Assessment of the Quality of Antenatal and Postnatal Care Services in Primary Health Centres in Rural Nigeria

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Abstract

Maternal mortality ratio in Nigeria is estimated to be 512 deaths per 100,000 live births. As with other low-income countries, a higher proportion of these deaths occur among women living in rural areas and in poor communities where access to maternal health care is limited by several barriers including quality of care in health facilities. The objective of this study was to assess the quality of antenatal and postnatal care in Primary Health Centres (PHCs) in two rural Local Government Areas of Edo State in Southern Nigeria. The data were obtained from exit interviews with 177 women after completion of antenatal and postnatal care in eight randomly selected PHCs. The interview questionnaire was adapted from the 2017 results-based financing exit interviews conducted by the World Bank in collaboration with the Federal Ministry of

Health and the National Bureau of Statistics. It consisted of questions on the treatment received by women. The data were analysed with descriptive statistics and logistic regression. The results showed the self-reporting by women of sub-optimal offerings of 20 signal antenatal treatments and 8 signal postnatal care treatments. Close to half (45.6%) of the respondents for antenatal care reported receiving sub-optimal antenatal treatments compared to about a third of postnatal care attendees. The predictors of sub-optimal offerings of standard PHC care included local government area, marital status and previous childbirths. We conclude that concerted actions by health providers and policymakers in the PHCs to develop policies and interventions will improve the quality of delivery of antenatal and postnatal services in rural PHCs in Nigeria.

Background

Maternal mortality continues to be a major public health challenge in low-income countries with complications of pregnancy and child birth causing more deaths and disabilities than other reproductive health issues. Data from the World Health Organization (WHO) suggest that globally approximately 830 women die daily from preventable causes related to pregnancy and childbirth, with 99% of the deaths occurring in low income countries (World Health Organization, 2015). Maternal mortality ratio in Nigeria is estimated to be 512 deaths per 100,000 live births (National Population Commission (NPC) [Nigeria] and ICF, 2019), and the World Health Organization reports that Nigeria accounts for 19% of the global maternal deaths with about 58,000 deaths in 2015 (World Health Organization, 2015). As with other low income countries, a higher proportion of these deaths occur among women living in rural areas and in poor communities where access to maternal health care is limited by several barriers including quality of care in health facilities (Azuh *et al.*, 2017; Okonofua *et al.*, 1992) .

Primary health care (PHC) has been recommended by the WHO to many sub-Saharan African countries and other low resourced countries around the world as the standard of care and the first level of health service for contact with the formal healthcare system. This is because in accordance with the Alma Ata Declaration and as reaffirmed by the World Health Organization (World Health Organization, 1978) "primary health care is an essential health care based on practical, scientifically proven and socially acceptable methods and technologies made scientifically accessible to individuals and families through their full participation and at the cost that the community and the country can afford to maintain at every stage of their development in the spirit of self-determination". To ensure universal health coverage for all Nigerians, the Federal Ministry of Health specifically recommends PHC as the entry point into the health care system (NPHCDA, 2012b, 2012a) in order to address the social inequities that lead to high rates of maternal mortality in the country. PHCs also provide the opportunity for health workers to offer personalized

care that address both cultural and social realities of rural women designed to organize health services around the needs and expectations of women (World Health Organization, 1978).

However, while PHC holds the key to enabling women in rural and low resourced persons to access skilled pregnancy care, there is evidence of continuing under-utilization of primary care by pregnant women in rural communities. A recent study in Edo State, south-south Nigeria, showed that even in rural communities with available PHC services, only 47% of women used the services, while the majority still used alternative maternal health care services, including traditional methods (Okonofua *et al.*, 2018). Part of the reasons adduced by the women for not using PHCs for maternal health care is their belief that the services provided in PHCs are of poor quality, which include perceptions that providers with the required skills and services may not always be available. Indeed, a notable finding in the study was that women with higher levels of education were less likely to use PHCs as compared to women with lower levels of education, again due to the perceptions by better educated women that the quality of service delivery in PHCs is sub-optimal and may not meet their needs.

The quality of health care is highly pertinent to the improvement of the uptake and effective utilization of maternal and child health services. The WHO defines quality health care as the care which consists of the proper performance according to standards (World Health Organization, 2006), which implies that the quality of maternal health care service should involve the proper application of all necessary multi-sectorial services to ensure effective delivery of health services (Kyei *et al.*, 2012). This includes services required to minimize the deleterious effects of both pre-existing and/or coexisting health conditions, to improve the health and social functions of women in need of care.

