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Determinants of Maternal Utilization of Health Services and Nutritional Status in a Rural Community in South-West Nigeria

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Abstract

Poor Maternal Health (MH) remains an issue of public health concern in Nigeria. This study identified the determinants of maternal utilization of health services and nutritional status in a rural community in south-west Nigeria. It was a cross-sectional house-hold survey of women aged 15-49 years. Data were analysed using Chi-square, logistic regression and generalized linear models (α=.05). Respondents' mean age was 29.9±7.8 years and about 9.0% were underweight, 76.7% attended ≥4 ANC visits and 65.7% were provided with ANC by skilled health workers. Sixty-two percent delivered in modern health facility, 67.5% were assisted by skilled health worker and 29.1% sought post-natal care within the first 3 days after delivery. The likelihood of delivery in health facility was 1.48(C.I=1.10-1.99, p<0.05) higher among women in monogamous than those in polygamy family. The estimated maternal mortality ratio was 448 deaths/100,000 live-births. The findings emphasize the need to scale-up MH improvement strategies in the study area. *(Afr J Reprod Health 2016; 20[2]: 72-85).*

Keywords: Maternal health care; Rural community, Maternal nutritional status

Résumé

La mauvaise Santé Maternelle (SM) reste un sujet de préoccupation pour la santé publique au Nigeria. Cette étude a identifié les déterminants de l'utilisation maternelle des services de santé et l'état nutritionnel dans une communauté rurale dans le sud-ouest du Nigeria. Il s'agissait d'une enquête transversale menée au sein des foyers des femmes âgées de 15-49 ans. Les données ont été analysées à l'aide du chi carré, la régression logistique et des modèles linéaires généralisés (α = .05). L'âge moyen des interviewées était de 29,9 ± 7,8 ans et 9,0% présentaient une insuffisance pondérale, 76,7% ont assisté à ≥4 des visites prénatales et 65,7% ont été bénéficie des services prénatals de la part du personnel de santé qualifié. Soixante-deux pour cent ont accouché dans un établissement de santé moderne, 67,5% ont été aidés par le personnel de santé qualifié et 29,1% ont demandé des soins post-natals dans au cours des trois premiers jours après l'accouchement. La probabilité de l'accouchement dans un établissement de santé était de 1,48 (C.I. = 1,10 à 1,99, p <0,05) plus élevé chez les femmes monogames que celles de la famille polygamie. Le taux de mortalité maternelle était estimée à 448 décès / 100.000 naissances vivantes. Les résultats soulignent la nécessité d'intensifier les stratégies d'amélioration SM dans la zone d'étude. *(Afr J Reprod Health 2016; 20[2]: 72-85).*

Mots-clés: soins maternels de santé; Communauté rurale maternelle état nutritionnel

Introduction

The evolving dynamics that face Maternal Health (MH) in sub-Saharan Africa is worrisome. The Maternal mortality rate is high in most of the countries in the region[1]. Nigeria, the most populous country in sub-Saharan Africa contributes to this high demographic index[1]. Over the last decade, there was an improvement in adult survival chances in Nigeria. Despite this achievement, Nigeria is characterized with myriad health crises when its health indicators are compared to that of the developed nations[1]. Its total fertility rate (5.7), infant mortality rate (68 per 1,000 live births) and maternal mortality ratio (545 per 100,000 women) are among the highest world-wide[1]. The life expectancy of women is 52 and this is further compounded by the AIDS epidemic[1]. There are apprehensions that the economic difficulties faced by the Nigerians and the progressive deterioration of the health care system contribute to the poor health outcomes among women in Nigeria[2,3]. The health care burden is seen as the responsibility of individual households[4]. In Nigeria, researches have revealed shortage of drugs in government health facilities and wherever drugs are available in these

facilities, clients pay almost the market price for them[4,5].

