

# Assessment of health facilities, commodities, and supplies for malaria case management at primary healthcare centers in Ogun state, Nigeria

## ABSTRACT

**Introduction:** Country-specific evidence shows that Nigeria has the largest population at risk of malaria in Africa. Primary healthcare facilities play a major role in malaria control and often provide the bulk of malaria case management services.

**Materials and Methods:** A cross-sectional study was conducted in primary healthcare centers (PHCs) in three Local Government Areas (LGAs) of Ogun state. A pretested observational checklist adapted from the National Malaria Control Programme (NMCP) guideline was used to assess the health facilities, commodities, and supplies for malaria case management in all the PHCs.

**Results:** A total of 75 PHCs were visited in the three LGAs. Only 32.0% of the PHCs had long lasting insecticide nets (LLINs) on the hospital beds. The majority (74.7 and 60.0%) of the PHCs distributed LLINs at antenatal care (ANC) and during immunization. The availability of sulfadoxine-pyrimethamine (SP) was good in 57.3% of the PHCs, and directly observed therapy of SP at ANC was good in 59.3% of the PHCs. Only 6.7% of the PHCs had the light microscope. There was availability of rapid diagnostic test kits in 62.7% of the PHCs. There was regular supply of artemisinin-based combination therapy in almost half of the PHCs. However, only 5.3% of the PHCs had quinine tablets available and only one of the PHCs had the correct prescription of quinine.

**Conclusion:** There should be adequate and regular supplies of NMCP commodities in the PHCs if the country is to achieve the general objective of the current National Malaria Strategic Plan.

**Keywords:** Commodities, Nigeria, NMCP, Ogun state, PHCs, supplies

## INTRODUCTION

The malaria burden faced by African countries continues to be a challenge for national governments. Malaria is the most prevalent parasitic endemic disease in Africa which is preventable, treatable, and curable.<sup>[1]</sup> Yet it remains one of the major health problems in Nigeria. The malaria situation in Nigeria is deteriorating despite numerous interventions that had been instituted so far.<sup>[1]</sup> Malaria control relies on effective prevention and case management. Prevention with vector control interventions aims to reduce transmission and thus decrease the prevalence and incidence of parasite infection and clinical malaria.<sup>[2]</sup> The Roll Back Malaria (RBM) provides a coordinated global approach to fighting malaria. It suggests that the most effective and evidence-based control interventions are prompt access to effective treatment, promotion of insecticide-treated bed nets and

improved vector control, prevention and management of malaria in pregnancy, and improved management of malaria in complex emergencies.<sup>[3]</sup>

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1 These interventions suggested by RBM can be categorized  
 2 into curative and preventive intervention strategies. The  
 3 curative measure involves the diagnosis and treatment of  
 4 malaria. Preventive measures include residual spraying, bed  
 5 net impregnation, larviciding, and environmental  
 6 management intervention, which include covering wells  
 7 and filling in ditches, keeping irrigation channels fast  
 8 flowing, changing irrigation water levels in the irrigation  
 9 canals, and ensuring proper drainage.<sup>[3]</sup> A number of  
 10 challenges must still be addressed before Nigeria can  
 11 achieve the aim of “getting to zero.” Primary among  
 12 these is addressing the issue of proper implementation of  
 13 the national malaria control program.<sup>[4]</sup> Important next  
 14 steps will involve assessing the malaria control program  
 15 at the health unit to see the availability of malaria health  
 16 commodities and supplies such as rapid diagnosis test (RDT)  
 17 kits and functioning microscope for the laboratory diagnosis  
 18 of malaria; trained expert to make the diagnosis of malaria;  
 19 availability of prompt, effective, and affordable artemisinin-  
 20 based combination therapy (ACT) for the treatment of  
 21 malaria; availability of sulfadoxine-pyrimethamine (SP) as  
 22 Intermittent preventive treatment for pregnant women;  
 23 provision and distribution of long lasting insecticide nets  
 24 (LLINs), its use and introduction of routine mechanisms to  
 25 maintain high coverage with LLINs; availability of a robust  
 26 national malaria surveillance and finally monitoring and  
 27 evaluation (M and E) of the malaria control program.<sup>[4]</sup>

