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Management of Malaria Among Health Workers in Public Health Facilities in Nigeria: Comparative Analysis Between Global Fund-supported and Non-Global Fund-supported Sites

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Abstract

With stalling of progress in malaria control globally, and with Nigeria as the worst hit, the need to review implementation strategies, including the training of health workers in Primary Health Care facilities, towards an effective malaria control implementation process. This was an observational-comparative study which compared knowledge and practices of health workers between Global Fund-supported and non-Global Fund supported Primary Health Care (PHC) facilities. There was a significantly positive difference in knowledge and practices in Global Fund-supported facilities who had received more trainings in terms of diagnosis, malaria case management, Health Management Information System, and Logistics Management Information System. There is a need for structured trainings for health workers in PHCs to ensure health systems development, and ultimately, effective malaria control.

Keywords

Health Facility, Training, Health Workers

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1. Introduction

As the global community pushes for the elimination, and ultimately, eradication of malaria, an important component of health systems, human resources management, comes to bear. Timely and appropriate malaria case management, in addition to appropriate prevention interventions, is a push the world needs to prevent, as well as, treat malaria to morbidity and mortality. These, if built on an effective program management, are essential to achieve success in the control and elimination of malaria. Left untreated, or improperly treated, uncomplicated malaria can progress quickly to severe disease or death. The burden of malaria in Nigeria is the highest in the world, with a morbidity of 25% of the 219 million malaria cases and mortality of 19% of the 435,000 malaria deaths globally (WMR 2018) [1].

Malaria is responsible for about 60% of out-patient cases in our public health facilities. Despite having made good progress over the years as evinced by the reduction in prevalence of 42% in 2010 to 27% in 2015 [2, 3]. progress towards pre-elimination seems to have stalled as reported by the World Malaria report of 2018, which reports over a million new incidence compared to the previous year [1]. This calls for re-evaluation of strategies towards malaria control globally.

Public health facilities in Nigeria are wrought with a barrage of inefficiencies, ranging from lack of or inadequate staffing to attrition of health workers, dearth of capacity building among existing staff, inadequate management tools, inadequate stock of commodities, and sometimes dilapidated structures. With appropriated health budgetary trend being in

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the region of 4% of the federal government budgets, international donors have provided additional funding for disease control programmes, albeit vertically, hence leaving health systems mainly inadequately developed, upon their exit. Since 2004, alongside other donors, The Global Fund to fight AIDS, Tuberculosis and Malaria (GFATM) has been investing in the Nigerian health space to contribute to the control of these three diseases. GFATM has been a major donor to support implementation of public health disease control programmes in Nigeria, consistently supporting Nigeria on the 3 diseases since about the year 2004.

Health Facility Assessment broadly aims to assess health worker readiness (e.g., training, supervision), health facility capacity (e.g. availability of diagnostics and antimalarials) to provide malaria case management, and quality of service [4]. Quality of care in public health facilities has been identified as a panacea for improving, to a large extent, health seeking-behaviour, and ultimately, outcomes [5, 6, 7]. With assured interim funding from donors, many of the identified bottlenecks to quality service delivery are mitigated, thereby resulting in efficiencies [8, 9].

Comparison was made on the knowledge and practice on case management of malaria among GF-supported health facilities and non-GF supported facilities in order to determine relationships between them in terms of output of trainings received.

2. Methodology

This paper is an off-shoot from a bigger nationwide Health Facility Assessment survey conducted in 2014.

2.1. Study Area

The study was conducted in twelve states of Nigeria with two states selected by simple random sampling from each of the six geopolitical zones across the country.

2.2. Study Population/Study Subjects

Healthcare workers and visiting caregivers of children under five years old with fever in the selected health facilities.