There are numerous reasons responsible for Nigeria's situation, but the central problem is that good health care services are neither available nor affordable to the people particularly the poor and those residing in the rural areas. Nigeria with estimated population of over 170 million has a growth rate of 2.8% per annum and this aggravates the present challenges to the health of Nigerians[1]. In response to the pattern of the population growth rate and its adverse effect on national development, a national health policy targeted at achieving health for all Nigerians was promulgated in 1988 and was reviewed in 2004[6]. The review was to provide effective, efficient, quality, accessible and affordable health services that will improve the health of Nigerians[6]. The policy document requires that a comprehensive health care system delivered through the primary health centres should include MH care[6]. Unfortunately, the health sector is characterised by wide rural urban disparities in status, service delivery, and resource availability. These problems have placed additional stress on health related aspects of the Nigerian family most especially the rural dwellers and raised questions of standing interest to the researchers. How are the pregnant women and mothers of new born babies living in the rural areas in Nigeria accessing modern health care? What is the maternal mortality rate in the rural areas in Nigeria? What is the nutritional status of women of childbearing age who give birth in the most recent five years?

The proximate determinants of childhood mortality identified by Mosley and colleague are; maternal factors, environmental contamination, nutrient deficiency, injury and personal illness control[7]. However, the infant mortality risks associated with these factors can be reduced if pregnant women adequately utilize health facility. A body of literature has found; number of ANC visits, ANC attendance, place of delivery, birth attendance and timing of first postnatal visit as significant factors in the midst of other variables influencing infant and childhood mortality[8,9]. Researches have also shown that approximately 80 per cent of maternal deaths could be averted if women had access to essential maternity and basic health-care services[10,11]. The utilization of maternal health care services is a challenge in Nigeria with constraints mainly acceptability, accessibility and affordability[12,13]. Other factors operate through these constraints. Previous studies conducted on assessment of utilization pattern of maternal healthcare services in different parts of Nigeria and other settings identified distance from healthcare facility, women's education, income and age as determinants of maternal healthcare services[12-16]. Also, in a study using a multilevel approach, education was found as the only individual-level variable that is consistently a significant predictor of service utilization, while socio-economic level is a consistent significant predictor at the household level[15]. Despite these findings, in the rural community where this study was conducted, such studies are scarce and health facilities are not within the reach of the generality of the residence. One of the themes of the MDGs is to improve child and maternal health by 2015[16] and sustainable development goal also emphasized this. For this reason, the current study as a way of actualizing this goal will provide information on how women utilize health facility during pregnancy, at childbirth and after childbirth in a rural community in Nigeria.

Since 2008, the Departments of Epidemiology and Medical Statistics (EMS), Faculty of Public Health and University College Hospital Public Health Nursing team currently runs a thrice weekly outreach clinic which provides basic clinical services and operate a school health programme at the study area. The initiation of the programme was to intervene concerning management of prevalent medical conditions in the community, health promotion and prevention of disease and other adverse health related events. This current study therefore assessed the state of MH in the villages and settlement around the outreach centre. The specific objectives of the study are to: (i) determine the proportion of pregnant women who; utilized skilled attendance during ANC, had at least 4 ANC visit, delivered at modern health facility, were assisted by skilled health worker during childbirth, and those who commenced post-natal care within 3 days after childbirth. (ii) examine the nutritional status of the women (iii) identify factors influencing; the utilization of skilled attendance during ANC,

attendance of at least 4 ANC visit, childbirth at modern health facility, being assisted by skilled health worker during childbirth, commencement of post-natal care within 3 days after childbirth and nutritional status of the women (iv) provide an estimate of maternal mortality. The state of health of pregnant women and absence of modern health facility at the study area informed the decision to conduct this study. The health risks associated with pregnancy and childbirth are especially prevalent among women with poor access to modern health facility. In the study area, efforts to reduce maternal mortality have received less attention[10, 11]. This study will help to guide the desperately needed efforts to bring "Good Health for All" to this rural community.

Methods

Study Area

The study was conducted among women of childbearing age in two political wards namely; Ajebo and Alapako-Oni out of the 12 wards in Obafemi Owode Local Government (LG), Ogun State. The two wards were purposively selected due to the presence of an outreach centre under the management of the Department of Epidemiology and Medical Statistics (EMS), Faculty of Public Health, University of Ibadan within the two wards. The centre offers health services to the people in the area. The residents are predominantly farmers and traders. The population is also quite mobile as the communities are within the reach of larger communities such as Abeokuta and Ibadan.

