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1 **Home-based malaria management in children by women: evidence from**  
2 **a malaria endemic community in sub-Saharan Africa**

3

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14

15 **ABSTRACT**

16 **Objective:** To examine the medicines and dosage that mothers who engaged in home-  
17 based malaria management administer to children aged  $\leq 5$  years having signs and  
18 symptoms associated with malaria. It was also to discuss the possibilities of designing an  
19 effective home-based malaria management strategy.

20 **Methods:** The data were obtained from face-to-face semi-structured interviews  
21 conducted with mothers in the Ugbowo Community of Benin City, Nigeria who were  
22 selected using multi-stage systematic random sampling technique. The data were

23 analyzed by qualitative content analysis, arithmetic mean, simple percentages and bar  
24 chart.

25 **Results:** Approximately 90% of the interviewees engaged in home-based malaria  
26 management and 10% patronised the hospital. Most of the interviewees who engaged in  
27 home-based malaria management administered medicines that stimulate the production of  
28 red blood cells and supplies vitamins to children having signs and symptoms of malaria,  
29 followed by painkillers, anti-malaria and cough medicine was the least. Of the anti-  
30 malaria medicines administered to children almost 80% of the interviewees administered  
31 chloroquine to children, 15% quinine and three per cent halfan. Approximately 60% of  
32 the interviewees had the correct knowledge of the dosage regime for chloroquine, 38%  
33 for quinine and nine per cent for halfan.

34 **Conclusions:** Although home-based malaria management is important it cannot serve as  
35 a substitute to the hospital. Some diseases have signs and symptoms that are similar to  
36 that of malaria which implies that administering anti-malaria medicines to a child without  
37 confirmatory tests might lead to irredeemable complications in that child. If the strategy  
38 is to make home-based malaria management effective and sustainable mothers and  
39 community health officials should be involved in designing the strategy. Simple rapid  
40 diagnostic test kits for malaria should be made available to community health officials  
41 and pharmacists so that confirmatory tests could be carried out before dispensing  
42 medicines.

43

44 **Keywords:** Anti-malaria medicines, Indigenous knowledge, Malaria management,  
45 Mothers, Paediatrics

46 **1. Introduction**

47 The *Plasmodium falciparum* (i.e. a protozoan parasite) has been the main cause of  
48 malaria which has led to the deaths of many children in sub-Saharan Africa [1,2].  
49 Malaria leads to various abnormalities in children such as renal failure, anaemia and  
50 hepatic dysfunction [3,4]. Although several initiatives such as roll back malaria have  
51 been introduced by international organizations and malaria endemic nations to control  
52 malaria it still remains a public health problem [5, 6]. The roll back malaria initiative has  
53 focused on the introduction of artemisinin (i.e. group of medicines that possess the most  
54 rapid action against *Plasmodium falciparum*) based combination therapy with home  
55 treatment [7]. It is aimed at creating awareness on most available potent anti-malaria  
56 medicines and appropriate dosages to people [8]. Medicines for the treatment and  
57 prevention of malaria (anti-malarial medicines) can be classified into: quinine and its  
58 related compounds, halofantrine, anti-folate compounds, aminoquinoline, antibiotics and  
59 pyronaridine. The derivative of quinine such as chloroquine has been mostly used for  
60 treatment of malaria however it is becoming less popular because *Plasmodium*  
61 *falciparum* tends to develop resistance to it [9,10]. Quinine has been one of the important  
62 anti-malarial medicines but its side effects such as cinchonism leading to blurred vision  
63 and impaired hearing [11] and its bitter taste has restricted its use. However, quinine and its  
64 isomer such as quinidine are often used as a last resort for treatment of malignant form of  
65 malaria [10]. Antibiotics such as tetracycline have anti-malarial effects and it can be used  
66 with other anti-malarial medicines to improve efficacy [12]. To help overcome the  
67 incidence of resistance of *Plasmodium falciparum* to anti-malarial medicines the World  
68 Health Organization has proposed a combination of artemisinin derivatives such as

69 artemether, amodiquine-sulphadoxine-pyremethamine, artesunate-mefloquine and  
70 artesunate-amodiaquine [13].