2.3. Sampling Technique

In each of the selected twelve states, the Local Government Areas (LGAs) were listed and classified into urban and rural LGAs. Three LGAs were then selected (1 urban and 2 rural). To calculate the number of Global Fund (GF)-supported health facilities to be sampled per LGA, 42% (being the proportion of public facilities supported by the GF grant in all 30 states it covered) was applied thus giving a sample of 10 supported health facilities per LGA and 15 non-supported facilities per LGA. Within each selected LGA, 25 public health facilities were selected by simple random sampling to participate in the study. Being a comparative-observational study, the selected public health facilities were grouped into GF supported and non-GF supported facilities. In each of the selected facilities, health workers who reported that they have been trained on any of the supported interventions, and who were working in the facility from October 2011 were invited to participate in the study. In each selected facility, clients presenting with fever to the facilities were observed while receiving care from the health worker; they were also interviewed upon exiting the facility.

2.4. Selection Criteria

States/LGAs were selected using the inclusion criteria, only Global Fund-supported states were included in the sampling frame. Also, only LGAs with at least twenty-five (25) public health facilities were included in the sample to allow for adequate numbers of both GF and non-GF supported facilities to be sampled. The exclusion criteria had LGAs with less than twenty-five (25) public health facilities excluded from the sampling frame for the above-mentioned reason. Additionally, seven states which were receiving support from the World Bank-funded Malaria Control Booster project were excluded from the study as these states had not benefited from GF support. For Health Workers, the inclusion criteria considered workers who reported that they had been trained on any malaria-related interventions, and who were working in the facility from October 2011. The exclusion criteria excluded health workers that had been newly recruited / transferred / redeployed into the health facility, and reporting that they had not been trained with GF support.

2.5. Study Design

The study was a comparative-observational study. Health workers' knowledge and practices in GF-supported public health facilities were compared with those in non-GF supported sites.

2.6. Sample Size Estimation

In 2011, at the commencement of Phase 2 Global Fund malaria grant implementation, 15 public health facilities were supported by the Global Fund per LGA in 30 states across the country. This constituted 47% of all facilities in the 30 states as listed in the Federal Ministry of Health's Department of Planning, Research and Statistics (DPRS) Compendium of Health Facilities (HF) in Nigeria (2011). In order to determine the sample size, the WINPEPI application, version 2.62, was used to calculate the number of HFs to be sampled using a cluster sampling methodology, considering the total number of health facilities, the proportion supported by Global Fund grant, study design effect and 95% confidence

interval. This gave a required sample size of 492. However, in order to provide a sample size large enough to detect differences between the study sites and the comparison sites, the number of facilities to be sampled was multiplied by the design effect of 1.5, thus bringing the total number to 738 public health facilities. However, 900 health facilities were selected to participate in the study in order to increase the power of the sample, and for ease of sampling from the 36 LGAs.

In order to calculate the sample size of health workers, the same software was used to calculate for a simple random sample assuming that 50% of those expected to have been trained were trained, using a 95% confidence interval. This gave a sample size of 385 health workers for study sites and 385 for comparison sites. Since the number of HFs to be sampled was 738, an average of one health worker per facility was interviewed to get the required sample size of health workers, from both study and comparison sites to get a total of 738 health workers.

To calculate the required sample size of clinical cases and exit interviews, the same application was used assuming 60% of out-patient department cases were fever cases, with population from the 2006 National Population Census, and an assumption that 26% of the population sought care from public health facilities (MIS 2010) [3], at 95% confidence interval. A total of 1150 clients were observed and interviewed from both comparison and study sites: this required an average of two clients to be observed and interviewed per participating health facility. Two clinical cases that met the criteria (child 1-59 months whose reason for visit is fever) were observed per facility visited in both the study and comparison sites resulting in a total of 1,476 cases as well as interviewees.

2.7. Data Collection and Management

A structured Health Worker questionnaire was administered to facility staff in the sampled health facilities to collect information on knowledge and practices relating to malaria case management and other management operations.

2.8. Data Analysis

Descriptive and comparative analysis was done using SPSS version 20.0 and statistical significance of the difference between baseline and end-line data were determined using chi-square or fisher's exact test where applicable at $p < 0.05$ or $p<0.01$.

2.9. Ethical Considerations

Protocol for this study was approved by the National Health Research Ethics Committee of Nigeria and written informed consent was obtained from willing participants.