Study design/sampling technique

The study was a cross-sectional house-hold survey and focused on all female residents of reproductive age who must have lived in the study area for at least 5 years prior the survey. Every households having at least one woman of reproductive age (15-19 years) who meets the inclusion criteria was enrolled into the study. However, in a household having more than one eligible respondent, a respondent was selected among them using simple random sampling technique. Originally, 1007 women aged 15-49 were interviewed on reproductive health, fertility, mortality and environmental health related issues. However, among these women, the current study focused on those who had live-birth in the last five years prior the survey (n=772). But for the estimation of maternal mortality ratio, 864 women who provided relevant information were used since the approach accommodates all women of reproductive age.

Variables description

The dependent variables were the indicators of maternal health viz; number of ANC visit, type of ANC provider, delivery place, delivery assistant, timing of commencement of post-natal care and maternal nutritional status. During analysis the variables were categorized as; Number of ANC visit: *≤3=0 and ≥4=1*; Type of ANC provider: *Unskilled=0 and Skilled=1*; Delivery place: *Modern public or private health facility=1 and 0 if otherwise*; Delivery assistant: *Unskilled=0 and Skilled=1*; Timing of commencement of post-natal care: *≤3 days after childbirth=1 and 0 if otherwise*.

The maternal nutritional status was measured using the anthropometric data on height and weight which were obtained using tape rule and weighing balance respectively with the view to getting the body mass index. Body Mass Index (BMI) was computed as weight in kilogram divided by height in meters squared (kg/m^2).

$$\text{Maternal nutritional status} = \begin{cases} \text{Underweight if BMI} < 18.50 \\ \text{Normal if } 18.5 \leq \text{BMI} < 25.0 \\ \text{Overweight if } 25.0 \leq \text{BMI} < 30.0 \\ \text{Obese if BMI} \leq 30 \end{cases}$$

The independent variables were socio-demographic characteristics of the women; age at birth, level of education, family type, religion, ethnicity, work status, occupation and income.

Data collection procedures

All the houses had been numbered in 2008 by the Department of EMS, Faculty of Public Health, University of Ibadan. A list of households having at least one eligible respondent was made in the area. Thereafter, a woman of childbearing age was interviewed in a household where there are more than one eligible respondent. In this case, lottery method was used to choose the qualified woman. Interviewers who are university degree holders

with previous field experience were trained on the questionnaire content and interviewing skills. Pre-test was conducted and the completed questionnaires were validated for reliability, internal consistency and accuracy. During the field work, interviewers were closely supervised by field supervisors on interviews, performed spot-check and re-interviews where appropriate. Data collection lasted for a 2-week period, in February and March, 2013.

Data processing and analysis

Data entry and editing were accomplished using the CSPro software. The processing of data was initiated in June, 2013 and completed in July, 2013. Data were analyzed using SPSS software version 21.0. Further analyses were performed using Chi-square, logistic regression and generalized linear models at 5.0% level of significance. The Chi-square model was used to examine the association between the five indicators of maternal health care services access in this study, maternal nutritional status and socio-demographic characteristics. ANOVA was used to examine the mean BMI across all the groups in each of the independent variables. Variables found to be statistically significant at 5.0% at the bivariate level were used at the multivariate level. At this level, binary logistic regression and generalized linear model were used. The binary logistic regression was used to identify factors influencing; at least 4 ANC visit, ANC provided by skilled health worker, delivery at modern health facility, assisted by skilled health worker during childbirth, and commencement of post-natal care within 3 days after childbirth.