71 The control of malaria in a community requires knowledge of potent anti-malarial  
72 medicines for management of the disease. Effective home-based malaria management has  
73 the potential of reducing malaria related deaths in malaria endemic countries [14,15].  
74 Self- medication for malaria treatment is common in some African countries such as  
75 Nigeria, Uganda and Tanzania [15,16,17]. Several factors influence choice of medicines  
76 for treatment of malaria. These include knowledge of anti-malaria medicines, knowledge  
77 of symptoms and signs of malaria infection, and social impacts of the disease [18, 19,20].  
78 Because most of the malaria related deaths occur among children in sub-Saharan Africa  
79 [2] and that women play an important role as caregivers at home [21] this paper has  
80 focused on how mothers care for children suspected to have malaria infection. Moreover,  
81 the study reported in this paper was conducted in the Nigerian rainforest where malaria is  
82 endemic [22]. Malaria has been one of the main causes of death among children in  
83 Ethiopia, Burkina Faso and Nigeria [23,24,25,26]. Several malaria control strategies  
84 have been implemented to help reduce malaria related incidence in sub-Saharan Africa.  
85 For example, prompt access to diagnostic testing using rapid diagnostic tests [27], home-  
86 based management of malaria [28], use of insecticide treated bed nets and indoor  
87 insecticide sprays [29,30] and artemisinin-based combination therapy [8]. For malaria  
88 control strategy such as home-based malaria management to be effective and sustainable  
89 it is important for women who are often caregivers to be involved in planning the  
90 strategy. This has the potential of making the strategy more acceptable, sustainable in  
91 malaria endemic community and could help integrate indigenous with scientific

92 knowledge in management of malaria. In designing a home-based malaria management  
93 strategy related to children it is important to have knowledge regarding the way that  
94 caregivers have managed malaria infected children in the past and what could be done to  
95 improve the current situation.

96 In the literature there are several published papers that have focused on home-based  
97 malaria management. For example, malaria self-medications and choices of medicines  
98 [8,31], home management practices of malaria in Abeokuta, Nigeria, and Uganda  
99 [32,33,17], home management of malaria in children by mothers in Kenya and Nigeria  
100 [34,15]. Although self-medication is common in some African countries such as Nigeria  
101 only few studies [8,31] have focused on medicines that people who practice self-  
102 medication use for treatment of malaria infection. Although effective treatment for  
103 malaria infection is available, the disease still remains one of the main causes of sickness  
104 and deaths especially in children in sub-Saharan Africa. In some cases malaria infected  
105 children are managed at home but the inability of their caregivers to correctly recognize  
106 malaria related signs and symptoms and the required care have often led to serious  
107 complications and sometimes deaths in children [35,36]. Because in Africa mothers are  
108 often the caregivers especially on childhood ailments [37], it is important to better  
109 understand how they care for malaria infected children and the knowledge that these  
110 caregivers are lacking. This will help health managers in designing home-based malaria  
111 management strategy that integrates mothers' experiences as well as address areas they  
112 have been lagging behind. To the best of our knowledge there is no previously published  
113 paper especially in Nigeria that has focused on the medicines and dosage that mothers  
114 who practice home-based malaria management administer to children exhibiting some

115 signs and symptoms of malaria infection. The aim of this paper was to explore how  
116 mothers care for children aged  $\leq 5$  years having some signs and symptoms of malaria  
117 infection, medicines and dosage administered to these children. It was also to explore the  
118 possibilities of designing an effective home-based malaria management strategy that  
119 involves mothers and health officials. The study reported in this paper involves women of  
120 Ugbowo Community in Benin City, Nigeria who were selected by multi-stage systematic  
121 random sampling technique. It is hoped that the findings will provide women with more  
122 understanding on how to care for children infected by malaria and how to incorporate this  
123 in designing an effective home-based malaria management strategy.