3. Results

Result of the demographic characteristics of the health workers is presented in Table 1. Result reveals that most of the respondents were female (54.1%) while 88.5% of the respondents were married and most of the respondents were of the Christian faith (71.1%). The distribution of the respondents' employment status revealed that almost all the respondents (94.7%) were permanent staff. The table also reveals that majority (49.9%) of the respondents had ≥14 years of work experience while 42.0% were between 31-40 years. The result also shows that differences in sex (p=0.257), marital status (p=0.241), religion (p=0.593), employment status (p=0.276) and years of experience (p=0.404) were not significant between those in Global Fund (GF)-supported and non-GF-supported health facilities, respectively. There was a significant difference in the age distribution of respondents between Global Fund supported and non-Global Fund supported health facilities (p=0.031, p<0.05).

Table 1. Demographics characteristics of the respondents in Global Fund (GF)-supported non-GF supported health facilities.

Demographics characteristics	Global Fund (GF)-supported f(%)	non- Global Fund (GF)-supported f(%)	Total f(%)	p-value
Sex				
Male	228(45.1)	132(47.3)	360(45.9)	0.257
Female	227(54.9)	147(52.7)	424(54.1)	
Marital status				
Single	44(8.6)	32(11.4)	76(9.6)	
Married	454(88.8)	246(87.9)	700(88.5)	
Divorced	3(0.6)	0(0.0)	3(0.4)	0.241
Widowed	8(1.6)	1(0.4)	9(1.1)	
Separated	2(0.4)	1(0.4)	3(0.4)	
Religious				
Christianity	367(71.1)	202(71.1)	569(71.1)	
Islam	148(28.7)	82(28.9)	230(28.8)	0.593
Traditional Religion	1(0.2)	0(0.0)	1(0.1)	
Employment status				
Permanent	493(95.9)	264(92.6)	757(94.7)	0.276
Volunteer	7(1.4)	8(2.8)	15(1.9)	

Demographics characteristics	Global Fund (GF)-supported f(%)	non- Global Fund (GF)-supported f(%)	Total f(%)	p-value
Part-time	3(0.6)	3(1.1)	6(0.8)	
Contract	4(0.8)	6(2.1)	10(1.3)	
Others	7(1.4)	4(1.4)	11(1.4)	
Years of experience				
< 2 years	7(1.4)	8(2.8)	15(1.9)	
2-5 years	45(8.7)	26(9.2)	71(8.9)	
6-9 years	92(17.8)	49(17.3)	141(17.6)	0.404
10-13 years	106(20.5)	68(23.9)	174(21.7)	
14 and above	267(51.6)	133(46.8)	400(49.9)	
Age				
20-30	44(9.0)	41(15.4)	85(11.2)	
31-40	204(41.5)	114(42.7)	318(42.0)	0.031*
41-50	181(36.9)	87(32.6)	268(35.4)	
Above 50	62(12.6)	25(9.4)	87(11.5)	

*significant at 5% ($p<0.05$).

Table 2 shows the level of knowledge and practice of malaria diagnosis and case management in the two categories of health facilities. A higher percentage (90.3%) of the health workers in the Global Fund-supported health facilities than in the non-Global Fund supported health facilities (59.0%) believed that fever in the preceding 24 hours with parasitological confirmation would help to determine whether someone had malaria. In both groups, majority of the respondents recommended Artemether-Lumefantrine (AL) as the first line of treatment for uncomplicated malaria (93.6% in Global Fund supported and 82.9% in non-Global Fund supported facilities). Similarly, a higher percentage (93.2%) in the Global Fund supported facilities compared with non-Global Fund supported facilities (88.6%) indicated that adults should take four tablets of AL. Also, in terms of dosage, it was indicated that this drug should be taken twice daily: 90.1% and 86.1%, in GF supported and non-GF supported sites, respectively. Similarly, 93.6% of the respondents in the GF supported sites recommended 3 days while (91.4%) in non-GF supported sites also recommended 3 days.

For the number of tablets to be taken by a 2-year old at a time, majority in both sites recommended one tablet (90.0% in GF supported and 79.5% in non-GF supported sites). The result also shows that a higher percentage of the respondents in the two sites opined that a 2-year-old should take AL drug twice daily: 91.5% and 85.8% in the Global Fund supported and non- Global Fund supported sites, respectively.