According to the Donabedian model on healthcare quality, the assessment of the quality of care should examine the structure of the setting in which care is provided, measuring the actual processes of care and assessing the outcomes of care (Donabedian, 1988). Assessing the quality of healthcare services involves evaluating the demand and supply components of the health services as well as the respectful and prompt treatment of patients, respect for traditional beliefs, available transport systems and affordable cost of care as well as the availability of conducive and well equipped facilities (Babatunde *et al.*, 2013; Hulton *et al.*, 2000). Although there are reports relating to perceptions of quality of care in high-income countries (Brock *et al.*, 2014; Farquhar *et al.*, 2000; Margolis *et al.*, 2003), reports on the quality of care in developing countries are limited.

While most studies of PHCs in Nigeria and many other countries in sub-Saharan Africa have focused on the determinants of the use and non-use of PHCs and perceptions of the quality of maternal health care (Babatunde *et al.*, 2013; Nnebue *et al.*, 2014; Ogaji *et al.*, 2015; Okonofua *et al.*, 2018; Oladapo *et al.*, 2008), clients' assessment of the quality of health care services

especially in rural settings based on objective measurement of the expected and recommended health care together with personal experiences and expectations in seeking health care have not been adequately and systematically investigated.

Understanding women's report of the quality of maternal healthcare using objective measures provides opportunities for identifying deficiencies and implementing interventions to improve the delivery of health care. The objective of this study was to determine the quality of healthcare based on women's experiences while receiving antenatal and postnatal care services at PHCs in rural communities in Etsako East and Esan South-East Local Government Areas of Edo State in Southern Nigeria. We believe that the results obtained from the study will inform the design of policies that respond to the needs of pregnant women using PHCs for maternal care in rural Nigeria, and other similarly low resourced settings.

Methods
Study Design and Population
This study was a part of the baseline research of a larger community-based quasi-experimental study to increase rural women's access to skilled pregnancy care. It consisted of exit interviews with women using antenatal and post-natal services in randomly selected PHCs in two Local Government Areas (LGAs) - Esan South East and Etsako East in Edo State, Southern Nigeria. The two LGAs were purposively selected because they are predominantly rural. Administratively, Nigeria is made up of 36 states and a Federal Capital Territory (FCT), Abuja, and each state consists of LGAs. The LGAs consist of 10 wards each, and each ward comprises several communities or villages. PHCs in Nigeria are located in wards, and each ward has at least one PHC.

The two LGAs have up to 51 PHCs between them, of which 36 provide antenatal and postnatal services to the populace. The PHCs provide basic emergency obstetric care services comprising skilled delivery care, administration of antibiotics, manual removal of the placenta, removal of retained products of conception, assisted vaginal delivery with a vacuum extractor, and basic neonatal resuscitation. They also offer antenatal care, postnatal checks and immunisation services. However, we decided to focus on antenatal and postnatal care provision because only two women delivered in the selected PHCs during the data collection period (July 29 to August 16, 2017). Our initial experience suggests that a large proportion of women who attended antenatal care do not turn up in the same health facilities for intra-partum care.

Sampling Technique and Sample Size
Eight wards were randomly selected from the twenty wards in the two LGAs, and one PHC was randomly selected from each of the eight wards (4 from each LGA) in which to conduct the exit interview. For the purpose of this study, the PHCs were not identified by their usual names. Unique identifiers were

assigned as follows: Esan South East (ESE), ESEPHC1 ESEPHC2, ESEPHC3 and ESEPHC4, and Etsako East (ETE) ETEPHC1, ETEPHC2, ETEPHC3 and ETEPHC4.

Due to the small number of women who normally use the PHCs and the non-availability of accurate record of women who use the facilities for maternal care, a sample size could not be determined beforehand. Thus, all women who attended the selected PHCs for antenatal and postnatal care during the data collection were eligible for the interview. We approached the women after they attended the PHCs to receive antenatal and postnatal care as they were exiting the PHCs. We explained the purpose of the study and requested them to confidentially answer questions relating to the care they just received in the PHCs. We assured them of the confidentiality of information obtained and that the results will be used for policy formulation and research, and not for anything else. Only those who agreed to participate in the study after a full explanation of the study methods and processes were included. Altogether, 177 out of 203 respondents who met the selection criteria for the study were successfully recruited and interviewed from both LGAs. An exit interview was conducted for each respondent by trained female interviewers employing a computer-assisted personal interviewing (CAPI) technique. Each interview lasted an average of 40 minutes and the questions were asked either in English or Pidgin English language depending on the respondent's choice.