124

## 125 **2. Materials and methods**

### 126 2.1. The study area

127 This study was conducted in the Ugbowo Community located in Egor Local Government  
128 Area, Edo State, Nigeria. Because the Ugbowo Community is located in the rainforest  
129 region the environmental condition of the area is conducive for breeding of mosquito, i.e.  
130 vector for transmission of *Plasmodium falciparum* [38]. For example, it rains for greater  
131 part of the year (eight months) and the dry season is only four months in Ugbowo.  
132 Moreover, the Ugbowo Community has poor drainage systems. For example, some of  
133 these drainage systems are either faulty or non-functional. This has led to the presence of  
134 stagnant water in some areas of the Community and serves as breeding places for  
135 mosquitos. Evidence [39] has shown that there are more cases of malaria related ailments  
136 in Benin City (Ugbowo is part of the City) during the wet season than in the dry season

137 which further compounds the problem. Health facilities such as pharmacy, patent  
138 medicine stores and hospital are either found in or located near the Ugbowo Community.

139

## 140 2.2 Data collection and Analysis

141 The data collection was made by semi-structured face-to-face interviews [40]. Prior to the  
142 interviews discussions on research design were held with some academics at the  
143 Department of Clinical Pharmacy, University of Benin, Benin City, Nigeria whose works  
144 were related to prevention and control of malaria. These academics helped in the design  
145 of potential questions for the interviews. A question draft was developed and sent to the  
146 academics for their comments. After modifying the draft to address concerns raised by  
147 the academics it was sent back to them again. This continued until all the academics were  
148 satisfied with the question draft. To verify whether the questions can be understood by  
149 potential interviewee pre-test interviews were carried out in January 2002. The  
150 interviewees for the test were randomly selected from the Ugbowo Community and were  
151 asked to comment on whether the questions are easy to comprehend and to suggest ways  
152 of improving the questions. Their comments led to some changes in the question draft  
153 and the final questions were produced. The questions consist of open-ended and closed-  
154 ended question format.

155 The main interviews were conducted from February to May 2002 which combined  
156 the dry and wet seasons thus helping to reduce the effect of season on the results. All the  
157 interviews were carried out in the late evening (i.e. 17:00 and 19:00 hours) when most  
158 women in the Ugbowo Community are expected to be at their homes. This was a way to  
159 increase chances of involving women from several socioeconomic backgrounds in the



160 interviews. Participants to the interviews were selected by multi-stage systemic random  
161 sampling procedure [41]. Firstly, 15 streets were randomly selected from Ugbowo  
162 community and 10 houses from each of the street selected. Secondly, one woman who  
163 had a child aged  $\leq 5$  years that have had malaria was randomly selected from each house  
164 and interviewed. If there is no woman who meets the selection criteria in the selected  
165 house another house is randomly selected again. In all, a total of 155 women were  
166 interviewed.

167 Prior to the interviews the purpose of the study reported in this paper was explained  
168 to the interviewees, i.e. increasing women participation in management and control of  
169 malaria infection. The interviewees were informed that their responses will be held in  
170 confidence. They were asked questions such as income, number of children  $\leq 5$  years,  
171 age, education, occupation and marital status. The interviewees were asked about the  
172 most important thing they do when they suspect that their child have malaria infection,  
173 whether they administer treatment to their children at home and to give names of  
174 medicines they have used for the treatment. The interviewees were asked about the  
175 dosage administered to the child suspected to have malaria infection, where they often  
176 buy the medicines used for caring for the child and whether the child often get relieved at  
177 the end of treatment at home. The data generated from the interviews were analysed by  
178 qualitative content analysis i.e. a research method for interpreting qualitative information  
179 through classification process of coding, categorizing and identifying themes [41] and by  
180 simple percentages, arithmetic mean and bar charts using the Microsoft Office Excel.