28  
 29 Primary health care is the entry point to the national health  
 30 system in the country.<sup>[5]</sup> The key functions of primary  
 31 healthcare facilities in relation to malaria case  
 32 management, include: planning malaria control activities  
 33 to ensure early access to appropriate diagnosis and  
 34 treatment at health units and in the community; ensuring  
 35 adequate provision and availability of antimalarial  
 36 medicines, diagnostics, and other supplies for health  
 37 units and the community; ensuring that the relevant  
 38 information is recorded in a malaria patient register,  
 39 summarized monthly, and analysed before reporting to  
 40 the local government. The study is aimed to assess the  
 41 malaria control program at the primary healthcare centers  
 42 (PHCs) to see the availability of malaria case management  
 43 commodities and supplies.

## 44 MATERIALS AND METHODS

45  
 46  
 47 The study was conducted in PHCs in three Local Government  
 48 Areas (LGAs) of Ogun state. These LGAs are Ado-Odo/Ota,  
 49 Ewekoro, and Ijebu-ode LGAs. Each of the LGA was selected  
 50 by simple random sampling via balloting from each of the  
 51 three senatorial districts in Ogun state. It was a descriptive  
 cross-sectional study assessing the situation of the National

Malaria Control Program in all the 75 PHCs in the three LGAs. 1  
 The study was between June 2013 and May 2014. The PHCs 2  
 were selected into the study using the cluster sampling 3  
 method. An observational checklist was used to collect 4  
 information on the condition and supplies of health 5  
 commodities of the malaria control program in the PHCs. 6  
 These activities were majorly conducted by the investigators 7  
 on antenatal care (ANC) clinic and immunization days. 8  
 9

The observational checklist was designed to capture 10  
 the following information: the environmental sanitation 11  
 around the PHC and the supplies of malaria health 12  
 commodities such as the availability of RDT kits and 13  
 functioning microscope for the laboratory diagnosis of 14  
 malaria; trained expert to make the diagnosis of malaria; 15  
 availability of prompt, effective and affordable ACT for the 16  
 treatment of malaria and quinine tablets in some instances; 17  
 availability of SP as intermittent preventive treatment for 18  
 pregnant women and directly observed therapy (DOT) of all 19  
 pregnant women on SP; provision and distribution of LLINs. 20  
 21

The observational checklist was pretested on 10 PHCs in 22  
 Lagos state. All PHCs with malaria control commodities that 23  
 had supplies since a month ago and still have commodities 24  
 in stock that can last one more month was considered as 25  
 good and otherwise as poor. Observation by the investigator 26  
 on regular DOT of all pregnant women on SP at each of the 27  
 PHC during ANC clinics as well as regular use of RDT to 28  
 diagnose malaria before treatment was also considered as 29  
 good. 30

Data collection methods: An observational checklist adapted 32  
 from the National Malaria Control Programme (NMCP) 33  
 guidelines was used to collect information 34  
 on the condition and supplies of health commodities of 35  
 the NMCP in all the 75 primary healthcare facilities. 36  
 37

Data analysis: The information obtained was entered and 38  
 analyzed using Statistical Package for the Social Sciences 39  
 version 20.0 software (SPSS Inc., Chicago, IL, United States). 40  
 Results from the observational checklist were presented in 41  
 frequencies and percentages. The findings from the PHCs 42  
 were compared between the three LGAs. Relationships 43  
 between categorical variables were tested using the chi- 44  
 square test (Fisher’s exact test was reported instead of 45  
 Pearson’s chi-square test if any of the cells have expected 46  
 count cell less than five). *P* values <0.05 were considered 47  
 statistically significant. 48  
 49

Ethical considerations: Ethical approval was obtained from 50  
 the Health Research and Ethics Committee of the Olabisi 51  
 Onabanjo University Teaching Hospital Sagamu and Ogun

State Primary Health Care Board, Ogun State Ministry of Health Abeokuta, Nigeria. Written approval was also sought and obtained from the Local Government Health Authorities in the three LGAs.

## RESULTS

A total of 75 PHCs were visited during the study, 34 (45.3%) in Ado-Odo/Ota LGA, 24 (32%) in Ewekoro LGA, and 17 (22.7%) PHCs in Ijebu-Ode LGA.

