Global Scientific JOURNALS

GSJ: Volume 7, Issue 10, October 2019, Online: ISSN 2320-9186
www.globalscientificjournal.com

ORIGINAL RESEARCH

ACCESS TO ARTEMISININ COMBINATION THERAPY AMONG MOTHERS OF UNDER FIVE YEARS OLD CHILDREN IN KISUMU CITY, KISUMU COUNTY

Judith Atieno[1,2] George Ayodo[1] Samson Ongwen Adoka[2]

Author affiliations: [1]School of health Sciences, Jaramogi Oginga Odinga University of Science and Technology, Kisumu, Kenya. Correspondence: Judith Atieno P.O. Box 1578-40100, Kisumu, Kenya Tel: +254700464113 Email: atienojudith2000@gmail.com

Abstract

Background: Antimalarial subsidy policy on artemisinin-based combination therapy (ACT) was adopted to increase access to the most effective treatment option against malaria in Kenya. However, there is a paucity of data on access to ACT among mothers of children under five years from malaria prone areas of western Kenya. Therefore, this study was designed to determine access to ACT and the factors that influence access to ACT among mothers of children below the age of 5 years.

Methods: To this end, this study adopted a cross-sectional study design and data was collected using questionnaires from 181mothers with under-five year old children within Manyatta Slum in Kisumu city, which is within malaria-endemic region. Data collected was checked in the field and cleaned at the end of each day to ensure completeness, consistency, credibility and eligibility. This was done to correct errors or to fill in missing information before another day of data collection. Quantitative data for the study was analysed. For variables with two possible outcomes (knowledge of malaria treatment policy and factors influencing knowledge of ACT) a multivariet logistic regression was used to determine factors that influence access to ACT. For knowledge of ACT, analysis was performed by chi-square tests. Statistical significance was assessed at a $p \leq 0.05$. For demographic characteristics of the study population, data was presented using frequencies.

Results: The results of this study revealed that 171study participants (94.5%) were aware of ACT as a drug for malaria treatment, 167(92.3%) had access while 164 (90.6%) knew the correct dosages. Further analysis using binary logistic regression analysis revealed that those who were aged between 21-30 years (Adjusted Odds, 1.86; 95% C.I 0.16-22.13; P=0.624) and those aged between 31-40 years (Adjusted Odds, 4.29; 95% C.I 0.42-44.15; P=0.6221) were more likely to access ACTs relative to those aged below 21 years. Those having secondary education (Adjusted Odds, 11.12; 95% C.I 1.15-107.64;P=0.038) were more likely to access ACTs relative to those with primary education and those who perceived ACT to be affordable were more likely (Adjusted Odds, 152.87; 95% C.I 10.52-2221;P=0.0001) to access it relative to those who perceived it not to be

affordable. The results reveal that those who were aged between 31-40 years (Adjusted Odds, 10; 95% C.I 10.52-23.21;P=0.0005), were more likely to be knowledgeable about malaria treatment policy relative to those below 21 years. In addition, those with tertiary education (Adjusted Odds, 15.97; 95% C.I 1.48-172.64; P=0.023) were more likely to be knowledgeable about malaria treatment policy relative to those with primary education. Those who were employed were more likely (Adjusted Odds, 1.32; 95% C.I 0.3-5.74; P=0.0714) to be knowledgeable about malaria treatment policy relative to those who were not employed.

Conclusion: These data reveal that age, education level employment status and perception of affordability are key predictors of access to ACT. There is need of programmatic interventions that target young mothers and those with low socioeconomic status to ensure that there is prompt access to ACT that will result in effective treatment of malaria among children aged below five years.

Keywords: [Artemisinin Combination Therapy (ACT), Access to ACT, Malaria treatment policy]

Introduction

Malaria is a major public health problem associated with a global morbidity of 207 million and mortality of 627,000 annually. Of note is that Sub-Saharan Africa accounts for 90% of annual mortality with children below five years of age and pregnant women bearing the brunt of malaria associated morbidity and mortality [1]. Although malaria reduction strategies have reduced malaria transmission and associated mortality (WHO, 2010), there is emergence of insecticide resistant vectors, coupled with weak public health infrastructure, drug resistant parasite strains and changes in vector biting behaviors that is leading to resurgence of the disease [2]; [3]). Moreover, evidence indicates that malaria is a poverty related disease with the 20% of world's poorest countries contributing to 58% of annual global mortality [4]). Thus adoption of policies that ensure prompt access to affordable and effective malaria treatment will be critical in effective malaria control programs. To this end The Roll Back Malaria (RBM) partnership developed strategies to ensure prompt access to affordable and appropriate treatment within 24 hours of symptoms ([5]). To achieve this, the government of Kenya adopted Artemether-Lumefantrine (AL) as the first-line ACT drug for the treatment of uncomplicated malaria in the year 2004

[6]. Moreover, to cushion the vulnerable population especially in poor resource settings, the government of Kenya further introduced antimalarial subsidy policy in 2010 to ensure prompt access to affordable and effective anti-malarial therapy (DOMC, 2011).However, what is not clear is whether, and how, this policy has impacted on access (which is basically availability, affordability and price) to effective artemisinin-based combination therapy (ACT). Hence this study assessed the effect of malaria treatment policy on access to ACT in poor resource setting within Manyatta slum of Kisumu City which is within malaria holo-endemic region of western Kenya.