181

182

183 **3. Results**

184 The results showed that 131 (87%) of all people who were selected for the interviews  
185 agreed to participate in the interview. Of the 131 interviewees, 125 answered all  
186 questions associated with the variables used in the study reported in this paper. Out of the  
187 125 interviewees approximately 90% (113) reported that they administer treatment  
188 against malaria infection to their children at home (home-based malaria management)  
189 and 10% took their children to the hospital. The analysis reported in this paper is based  
190 on responses from the 113 interviewees who practice home-based malaria management.  
191 The results revealed that all the interviewees have formal education, most of them  
192 engaged in trading, married and purchased medicines from pharmacy (Table 1).

193

194 **Insert Table 1 here**

195

196 The results showed that on average medicines that the interviewees administered to  
197 children suspected to have malaria can be classified into five (Fig 1). Of these classes,  
198 medicine that stimulates the production of red blood cells (haematinic) and supplies  
199 various vitamins and minerals (multivitamin) was the highest administered to children,  
200 followed by painkillers (analgesic), anti-malaria and cough medicine (antitussive) was  
201 the least (Fig 1).

202

203 **Insert Fig 1 here**

204

205 Among the anti-malarial medicines administered to children chloroquine was the most  
206 frequent (78%) followed by quinine (15%) and halfan (3%) see Fig 2. However, some of  
207 the interviewees (3%) reported that they administer chloroquine but if the malaria  
208 persists they switch to quinine and some (1%) reported to have switched from  
209 chloroquine to halfan. Almost all the interviewees (99%) reported that their children  
210 experienced relief after completing dose of the anti-malarial medicine that was  
211 administered. The results revealed that 60% of the interviewees have correct knowledge  
212 of the dosage regime for chloroquine, 38% for quinine and only nine per cent for halfan.  
213 Of these all the interviewees who had secondary and post-secondary school education,  
214 respectively can administer the correct dosage for chloroquine. All the interviewees who  
215 had secondary school education also have the correct knowledge of the dosage regime for  
216 quinine while only few who had primary school education had the correct knowledge.

217

218 **Insert Fig 2 here**

219

220 Almost all the interviewees (95%) reported that they used non-medicine preventive  
221 measures against malaria infection and five per cent used medicines. The medicines used  
222 were mainly pyrimethamine and chloroquine. The insecticide-treated bed net was the  
223 most non-medicine measures used.

224 The results showed that the interviewee who had secondary school education,  
225 engaged in trading, married and purchased anti-malarial medicines from pharmacy were  
226 more likely to administer chloroquine to children (Table 2). The interviewee who gets  
227 <16330 NGN (i.e. average annual income from this study), aged  $\leq 36$  years and had  $\leq 3$

228 years old child were also more likely to administer chloroquine to a child suspected to  
229 have malaria infection. The interviewee who had primary school education, engaged in  
230 trading, married and purchased anti-malarial medicines from patient medicine store were  
231 more likely to administer quinine to a child. This was also so for the interviewees who  
232 get  $\geq 16330$  NGN annually, aged  $>36$  years and had a child aged  $>3$  years. The  
233 interviewee who had post-secondary school education, engaged in trading, married and  
234 purchased anti-malarial medicine from pharmacy were more likely to administer halfan  
235 to a child. The interviewee who gets  $\geq 16330$  NGN annually, aged  $>36$  years and had a  
236 child aged  $>3$  years were also more likely to administer halfan to a child suspected to  
237 have malaria infection.