Study Questionnaire

A pretested structured questionnaire divided into five sections was used to collect data. The questions and format were adapted from Health Results Based Financing Nigeria 2017 Exit Interview for Antenatal Care Visit by World Bank, Federal Ministry of Health, and National Bureau of Statistics; and 2013 Nigeria Demographic and Health Survey (NPC & ICF International, 2014; World Bank *et al.*, 2017). In section 1, information was collected on socio demographic characteristics, while section 2 focussed on the treatment and counselling during antenatal and postnatal care. The questions in section 2 were based on the expected standard treatment and counselling in each continuum of maternal care. Section 3 addressed patients travel and expenditure; section 4 elicited information on clients' satisfaction with care; while perceptions about security and trust were elicited in section 5.

Variables and Measures

The dependent variables were the quality of services received during antenatal and postnatal care.

Quality of antenatal care: Twenty questions on the expected treatment and counselling during antenatal care were used to measure the quality of antenatal care. They included whether weight, height, blood pressure, and fundal height were measured. Others were whether the woman was given information on estimated time of delivery, nutrition, family planning, exclusive breastfeeding;

given iron pills and whether they were told the side effects of antimalarial pills and other drugs, among others.

This analysis was based on 58 respondents who received antenatal treatment. The response options to the 20 items on treatment and counselling during antenatal care were Yes (coded 1) and No (coded 0). Responses were aggregated to generate a composite variable with a lowest possible score of 0 and a highest possible score of 20. The composite variable yielded scores of 3-19 indicating that no respondent received less than 3 of the expected treatment and none received all the 20 treatment. A two-category variable was further generated using the composite variable with the mean value (11.2±3.9) as the cut off. Scores below the mean were categorised as low quality treatment (coded 1) whereas scores at the mean and above were considered better quality treatment (coded 0).

Quality of postnatal care: The quality of postnatal care was measured with eight items including whether checks were conducted on the mother and the baby six weeks after delivery; what was done during the baby check – cord, checked, observation of how well baby breastfeeds, assessment of temperature; check to see if the baby might be sick; and information on immunization. Where applicable, the response was confirmed by sighting. For instance, the prescription and drugs received during the antenatal and postnatal care were sighted by the interviewer.

The analysis for postnatal care was based on 108 women who have complete information on the expected postnatal care treatment. The response options for the 8 items used to measure the quality of postnatal care were Yes (coded 1) and No (coded 0). The scores were aggregated to generate a single measure of postnatal care quality with 0 as the least and 8 as the highest score. The composite measure yielded scores of 0-8, one respondent received none (score of 0), and 16 (14.8%) received all the 8 signal treatments. A two-category variable was generated using the mean value (5.3±2.2) as the cut off; scores below the mean were categorised as low quality care (coded 1) whereas scores at the mean and above were grouped as better quality (coded 0).

The independent variables included Local Government Area (Esan South East, and Etsako East), age categorised as 16-24, 25-29, 30-34, and 35-46, highest education measured as no education, primary, secondary and higher, and marital status measured as (married (polygynous), married (monogamous), and living together with a partner. Other independent variables were work status (not working and working), number of living children categorised into 1-2, 3-4, and 5 or more, and partner's education (no education/primary, secondary, and higher.

Data Analysis
All data analyses were conducted with Stata 12.0 for windows. This included the description of the background characteristics of the respondents, and the distribution of the responses according to the expected treatment received.

These were described using absolute number, percentage and summary statistics where applicable. To access the variation in the quality of care by the respondents' characteristics, logistic regression was conducted. Due to the small sample size, the regression was bivariate (unadjusted). Some of the variables such as highest level of education was re-categorized for logistic regression. The results are reported in odds ratio with a 95% confidence interval.

Results

Description of the Study Population

The characteristics of the study population are presented in Table 1. Altogether, 177 respondents participated in the study with a mean age of 27.6 years (SD=6.5). Slightly above 6% of the respondents had no education; 45.8% attained primary education; 39.5% had secondary education; while 8.5% attained tertiary education. Many of the respondents (54.8%) were married in monogamous union; 16.4% were in polygynous union; 26.5% were cohabiting with a male partner; 1.7% were never married, while one woman was separated. With regard to religion, the majority (63.3%) of the respondents were Christians other than Catholics; 20.9% were Catholics; and 15.8% practiced Islamic religion. Many of the respondents have had one or more children, while 8.5% of the respondents were pregnant with their first child. The majority of the respondents (67.2%) came for postnatal care, while 32.8% came for antenatal care.