Evidence suggest that despite up-scaling of malaria controls programs in Kenya including adoption of ACT as first line treatment and subsidy policy on ACT, the uptake of ACT is still low especially among the poor [7-9], consistent with data from Tanzania and the Gambia ([10]; [4], indicating that effective malaria treatment policies goals are undermined by many challenges on the implementation in many settings [11, 12]. This includes patient perception of disease causation leading to most of the poor people seeking help from traditional healers first especially in case of uncomplicated malaria [13, 14]. Alternatively, patient perception on the effectiveness of malaria treatment and quality of care provided has led to very few people seeking help from public health facilities [7, 15] and they opt for self-treatment because they consider private medicine retailers to be friendly than health providers in government facilities. Some argue that public health facilities offer poor quality of services [8, 15].

Moreover, despite the malaria treatment policy change most people still prefer chloroquine and amodiaquine to ACT [16] and this has been attributed to lack of knowledge on the provisions of ACT regimens by both the health providers and consumers [17, 18]. This is compounded by frequent stock-out of recommended ACTs in public health facilities leading to people buying medicine from private retailers [18], who stock un-subsidized Artemisinin-based combinations due to unprofitability of subsidized ACT or sell the subsidized ACT at comparatively higher prices [9, 19]. This coupled with the low availability of weight specific pack like the six-tablet Pack meant for the treatment of children under five years has led to inappropriate dosages being given to malaria patients [9]. The other factors that impede access to ACT include government policy that require that ACTs be administered as prescription only medicine after laboratory confirmation despite lack of these facilities in all health facilities [20]; MoPHS, 2009; MoPHS, 2010), distance from public health facilities, lack of awareness about changes in malaria treatment policies among health providers and consumers [9, 15, 17, 18, 21]. Together these data suggest that despite the implementation of anti-malarial subsidy policy, poor people

still do not get prompt access to subsidized anti-malarial. Therefore, there is a need to understand the factors preventing low-income groups from accessing interventions and effective treatment in Kenya. Hence this study evaluated the factors that hinder access to subsidized ACTs within Manyatta slum in Kisumu City.

It should be noted that although changes in malaria treatment and subsidy policies on antimalarials can ensure availability of effective and affordable ACT and strengthen effective malaria case management[7, 22], data suggest there is low awareness of changes on malaria treatment and subsidy policies on antimalarials among consumers at the community level [17]. This is due to various social, cultural and behavioral factors that influence community perceptions and practices on malaria [21, 23], such as population poor health education and low awareness of health issues due to poor implementation and lack of education on changes in malaria treatment policy or their low education levels [8, 17, 24]. This may be attributed to the fact that most people dispensing ACT in private outlets do not have formal clinical training hence they sometimes do not advise consumers correctly and this further compounded by lack of or poor advocacy on malaria treatment policy [18, 25]. Moreover, a study in rural set up in Siaya County Western Kenya revealed that adherence to recommended dosage of ACT is very low and that adherence is associated with education level, age and family socioeconomic status [25]. The poor awareness of ACT treatment and subsidy policy within the population may explain the low use of ACT and this suggest that supply and demand factors may be critical in synergy between the service delivery and the community responses to it [23]. Hence, educating both health providers and communities about diagnosis and change in antimalarial treatment policy and diagnosis is critical in effective malaria case management [22]. Together these data indicate that the success of malaria treatment policy including subsidy policy will depend on the community knowing it, understanding its importance and ultimately using it. Therefore this study assessed the knowledge and use of ACT for malaria treatment. In doing this, people's knowledge, the factors that influence knowledge and how knowledge affects the use of ACT was determined in the Manyatta slum in Kisumu city Kisumu county.

Material and methods

Study design

A cross-sectional study design was used. A survey was conducted in Manyatta A sub-location within Kisumu City, Kisumu County**.**

Study setting

The current study was carried out in Manyatta-A sub-location (latitude -0^{o} 5'6.59 and longitude 34^{o}46'28.58) in Kisumu Central division of Kisumu County (Appendix 1). The sub-location is mainly an informal dwelling called Manyatta Estate with a population of 41,910 with 20900 males and 21,210 females in 10000 households [26]). It has a total area of 2 km2 with a population density of 20955 people/km^2 [26]). In addition, about 12.5% (456) of the females are of reproductive age [26]). A majority of the population live in rented houses measuring 10-20 m^2 for 4-8 persons in a household. Due to poor urban physical planning most of the houses are congested are in poor conditions. In addition 60% lack piped water, have poor ventilation, lack proper sewage disposal systems and drainage systems resulting to a lot of stagnant water which form breeding ground for malaria vector [18]. In addition malaria causes a lot of morbidity and mortality among under-five year old and pregnant women in this region [9, 21]. Malaria accounts for 40% of out-patient visits and 40% of hospital in-patient admissions with between 10-15 paediatric cases of severe malaria often complicated with anaemia and malnutrition, on a daily basis.

