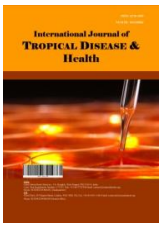

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Assessing the Current States of Logistics Management and Training on Family Planning Services in Nigerian Healthcare Facilities

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Authors' contributions

This work was carried out in collaboration among all authors. Author AJO designed the study, wrote the protocol, author FOS performed the statistical analysis and wrote the first draft of the manuscript. Authors SPA, POA and SIO managed the analyses of the study. Author SAL managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Background: Management of Family planning (FP) commodities is a significant problem that is not limited to compromising the quality of FP services but also results in economic burden especially in developing countries. Some facilities may have ample FP commodities while others have a shortage if FP logistics are managed poorly. Hence, assessing the FP commodities logistic management is relevant to inform decision-makers.
Methods: This survey was a cross-section study of 763 public primary and secondary healthcare facilities in Nigeria. The study involved facility assessment and quantitative interview of key personnel in each facility, using a structured questionnaire. The study was conducted from May to

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July 2019. The data collected were analysed with IBM-SPSS version 25.0. Descriptive statistics were performed, Chi-Square and linear logistics regression were used to establish significant associations; $p<0.05$ was considered significant.

Results: About half (51.4%) of primary and 33.5% of secondary healthcare facilities were not using forms for reporting FP supplies. Also, 23.8% of primary and 18.8% of secondary facilities waited for more than two months before receiving orders. The facilities have an average of 2-3 trained personnel on FP services. FP staff who were trained had their last training over a year ago (primary-31.9%); secondary-37.4%). Secondary facilities were 2.102(95% CI:1.567–2.820) times more likely to use log forms, 1.845(95% CI: 1.076–3.165) times more likely to have cold chains, and 4.785(95% CI: 3.207–7.139) more likely to have trained staff on insertion and removal of implants than primary facilities ($p<0.05$).

Conclusion: We advocate that the government and donor agencies carry out urgent interventions such as regular supply of contraceptives, regular training of FP service providers, provide sufficient manpower, carry out regular monitoring and evaluation of FP services and create awareness on the need to use FP services among grassroots citizens.

Keywords: Family planning; contraceptives; health facilities; logistics; training.

1. INTRODUCTION

Family planning (FP) is an important tool in the prevention of child and infant deaths, unintended pregnancies, risky births, unsafe abortions, and maternal mortality deaths. This requires adequate supply, availability, affordability, accurate information and qualified personnel [1]. Literature reveals that families that use FP usually have stronger and healthier children [2]. Also, young people using FP have the likelihood of remaining in school longer than those who do not [2]. Though accessibility, affordability and availability of quality FP services are taken as one of the fundamental human rights, yet the 2015 report of the United Nations on "world contraceptive pattern" revealed that over 216 million married women who are willing and ready to use contraceptives are not able to access them [3].

Since the 1980s, the Nigerian government has made concerted efforts at various levels to improve maternal and child health, particularly in FP and these efforts have yielded positive results up to 2003 after which the improvement rate was less than three percent for the next ten years (up to 2013) [2]. The government has since intensified efforts including the five-year plan to overcome the challenges and barriers to the provision of quality FP services across Nigeria [4]. The government planned to improve the modern contraceptive prevalence rate (CPR) from 10% in 2015 to 36% in 2018 [2] but when it was clear that this could not be achieved in 2017, it later rebased to a 27% CPR target for 2020 [5]. The 2018 report of the National Demographic Health Survey (NDHS) [6] showed that the CPR in Nigeria was 18% and 12% for married women, which shows a 2% increase from 2013.

Inability to achieve the targeted rate cannot be blamed on the government alone because several other factors such as logistics and data management, availability of trained or qualified personnel, the quality of services, supervision and several other factors need to be considered. Literature also shows that Nigeria health sector is facing the problem of poor FP ordering because of a poor knowledge of logistics management among healthcare professionals [2,7]. A previous study conducted in Nigeria revealed that only "53% of Nigerian health facilities had trained personnel in postpartum family planning; 68% in long-acting, reversible contraceptives 56% in commodity logistics management system" [1].