Result in Table 2 also shows that a higher percentage of the respondents in the GF supported sites were able to state four or more conditions that a health worker in a Primary Health Centre (PHC) could refer cases of malaria to higher facilities (55.2% vs 36.9%), identified dangers signs of malaria (66.6% vs 45.8%) as well as the kind of information to give to mothers upon prescription of treatment. For most of the items that assessed the knowledge of malaria diagnosis and treatment, the percentage of respondents in the Global Fund Supported facilities who were knowledgeable about malaria diagnosis and treatment were significantly higher than those from non-Global Fund supported facilities ($p<0.05$). For the practice, 93.6% and 82.9% of the respondents from GF supported and non-GF supported facilities recommended Artemether-Lumefantrine as the anti- malarial medicine they prescribed.

Table 2. Knowledge and practice of malaria diagnosis and case management in Global Fund supported health facilities and non-GF-supported sites.

Malaria Diagnosis and case management	Global Fund supported f(%)	non-GF supported f(%)	p-value
How would you know if someone has malaria			
Fever in preceding 34 hours with parasitological confirmation	467(90.3)	164(59.0)	<0.0001**
Fever in the preceding 24 hours without parasitological confirmation	50(9.7)	114(41.0)	
What is the first line treatment for uncomplicated malaria			
Artemether-Lumefantrine	487(94.6)	235(87.4)	<0.0001**
Artesunate-Amodiaquine	22(4.3)	12(4.5)	
Artesunate + Sulphadoxine-Pyrimethane	1(0.2)	4(1.5)	
Chloroquine	2(0.4)	8(3.0)	
Others	3(0.6)	10(3.7)	
Which first line anti-malarial do you prescribe			
Artemether-Lumefantrine	479(93.6)	228(82.9)	<0.0001**
Artesunate-Amodiaquine	21(4.1)	16(5.8)	
Artesunate + Sulphadoxine-Pyrimethane	1(0.2)	5(1.8)	
Chloroquine	8(1.6)	13(4.7)	
Others	3(0.6)	13(4.7)	
How many tablets of AL should an ADULT take at a time			
One	23(4.5)	11(3.9)	0.001**

Malaria Diagnosis and case management	Global Fund supported f(%)	non-GF supported f(%)	p-value
Two	6(1.2)	5(1.8)	
Three	4(0.8)	4(1.4)	
Four	481(93.2)	249(88.6)	
Five	1(0.2)	0(0.0)	
Don't know	1(0.0)	12(4.3)	
How many times should AL be taken by an ADULT per day?			
One	12(2.3)	7(2.5)	0.0001**
Two	463(90.1)	242(86.1)	
Three	10(1.9)	6(2.4)	
Four	29(5.6)	14(5.0)	
Over how many days should an ADULT take AL?			
One	5(1.0)	1(1.4)	<0.0001**
Two	11(2.1)	0(0.0)	
Three	481(93.6)	64(91.4)	
Four	16(3.1)	4(5.7)	
Five	1(0.2)	1(1.4)	
Other	0(0.0)		
Don't know	0(0.0)		
How many tablets of AL should a 2-yr old take at a time?			
One	460(90.0)	221(79.5)	<0.0001**
Two	36(7.0)	23(8.3)	
Three	9(1.8)	13(4.7)	
How many times should a 2-yr old take AL per day?			
One	30(5.8)	16(5.7)	<0.0001**
Two	371(91.5)	241(85.8)	
Three	12(2.3)	7(2.5)	
Over how many days should a 2-yr old take AL?			
One	5(1.0)	3(1.1)	<0.0001**
Two	14(2.7)	13(4.6)	
Three	485(95.1)	246(87.9)	
Four	2(0.4)	1(0.4)	
Under what conditions should a Health Worker in a PHC refer cases of malaria to a higher facility?			
State 4 or more correctly	276(55.2)	100(36.9)	<0.0001**
State less than 4 correctly	220(44.0)	165(60.9)	
None correct	4(0.8)	6(2.2)	
Danger signs of malaria			
State at least 4 with 1 danger sign correctly	323(66.6)	125(45.8)	<0.0001**
State less than 3 correctly	148(30.5)	139(50.9)	
None	14(3.9)	9(3.3)	
A child under five comes to your clinic with symptom of fever. The child has no other symptoms.			
What would you do?			
Do a blood test	453(92.1)	129(51.8)	<0.0001**
Give ACT if test is positive to malaria	328(68.0)	88(35.5)	<0.0001**
Give ACT (no mention test)	65(13.4)	84(33.9)	<0.0001**
Give Paracetamol	252(52.3)	129(51.6)	0.923
Give a prophylaxis	56(11.6)	29(11.7)	0.997
Give other anti-malaria	44(9.1)	29(11.7)	0.340
Others	29(6.7)	24(9.8)	0.103
What test will you do?			
Malaria RDT	417(93.7)	98(83.1)	<0.0001**
Blood film for microscopy	12(2.7)	15(12.7)	
Both	16(3.6)	5(4.2)	
What other information will you give the mother once you have prescribed this treatment?			
How to give the medicine	444(88.1)	221(85.3)	0.333
Importance of compliance	234(46.4)	98(38.4)	0.043
Return to clinic if no improvement after 2 days	324(63.9)	159(61.6)	0.591
Sleeping insecticide treated net	361(71.8)	141(56.0)	<0.001**
Preventive exposure to mosquito bites	222(44.4)	70(27.8)	<0.0001**
Other	45(9.1)	10(4.0)	0.020*