Study population

This was a household survey involving 181mothers with children aged under five years living within Manyatta slums in Kisumu City, Kisumu County.

Data collection Procedures:

Questionnaires were used to collect data from the respondents. A semi structured questionnaire with both closed and open ended questions was used to collect socio-demographic data: age, level of education, occupation, marital status and religious affiliations; Respondents awareness of ACT; pricing and willingness to pay for ACT by the respondents. Data was also collected on the respondent's knowledge of malaria treatment policy and ACTs subsidy policy and its influence on availability, affordability and price of ACTs. Data collected was checked in the field and cleaned at the end

of each day to ensure completeness, consistency, credibility and eligibility. This was done to correct errors or to fill in missing information before another day of data collection.

Statistical analysis

Quantitative data for the study was analysed. For variables with two possible outcomes (knowledge of malaria treatment policy and factors influencing knowledge of ACT) a multivariet logistic regression was used to determine factors that influence access to ACT. For knowledge of ACT, analysis was performed by chi-square tests. Statistical significance was assessed at a $p \leq 0.05$. For demographic characteristics of the study population, data was presented using frequencies.

Results

Sociodemographic characteristics of the study participants

A total of 181 adults participated in the study. Table 1 shows that a majority of the study participants were aged between 31-40 years (76.2%). About 86.7% had secondary education 7.2% had primary education and 5.5% had tertiary education. There were more Christians (81.2%) relative to Muslims (3.3%). In addition, a majority of the study population are married (82.3%) and unemployed (86.2%) respectively.

Knowledge and use of ACT among mothers of children under five year in Manyatta slums

In order to establish if the study participants knew about ACT and if they perceived it to be widely used for malaria treatment among children under-five, the distribution of proportions of mothers' knowledge and use of ACT among mothers of children under five

years in Manyatta slums was performed and analysed using Chi-Square. As shown in table 2, the proportions of study participants who perceived ACT as widely used for malaria treatment was significantly higher ($p<0.0001$). The results demonstrate that a significantly higher proportions of the study participants cited ACT as being effective for malaria treatment as the main reason for the wide use of ACT ($p<0.0001$). Further analysis revealed that a significantly higher proportion of the study participants cited that there is still need for adequate knowledge on ACT ($p<0.0001$); Those who were willing to pay for ACT without subsidy were also significantly higher ($p<0.0001$) than those who were not willing to pay; Those who perceived ACT to be less expensive than monotherapies were also significantly higher ($p<0.0001$) and those who perceive ACT to be easily accessible were also significantly higher ($p<0.0001$).

Factors influencing access to artemisinin combination therapy

In order to assess the factors that influence access to ACT, multivariate logistic regression was performed. Those aged between 21-30 years (Adjusted Odds, 1.86; 95% C.I 0.16-22.13;P=0.624) and those aged between 31-40 years (Adjusted Odds, 4.29; 95% C.I 0.42-44.15;P=0.6221) were more likely to access ACTs relative to those aged below 21 years. The model revealed that level of education was a significant factor associated with access to ACT with those having secondary education (Adjusted Odds, 11.12; 95% C.I 1.15-107.64; P=0.038) more likely to access ACTs relative to those with primary education. In addition, perception of affordability of ACT was another significant factor associated with access to ACT with the data revealing that those who perceived ACTs to be affordable were more likely (Adjusted Odds, 152.87; 95% C.I 10.52-2221;P=0.0001) to access ACT relative to those were perceived it not to be affordable. In addition, awareness of ACT as a drug for treatment of malaria was a significant determinant of access, with those who were aware of ACTs being more likely to access ACT (unadjusted Odds, 10.09; 95% C.I 2.64-38.62;P=0.001) relative to those who were not aware of ACTs. However, awareness was not a significant factor when adjusted for confounding variables was done.

Factors influencing knowledge of malaria treatment policy

The results reveal that those aged between 31-40 years (Adjusted Odds, 10.00; 95% C.I 10.52-23.21;P=0.0005) were more likely to be knowledgeable about malaria treatment policy relative to those aged below 21 years. In addition, those with tertiary education (Adjusted Odds, 15.97; 95% C.I 1.48-172.64; P=0.023) were more likely to be knowledgeable about malaria treatment policy relative to those with primary education. Those who were employed were more likely (Adjusted Odds, 1.32; 95% C.I 0.3-5.74; P=0.0714) to be knowledgeable about malaria treatment policy relative to those who were not employed. Analysis further revealed that those who were aware of ACT were more likely to be knowledgeable about malaria treatment policy (Odds, 14.14; 95% C.I 2.8-71.39; P=0.001) relative to those who were not aware.