Table 1: Percent Distribution of Respondents by Background Characteristics

Characteristic	Frequency(n-177)	Percent
Local Government Area		
Esan South East	78	44.1
Etsako East	99	55.9
Facility Name (PHC)		
ESEPHC1	26	14.7
ESEPHC2	6	3.4
ESEPHC3	34	19.2
ESEPHC4	12	6.8
ETEPHC1	18	10.2
ETEPHC2	17	9.6
ETEPHC3	29	16.4
ETEPHC4	35	19.8
Age		
16-24	68	38.4
25-29	40	22.6
30-34	32	18.1
35-46	37	20.9
Mean Age 27.6 (sd 6.5)		
Level of Education		
No education	11	6.2
Primary	81	45.8
Secondary	70	39.5
Higher	15	8.5
Marital Status		
Never married	3	1.7
Married(polygamous)	29	16.4
Married(monogamous)	97	54.8
Co habiting (Living together)	47	26.5
Separated	1	0.6
Work status		
Not working	43	24.3
Working	134	75.7
Number of children		
0	15	8.5
1-2	61	34.7
3-4	62	35.0
5+	39	22.0
Partner's highest education		
No education	8	4.5
Primary	26	14.7
Secondary	108	61.0
Higher	35	19.8
Type of treatment		
Antenatal care	58	32.8
Postnatal care	119	67.2

Quality of Antenatal Care
The distribution of the 20 measures of antenatal care quality by the response options Yes/No (whether they received or did not receive the treatment) and unstated where applicable is presented in Table 2. Over 70% of the respondents

received the expected treatment in six (weight, blood pressure, tummy palpitation, advice on diet, prescription of iron pills and folic acid, and ever received tetanus toxoid) of the 20 measures of antenatal care quality. In five measures, 50-69% received the appropriate treatment and in nine measures, less than 50% received the expected treatment.

Table 2: Measures of Antenatal Care Treatment and Counselling

S/N	Item	Received N (%)	Not received N (%)	Unstated N (%)
1	Weighed	45 (77.6)	12(20.7)	1(1.7)
2	Height measured	28((48.3)	29(50.0)	1(1.7)
3	Blood pressure measured	42(72.4)	15(25.9)	1(1.7)
4	Urine sample given	25(43.1)	32(55.2)	1(1.7)
5	Blood sample given	26(44.8)	31(53.5)	1(1.7)
6	Tummy palpated	45(77.6)	12(20.7)	1(1.7)
7	Time of delivery estimated/informed	6(10.3)	52(89.7)	-
8	Uterine (fundal) height measured	24(41.4)	34(58.6)	-
9	Advice on diet given	46(79.3)	12(20.7)	-
10	Given iron pills, folic acid or iron with folic acid or prescription for them	49(84.5)	9(15.5)	-
11	*Side effects of iron pills discussed	109(17.2)	48(82.8)	-
12	Antimalarial pill prescribed or given	29(50.0)	29(50.0)	-
13	*Insecticide treated net offered free of charge	26(44.8)	32(55.2)	-
14	*Asked ever received a tetanus toxoid injection during current or previous visits	40(69.0)	18(31.0)	-
15	Ever received tetanus toxoid including one received during the current visit	46(79.3)	12(20.7)	-
16	*Informed signs of complications	35(60.3)	23(39.7)	-
17	Family planning discussed	29(50.0)	29(50.0)	-
18	*Importance of exclusive breastfeeding discussed	40(69.0)	18(31.0)	-
19	*Discussed where respondent plans to give birth	22(37.9)	36(62.1)	-
20	*HIV counselling and testing discussed	26(44.8)	32(55.2)	-

*during the current visit or previous visits in the same facility

Of the 20 antenatal care items, estimation of time of delivery and discussion of the side effects of iron pills were the least received treatments. The distribution of the aggregated result of the 20 measures shows that no respondent received less than 3 of the expected treatment and none received all the expected 20 treatments. Many respondents (45.6%) who presented for antenatal care received low quality care (Table 3). Low quality care was significantly less in Etsako LGA with about 36% of the respondents compared to Esan South East where 66.7% received better quality care (OR 0.28 $p<0.05$). A higher percentage of younger women aged 16-24 years received low quality care but the variation by age was statistically insignificant. The two women with no education received low quality treatment. The odds of receiving low quality antenatal health care treatment was 10.2 times higher among women who are cohabiting compared to those who are married. Also, more women who are not working received low quality care. The respondents who had 1-2 living

children were less likely to receive low quality treatment than those who were pregnant for the first time (OR 0.20 p<0.05).