Availability of quality data [1,8], quality service [9], trained or qualified personnel [10,11], good logistics management [9,12–14], good storage facilities [5,13,15,16], and supportive supervision [6,8,12,16] have been identified as the bedrocks of the provision of quality FP services. Also, poor logistics management and supply of contraceptives chain has been associated with the inability to sufficiently serve FP clients [17]. The six rights of client need which are "delivering the right products, in the right quantity, in the right condition, to the right place and for the right cost" can only be fulfilled through good logistics management systems [18].

Studies have shown that providers' training is an essential component of FP services [19–21]. Besides, it has been documented in the literature that FP providers who have been trained showed

better knowledge and positive attitudes towards modern contraception than their counterparts with less training [22]. The objective of this study is to identify the current state of logistics management and the level of trained and qualified FP personnel available in Nigerian public primary and secondary healthcare facilities. The outcomes of the study are relevant to both government, researchers and stakeholders in the health sector for policymaking, interventions design, and further studies.

2. METHODOLOGY

2.1 Study Design

This survey was a cross-section study of functional public primary and secondary healthcare facilities in 33 states and the Federal Capital Territory (FCT), Abuja, Nigeria. The study excluded three states including Borno, Yobe and Adamawa state due to insecurity. The study involved facility assessment and quantitative interview of key personnel in each healthcare facility, using a semi-structured questionnaire. The key personnel interviewed included the supply chain managers, the chief medical directors, and the head of records departments who are the administrators or directly involved in facility' logistics and supply chain management. The study was conducted for three months from May to July 2019.

2.2 Sample Size

Only facilities offering family planning services were included in the study. The sample size was calculated using the Yaro Yamane formula:

$$\frac{N}{1 + Ne^2}$$

Where: n is the sample size, N is the population size, and *e* is the level of precision = 5% = 0.05 at 95% confidence level.

The Federal government list of Nigerian Healthcare facilities was used to determine total the number of primary and secondary facilities in the country. The number of primary and secondary health facilities offering family planning after removing Borno, Adamawa, and Yobe States are 32,273, and 4,987 respectively [18]. Using the above formula, a sample size of 356 and 395 were obtained for primary and secondary facilities, making a total of 751 facilities. An average of 22 facilities (10 secondaries and 12 primaries) were selected each State, though 23 were selected from 15 States with more primary health facilities (Bauchi, Benue, Cross River, Kaduna, Katsina, Kogi, Nasarawa, Niger, Ogun, Osun, Plateau, Oyo, Lagos, Kano, and Rivers) The total facilities selected was (22x19) + (23 x 15) = 418 + 345 = 763 facilities instead of the initial 751 estimated with formula.

2.3 Data Collection

Information on the persons responsible for order placement, "the use of forms for reporting and ordering FP supplies, the main source of routine FP medicines and supplies, the person responsible for transporting FP products to the facility, the average time it takes between ordering and receiving FP products, availability and management of cold chain system and trained personnel for logistics and FP services were obtained". Data collection involved personnel interviews and physical verification of available information.

2.4 Cleaning and Analysis of Data

The data collected were inputted in MS Excel database, cleaned and exported to IBM-SPSS version 25.0 for analysis. Descriptive statistics were performed and the outcome presented in Tables. Association between variables was established using Chi-Square and $p<0.05$ was considered significant.

3. RESULTS

The study surveyed 763 health facilities of which 407 (53.3%) were primary and 356 were secondary (46.7%) healthcare facilities.

Table 1 shows that the nurses (54.0%) and administrative officers (40.2%) are in charge of ordering medical supplies in most primary and secondary healthcare facilities in Nigeria. A large proportion of the primary healthcare facilities surveyed were either not using log forms or were unverifiable (51.4%) as compared to 33.5% in secondary healthcare facilities ($p<0.001$). About half (50.8%) of secondary facilities get routine FP medicines and supplies from a central medical store whereas 57.7% of primary facilities get theirs from local warehouses. However, a reasonable proportion (21.2%) of all the facilities still get their supplies from private sources. Transportation of FP supplies is mainly taken up

by both primary (64.9%) and secondary facilities (70.8%) (p<0.05). More than half of the facilities (primary-65.6% and secondary-70.8%) get their FP supplies in less than two weeks after placing an order. However, 23.8% of primary and 18.8% of secondary facilities had to wait for over two months before getting orders.