Factors influencing knowledge of subsidy policy on ACT

Further inquiries on the factors that influence the study participants' knowledge of subsidy policy was carried out. Data reveal that those who had tertiary education (Adjusted Odds, 15.97; 95% C.I 1.48-172.64;P=0.023) were more likely to be knowledgeable about the ACT subsidy policy relative to those with primary education. Those who were employed (Adjusted Odds, 1.32; 95% C.I 0.3-5.74;P=0.714) were more likely to be knowledgeable about the ACT subsidy policy relative to those without employment.

Discussion

Artemisinin combination therapy is recommended as an intervention for the treatment of malaria especially in malaria prone areas which contributes to over 60% of global malaria burden [27]. Malaria elimination, which is a critical step in malaria eradication can only be achieved if a majority of malaria patients have access to effective malaria treatment [28]. As is the case for many other malaria endemic countries in sub-Saharan Africa, children under the age of 5 years and pregnant women bears the brunt of malaria associated morbidity and mortality (WHO, 2014). Although there have been reports of decline of malaria cases in Kenya, there is a need for interventions to sustain these gains and move towards malaria elimination. However, one of the bottlenecks to malaria elimination is poor access to efficacious drugs like ACT that are most efficacious against uncomplicated malaria [27]. Since access to anti-malarials in malaria prone areas is a key factor in determining ACT drugs usage, their efficacy and effectiveness, there is need to ensure that ACT are accessible. To achieve improved access to ACT, the Kenyan government adopted the use of ACT as the first line treatment for uncomplicated malaria. ACT has been subsidized to ensure that malaria patients adhere to prescription in order to reduce emergence of drug resistant parasite strains [25]. The current study was designed to investigate factors that influence access to ACT, knowledge on malaria treatment policy and the knowledge of subsidy policy on ACT in a malaria prone region in Kisumu county.

This study revealed that majority of the study participants were aware of ACT as a drug for treatment of malaria and this may be partly due to implementation of malaria treatment policy that adopted ACT as the first line treatment in Kenya [18]), that has led to ACT having a large share of market relative to other antimalarials [29]In support of this hypothesis, this study reveals that majority of the study population were aware of changes in malaria treatment policy. Of importance is that majority of the study participants had access to ACT and this can be attributed to the fact that in Kenya, children under five years of age are treated for free in government health facilities [25]. In deed previous studies have shown that access to ACT can be improved by reducing charges in health facilities [29, 30]. These data show that subsidizing malaria treatment can lead to prompt and effective treatment of malaria leading to reduction in malaria burden in malaria prone areas. Using proper dosages of ACT is important in effective malaria treatment and avoidance of emergence of drug resistant malaria in malaria endemic settings[8, 25]. However, previous studies have shown that even where the

recommended drugs are used, inappropriate treatment regimens such as under-treatment or non-compliance with correctly prescribed regimens are still common [18, 29]. This is mainly attributed to the practice of purchasing drugs off the counters without proper prescription [18].

Based on the odds ratio, this study revealed that level of education is significant factor associated with access to ACT with those having secondary more likely to access ACTs relative to those with primary education. This observation is consistent with previous studies showing that children whose mothers had at least secondary education were more likely to have prompt and effective treatment of malaria [29, 31]. Additionally other studies have shown that children's uptake of health services are positively correlated mother's level of education [32]. This is partly due to the fact that educated mothers may be more open to advances in public health and medicine, more knowledgeable of malaria symptoms, have more faith in health providers and have the ability to negotiate for first line malaria treatment [29, 33]. This enables the mothers to make quick decisions on prompt and effective treatment. Of note is that due to government programs that are geared towards subsidizing education to increase education coverage in Sub-Saharan Africa, a majority of women are now attaining secondary education. This will ultimately accelerate gains in children's health in Sub-Saharan Africa [34]. Further analysis revealed that age was determinant of access to ACT with those aged between 21-30 years and between 31-40 years being more likely to access ACTs relative to those aged below 21 years. This is consistent with studies showing that adolescents are less likely to uptake maternal and child health services [35]) this may be partly due to the fact that most older women draw from their prior experiences with malaria and are more likely to prefer taking their children to hospitals especially if they suspect malaria. Perception of affordability of ACT was another significant factor associated with access to ACT with the data revealing that those who perceived ACTs to be affordable were more likely to access it relative to those were perceived it not to be affordable. This is consistent with previous data indicating that reducing prices of antimalarial drugs can improve access to malaria drugs [25, 29]. Hence there is a need to make antimalarial drugs affordable in order to ensure wider coverage and improve equity in populations from malaria prone regions. Access and uptake of antimalarial drugs is influenced by knowledge or awareness about them [8]. Consistent with these previous data, this study also shows that awareness of ACT as drugs for treatment of malaria was a

significant determinant of access indicating that there is a need of educating consumers about ACT as this will improve the use of this drug in prompt and effective treatment of malaria.