Table 3: Percent Distribution and the odds of low quality antenatal care by selected background characteristics

Characteristic	Better quality n (%)	Low quality n (%)	OR (95% CI)
All respondents	31(54.4)	26(45.6)	
LGA			
ESE	6(33.3)	12(66.7)	1
ETE	25(64.1)	14(35.9)	0.28(0.08-0.90)*
Age			
16-24	13(48.2)	14(51.8)	1
25-29	7(50.0)	7(50.0)	0.92(0.25-3.37)
30-46	11(68.7)	5(31.3)	0.42(0.11-1.54)
Highest Education			
No education/primary	18(54.5)	15(45.5)	1
Secondary/higher	13(54.2)	11(45.8)	1.01(0.35-2.91)
Marital status			
Married	22(51.2)	21(48.8)	1
Living together with partner	2(15.4)	11(84.6)	10.2(2.00-52.5)**
Work status			
Not working	8(42.1)	11(57.9)	1
Working	23(60.5)	15(39.5)	0.47(0.15-1.45)
Number of living children			
0	5(33.3)	10(66.7)	1
1-2	12(70.6)	5(29.4)	0.20(0.04-0.93)*
3-5	14(56.0)	11(44.0)	0.39(0.10-1.48)
Partner's highest education			
No education/Primary	9(69.2)	4(30.8)	1
Secondary	18(48.6)	19(51.4)	2.37(0.62-9.09)
Higher	4(57.1)	3(42.9)	1.68(0.25-11.3)

Note: OR – Odds Ratio; CI – Confidence Interval; ***p<0.001; **p<0.01; *p<0.05

Quality of Postnatal Care

The eight measures used for assessing the quality of postnatal care are presented in Table 4. More than 70% of the respondents received the expected care in 3 measures with over 90% given information about immunization. Between 50-68% received the expected treatment in 4 measures whereas less than 50% reported receiving the appropriate treatment only in one measure (check on the mother after leaving the hospital) where only 41.7% reported being checked.

Table 4: Measures of Postnatal Care Treatment

S/N	Item	Received N (%)	Not received N (%)
1	Check on mother's health six weeks after delivery at the facility	84(77.8)	24(22.2)
2	Check on baby after delivery	77(71.3)	31(28.7)
3	Baby's cord checked	74(68.5)	34(31.5)
4	Baby breastfeeding observed/checked	71(65.7)	37(34.3)
5	Baby's temperature assessed	68(63.0)	40(37.0)
6	Counsel on how to recognize a sick baby	57(52.8)	51(47(2)
7	Given information on immunization	101(93.5)	7(6.5)
8	Check on mother after leaving the hospital	45(41.7)	63(58.3)

One-third of the respondents received low quality postnatal care (Table 5). The proportion of respondents who received low quality treatment was higher in Etsako than in Esan South East, and among older women than those aged 16-24 years. A higher proportion of women with higher education reported receiving low quality postnatal treatments compared to their counterparts with less or no education. The odds of receiving low quality treatment were only statistically significant by number of children. Respondents who had 3-4 children were more likely to receive low quality treatment as compared to those who had 1-2 children (OR 3.22 p<0.05).

Table 5: Percent Distribution and Odds of low quality postnatal care by respondents' characteristics

Characteristic	Better quality N (%)	Low quality N (%)	OR (95% CI)
All respondents	72(66.7)	36(33.3)	
LGA			
Esan South East	36(70.6)	15(29.4)	1
Etsako East	36(63.2)	21(36.8)	1.40(0.62-3.13)
Age			
16-24	28(75.7)	9(24.3)	1
25-29	12(57.1)	9(42.9)	2.33(0.74-7.33)
30-34	17(70.8)	7(29.2)	1.28(0.40-4.07)
35-46	15(57.7)	11(42.3)	2.28(0.77-6.72)
Highest education			
No education/Primary	39(69.6)	17(30.4)	1
Secondary/higher	33(63.5)	19(36.5)	1.32(0.59-2.94)
Marital status			
Married (polygynous)	11(47.8)	12(52.2)	1
Married (monogamous)	37(71.2)	15(28.8)	0.37(0.13-1.02)
Living together	23(71.9)	9(28.1)	0.35(0.11-1.10)
Work Status			
Not working	14(66.7)	7(33.3)	1
Working	58(66.7)	29(33.3)	1.00(0.36-2.74)
Number of living children			
1-2	27(77.1)	8(22.9)	1
3-4	23(51.1)	22(48.9)	3.22(1.20-8.61)*
5+	22(78.6)	6(21.4)	0.92(0.27-3.05)
Partner's highest education			
No education/primary	10(55.6)	8(44.4)	1
Secondary	49(73.1)	18(26.9)	0.45(0.15-1.34)
Higher	13(56.5)	10(43.5)	0.96(0.27-3.33)