* significant at 5% ($p<0.05$), ** significant at 1% ($p<0.001$ and 0.0001).

Table 3 reveals the practice of record keeping for services provide using the National Health Management Information System (NHMIS) tools in Global Fund supported health facilities and non- Global Fund Supported facilities: NHMIS tools such as OPD register (98.1% vs 77.2%); Ante-Natal Care (ANC) register (88.1% vs 55.4%); In-Patient Care

register (48.1% vs 33.8%); and Facility Monthly Summary Form (92.0% vs 68.6%) were observed more in the Global Fund supported health facilities than in the non-Global Fund supported facilities. The tools were significantly more available in the Global Fund supported sites than non-Global Fund supported sites (P<0.05). In terms of how recent the data entry was, results also show that health facilities in the Global Fund supported sites had more recent service records entered than in the non-Global Fund supported sites.

Table 3. Practice of HMIS in Global Fund supported health facilities and non-GF-Supported Sites.

	Global Fund supported f(%)	Non-GF supported f(%)	p-value
OPD Register			
Observed	505(98.1)	223(77.2)	<0.0001**
Reported, not seen	6(1.2)	12(4.2)	
No Register	4(0.8)	54(18.7)	
How recent is the date of the most recent entry?			
Within the past 7 days	440(88.9)	174(81.3)	0.006**
More than 7 days old	53(10.8)	40(81.7)	
Immunization monthly summary			
Observed form	448(88.0)	208(73.0)	<0.0001**
Reported, not seen	17(3.4)	16(5.6)	
No monthly summary	30(5.9)	39(13.7)	
Not applicable	14(2.8)	22(7.7)	
How recent is the date of the most recent entry?			
Within 7 days	340(77.6)	141(73.4)	0.300
More than 7 days	98(22.4)	51(26.6)	
ANC Register			
Observed Register	438(88.1)	153(55.4)	<0.0001**
Reported, not seen	14(2.8)	19(6.9)	
No Register	31(6.2)	73(26.4)	
Not applicable	14(2.8)	31(11.2)	
How recent is the date of the most recent entry?			
Within 7 days	360(83.5)	97(66.9)	<0.0001**
More than 7 days	71(16.5)	48(33.1)	
In-Patient Care Register			
Observed Register	232(48.1)	92(33.8)	<0.0001**
Reported, not seen	26(5.4)	26(9.6)	
No Register	109(22.6)	104(38.2)	
Not applicable	115(23.9)	50(18.4)	
How recent is the date of the most recent entry?			
Within the past 7 days	178(80.5)	59(68.6)	0.037*
More than 7 days old	43(19.5)	27(31.4)	
Facility Monthly Summary			
Observed form	463(92.0)	188(66.7)	<0.0001**
Reported, not seen	21(4.2)	25(8.9)	
No monthly summary form	19(3.8)	69(24.5)	
How recent is the date of the most recent entry?			
Within the past 7 days	265(58.6)	105(59.0)	0.999
More than 7 days old	187(41.4)	73(41.0)	

* significant at 5% (p<0.05), ** significant at 1% (p<0.01 and 0.0001).