238

239 **Insert Table 2 here**

240

#### 241 **4. Discussion**

242 Although malaria infection is primarily treated using anti-malarial medicines the results  
243 of the study reported in this paper have revealed that mothers who practice home-based  
244 malaria management administer various groups of medicines to children suspected to  
245 have malaria. For example, greater percentage of the mothers interviewed administered a  
246 group of medicine that stimulates the body to produce more blood and supply minerals  
247 and vitamins (haematinic/multivitamins). Because one of the important early signs of  
248 malaria in children is often loss of appetite this might be the reason the mothers  
249 administered haematinic/multivitamins to help improve the child's appetite. This suggests  
250 that mothers practicing home-based malaria management often initiate treatment based

251 on “trial and error”. The result is consistent with findings elsewhere in Nigeria. For  
252 example, it was found that some people who practice self-medication often use wrong  
253 medicines [8]. Because some other diseases have similar signs to malaria thus  
254 administering medicines to children based on guesses might worsen the situation.  
255 Although home-based malaria management is important it should focus more on first aid  
256 measures given to the sick child before taking him or her to the hospital. It is important to  
257 note that before administering medicines (especially prescription medicines) to a child  
258 appropriate diagnostic test should be done to help in identifying the correct medicine. It  
259 is interesting that some mothers give their children medicines that stimulate production of  
260 red blood cells (haematinic) and multivitamin. This have the potential of boosting the  
261 immune system of the child infected by malaria and help lower the tendency of future  
262 malaria infection. This indicates the importance of giving children haematinic and  
263 multivitamins to help boost their immune system which could lower their vulnerability to  
264 malaria infection.

265       When a child loses appetite it is often common for him or her to develop fever [42].  
266 As in many African countries mothers often find it easier to detect abnormal body  
267 temperature in their children. Once they notice that a child’s body temperature is above  
268 normal the next call of action is to give the child medicine such as paracetamol (i.e.  
269 analgesic) to help normalise the body temperature. This could be the possible reason that  
270 analgesic was the second most important class of medicine administered to children  
271 suspected to have malaria. The finding is in line with that of Obembe et al. [31], who  
272 found that some residents of Ilorin City, Nigeria who engaged in self-medication uses  
273 paracetamol when they have fever.

274 From experience some mothers in Nigeria who engage in home-based malaria  
275 management often give anti-malarial medicine to their children once they do not get  
276 relief after administering analgesic. This might be a reason that anti-malarial medicine  
277 was the third most important class of medicines mothers administer to children suspected  
278 to have of malaria infection. The results regarding antitussive been the least medicine  
279 administered to children suggests that most mothers do not often wait until their child  
280 start coughing before giving them anti-malarial medicine. This could be the reason that  
281 antitussive was the least important class of medicines given to a child suspected to have  
282 malaria infection. Because *Plasmodium falciparum* is becoming resistant to some anti-  
283 malarial medicines in some cases antibiotics are used to improve the effectiveness of  
284 anti-malarial. However, this practice is not very common especially among people who  
285 are not very familiar with how different medicines interact thus this is not popular among  
286 people who engage in home-based malaria management. This may be the reason that only  
287 few of the mothers administered antibiotics to their children.

288 Although effort has been made by the Nigerian government toward provision of  
289 health facilities for residents it is worrisome that most mothers practice home-based  
290 malaria management and only few patronise the hospital as revealed by the results of the  
291 study reported in this paper. The results conform to findings from other part of Nigeria  
292 [43] and elsewhere in Africa [16,17] however it differs from findings from a study in the  
293 Gambia [44]. A possible reason is the long waiting time in some of the state owned  
294 hospitals in Nigeria and sometimes the nearest hospital might be several kilometres away  
295 from home. Although private hospitals may be available it is often expensive which  
296 makes it accessible to only high income earners in the society. It is interesting that a

297 greater percentage of mothers interviewed bought medicines from pharmacy. This has the  
298 potential of getting access to correct medicines especially if mothers could give the  
299 pharmacist the right information about some signs they observed on the sick child. The  
300 present situation could be improved if simple rapid diagnostic testing kits for malaria are  
301 made available to health professionals such pharmacists so that children could be tested  
302 for malaria before treatment.