Table 2 shows the availability of cold chain at the healthcare facilities surveyed. While 83.1% of secondary healthcare facilities stock supplies that require cold chain storage, slightly over half (56.9%) of primary facilities do the same. However, the majority (88.4%) of the facilities had a cold chain system (Secondary -91.2%; Primary - 84.9%). The most common cold chain system was an electric fridge, available in 87.8% of secondary and 59.4% of primary facilities (p<0.001). A significantly higher proportion (32.5%) of primary facilities use ice block for the cold chain but only 8.1% of the secondary facilities use it.

Table 1. Information on supply chain

	Response	Primary	Secondary	Total	X^2 (P-value)
	Person responsible FP supplies				
1	Clinical officer	8 (2.0)	1 (0.3)	9 (1.2)	141.337
	Doctors	0 (0.0)	8 (2.2)	9 (1.0)	(<0.001)
	Nurses	164 (40.3)	248 (69.7)	412 (54.0)	
	Pharmacists	0 (0.0)	27 (7.6)	27 (3.5)	
	Admin officers	235 (57.7)	72 (20.2)	307 (40.2)	
	Log forms for reporting FP orders				
2	Not available	146 (35.9)	91 (25.6)	237 (31.1)	26.431
	Yes, but not verified	63 (15.5)	28 (7.9)	91 (11.9)	(<0.001)
	Yes, verified	407 (48.6)	237 (66.6)	435 (57.0)	
	Major source of FP commodities supplies				
3	Central medical stores	73 (17.9)	181 (50.8)	254 (33.3)	98.163
	Donors	2 (0.5)	1 (0.3)	3 (0.4)	(<0.001)
	Local warehouse	235 (57.7)	105 (29.5)	340 (44.6)	
	NGOs	3 (0.7)	1 (0.3)	4 (0.5)	
	Private sources	94 (23.1)	68 (19.1)	162 (21.2)	
	Person in charge of FP products transportation				
4	Facility	264 (64.9)	252 (70.8)	516 (67.6)	13.959
	Local district admin	38 (9.3)	16 (4.5)	54 (7.1)	(0.003)
	National Central Govt.	3 (0.7)	11 (3.1)	14 (1.8)	
	Others	102 (25.1)	77 (21.6)	179 (23.5)	
	Time between ordering and receiving FP orders				
5	Less than 2 weeks	267 (65.6)	260 (73.0)	527 (69.1)	5.362
	2 weeks to 1 month	30 (7.4)	18 (5.1)	48 (6.3)	(0.147)
	Between 1 & 2 months	13 (3.2)	11 (3.1)	24 (3.1)	
	More than 2 months	97 (23.8)	67 (18.8)	164 (21.5)	

Table 2. Availability of cold chain at the healthcare facilities

SN	Parameter	Response	Primary	Secondary	Total	X^2 (P-value)
1	Stock supplies that are supposed to be in cold storage	Yes	230 (56.9)	295 (83.1)	525 (69.2)	60.676 (<0.001)
2	Availability of cold chain to store such products	Yes	197 (84.9)	270 (91.2)	467 (88.4)	5.056 (0.025)
3	Type of Cold Chain in the facility	Electric fridge	117 (59.4)	237 (87.8)	354 (75.8)	51.974 (<0.001)
		Ice block	64 (32.5)	22 (8.1)	86 (18.4)	
		Others	16 (8.1)	11 (4.1)	27 (5.8)	
		Total	197 (100.0)	270 (100.0)	467(100.0)	

Table 3 shows the level of training on FP services in the healthcare facilities. About half (53.7%) of secondary and 38.4% of primary healthcare facilities have trained personnel of logistics management of FP commodities with an overall of 45.5% (p<0.001). The average number of trained personnel on FP commodities logistics was 2 in primary and 3 in secondary healthcare facilities. In all the healthcare facilities, and around 60% have trained staff on FP services with 71.9% in secondary and 48.9% in primary healthcare facilities.

