019 (Published 4 March 2015)
- [4]. Arrow KJ, Panosian CB, Gelband H. Saving lives, buying time: economics of malaria drugs in an age of resistance. Institute of Medicine, 2004
- [5]. Buabeng K.O, The Role of the Pharmaceutical Sector in malaria Control in Ghana, Faculty of Health Science, University of Eastern Finland 2010
- [6]. Cohen JC, Gyansa-Lutterodt M, Torpey K, Esmail LC, Kurokawa G: TRIPS, the Doha Declaration and increasing access to medicines: policy options for Ghana. *Global Health* 1: 17, 2005
- [7]. Danquah D.A ,Evaluating Access to Anti-Malaria medicine and quality of Service delivery by Community Pharmacies and Licensed Chemical Shops in Ashanti Region, Ghana 2010
- [8]. FHI 360, OTC medicine sellers identification and selection exercise, Pru, Sene and Atebubu-Amantin districts, 2015, Ghana
- [9]. Gallup, JL; Sachs, JD. The economic burden of malaria. *Am J Trop Med Hyg.* 2001; 64:85–96. [PubMed]
- [10]. Ghana district map -www.ghanadistricts.com/home) accessed on May 5th, 2015
- [11]. Global Fund AMFm pricing , August 2010 report
- [12]. Goodman C, Brieger W, Unwin A, Mills A, Meek S, Greer G: Medicine sellers and malaria treatment in sub-Saharan Africa: what do they do and how can their practice be improved? *Am J Trop Med Hyg* 77(Suppl 6): 203–218, 2007a
- [13]. Health Partners Ghana. Management of malaria by care givers and licensed chemical sellers in the Ashanti Region, Ghana. A baseline survey of the MAM Project October, 2008.

- [14]. Ministry of Health (GNDP) Ghana: Ghana national drug policy, second edition 2004. Accessed May 4th 2015 from http://who.int/countries/gha/publications/Ghana_National_DrugPolicy_2nd_Edition.pdf
- [15]. Pharmacy Council, Ghana: Practice standards for pharmacist and licensed chemical sellers, 2004.
- [16]. Republic of Ghana (Pharmacy ACT 489): Pharmacy Council ACT, 1994
- [17]. World Health Organization: Guidelines for Treatment of Malaria, 2015
- [18]. World Health Organization: World Malaria Report 2015.
- [19]. WHO The Roll Back Malaria strategy for improving access to treatment through home management of malaria. World Health Organization. 2005.