The generalized linear model was used to examine the mean difference in maternal nutritional status in a categorical variable using one of the categories as the reference. The generalized linear model used in this study is a generalization of the linear regression model such that nonlinear and linear effects can be tested for predictor variables that are categorical or continuous, using maternal nutritional status as the dependent variable since this event has non-negative integers. The generalized linear model is made up of a linear predictor $\eta_i = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \cdots + \beta_p x_{pi}$ and two functions; a link function that describes how the mean, $E(Y_i) = \mu_i$ depends on the linear predictor $g(\mu_i) = \eta_i$ and a variance function that describes how the variance, $var(Y_i)$ depends on the mean $var(Y_i) = \phi V(\mu)$ where the dispersion parameter ϕ is a constant

Maternal mortality ratio (MMR)

The method is multi-indirect which involves two procedures. First, the adjusted total fertility rate (Adj.TFR) was estimated using Coale and Trussell P/F ratio model[12]. Second, the Life Time Risk of Maternal Death (LTRMD) was estimated using sisterhood method which is used in developing countries for indirect estimation of maternal mortality due to inadequate vital statistics. Thereafter, standard adjustment factors were used to transform the proportions into estimates of MMR. The principal indicator obtained is the life-time risk of maternal death which was converted to an estimate of the MMR by using the adjusted total fertility rate[13].

The formula is;

$$\mathrm{MMR} = 1 - (1 - \mathrm{LTRMD})^{1/\mathrm{adj.TFR}}$$

Ethical consideration

The study was approved by the Ethical Committee at the Oyo State Ministry of Health. Permission to conduct this research was obtained from the community heads and chiefs in the study area. Informed consent was obtained from study participants after explaining to them the study objectives, purpose and processes and all participants were legally and psychologically competent to give consent. Participants were assured of confidentiality of information provided. Respondents were asked to participate voluntarily and were also made to know that they could discontinue the study if they so wished with no consequences. Then, participants were asked to sign a consent form which simply indicated that they understood what has been explained to them.

Table1: Percentage Distribution of Women by Socio-Demographic Characteristics

Background Characteristics	Number of Women	Total Women	%
Mother's age at birth		772	
<20	87		11.3
20-34	556		72.0
35+	129		16.7
Education		772	
None	195		25.3
Primary	437		56.6
Secondary+	140		18.1
Family Type		772	
Single	4		0.5
Monogamy	460		59.6
Polygamy	308		39.9
Religion		772	
Christianity	569		73.7
Islam	198		25.7
Traditional	5		0.6
Ethnicity		772	
Yoruba	617		79.9
Others	155		20.1
Work status		772	
Working	768		99.6
Not working	4		0.5
Occupation		772	
Not working	4		0.5
Artisan	144		18.7
Civil Servant	16		2.0
Farming	222		28.8
Trading	386		50.0
Income		772	
<5000	122		15.8
5000-9999	388		50.3
10000-14999	164		21.2
15000-19999	60		7.7
20000+	38		4.9
Children Ever Born		706	
≤2	240		34.0
3-4	247		35.0
5+	219		31.0
Birth Interval		592	
7-23	75		12.6
24-35	185		31.3
36-59	209		35.3
60+	123		20.8

Results

Background characteristics of the studied women

In Table 1, the data show that majority of the women (72.0%) were aged 20-34 years at the time of the birth of their most recent child while 56.6% and 18.1% had primary and at least secondary education respectively.

About 60.0% of the women were from monogamous family and only 0.5% were single. Majority of the women (73.7%) belong to Christian religious group while very few 0.6% were traditionalists. The Yoruba ethnic group constituted 79.9% of the women and 99.6% were working with half (50.0%) engaged in trading activities as their main source of occupation. Also, 50.3% of the respondents earned between 5000-9999 naira a month and 31.0% had given birth to at least 5 children. Among the women who had at least 2 live born children prior the survey, 12.6% and 31.3% left an interval of 7-23 and 24-35 months respectively between their recent and immediate previous child.