Effective implementation of malaria treatment policy that will result in prompt and effective treatment of malaria especially among the under-five year old will rely on their mother's knowledge of malaria treatment policy and how they translate it in seeking treatment for malaria cases. Therefore, understanding the factors the influence knowledge of malaria treatment policy will guide interventions needed to improve their knowledge and practices to adhere to the recommended malaria guidelines leading to overall improvements in the lives of under-five year olds from malaria endemic regions [12, 29]. This study revealed that those who were aged between 31-40 years were more likely to be knowledgeable about malaria treatment policy relative to those below 21 years this may be due to the fact that older study participants may have had prior experiences with malaria and this influences their knowledge on malaria treat policy [29, 35]. Educated mothers have been shown to be more knowledgeable about malaria symptoms and more open to advances in public health [8, 33]. Consistent with these previous finding this study also found that mothers with tertiary education relative to those with primary education. These data indicate that more educated mothers more likely to seek children health services that ensure prompt and effective treatment of their children against malaria. This study further revealed that the study participants who were employed were more likely to be knowledgeable about malaria treatment policy relative to those who were not employed this is probably due to the fact that they may be more educated that the unemployed and can easily access health facilities where they are educated about malaria treatment policy or they can afford access to mass media where they get knowledge about malaria treatment policy. Those who were aware of ACT were more likely to be knowledgeable about malaria treatment policy relative to those who were not aware this partly due to the fact they may have gotten this information from the hospitals or mass media. The factors that were determinants of knowledge about malaria treatment policy included having tertiary education and being employed suggesting there is need to strengthen intervention that target educating mothers especially those who were having primary education and unemployed on malaria treatment subsidy policy in order to increase uptake of subsidized anti-malarials for treatment of children.

Conclusion

This study shows that awareness about ACT among mothers of under-five year old children is high. Importantly, awareness of the changes in malaria treatment policy in recommending the use of ACT for malaria treatment was also high and a majority of the study population were aware of proper dosages with majority getting information on dosages from medical personnel. Further, the main factors that influence access to ACT include age, level of education, perception of affordability and awareness of ACT as drugs for treatment of malaria. These data reveal that age, level of education, employment status and awareness of ACT were important determinants of knowledge on malaria treatment policy.

Recommendation for action

These data indicate there is need of programmatic intervention by the Ministry of Health malaria control programs to carry out health promotions targeting mothers with low education and those from poor households in order to increase the uptake of ACT and for successful implementation of malaria treatment policy. In addition, there is need to educate the mothers on the importance of drug adherence to reduce the emergence and spread of drug-resistant malaria.

Recommendation for future studies

There is need of comparative studies on the factors that influence implementation of ACT subsidy policy between mothers from rural and urban communities. More exploration of factors influencing mothers behaviors and practices on use of ACT need to be investigated. More exploratory studies are needed to understand barriers to access on the side of mothers from poor households and those with low education levels.

Abbreviation

ACT- Artemisinin Combination Therapy, AMFm- Affordable Medicine Facility-Malaria, AIDS- Acquired Immune Deficiency Virus, AL- Artemether Lumefantrine, BPGS- Board of Post Graduate Studies, GFATM-Global Fund for HIV/AIDS, TB and Malaria, HIV- Human Immune deficiency Virus, KNBS- Kenya National Bureau of Statistics, MOH- Ministry of Health, MoPHS- Ministry of Public Health and Sanitation, RBM- Roll Back Malaria, STI- Sexually Transmitted Infections, TB- Tuberculosis, WHO- World Health Organization.

Acknowledgments

Acknowledgement goes to all the participants who agreed to be part of this study. They have made this a success. My acknowledgement also goes to the school of health sciences Jaramogi Oginga Odinga university of Science and Technology for giving me an opportunity to do this.

Ethical approvals

The study was approved by the Board of Post Graduate Studies (BPGS) of Jaramogi Oginga Odinga University of Science and Technology (JOOUST). Ethical approval was obtained from University of Eastern Africa, Baraton Ethical Review Committee prior to the commencement of the study in the area. The aim and purpose of all components of the study was discussed and agreed on before legal consent is obtained from the authorities. A written informed consent was obtained from each participant to signify their willingness to participate in the study. The researcher briefed the respondents about the nature of the research, its purpose, implications and benefits of the study to the respondents. In order to encourage informed consent, the respondents were required to sign the consent form of which a copy was retained by the respondent. Confidentiality of the information given was assured before starting each interview. The respondents were also informed that their participation in the study was voluntary and that they were free

to drop out of the study at will. All possible harm and also benefits that the participants will receive as a result of this study was also explained.