Table 1 shows that environmental sanitation around the health facilities was good in 33.3% of the PHCs and 32% in the community but was poor in over 60% of the PHCs and in the community visited. Clearing of the drainage around the PHC was good in 29.3% of the centers and was good in the community in 24% of the centers. Less than half (46.7%) of the health facilities visited had a good covering of water stored, a higher percentage (76.5%) was observed in Ijebu-Ode LGA and a lower percentage (29.4%) in Ado-Odo/Ota ( $P=0.005$ ). Twenty-seven (36%) of the PHCs had Information Education and Communication (IEC) material displayed on their walls, a significantly higher proportion (64.7%) of the PHCs in Ijebu-Ode had good display of IEC materials on their walls, while only 33.3 and 23.5% of the PHCs in Ewekoro and Ado-Odo/Ota had good display of the IEC materials ( $P=0.002$ ). Thirty-five (46.7%)

of the PHCs had health educator to work with during health education.

About 69.3% of the PHCs had good availability of LLINs but a very low percentage was seen in Ado-Odo/Ota (44.1%) and a high percentage (91.7%) in Ewekoro LGA ( $P < 0.001$ ). Three-quarter (74.7%) of the PHCs had a good distribution of LLINs; however, a lower proportion was observed in Ado-Odo/Ota (55.9%). Only 32% of the PHCs had LLINs on the hospital beds; however, a higher value was seen in Ijebu-Ode (52.9%). The majority (74.7 and 60.0%) of the PHCs distributed LLINs at ANC and during immunization. However, a higher proportion was observed in Ewekoro (95.8 and 87.5%) and a lower proportion in Ado-Odo/Ota LGAs (58.8 and 41.2%) ( $P=0.010$ ). About two-thirds of the PHCs have regular supply of LLINs; however, a significantly higher proportion (91.7%) of the PHCs in Ewekoro had regular supply of LLINs compared to PHCs in the other LGAs ( $P < 0.001$ ) [Table 1].

The availability of SP was good in 57.3% of the PHCs, a higher proportion (83.3%) was recorded in Ewekoro LGA, and a lower proportion (32.4%) was recorded in Ado-Odo/Ota LGA ( $P < 0.001$ ). The administration of SP at ANC was good in 48 (64%) of the PHCs, but a higher proportion (79.2%) was seen in Ewekoro LGA. DOT of SP at ANC was good in 52 (59.3%) of the PHCs, and a higher proportion was observed