Primary facilities had an average of 2 on FP services whereas secondary facilities had an average of 4 trained personnel (p<0.001). Only 27.7% of primary and 64.7% of secondary health facilities had trained staff specifically on insertion and removal of implant contraceptive with an average of 1 and 2 trained staff in primary and secondary facilities respectively (p<0.001). About half (51.1%) of primary and 27.5% of secondary healthcare facilities in Nigeria did not hold training on FP services for their staff. For those that held training, the majority of them held their last training more than a year ago, primary (31.9%) and secondary (37.4%) (p<0.001).

As shown in Table 4, 35.7% of Nigeria healthcare facilities are not supervised on FP services. Also, 40.5% of primary and 32.3% of secondary facilities have never received visits from supervisory authorities for family planning. For facilities under supervision, the major qualities being assessed include data completeness, quality and timely reporting (56.6%), drug stockout and expiry (52.8%) while staff clinical practices (43.3%), staff availability training (32.0%), and "review use of specific guideline or job aid for reproductive health" (26.5%) received little supervision or attention.

As shown in Table 5, the availability of log form for reporting orders was 2.102 (95% CI:1.567 – 2.820) higher in secondary health facilities than primary (p<0.001). Also, availability of cold chain availability was 1.845 (95% CI: 1.076 – 3.165) higher in secondary facilities (p = 0.026). Secondary facilities were 1.855 (95% CI: 1.390 – 2.476) times more likely to have trained staff in Logistics Management of FP Commodities, 2.676 (95% CI:1.979 – 3.619) times more likely to have trained staff for the provision of general FP services, and 4.785 (95% CI: 3.207 – 7.139) more likely to have trained staff specifically on insertion and removal of implant contraceptive than primary healthcare facilities (p<0.001).

4. DISCUSSION

Global promotion of family planning (FP) is an essential key to adequately prevent children's deaths, unintended pregnancies, risky births, unsafe abortions, and maternal mortality deaths. This requires adequate supply, availability, affordability, accurate information and qualified personnel [1]. The Nigerian government, in 2016 set an objective to improve the FP logistics

Table 3. Availability of trained personnel on FP services

SN		Primary	Secondary	Total	(P-value)
1. Have trained staff in Logistics Management of FP Commodities					
	Yes	156 (38.4)	191 (53.7)	347 (45.5)	<0.001
	Average number trained	2	3	2	<0.001
2. Have trained staff for the provision of FP services generally					
	Yes	199 (48.9)	256 (71.9)	455 (59.6)	<0.001
	Average number trained	2	4	3	<0.001
3. Have trained staff specifically on insertion and removal of implant contraceptive					
	Yes	56 (27.7)	167 (64.7)	233 (48.5)	<0.001
	Average number trained	1	2	2	<0.001
4. The last date any staff receive training in the provision of FP services					
	Within the last 2 months	25 (12.6)	42 (11.8)	67 (8.8)	<0.001
	Between 2 to 6 months	21 (5.2)	37 (10.4)	58 (7.6)	
	Between 6 to 12 months	23 (5.7)	46 (12.9)	69 (9.0)	
	More than 1 year	130 (31.9)	133 (37.4)	263 (34.5)	
	No training	208 (51.1)	98 (27.5)	306 (40.1)	
5. Was insertion and removal of implant contraceptive on clients or models included in the training?					
	Yes	56 (28.1)	151 (58.8)	207 (45.4)	<0.001