Note: OR – Odds Ratio; CI – Confidence Interval; ***p<0.001; **p<0.01; *p<0.05

Discussion

The study was designed to assess the quality of antenatal and postnatal services received in PHCs in rural LGAs in Edo State of Nigeria. We used two component measures to determine quality – the extent to which the recommended signal treatments for antenatal and postnatal care were reported to have been received at PHCs by women using the services. Our results for antenatal care showed that none of the women received all the 20 identified signal treatments at the PHCs, while slightly less than half received below the mean of the signal antenatal treatments. This sub-optimal offering of signal treatments epitomizes the inadequacy of antenatal care services in the two rural PHCs, and suggests that pregnant women attending PHCs for antenatal care do not often receive the full complement of services. When full clinical services are not offered, it suggests that women may not benefit from the initial intention of PHCs, which is to provide early detection and treatments for potential complications (NPHCDA, 2012a; World Health Organization, 1978).

Of interest was that the proportion of women receiving low quality antenatal care treatments was less in Etsako LGA than in Esan South East

LGA. This may be due to the fact that PHC functions are administered by the Local Government Area Councils, suggesting Etsako LGA may have a more functional PHC system as compared to Esan South East LGA. An important statistically significant determinant of low offerings of the signal antenatal treatments at the PHCs was being in a consensual union (as compared to being married). A past study in Western Africa associated consensual union with women who are not working as compared to working women (Ntoimo *et al*., 2016). This being an indicator of women's low social status, suggests that health providers may not offer equitable service delivery options. It is possible that women of low socio-economic status may be denied equitable health services access and care in the PHCs as have been shown in some other settings (Adeyanju *et al*., 2017; Ahmed *et al*., 2010; Say & Raine, 2007).

We also found that women with one or two children were less likely to receive below average of the signal antenatal treatments as compared to women who are pregnant for the first time. This is not unexpected as some primigravid women (women in their first pregnancies) may not know what to expect and may fail to complete the required procedures unlike their multigravida (women in their second or more pregnancies). Traditionally, primigravid women are treated with greater care in antenatal care services at all health care levels as compared to multigravida women. This finding indicates that this may not have been the case in the PHCs. Due to the sustained avoidable morbidity and mortality due to maternal causes in Nigeria, it is important that equal attention is paid to all women during antenatal care despite their previous pregnancy experiences (Tunçalp *et al*., 2017; World Health Organization, 2016).

With regard to postnatal care, we tested the extent to which women reported that they received eight signal treatments. Among the respondents, only 14.8% received all eight signal treatments, while about one-third received low quality treatments. From these results, postnatal treatment offerings may appear better than antenatal care offerings, but it still demonstrates the inadequacy of the total offerings for maternal health care in the PHCs. Of interest was that more than 90% of the respondents indicated that they received information on immunization, which may be due to the increasing pre-eminence given to immunization in postnatal care services offered in rural settings in Nigeria (National Primary Health Care & Development Agency, Nigeria, 2012).

Contrary to the findings for antenatal care, we found that PHCs in Etsako LGA were less likely to offer optimal postnatal care services as compared to those in Esan South East LGA. Again, this probably demonstrates the inconsistency in maternal health care provision and the absence of a definitive strategy for providing antenatal and postnatal services in the LGAs. We also identified that women with more children were more likely to receive low quality postnatal services as compared to women with fewer children. We believe that a composite approach that encompasses the provision of

comprehensive care for all categories of women will be ideal to solve this inherent inequity.

This study has its strengths and weaknesses. This study contributes to what is known about the quality of maternal health care in PHCs in predominantly rural communities, from the perspectives of clients who utilised these services. We have previously assessed services based on women's beliefs and perceptions (Ntoimo *et al.*, 2019), but in this study interview was conducted with women immediately after they received services on the nature of the services they received. The exit interview approach is non-invasive and enables women who just received services to identify the services they received and comment on its quality. The approach prevents loss of information because of recall difficulties, and also enables the interviewers to actually confirm the responses by sighting some of the prescriptions received in the clinics. By contrast, the absence of a composite interrogation with the health workers and observation of the PHC facilities limits the extent of the interpretation that can be given for the sub-optimal services offered in the facilities. It is possible that both client factors as well as provider factors may be responsible for the limited services provided (Levesque *et al.*, 2013). These can only be identified through possible qualitative and observation studies in the PHCs.