**Table 1: Information on the environmental sanitation, LLINs, IPT, and IRS in the PHCs**

Variables	Frequency (%)			Total (%)	Test statistic $\chi^2$	P-value
	Ado-Odo/Ota	Ewekoro	Ijebu-Ode			
Good environmental sanitation in PHCs	9 (26.5)	8 (33.3)	8 (47.1)	25 (33.3)	2.315**	0.678
Good environmental sanitation in the community	8 (23.5)	5 (20.8)	11 (64.7)	24 (32.0)	10.327**	<b>0.035</b>
Good flow of drainage in PHCs	7 (20.6)	10 (41.7)	5 (29.4)	22 (29.3)	6.963**	0.138
Good flow of drainage in the community	4 (11.8)	8 (33.3)	6 (35.3)	18 (24.0)	9.527**	<b>0.049</b>
Good water storage seal in the PHC	10 (29.4)	12 (50.0)	13 (76.5)	35 (46.7)	14.646**	<b>0.005</b>
Good availability of IEC materials	8 (23.5)	8 (33.3)	11 (64.7)	27 (36.0)	16.900**	<b>0.002</b>
Presence of a health educator	13 (38.2)	16 (66.7)	6 (35.3)	35 (46.7)	5.916**	0.205
Good health education on environmental sanitation	16 (47.0)	17 (70.8)	11 (64.7)	44 (58.7)	10.253**	<b>0.036</b>
Good availability of LLINs	15 (44.1)	22 (91.7)	15 (88.2)	52 (69.3)	25.270**	<b>&lt;0.001</b>
Good distribution of LLINs	19 (55.9)	23 (95.8)	14 (82.4)	56 (74.7)	15.815**	<b>0.003</b>
Good use of LLINs on PHC beds	7 (20.6)	8 (33.3)	9 (52.9)	24 (32.0)	6.049**	0.196
Good distribution of LLINs at ANC	20 (58.8)	23 (95.8)	13 (76.5)	56 (74.7)	13.350**	<b>0.010</b>
Good distribution of LLINs at immunization	14 (41.2)	21 (87.5)	10 (58.8)	45 (60.0)	14.423**	<b>0.006</b>
Health education on the use of LLINs at ANC	19 (55.9)	24 (100.0)	12 (70.6)	55 (73.3)	19.800**	<b>0.001</b>
Health education on the use of LLINs at immunization	17 (50.0)	21 (87.5)	11 (64.7)	49 (65.3)	16.789**	<b>0.002</b>
Regular supply of LLINs	14 (41.2)	22 (91.7)	14 (82.4)	50 (66.7)	27.171**	<b>&lt;0.001</b>
Good availability of SP	11 (32.3)	20 (83.3)	12 (70.6)	43 (57.3)	20.261**	<b>&lt;0.001</b>
Good health education on the importance of IPT	19 (55.9)	21 (87.5)	12 (70.6)	52 (69.3)	11.151**	<b>0.025</b>
Administration of SP at ANC	19 (55.8)	19 (79.1)	10 (58.8)	48 (64.0)	8.569**	0.073
DOTs of SP at ANC	20 (58.8)	20 (83.4)	12 (70.6)	52 (59.3)	7.667**	0.105
Regular supply of IPT	9 (26.5)	20 (83.3)	11 (64.7)	40 (53.3)	29.385**	<b>&lt;0.001</b>
Availability and use of IRS	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	–	–

IEC, information education and communication; IPT, intermittent preventive therapy; IRS, indoor residual spray. Values that are statistically significant, that is  $P$ -value  $< 0.05$ . \*\* Fisher's exact test.

**Table 2: Information on light microscope, RDT kits, ACT, and quinine in the PHCs**

Variables	Frequency (%)			Total (%)	$\chi^2$	P-value
	Ado-Odo/Ota	Ewekoro	Ijebu-Ode			
Good availability of light microscope	1 (2.9)	2 (8.3)	2 (11.8)	5 (6.7)	3.153**	0.532
Use of light microscope	1 (2.9)	1 (4.2)	2 (11.8)	4 (5.3)	3.129**	0.536
Good availability of RDT kits	13 (38.2)	23 (95.8)	11 (64.7)	47 (62.7)	24.727**	<0.001
Use of RDT	16 (47.0)	23 (95.8)	12 (70.6)	51 (68.0)	20.797**	<0.001
Regular supply of RDT	11 (32.4)	21 (87.5)	13 (76.5)	45 (60.0)	22.807**	<0.001
Good availability of ACT	13 (38.2)	21 (87.5)	7 (41.2)	41 (54.7)	23.787	<0.001**
Regular supply of ACT	10 (29.4)	19 (79.2)	8 (47.1)	37 (49.3)	16.583**	0.002
Availability of quinine	1 (2.9)	2 (8.3)	1 (5.9)	4 (5.3)	3.865**	0.425
Correct prescription of quinine	0 (0.0)	1 (4.2)	0 (0.0)	1 (1.3)	8.382**	0.079

\*\*Fisher's exact test.

**Table 3: Monitoring and evaluation**

Variables	Frequency, n (%)			Total, n (%)	$\chi^2$	P-value
	Ado-Odo/Ota	Ewekoro	Ijebu-Ode			
Presence of M and E officer	13 (38.2)	16 (66.7)	9 (52.9)	38 (50.7)	6.606**	0.143
Availability of M and E forms	10 (29.4)	19 (79.2)	6 (35.3)	35 (46.7)	25.022**	<0.001
Availability of M and E filled forms	10 (29.4)	20 (83.3)	8 (47.1)	38 (50.7)	25.327**	<0.001
Availability of malaria data	9 (26.5)	22 (91.7)	7 (41.2)	38 (50.7)	35.248**	<0.001
Availability of up to date malaria data	8 (23.5)	22 (91.7)	7 (41.2)	37 (49.3)	38.646**	<0.001

\*\*Fisher's exact test.

in Ewekoro LGA (83.3%) and Ijebu-Ode (70.6%). None of the PHCs visited used indoor residual spray (IRS) as a prevention intervention against malaria [Table 1].