303       Regarding anti-malarial medicines used by mothers who practised home-based  
304 malaria management the results reported in this paper revealed that these mothers tend to  
305 prefer the most popular and cheapest medicine. Over the years chloroquine has been one  
306 of the cheapest and effective medicine for treatment of malaria until in the recent past  
307 when it was discovered that *Plasmodium falciparum* show some level of resistance to it.  
308 This could be a reason most mothers administered chloroquine to children suspected of  
309 having malaria infection. The findings are in line with that of other studies such Jombo et  
310 al. [8] and Chukwuocha [45]. However, it differs from that of Obembe et al. [31]. A  
311 possible reason for the difference in the findings is that the study by Obembe et al. [31]  
312 has focused on malaria in adults and most of the respondents were male but the present  
313 study has focused on medicines mothers administer to children. Because the knowledge  
314 regarding home-based malarial management is often passed from generation to  
315 generation some mothers may not be well informed about resistance of *Plasmodium*  
316 *falciparum* to some anti-malarial medicines. This suggests the importance of educating  
317 mothers on the strategy developed to address the problem such as the use of artemisinin  
318 combination therapy.

319 Like chloroquine, quinine has been used for the treatment of malaria for a long time  
320 and it is one of the most effective drug however it strong bitter taste and critical side  
321 effects [10,11] when not used properly often make people to shy from using it. A reason  
322 that the mothers interviewed preferred chloroquine could be that quinine has been highly  
323 regulated and it is often used as a last resort. Moreover, quinine is more expensive than  
324 chloroquine. It is interesting that the results showed that quinine which is among highly  
325 regulated medicines in Nigeria is still been dispensed by some patent medicine stores.  
326 This suggests the need for developing a more effective strategy for monitoring the  
327 activities of these medicine stores. Halfan is not as popular as chloroquine and quinine  
328 and it is more expensive as well as has not been available as long as the other two anti-  
329 malarial medicines. This maybe a reason that only few of the mothers interviewed used  
330 halfan. Halfan has the advantage of not leaving a bitter taste which suggests that children  
331 may prefer it compared to chloroquine and quinine. Although the mothers claimed that  
332 they only administered other anti-malarial medicines when the one in use proved to be  
333 ineffective it is important for them to be well informed on some implications regarding  
334 the use of various anti-malarial medicines simultaneously. For example, administering  
335 medicines such as chloroquine and quinine simultaneously is not advisable.

336 People who have used a particular good several times should be more familiar with it  
337 [46]. Because most of the mothers interviewed administered chloroquine to children  
338 suspected to have malaria they are likely to have more knowledge about the medicine  
339 than other anti-malarial medicines. This could be a possible reason that more of the  
340 mothers had correct knowledge of the dosage for chloroquine compared to quinine which  
341 is regulated and not readily available. Halfan is relatively new to the market compared to



342 the other two medicines which implies that mothers may not know much about it thus  
343 only a few mothers had knowledge about it dosage.

344 Education provides people with access to opportunities that help them know more  
345 about things happening around them [47]. The results of the study reported in this paper  
346 revealed that education plays an important role in home-based malaria management  
347 especially in the area regarding correct knowledge of dosage for anti-malarial medicines.  
348 For example, all the mothers who had at least secondary school education had correct  
349 knowledge of dosage for chloroquine, quinine and halfan. This suggests the importance  
350 of educating women on issues related to childhood health care. In controlling malaria at  
351 community level it might be better to target preventive measures to help reduce burden  
352 that the disease impose on individuals and the community at large. For example,  
353 improving sanitary conditions, sleeping under insecticide-treated bed nets and destroying  
354 places that provides favourable condition for breeding mosquitoes. The use of haematinic  
355 and multivitamins for boosting the immune system of children is also important.