Knowledge of Malaria Commodity Logistics System (MCLS) between Global Fund supported and non-Global Fund supported sites are as recorded in Table 4. The result reveals that a higher percentage of respondents in the Global Fund supported sites than in non-Global Fund Supported sites were able to mention the purpose of MCLS (66.5% vs 21.5%); ‘’six rights a logistic system must provide’’ (20.0% vs 8.6%); listed any 5 commodities included in MCLS (51.2% vs 21.1%); and also mentioned the three forms at the facility where adjustments are recorded (27.5% vs 12.1%). The result also shows that a higher percentage of respondents in Global Fund supported sites were able to correctly mention where Bin Cards were kept (73.8% vs 34.7%). Generally, a higher percentage of respondents in Global Fund supported sites had better knowledge of MCLS systems and processes than those in non-Global Fund Supported health facilities and these were significant (p<0.05).

Table 4. Knowledge of MCLS between Global Fund supported and non-G-F-Supported sites.

	GF-supported f(%)	non-GF supported f(%)	p-value
Purpose of the Malaria Commodity Logistics System in Nigeria			
Two or more correct answer	313(66.5)	54(21.5)	<0.0001**
Less than two correct answer	72(15.3)	51(20.3)	
No correct answer	86(18.3)	146(58.2)	
What are the six rights a logistics system must provide?			
Mention six	98(20.0)	22(8.6)	<0.0001**
At least 3 mentioned	204(41.6)	45(17.6)	
Less than 3 mentioned	72(14.7)	29(11.3)	
Non mentioned	116(23.7)	160(62.5)	
Can you list any 5 commodities included in the MCLS?			
List a minimum of 5 commodities	252(51.2)	54(21.1)	<0.0001**
List less than 5 commodities	222(45.1)	123(48.0)	
List none	18(3.7)	79(30.9)	
On which form (s) at the facility are adjustments recorded?			
Mentioned the 3 forms	127(27.5)	31(12.1)	<0.0001**
Mentioned less than 3 forms	259(56.2)	54(21.0)	
Mentioned none	75(16.3)	172(66.9)	
Where is the Bin Card kept?			
Correct	358(73.8)	83(34.7)	<0.0001**
Incorrect	127(26.2)	156(65.3)	
When should Service Delivery Points (SDPs) submit their Bi-Monthly (two months) Facility Stock Report?			
One correct	224(45.4)	55(21.0)	<0.0001**
Both correct	215(43.6)	39(14.9)	
Non correct	54(11.0)	168(64.1)	
What are the maximum, minimum and Emergency Order Points (EOPs) for commodities at the health facility?			
All correct	90(18.6)	22(8.8)	<0.0001**
One correct	164(34.0)	41(16.3)	
Two correct	104(21.5)	14(5.6)	
None correct	125(25.9)	174(6.3)	
What is the trigger for placing an emergency order?			
Correct	304(62.4)	73(28.5)	<0.0001
Incorrect	183(37.6)	183(71.5)	
Which form should be used by SDPs to place an emergency order?			
Correct	298(60.9)	50(19.5)	<0.0001
Incorrect	191(39.1)	206(80.5)	
Where is the emergency order sent?			
Correct	349(71.8)	85(33.5)	<0.0001
Incorrect	137(28.2)	169(66.5)	
Who is responsible for placing orders for the facility?			
Correct	416(84.0)	104(41.3)	<0.0001
Incorrect	79(16.0)	148(58.7)	
Should medicines be stored according to First In, First Out (FIFO)?			
Correct	402(79.0)	153(56.9)	<0.0001
Incorrect	107(21.0)	116(43.1)	
Do Rapid Diagnostic Tests (RDTs) need refrigeration?			
Correct	461(90.7)	181(67.3)	<0.0001
Incorrect	47(9.3)	88(32.7)	
When should a physical count be conducted at the health facility?			
Correct	452(89.9)	131(48.9)	<0.0001
Incorrect	51(10.1)	137(51.0)	
Name at least three transactions a Store Pharmacist in a small facility would need to record on an Inventory Control Card?			
At least four correct	211(42.3)	40(14.9)	<0.0001
Less than 4 correct	225(45.1)	80(29.7)	
None correct	63(12.6)	149(55.4)	
What are the roles and responsibilities of the State RBM Manager in relation to MCLS?			
Correct	300(60.2)	65(24.4)	<0.0001
Incorrect	198(39.8)	201(75.6)	
To ensure the shelf life of malaria commodities, temperatures in the storeroom should not exceed what temperature?			
Correct	338(68.3)	132(50.4)	<0.0001
Incorrect	157(31.7)	130(49.6)	
Can ACTs and RDTs can be stored in places with direct exposure to sunlight			