Table 2 depicts that 93.3% of the PHCs visited were without a light microscope. Only 5 (6.7%) of the PHCs had a light microscope. The use of light microscope was good in 4 (5.3%) of the PHCs. There was good availability of RDT in 47 (62.7%) of the PHCs, and a higher proportion (95.8%) was recorded in Ewekoro LGA and lower proportion (38.2%) in Ado-Odo/Ota LGA. There was a good use of RDT in 51 (68%) of the PHCs, and there was a significantly higher proportion (95.8%) in Ewekoro LGA and a lower proportion (47%) in Ado-Odo/Ota LGA ( $P < 0.001$ ).

More than half (54.7%) of the PHCs had good availability of free ACT, although a significantly higher proportion (87.5%) was recorded in Ewekoro LGA ( $P < 0.001$ ). All (100%) the PHCs had the correct prescription of the ACT. The supply of ACT was good in almost half (49.3%) of the PHCs; however, a significantly higher proportion (79.2%) was recorded in Ewekoro LGA ( $P = 0.002$ ). Only 4 (5.3%) of the PHCs had quinine tablets available and only 1 (1.3%) of the PHC had a correct prescription of quinine [Table 2].

Table 3 shows that half (50%) of the PHCs had regular visit of M and E officer, 66.7% of the PHCs in Ewekoro were regularly visited by M and E officer, and 52.9% of the PHCs in Ijebu-Ode were regularly visited by M and E officer but only 38.2%

of the PHCs in Ado-Odo/Ota were regularly visited. Only 46.7% of the PHCs had M and E forms, 80% of the PHCs in Ewekoro had M and E forms as well as M and E filled forms while 35.3 and 29.4% of the PHCs in Ijebu-Ode and Ado-Odo/Ota had M and E forms. But 8 (47.1%) PHCs in Ijebu-Ode and only 10 (29.4%) in Ado-Odo/Ota had copies of filled forms. Half (50.7%) of the PHCs presented their malaria data, >90% of the PHCs in Ewekoro had malaria data available and the data were up to date, while only 40% of the PHCs in Ijebu-Ode had malaria data and have the data up to date. However, <30% of the PHCs in Ado-Odo/Ota had malaria data up to date ( $P < 0.001$ ).

## DISCUSSION

This study assessed the condition and supplies of commodities regarding the national malaria control program in PHCs in Ogun state, Nigeria. Environmental sanitation in most of the PHCs and in the communities was very poor. There was a poor availability of LLINs on beds for admission in the health facilities. The provision of the RDT was not always regular and there was a poor availability of light microscopes; thus some of the healthcare workers use clinical suspicion for diagnosis. Quinine was not readily available in most of the health facilities. More than half of the health facilities did not have behavioral change communication (BCC) and IEC materials displayed on their walls. The availability of health educator and M and E officers was inadequate. There was, however, a good

provision of malaria control commodities in Ewekoro LGA compared with other LGAs.

About a third of the PHC had a good environmental sanitation, and almost half of the PHC had good water storage facility. Information education and communication materials were displayed on the walls of about a third (36%) of the PHCs; hence, passive health education on malaria is not in use in about two-thirds of the PHCs. However, this finding is higher than the finding in Kenya.<sup>[6]</sup> More than two-thirds (69.3%) of the PHCs had adequate LLINs in store, this is consistent with findings in a similar study in Anambra state.<sup>[7]</sup> The majority (74.7%) of the PHCs regularly distribute the nets. However, only 32% of the PHCs had LLINs on their hospital beds. The availability (69.3%) and distribution (74.7%) of LLINs were good among the PHCs in the LGA. There was regular and adequate health education on the use of LLINs during immunization and ANC.