We believe that further studies that present these results to health providers and policymakers will help to provide explanation that will justify appropriate lines of action.

Conclusion
The results of this study provide evidence that the appropriate signal treatments are presently not offered optimally during antenatal and postnatal care in rural PHCs in Edo State of Nigeria. This calls for concerted action by health providers and policymakers in the PHCs to develop policies and interventions to improve the quality of delivery of antenatal and postnatal services in the State. A major recommendation of this study is the need for LGAs to develop strategic plans for the provision of PHC services that incorporates a systematic approach for the delivery of maternal health services. Also, we strongly recommend the provision of the facilities and equipment that meet the requirements for the antenatal and postnatal signal treatments, the re-training of staff on equitable care for all persons, and the provision of appropriate health education and counselling of women and their families.

This study in Edo State has implications for entire Nigerian health care system. We believe that an approach that focuses on improvement of maternal health care quality will not only increase the utilization of services by women, it will also reduce the present high rate of maternal morbidity and mortality in rural parts of the country.

Declarations
Ethics Approval and Consent to Participate
Ethical approval for the study was obtained from the National Health Research Ethics Committee (NHREC) of Nigeria – protocol number NHREC/01/01/2007 – 10/04/2017. The communities were contacted through lead contact persons, and permission to undertake the study was obtained from the Heads (Odionwere) of the communities, and the PHCs. The participants were informed of the purpose of the study, and individual written informed consent was obtained from them. They were assured of confidentiality of information obtained, and also that such information would only be used for the study and not for other purposes. No names or specific contact information were obtained from the study participants. Only women that agreed to participate in the fully explained study were enlisted in the study.

Consent for publication
Not applicable.

Availability of data and material
The questionnaire and the associated data for this study are archived on OpenICPSR, and are available from the corresponding author on reasonable request.

Competing Interests
The authors declare that they have no competing interests.

Authors' Contributions
FEO conceived the study and wrote sections of the paper; NLFC supervised data collection, analyzed the data and wrote sections of the paper; JO supervised data collection, data extraction and cleaning; BO assisted in data analysis and contributed to sections of the paper; WI contributed to the study design and data collection; SY contributed to the conception of the study and sections of the paper. All authors approved the final version of the paper.

References

Adeyanju, O., Tubeuf, S. & Ensor, T. (2017) Socio-economic inequalities in access to maternal and child healthcare in Nigeria: Changes over time and decomposition analysis. *Health Policy and Planning*, 32(8): 1111–1118.

Ahmed, S., Creanga, A.A., Gillespie, D.G. & Tsui, A.O. (2010) Economic status, education and empowerment: Implications for maternal health service utilization in developing countries. *PloS One*, 5(6): e11190.

Azuh, D.E., Azuh, A.E., Iweala, E.J., Adeloye, D., Akanbi, M. & Mordi, R.C. (2017) Factors influencing maternal mortality among rural communities in southwestern Nigeria. *International Journal of Women's Health*, 9: 179–188. https://doi.org/10.2147/1jwh.s120184.

Babatunde, O.A., Aiyenigba, E., Awoyemi, O.A., Akande, T.M., Musa, O.I., Salaudeen, A.G., Babatunde, O.O. & Atoyebi, O.A. (2013) Primary Health Care Consumers' Perception of Quality of Care and Its Determinants in North-Central Nigeria. *Journal of Asian Scientific Research*, 3(7): 775–785.

Brock, E., Charlton, K.E. & Yeatman, H. (2014) Identification and evaluation of models of antenatal care in Australia–a review of the evidence. *Australian and New Zealand Journal of Obstetrics and Gynaecology*, 54(4): 300–311.

Donabedian, A. (1988) The quality of care: How can it be assessed? *Jama*, 260(12): 1743–1748.

Farquhar, M., Camilleri-Ferrante, C. & Todd, C. (2000) Continuity of care in maternity services: Women's views of one team midwifery scheme. *Midwifery*, 16(1): 35–47.

Hulton, L., Matthews, Z. & Stones, R.W. (2000) *A framework for the evaluation of quality of care in maternity services*. University of Southampton.

Kyei, N.N., Chansa, C. & Gabrysch, S. (2012) Quality of antenatal care in Zambia: A national assessment. *BMC Pregnancy and Childbirth*, 12(1): 151.