Disclosure

The author reports no conflicts of interest in this work

Author's contribution

Availability of data and material

Consent for publication: Not applicable

Table 1 :Demographic characteristics of the study population

		n	%
	Below 21 Yrs	16	8.8%
	21-30 Yrs	24	13.3%
	31-40 Yrs	138	76.2%
	41+ Yrs	3	1.7%
Total		181	100.0%
	None	1	0.6%
	Primary Level	13	7.2%
	Secondary Level	157	86.7%
	Tertiary Level	10	5.5%
Total		181	100.0%
	Christian	147	81.2%
	Muslim	28	15.5%
	Missing	6	3.3%
Total		181	100.0%
	Married	149	82.3%
	Never Married	18	9.9%
	Divorced	10	5.5%
	Separated	2	1.1%
	Missing	2	1.1%
Total		181	100.0%
Employment	Employed	19	10.5%
	Unemployed	156	86.2%
	Missing	6	3.3%
Total		181	100.0%

Data presented using frequencies

Table 2: Knowledge and use of ACT among mothers of children under five years in Manyatta slums

	n(%)	P value
Are ACT widely used for malaria treatment		
Yes	167 (92.27)	**0.0001**
No	9(4.97)	
Undecided	4(2.21)	
Non response	1(0.55)	
Reason for wide use of ACT		
Effective in malaria treatment	158(87.29)	**0.0001**
Affordable	2(1.10)	
Are expensive	1(0.55)	
I don't understand why	1(0.55)	
Never used ACT	1(0.55)	
Recommended in hospitals	1(0.55)	
Undecided	17(9.39)	
Adequate knowledge on ACT still needed		
Yes	156(86.19)	**0.0001**
No	11(6.08)	
Undecided	14(7.73)	
Willingness to pay for ACT without subsidy		
Yes	143(79.01)	**0.0001**
No	32(17.68)	
Undecided	6(3.31)	
Is ACT more expensive than monotherapies?		
Yes	12(6.63)	
No	154(85.08)	**0.0001**
Undecided	5(2.76)	

Is ACT accessible in your area?		
Easy to access	153(84.53)	0.0001
Not easy to access	21(11.60)	
Available but easy to access	1(0.55)	
Undecided	6(3.31)	

Analyses performed by Chi-square tests. *Statistically significant at P ≤ 0.05

Table 3: Factors influencing access to Artemisinin Combination therapy

		ACT accessible n (%)	Crude OR OR(95%CI)	P value	Adjusted OR OR(95% CI)	P value
Age						
	Below 21 Yrs	**10(62.5)**	**Ref**		**Ref**	
	21-30 Yrs	**14(58.3)**	**0.84(0.23-3.07)**	**0.792**	**1.86(0.16-22.13)**	**0.624**
	31-40 Yrs	**127(92)**	**6.93(2.12-22.65)**	**0.001**	**4.29(0.42-44.15)**	**0.221**
	41+ Yrs	**2(66.7)**	**-**	**-**	**-**	**-**
Education Level						
	Primary level	**5(38.5)**	**Ref**		**Ref**	
	Secondary level	**143(90.5)**	**15.25(4.43-52.58)**	**<0.0001**	**11.12(1.15-107.64)**	**0.038**
	Tertiary level	**5(50)**	**1.6(0.3-8.49)**	**0.581**	**0.73(0.05-11.08)**	**0.821**
Employment Status						
	Not Employed	**140(89.7)**	**Ref**		**Ref**	
	Employed	**9(47.4)**	**0.1(0.04-0.29)**	**<0.0001**	**0.46(0.08-2.65)**	**0.385**
Perception on affordability						
	Not affordable	**2(13.3)**	**Ref**		**Ref**	
	Affordable	**150(93.8)**	**97.5(19.29-492.92)**	**<0.0001**	**152.87(10.52-2221)**	**<0.0001**
ACT awareness						
	Not aware	**4(40)**	**Ref**		**Ref**	
	Aware	**148(87.1)**	**10.09(2.64-38.62)**	**0.001**	**0.17(0.01-4.23)**	**0282**

The P-values in bold are statistically significant at P ≤ 0.050.Statistical significance determined by logistic regression tests. **-** Not computed due to inadequate data

Table 4:Factors influencing knowledge of malaria treatment policy

		Have knowledge of treatment policy n(%)	Crude OR OR(95% CI)	P value	Adjusted OR OR(95%CI)	P value
Age						
	Below 21 Yrs	**15(6.3)**				
	21-30 Yrs	**20(16.7)**	**0.33(0.03-3.3)**	**0.347**	**0.68(0.13-3.66)**	**0.655**
	31-40 Yrs	**135(2.2)**	**3(0.29-30.69)**	**0.354**	**0.1(0.02-0.5)**	**0.005**
	41+ Yrs	**3(0)**	**-**	**-**	**-**	**-**
Education level						
	Primary level	**10(23.1)**				
	Secondary level	**154(2.5)**	**11.55(2.27-58.82)**	**0.003**	**0.58(0.1-3.29)**	**0.536**
	Tertiary level	**9(10)**	**2.7(0.24-30.85)**	**0.424**	**15.97(1.48-172.64)**	**0.023**
Employment Status						
	Not employed	**152(2.6)**				
	Employed	**16(15.8)**	**0.14(0.03-0.68)**	**0.015**	**1.32(0.3-5.74)**	**0.714**
ACT awareness						
	Not aware	**7(30)**				
	Aware	**165(2.9)**	**14.14(2.8-71.39)**	**0.001**	**0.12(0.01-1.32)**	**0.083**