	GF-supported f(%)	non-GF supported f(%)	p-value
Correct	454(91.7)	211(79.6)	<0.0001
Incorrect	41(8.3)	54(20.4)	
Can RDTs can be stored in humid places (wet areas)			
Correct	407(89.5)	184(76.7)	<0.0001
Incorrect	48(10.5)	56(23.3)	

* significant at 5% (p<0.05), ** significant at 1% (p<0.01 and 0.0001).

Table 5 shows the practice of MCLS processes between the two categories of health facilities. Results reveals that Requisition, Issue and Receipt Voucher (RIRV) forms (62.4% vs 17.0%), Inventory Control Cards (ICC) (78.6% vs 19.9%), Bin Cards (65.9% vs 22.2%) and Bi-monthly Facility Stock Report forms (69.7% vs 15.8%) were significantly more available in the Global Fund supported sites than in the non-Global Fund supported health facilities (P<0.05). In terms of completeness of the records, health facilities in the GF-supported sites out-performed those in non-Global Fund supported sites.

Table 5. Practice of MCLS between Global Fund-supported and non-GF supported sites.

	GF-supported f(%)	Non-GF supported f(%)	p-value
Are RIRV forms available in the facility?			
Yes	313(62.4)	46(17.0)	<0.001
No	189(37.6)	225(83.0)	
If yes, observe completeness of entry			
Complete	219(73.7)	30(66.7)	0.416
Incomplete	78(26.3)	15(33.3)	
Are ICC forms available in the facility			
Yes	393(78.6)	53(19.9)	<0.0001
No	107(21.4)	214(80.1)	
If yes, observe completeness of entry			
Complete	318(84.6)	40(80.0)	0.532
Incomplete	58(15.4)	10(20.0)	
Are Bin cards available in the facility			
Yes	323(65.9)	58(22.2)	<0.0001
No	167(34.1)	203(77.8)	
If yes, observe completeness of entry			
Complete	277(89.1)	46(83.6)	0.354
Incomplete	34(10.9)	9(16.4)	
Are Bi-monthly Facility Stock Report forms available in the facility			
Yes	349(69.7)	41(15.8)	<0.0001
No	152(30.3)	218(84.2)	
If yes, observe completeness of entry			
Complete	305(69.7)	34(89.5)	0.9999
Incomplete	33(9.8)	4(10.5)	

* significant at 5% (p<0.05), ** significant at 1% (p<0.01).

4. Discussion

The caliber of staff at the health facilities comprised 94.7% with permanent employment. The age range at all facilities ranged between 20 to above 50 years. This is similar to other studies where the age range of health workers was in the range of 20 – 77 years [10, 11]. For most of the items that assessed the health workers' knowledge and practice of malaria diagnosis and case management, the percentage of respondents in the Global Fund Supported facilities who were knowledgeable about malaria diagnosis and case management were significantly higher than those of non-Global Fund supported facilities (p<0.05). It is imperative to state here that non-GF supported health facilities could refer to facilities supported by other donors or without any donor support within the same LGA where GF supports some facilities. The implication observed here is that more trainings were conducted for Health Workers in GF-supported facilities: a reflection of health systems strengthening by donors, especially human resources and its development.