356 In consumer behaviour, if given alternative products people often prefer to buy the  
357 product that has the least price [48]. The results revealed that income is important in  
358 choice of anti-malarial medicine. For example, mothers who have more money bought  
359 more expensive anti-malarial medicine. This suggests that if the strategy is to provide  
360 people with effective medicine for treatment of malaria such as artemisinin combination  
361 therapy it is important to educate the people on the importance of using the medicine and  
362 the medicine should be made affordable for all income categories of people.

363 If the strategy is to make home-based malaria management more effective and  
364 sustainable it is important to educate mothers and potential mothers on the implications

365 of administering various anti-malarial medicines to children and medicines that should  
366 not be used simultaneously. More community health workers should be given special  
367 training on diagnosis, treatment and control of malaria. These health workers should  
368 collaborate with women practising home-based malaria management in carrying out their  
369 tasks. It is important for women to be well informed on some medicines that can only be  
370 dispensed by pharmacy and those that patent medicine stores are prohibited from  
371 dispensing. Simple diagnostic tests kits for malaria should be made available to  
372 pharmacists and other health professionals so that children can easily be diagnosed and  
373 treated appropriately. Effective anti-malaria medicines should be made available at prices  
374 that most people can afford and mothers should be encouraged to be giving their children  
375 medicines and foods that boost the immune system as well as reduce exposure of their  
376 bodies to mosquito bites.

377

378

### 379 **Conflict of interest statement**

380 We declare that we have no conflict of interest.

381

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391

392

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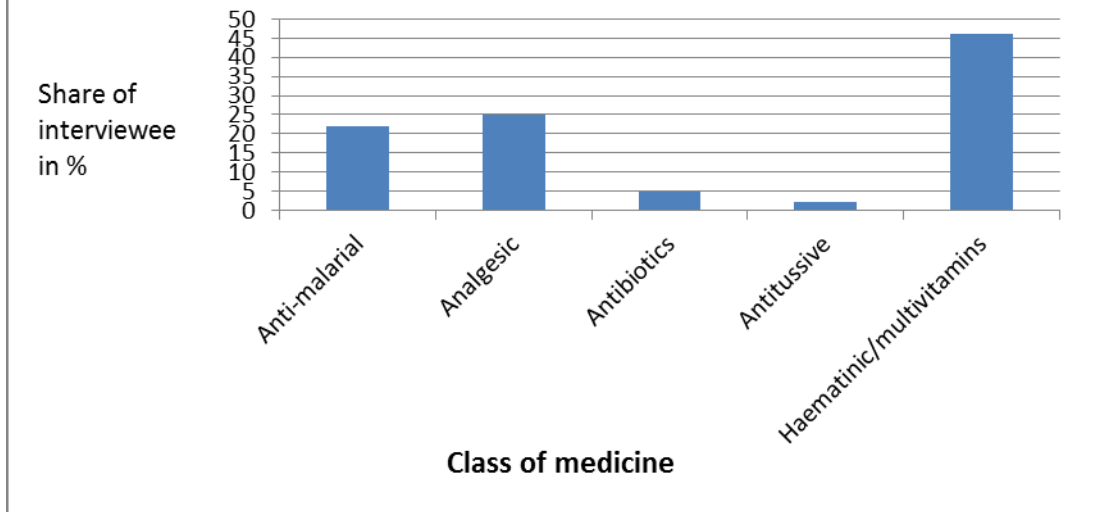


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**Fig 1**Classes of medicines administered to malaria infected children