Levesque, J.-F., Harris, M.F. & Russel, Gr. (2013) Patient-centred access to health care: Conceptualising access at the interface of health systems and populations. *International Journal for Equity in Health*, 12, 18.

Margolis, S.A., Al-Marzouqi, S., Revel, T. & Reed, R.L. (2003) Patient satisfaction with primary health care services in the United Arab Emirates. *International Journal for Quality in Health Care*, 15(3): 241–249.

National Population Commission (NPC) [Nigeria] and ICF (2019) *Nigeria Demographic and Health Survey 2018*. NPC and ICF.

National Primary Health Care & Development Agency, Nigeria (2012) *Nigerian National Routine Immunisation Strategic Plan (2013-15).*

Nnebue, C., Ebenebe, U., Adinma, E., Iyoke, C., Obionu, C. & Ilika, A. (2014) Clients' knowledge, perception and satisfaction with quality of maternal health care services at the primary health care level in Nnewi, Nigeria. *Nigerian Journal of Clinical Practice*, 17(5): 594–601.

NPC & ICF International (2014) *Nigeria Demographic and Health Survey 2013*. National Population Commission, Nigeria and ICF International.

NPHCDA (2012a) *National Guidelines for the Development of Primary Health Care System in Nigeria*.

NPHCDA (2012b) *National Primary Health Care Development Agency: Minimum Standards for Primary Health Care in Nigeria*. Department of Planning, Research and Statistics, National Primary Health Care Development Agency. www.nphcda.gov.ng.

Ntoimo, L.F.C., Okonofua, F.E., Igboin, B., Ekwo, C., Imongan, W. & Yaya, S. (2019) Why rural women do not use primary health centres for pregnancy care: Evidence from a qualitative study in Nigeria. *BMC Pregnancy and Childbirth*, 19(1): 1–13. https://doi.org/10.1186/s12884-019-2433-1.

Ntoimo, L.F.C., Odimegwu, C.O., Dansou, J. & Ola, T.M. (2016) Consensual Union in West Africa. *African Population Studies*, 30(2): 2416–2430.

Ogaji, D.S., Giles, S., Daker-White, G. & Bower, P. (2015) Systematic review of patients' views on the quality of primary health care in sub-Saharan Africa. *SAGE Open Medicine*, 3, 2050312115608338.

Okonofua, F.E., Abejide, A. & Makanjuola, R.A. (1992) Maternal mortality in Ile-Ife, Nigeria: A study of risk factors. *Studies in Family Planning*, 23(5): 319–324.

Okonofua, F.E., Ntoimo, L.F.C., Ogungbangbe, J., Anjorin, S., Imongan, W. & Yaya, S. (2018) Predictors of Women's Utilization of Primary Health Care for Skilled Pregnancy Care in Rural Nigeria. *BMC Pregnancy and Childbirth*, 18, 106. https://doi.org/doi.org/10.1186/s1286/s12884-018-1730-4.

Oladapo, O.T., Iyaniwura, C.A. & Sule-Odu, A.O. (2008) Quality of Antenatal Services at the Primary Care Level in Southwest Nigeria. *African Journal of Reproductive Health*, 12(3): 71–92.

Say, L. & Raine, R. (2007) A systematic review of inequalities in the use of maternal health care in developing countries: Examining the scale of the problem and the importance of context. *Bulletin of the World Health Organization*, 85(10): 812–819.

Tunçalp, Özge, Pena-Rosas, J.P., Lawrie, T., Bucagu, M., Oladapo, O.T., Portela, A. & Gülmezoglu, A.M. (2017) WHO recommendations on antenatal care for a positive pregnancy experience-going beyond survival. *BJOG*, 124(6): 860–862.

World Bank, Federal Ministry of Health & National Bureau of Statistics (NBS) (2017) *Health Results Based Financing Nigeria 2017 Exit Interview for Antenatal care Visit*.

World Health Organization (1978) *Declaration of Alma-Ata: International Conference on Primary Health Care, Alma-Ata, USSR, 6–12 September 1978.* http://www.who.int/hpr/NPH/docs/declaration_almaata.pdf.

World Health Organization (2006) *Quality of care: A process for making strategic choices in health systems*.

World Health Organization (2015) *Trends in maternal mortality: 1990 to 2015. Estimates by WHO, UNICEF, UNFPA, The World Bank and the United Nations Population Division.* World Health Organization.

World Health Organization (2016) *WHO recommendations on antenatal care for a positive pregnancy experience*. World Health Organization.