More than half of the PHCs had free SP in stock, a finding lower than a similar study in Anambra, south-east, Nigeria.<sup>[7]</sup> About two-thirds of the PHCs administered SP at ANC and more than two-thirds of the PHCs conducted DOTS, a finding different from similar study in south-west LGA of Nigeria.<sup>[8]</sup> Indoor residual spraying was not practiced as a method of prevention of malaria in any of the PHC in the LGAs. This is probably due to its cost implication. This is in contrast to a similar study in India where implementation of IRS revealed 17–43% in the district.<sup>[9]</sup>

Light microscopes were available in only 6.7% of the PHCs and functioning in 5.3% of the PHCs. Free RDT for the diagnosis of malaria were available in almost two-third of the PHCs. Fifty-one (68%) PHCs use only RDT for the diagnosis of malaria before the commencement of treatment. This might be probably due to the absence of electricity and lack of manpower to handle the microscope. Most of these PHCs did not have the financial backup to make electricity available. The availability and use of RDT for the diagnosis of malaria was 62.7 and 68%, respectively, in all the health facilities. This finding was different in Anambra, where only 1.4% of the health facilities had RDT in stock,<sup>[7]</sup> but consistent with a similar study in Tanzania where only 20% of the health facilities made use of light microscope and 60% of the health facilities used RDT<sup>[10]</sup> and another study in south-east Nigeria where only 32.4% of the health facilities had RDT in stock and 51.1% of the health facilities had actually used it.<sup>[11]</sup> This finding corroborates with the annual report on malaria control where stock out of RDT kits was reported between April 2012 and March 2013.<sup>[12,13]</sup>

Although one of the reasons for the development of RDT was to combat electricity challenge, however, opportunity to confirm the diagnosis of malaria in patients that are RDT negative but has clinical symptoms of malaria will be denied in health facilities that do not have light microscope or has but no health personnel to operate it.

More than half (54.7%) of the PHCs had free ACT for the treatment of RDT-positive patients; this is lower than the findings from similar study in Tanzania and Kenya where 94 and 61% of the health facilities had ACT in stock, respectively<sup>[6,10]</sup> but higher than the findings from a study in Anambra, Nigeria. Only 5.3% of the PHCs had quinine. This is very low compared with the findings from Kenya where 92% of the health facilities had quinine tablets.<sup>[6]</sup> These quinine tablets are not free, only 1.3% of the PHCs knew the correct prescription of quinine. This is consistent with the report from Ogun State Ministry of Health.<sup>[14]</sup> Poor availability of quinine in the PHCs denied the pregnant women in their first trimester to be adequately treated when they are RDT positive. There was evidence of M and E visits by the M and E officers in half of the PHCs. M and E forms were available in half of the PHCs. This finding is different from that of a study in Anambra where M and E forms were available in 87.8% of the PHCs and filled forms were provided in 46.7% of the PHCs. Up-to-date malaria data were made available in 49.3% of the PHCs. National Health Management Information System reported to be in use since October 2013 by state ministry of health (SMOH)<sup>[15]</sup> was not in place in any of the LGAs. The most regularly supplied commodity was LLINs and the least regularly supplied commodity was ACT in each of the LGAs; this finding is different from the report of the 2013 annual operational plan (AOP) where it was reported that the proportion of PHCs with constant supply of free ACTs was 100%.<sup>[13]</sup> The assessment of the health facilities in the remote areas was always delayed due to delay in the arrival of the healthcare workers and the patients at the PHC as well as delay in the commencement of activities in the PHCs.

## CONCLUSION

Environmental sanitation in most of the PHCs and in the communities was very poor. The provision of RDT was not always regular and very few of the PHCs had light microscope. Quinine tablets were not available in most of the PHCs and some of the PHCs occasionally ran out of stock of ACT. Health educators, M and E officers and forms as well as malaria data were not available in some of the PHCs. More than half of the PHCs did not have BCC and IEC materials displayed on their walls. Therefore, there should be a regular and adequate supply of the malaria control commodities, especially all

the four packs of the ACT. The PHCs should be supplied with a light microscope and more health workers should be trained on how to use the microscope. Quinine tablets should be made available. BCC and IEC materials should be more readily available on the walls of the health facilities; these help to pass important information to the patient even when health education is not on. The PHCs and the communities should improve their environmental sanitation.

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### Conflicts of interest

There are no conflicts of interest.

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