In Nigeria, as in other low-income countries, short to medium term funding support to the health sector by donors are not sustainable. It has been prescribed that a longer-term sustainable solution would be to increase domestic financing for health by leveraging increases in fiscal space associated with improved levels of economic growth [12]. From the

same study, it was observed that shares of spending on Primary Health Care (PHC) Service Delivery increased in Ethiopia and Nigeria between 2000 to 2011; spending on basic health care and infrastructure grew from 7% to 36% of total donor spending on health for Ethiopia from 2000 to 2011, compared with only 2.5% to 9%, respectively, for Nigeria.

Donors are further encouraged to help put lower-income countries' health financing on a more sustainable basis by leveraging the increases in fiscal space that are possible through growth, however, this may be compromised by lack of adequate and quality data on health expenditure generated by government systems.

Health Management Information System (HMIS) ensures service delivery data is appropriately captured and analyzed to aid monitoring and evaluation of public health programmes, this is supported by other studies [13, 14]. HMIS tools (Out-Patient Department (OPD) register, Ante-Natal Care (ANC) register, In-Patient Care register, and Facility Monthly Summary) were significantly more available in the Global Fund supported sites than in the non-Global Fund supported sites ($p<0.05$). Additionally, timeliness of data entry was better in Global Fund supported health facilities than in non-Global Fund supported sites. Again, this could be a reflection of the relatively more trainings received by health workers in GF-supported health facilities, though the non-GF facilities were not disaggregated in terms of availability of active (other) donor support or worse still, no support at all. More than this, data from HMIS ought to be used to promote information and lobby for positive change in health outcomes [13].

The main aim of Malaria Commodity Logistics System (MCLS) is to ensure uninterrupted supply of malaria products for the prevention of, and case management of malaria. Some studies found that poor procurement planning and budgeting, lack of financial resources for procurement, poor quantification and forecasting, delay in procurement process and order processing, and delay in receiving insurance claims are some of the causes of inadequacy of logistics in the health systems [15-18]. Regular monitoring and evaluation of MCLS is also advised by a study by Manso JF etal [15]. For MCLS systems and processes, a higher percentage of respondents in Global Fund supported sites had better knowledge and practice than those in non-Global Fund-supported health facilities and these were significant ($p<0.05$). Of interest were the purpose of the Malaria Commodity Logistics System in Nigeria; six rights an MCLS should provide; list of commodities in the MCLS; the various tools in MCLS (RIRV, ICC, Bin Card, Facility Stock Report; and Emergency Order Points. Other characteristics assessed were: responsibility for placing orders for the facility; First In, First Out [FIFO] storage procedure; storage conditions of Rapid Diagnostic Tests (RDTs) kits; physical count of commodities; transactions to be recorded in the various tools; and handling of damaged or expired products).

Though appreciable, the aforementioned indicators that recorded better performance at the GF-supported facilities are suggestive of improved service quality. Service quality depends on sustainable health systems solutions, rather than quick fixes [19, 20]. Ultimately, the goal of every public health logistics system is to help ensure that every consumer has commodity security. Commodity security exists when every person is able to obtain and use quality essential health supplies whenever he or she needs them [18]. A properly functioning supply chain is a critical part of ensuring commodity security financing, policies, and commitment are in place.

With Nigeria's ambitious goal of attaining pre-elimination by the year 2020, she needs to key into proven strategies, one of which is the need for management development at the operational level, particularly team building and team management skills and techniques in finances, information, logistics, activity planning, and other administrative skills to support systemic improvements to managerial practice [21, 22].

As much as is known, there is dearth of this particular kind of study design where health workers in public health facilities assessed are compared based on donor-funding and non-donor funding. This is a call for implementation research in this area.

5. Conclusion

Comparison has been made by assessing service availability, delivery and quality between GF-supported and non-GF supported health facilities which were significantly different in favour of the GF-supported facilities which offered more training opportunities for health workers. Data entry and quality and better supply-chain processes were observed to be better in GF-supported facilities.

Author Contribution

IE conceived, analyzed the data and contributed to writing. NO coordinated data collation and contributed to writing.

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Data Availability

The data used to support the findings of this study is available on request to the corresponding author.

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