The P-values in bold are statistically significant at P ≤ 0.050.Statistical significance determined by logistic regression tests. - Not computed due to lack of data

Table 5:Factors associated knowledge of subsidy policy on ACT

		Have knowledge of treatment policy n(%)	Crude OR OR(95% CI)	P value	Adjusted OR OR(95% CI)	P value
Age						
	Below 21 Yrs	**6(37.5)**	**Ref**		**Ref**	
	21-30 Yrs	**9(37.5)**	**0.9(0.24-3.38)**	**0.876**	**0.68(0.13-3.66)**	**0.655**
	31-40 Yrs	**9(6.5)**	**0.11(0.03-0.36)**	**<0.0001**	**0.1(0.02-0.5)**	**0.005**
	41 Yrs	**0(0)**	**-**	**-**	**-**	**-**
Education level						
	Primary level	**6(46.2)**				
	Secondary level	**12(7.6)**	**0.08(0.02-0.3)**	**<0.0001**	**0.58(0.1-3.29)**	**0.536**
	Tertiary level	**6(60)**	**1.5(0.27-8.19)**	**0.64**	**15.97(1.48-172.64)**	**0.023**
Employment Status						
	Not employed	**14(9)**				
	Employed	**7(36.8)**	**6.41(2.14-19.16)**	**0.001**	**1.32(0.3-5.74)**	**0.714**
ACT awareness						
	Not aware	**6(60)**				
	Aware	**18(10.6)**	**0.06(0.01-0.26)**	**<0.0001**	**0.12(0.01-1.32)**	**0.083**

The P-values in bold are statistically significant at P ≤ 0.05.Statistical significance determined by logistic regression tests.-Not computed due to inadequate data

References

Uncategorized References

1. WHO: **Reducing risks, promoting healthy life**. 2010.
2. Romi R, Razaiarimanga MC, Raharimanga R, Rakotondraibe EM, Ranaivo LH, Pietra V, Raveloson A, Majori G: **Impact of the malaria control campaign (1993-1998) in the highlands of Madagascar: parasitological and entomological data**. *The American journal of tropical medicine and hygiene* 2002, **66**(1):2-6.
3. McCann RS, Messina JP, MacFarlane DW, Bayoh MN, Vulule JM, Gimnig JE, Walker ED: **Modeling larval malaria vector habitat locations using landscape features and cumulative precipitation measures**. *International journal of health geographics* 2014, **13**:17.
4. Sonko ST, Jaiteh M, Jafali J, Jarju LB, D'Alessandro U, Camara A, Komma-Bah M, Saho A: **Does socio-economic status explain the differentials in malaria parasite prevalence? Evidence from The Gambia**. *Malaria journal* 2014, **13**:449.
5. RBM: **Roll Back Malaria Partnership**. 2005.
6. MoH: **National Malaria Treatment Guidelines. Nairobi Kenya: Ministry of Health, Kenya**. 2006.
7. Chuma J, Musimbi J, Okungu V, Goodman C, Molyneux C: **Reducing user fees for primary health care in Kenya: Policy on paper or policy in practice?** *International journal for equity in health* 2009, **8**:15.
8. Watsierah CA, Jura WG, Raballah E, Kaseje D, Abong'o B, Ouma C: **Knowledge and behaviour as determinants of anti-malarial drug use in a peri-urban population from malaria holoendemic region of western Kenya**. *Malaria journal* 2011, **10**:99.
9. Watsierah CA, Ouma C: **Access to artemisinin-based combination therapy (ACT) and quinine in malaria holoendemic regions of western Kenya**. *Malaria journal* 2014, **13**:290.
10. Barat LM, Palmer N, Basu S, Worrall E, Hanson K, Mills A: **Do malaria control interventions reach the poor? A view through the equity lens**. *The American journal of tropical medicine and hygiene* 2004, **71**(2 Suppl):174-178.
11. Hetzel MW, Dillip A, Lengeler C, Obrist B, Msechu JJ, Makemba AM, Mshana C, Schulze A, Mshinda H: **Malaria treatment in the retail sector: knowledge and practices of drug sellers in rural Tanzania**. *BMC public health* 2008, **8**:157.