Table 4. Staff supervision on FP services in Nigerian health facilities

Response	Primary	Secondary	Total	X^2 (P-value)
1. Last visit of any supervisor				
In this Month	53 (13.1)	54 (15.2)	107 (14.1)	10.501 (0.033)
In Last 3 months	95 (23.5)	111 (31.2)	206 (27.1)	
In Last 6 Months	39 (9.6)	38 (10.7)	77 (10.1)	
1 year Ago	54 (13.3)	45 (12.6)	99 (13.0)	
Never	164 (40.5)	108 (30.3)	272 (35.7)	
2. Supervisors' visits for FP inspections				
Every week	3 (0.7)	2 (0.6)	5 (0.7)	7.958 (0.159)
Once a month	44 (10.9)	45 (12.6)	89 (11.7)	
Once in 3 months	98 (24.2)	105 (29.5)	203 (26.7)	
Once in 6 months	37 (9.1)	36 (10.1)	73 (9.6)	
Once a year	53 (13.1)	53 (14.9)	106 (13.9)	
Never	170 (42.0)	115 (32.3)	285 (37.5)	
3. Qualities assessed during supervision				
Staff Clinical practices	154 (37.8)	176 (49.4)	330 (43.3)	10.411 (0.001
Drug Stockout and Expiry	192 (47.2)	211 (59.3)	403 (52.8)	11.148 (0.001)
Staff availability training	104 (25.6)	140 (39.3)	244 (32.0)	16.560 (<0.001)
Data Completeness, quality and timely reporting	204 (50.1)	228 (64.0)	432 (56.6)	14.985 (<0.001)
Review use of specific guideline or job aid for reproductive health	85 (20.9)	117 (32.9)	202 (26.5)	14.003 (<0.001)

Table 5. Odds of availability of FP logistics and training of FP in primary and secondary healthcare facilities

Variable	COR (95% CI)	P-value
Log form availability		
Primary	1	<0.001
Secondary	2.102 (1.567 – 2.820)	
Cold chain availability		
Primary	1.00	0.026
Secondary	1.845 (1.076 – 3.165)	
Have trained staff in Logistics Management of FP Commodities		
Primary	1.00	<0.001
Secondary	1.855 (1.390 – 2.476)	
Have trained staff for the provision of general FP services		
Primary	1.00	<0.001
Secondary	2.676 (1.979 – 3.619)	
Have trained staff specifically on insertion and removal of implant contraceptive		
Primary	1.00	<0.001
Secondary	4.785 (3.207 – 7.139)	

management system in Nigeria and to guarantee that contraceptives are available in all facilities at all time in an affordable manner as well as to improve data management at all levels by the end of 2018 [2]. This study found that most Nigerian health facilities are still battling with the challenges of poor data quality management and auditing as only 57% of all the facilities were using forms for reporting FP supply orders. This makes it difficult to track supplies and hence insufficient or unavailable contraceptives. The study found that the majority of primary healthcare facilities were not using any form for monitoring FP supplies orders. It was also discovered that most of these facilities are responsible for ordering and transporting FP supplies instead of a central arrangement. This might be the reason some of them would not get

their supplies until after two months. Approximately one of every five (20.0%) of both primary and secondary health facilities reported not getting their orders for FP supplies until after two weeks. This delay may also be attributed to other factors such as bad roads (especially for facilities in the rural areas) [17] and unavailability of contraceptives and other FP commodities at the central medical stores and local warehouses [23,24]. The proportion of facilities using acquisition forms in this study is slightly lower than 69% previously reported among healthcare workers in Osun State, Nigeria [12]. However, the proportion of secondary health facilities was significantly higher than that of primary health facilities and the availability of log forms in secondary facilities was more than two times higher than in primary facilities. The implication of this is that most primary facilities poor tracking and reporting, which may be part of the reasons for stockouts of essential health commodities being reported in some studies [25–27].

Most of the surveyed health facilities reported stocking supplies that require a cold chain and over 80% had a refrigerator for storing the supplies. However, about 33% of primary healthcare facilities reported using ice block for storing their supplies. This is similar to the report in Ile-Ife, South-West, Nigeria where only 31.4% of the health facilities surveyed had a refrigerator and 45.7% relied on ice-block [12]. It is general knowledge that ice-block is unreliable for storing medical supplies for a long period, especially where there is no regular electric power supply. However, the unavailability of a regular electric power supply or standby generator cannot be ruled out in Nigerian health facilities. Even, where there are generators, it is very costly to maintain, due to high pump prices and generator maintenance. This might be the reason why some of these facilities have to abandon their refrigerators and opt for the cheaper ice-block even though it is not sufficiently reliable for long time storage. Poor or lack of proper storage might be a vital reason for poor availability and access to contraceptives in Nigeria as reported by some scholars [22,28].