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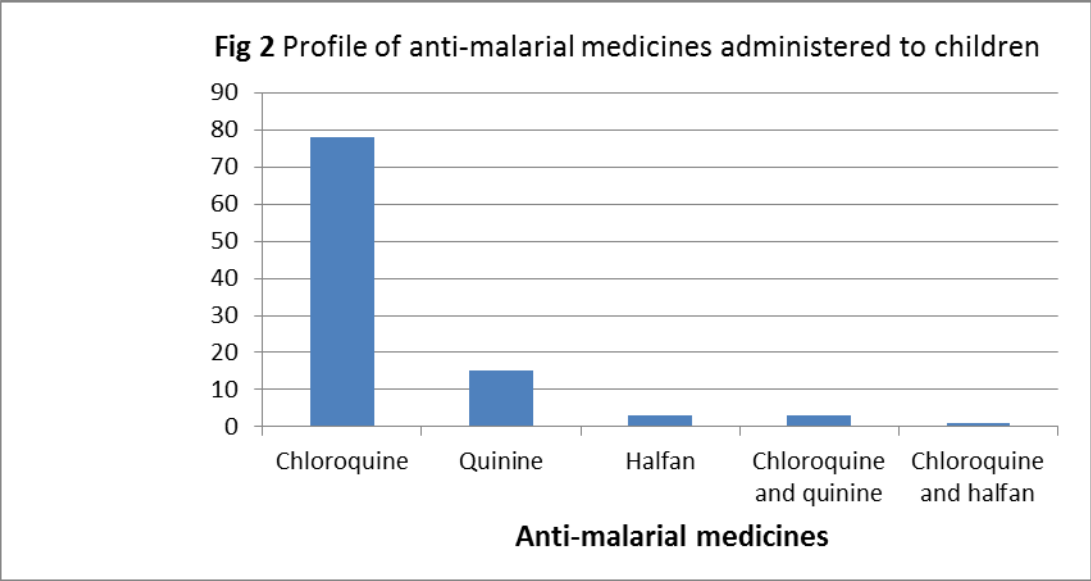
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629 **Table 1** Characteristics of interviewees

630	Variable	Description	%	Mean
631				
632	Educational level	The interviewee educational level		
633		No formal education	0	
634		Primary school	51	
635		Secondary school	45	
636		Post-secondary school	4	
637				
638	Occupation	The main occupation of interviewee		
639		Trading	55	
640		Tailoring/hairdressing	15	
641		Unskilled e.g. cleaning	6	
642		Student	5	
643		Housekeeping	17	
644		Civil servant	2	
645				
646				
647	Marital status	The interviewee marital status		
648		Married	85	
649		Never married	7	
650		Divorced	8	
651				
652	Medicine source	Place where interviewee mostly buy medicines		
653		Pharmacy	76	
654		Patent medicine store	24	
655				
656	Income	Interviewee annual disposable income in NGN		16330
657				
658	Children	Number of children $\leq 5$ years at home		4
659				
660	Age	The interviewee age in years		36
661				
662	Child age	The average age of children $\leq 5$ years at home		3

663  
664 NGN is Nigerian Naira: 1US\$ = 142NGN in the year 2002.

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670 **Table 2** Profile of anti-malarial medicines given to children in relation to some  
 671 characteristics of interviewees

672	Variable	Chloroquine (%)	Quinine (%)	Halfan (%)
674	<hr/>			
675	Educational level:			
676	Primary school	44	58	0
677	Secondary school	54	42	33
678	Post-secondary	2	0	67
679				
680	Occupation:			
681	Trading	35	59	67
682	Tailoring/hairdressing	19	35	0
683	Unskilled e.g. cleaning	15	6	0
684	Student	10	0	0
685	Housekeeping	20	0	0
686	Civil servant	1	0	33
687				
688	Marital status:			
689	Married	79	71	100
690	Never married	7	0	0
691	Divorced	14	29	0
692				
693	Medicine source:			
694	Pharmacy	52	0	100
695	Patent medicine store	48	100	0
696				
697	Income:			
698	< NGN16330 (average income)	59	24	0
699	≥ NGN 16330 (average income)	41	76	100
700				
701	Interviewee age:			
702	≤ 36 years (average age)	53	35	33
703	> 36 years (average age)	47	65	67
704				
705	Child age:			
706	≤ 3 years (average age)	57	10	0
707	> 3 years (average age)	43	90	100
708				
709	<hr/>			

710 NGN is Nigerian Naira: 1US\$ = 142NGN in the year 2002.