12. Mangham LJ, Cundill B, Ezeoke O, Nwala E, Uzochukwu BS, Wiseman V, Onwujekwe O: **Treatment of uncomplicated malaria at public health facilities and medicine retailers in south-eastern Nigeria**. *Malaria journal* 2011, **10**:155.
13. 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?** *The American journal of tropical medicine and hygiene* 2007, **77**(6 Suppl):203-218.
14. Lindblade KA, O'Neill DB, Mathanga DP, Katungu J, Wilson ML: **Treatment for clinical malaria is sought promptly during an epidemic in a highland region of Uganda**. *Tropical medicine & international health : TM & IH* 2000, **5**(12):865-875.
15. Williams HA, Durrheim D, Shretta R: **The process of changing national malaria treatment policy: lessons from country-level studies**. *Health policy and planning* 2004, **19**(6):356-370.
16. Wasunna B, Zurovac D, Goodman CA, Snow RW: **Why don't health workers prescribe ACT? A qualitative study of factors affecting the prescription of artemether-lumefantrine**. *Malaria journal* 2008, **7**:29.
17. Adeneye AK, Jegede AS, Mafe MA, Nwokocha EE: **Awareness of antimalarial policy and use of artemisinin-based combination therapy for malaria treatment in communities of two selected local government areas of Ogun State, Nigeria**. *World health & population* 2014, **15**(1):45-60.
18. Watsierah CA, Onyango RO, Ombaka JH, Abong'o BO, Ouma C: **Provider knowledge of treatment policy and dosing regimen with artemether-lumefantrine and quinine in malaria-endemic areas of western Kenya**. *Malaria journal* 2012, **11**:436.
19. Amuasi JH, Diap G, Blay-Nguah S, Boakye I, Karikari PE, Dismas B, Karenzo J, Nsabiyumva L, Louie KS, Kiechel JR: **Access to artesunate-amodiaquine, quinine and other anti-malarials: policy and markets in Burundi**. *Malaria journal* 2011, **10**:34.
20. Amin AA, Zurovac D, Kangwana BB, Greenfield J, Otieno DN, Akhwale WS, Snow RW: **The challenges of changing national malaria drug policy to artemisinin-based combinations in Kenya**. *Malaria journal* 2007, **6**:72.
21. Watsierah CA, Jura WG, Oyugi H, Abong'o B, Ouma C: **Factors determining anti-malarial drug use in a peri-urban population from malaria holoendemic region of western Kenya**. *Malaria journal* 2010, **9**:295.

22. Kokwaro G: **Ongoing challenges in the management of malaria**. *Malaria journal* 2009, **8 Suppl 1**:S2.
23. Das A, Das Gupta RK, Friedman J, Pradhan MM, Mohapatra CC, Sandhibigraha D: **Community perceptions on malaria and care-seeking practices in endemic Indian settings: policy implications for the malaria control programme**. *Malaria journal* 2013, **12**:39.
24. Bennett S, George A, Rodriguez D, Shearer J, Diallo B, Konate M, Dalglish S, Juma P, Namakhoma I, Banda H *et al*: **Policy challenges facing integrated community case management in Sub-Saharan Africa**. *Tropical medicine & international health : TM & IH* 2014, **19**(7):872-882.
25. Onyango EO, Ayodo G, Watsierah CA, Were T, Okumu W, Anyona SB, Raballah E, Okoth JM, Gumo S, Orinda GO *et al*: **Factors associated with non-adherence to Artemisinin-based combination therapy (ACT) to malaria in a rural population from holoendemic region of western Kenya**. *BMC infectious diseases* 2012, **12**:143.
26. UN-HABITAT: **Situation Analysis of Informal settlements in Kisumu**. 2005.
27. Khatib RA, Selemani M, Mrisho GA, Masanja IM, Amuri M, Njozi MH, Kajungu D, Kuepfer I, Abdulla SM, de Savigny D: **Access to artemisinin-based anti-malarial treatment and its related factors in rural Tanzania**. *Malaria journal* 2013, **12**:155.
28. Deressa W, Ali A, Enqusellassie F: **Self-treatment of malaria in rural communities, Butajira, southern Ethiopia**. *Bulletin of the World Health Organization* 2003, **81**(4):261-268.
29. Shah JA, Emina JB, Eckert E, Ye Y: **Prompt access to effective malaria treatment among children under five in sub-Saharan Africa: a multi-country analysis of national household survey data**. *Malaria journal* 2015, **14**:329.
30. Zurovac D, Njogu J, Akhwale W, Hamer DH, Larson BA, Snow RW: **Effects of revised diagnostic recommendations on malaria treatment practices across age groups in Kenya**. *Tropical medicine & international health : TM & IH* 2008, **13**(6):784-787.
31. Johansson EW, Gething PW, Hildenwall H, Mappin B, Petzold M, Peterson SS, Selling KE: **Diagnostic testing of pediatric fevers: meta-analysis of 13 national surveys assessing influences of malaria endemicity and source of care on test uptake for febrile children under five years**. *PloS one* 2014, **9**(4):e95483.
32. Desai S, Alva S: **Maternal education and child health: is there a strong causal relationship?** *Demography* 1998, **35**(1):71-81.

33. Cleland JG, Van Ginneken JK: **Maternal education and child survival in developing countries: the search for pathways of influence**. *Social science & medicine* 1988, **27**(12):1357-1368.

34. Gakidou E, Cowling K, Lozano R, Murray CJ: **Increased educational attainment and its effect on child mortality in 175 countries between 1970 and 2009: a systematic analysis**. *Lancet* 2010, **376**(9745):959-974.

35. Magadi MA, Agwanda AO, Obare FO: **A comparative analysis of the use of maternal health services between teenagers and older mothers in sub-Saharan Africa: evidence from Demographic and Health Surveys (DHS)**. *Social science & medicine* 2007, **64**(6):1311-1325.