One of the national blueprints of the Nigerian government in 2016 is to ensure “that every health facility has a sufficient number of trained staff” on FP by 2018 [2,5]. However, against this plan, our study found that the majority of Nigerian primary and secondary healthcare facilities lack trained personnel on logistics management of FP commodities as only 45.5% of all the facilities had trained personnel. Also, only 48.5% had trained staff on insertion and removal of implant contraceptive. The situation is worse in primary healthcare facilities as more than 60% did not have trained personnel. Secondary facilities were about 2-4 times more likely to have trained personnel on FP services than primary facilities ($p<0.001$). This is not a good report for primary health facilities because they are closer to the grassroots people and the first point of call for FP and other medical services. The implication of this is the poor FP services, regular stockouts, and low uptake of contractive in rural areas of the country [19,29–33]. The few facilities that had trained staff on FP commodities logistics did not have sufficient trained staff with an average of 1-2 and 3-4 trained personnel in both primary and secondary healthcare facilities respectively. Besides, most of the facilities were either lack trained staff on FP services or have not trained them for over one year. This can also be considered a threat to actualizing the Sustainable Development Goals (SDGs) of ensuring global access to FP and other sexual and reproductive healthcare services by 2030 [34]. Similar to our findings, poor inventory management due to lack of adequate training has been reported in Nigeria [4,9,12,35].

Regular and adequate training coupled with encouraging supervision of healthcare professionals is vital to enhance their performances, particularly in essential services such as cold chain, data management and logistics management [12]. This study found poor supervision of FP services across all healthcare facilities in Nigeria. Poor supervision or evaluation can result in laxity and a nonchalant attitude towards duties, which the consequences can be poor FP services and non-availability of contraceptives. This requires attention from both the government, donors and all stakeholders in the Nigerian health sector.

5. CONCLUSION

This study found poor data management, poor logistics management, lack of trained personnel on FP services, inadequate storage system and poor supporting supervision in most Nigerian healthcare facilities, particularly, the primary health facilities which are the closest to the grassroots people and the first place to visit for contraceptive needs. The findings of this study showed the need for interventions actions in improving FP service in Nigerian health facilities if the country must not fail to achieve the

Sustainable Development Goals (SDGs) of ensuring global access to FP and other sexual and reproductive healthcare services by 2030. It is therefore advocated that the government and donor agencies carry out urgent interventions such as regular supply of contraceptives and other FP commodities to the facilities, regular training for FP service providers, adequate number of FP staff, monitoring and evaluation of FP services and awareness creation on the need to use FP services at the grassroots. In addition to making contraceptives available, the government must ensure that the services are affordable and accessible at all levels of healthcare facilities. This will save the citizens from travelling a long distance to access FP services, reduce using unskilled and unqualified FP providers and will help the country to further prevent children's deaths, unintended pregnancies, risky births, unsafe abortions, and maternal mortality deaths in Nigeria. It will also help the country to have strong and healthy families, more adolescents will be able to complete their education which will, in turn, have positive impacts on the country's economy.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by the personal efforts of the authors.

CONSENT AND ETHICAL APPROVAL

Permission was obtained from the Ministry of health ethical review committee and approval was obtained from the management of each healthcare facilities. The interviewees were duly informed of the purpose of the survey and their consents were obtained before they were interviewed. All participants and the management of the facilities were assured of the confidentiality of the information provided. No information related to the identification of participants was collected, unique identification was used for each of the health facilities and no facility or individual name was written anywhere on the questionnaire. Also, there is no possibility of associating the information collected with any of the health facilities. Besides, they were assured of the use of the information for research purposes only.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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