Indicators of maternal health

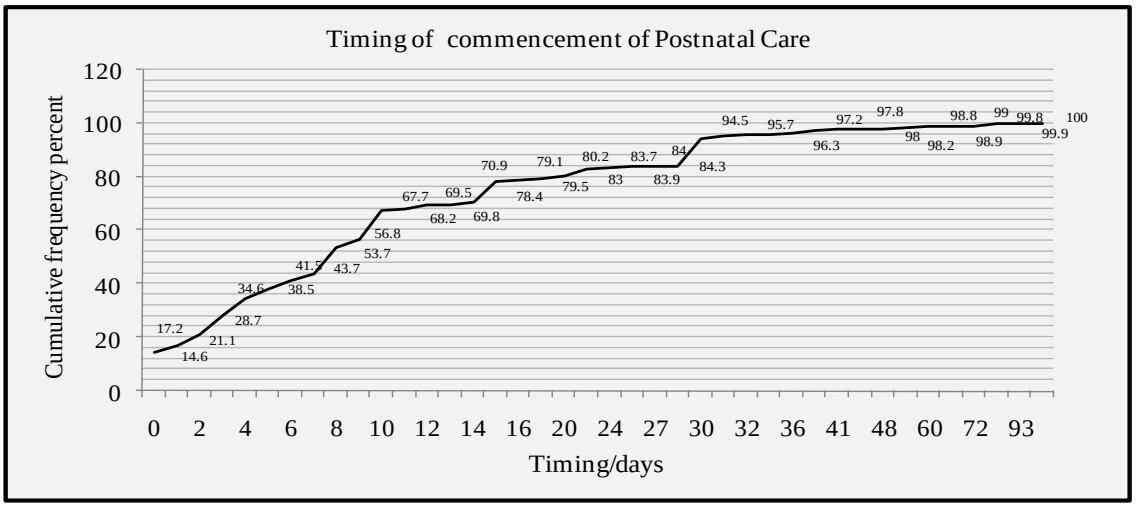
Antenatal care coverage

The data as shown in Table 2 depict distribution of women according to number of ANC visit during the pregnancy of their most recent under-five child. The data show that 76.7% of the women had attended at least 4 ANC visits while only 7.3% did not seek any ANC. The data further show that women who were less than 20 years old had a very small proportion of their members not attending any ANC (2.8%) compared to 8.1% among those aged 20-34 years at the birth of their most recent child. As expected the percentage of women who had no ANC visits reduces consistently with increasing level of education. It reduces from 10.2% among women with no education to 5.6% among those with at least secondary education. There was no significant difference between mother's age at birth of the child, education, family type, religion, ethnicity, work status, occupation, income and number of ANC visits ($p>0.05$) (Table 2).

Antenatal care service provider

For women who reported more than one source for antenatal services, only the provider with the highest qualifications is noted. It is interesting to know that care was provided for the majority of the

Figure 1: Cumulative Frequency Percent of Women who had Live Birth in the Past Five Years Prior the Survey by Timing of Commencement Of Post-Natal Care in days



women by skilled health workers (65.7%). About 7.3% of the women did not receive any antenatal care. The distribution of women who had a live birth in the five years preceding the survey who sought ANC from skilled worker was also presented in Table 2 according to background characteristics. The family type and religion were found to be significantly associated with ANC provider. The percentage of women who sought ANC from skilled provider was higher among women from monogamous family (69.8%) than those from polygamous (59.4%). Higher proportion of women from Christian religious denomination sought ANC from skilled provider (67.7%) than their counterparts who belong to Islamic religion. Other variables such as education, ethnicity, work status and income were insignificantly associated with ANC provider ($p>0.05$).

Place of delivery and skilled attendant at birth

The data show that majority of the women who reported that they had live birth in the last 5 years delivered in either private or public health facility (62.4%). The type of family was the only maternal characteristics found to be significantly associated with delivery place. About 66.1% of women from monogamous Family against 56.8% of their counterparts from polygamous family delivered at health facility. Although, no significant association was established between ethnicity and place of delivery, but the data show that women from other ethnic background who reside in the study area had higher proportion of their members delivered at health facility (64.5%) than the Yorubas (61.9%).

Also, majority of the women in the study area who had live birth in the last 5 years were assisted by skilled health worker (67.5%) while only 3.0% did not receive any assistance at delivery. In Table 2, maternal characteristics like education, ethnicity and income were significantly associated with delivery assistant ($p<0.05$). The proportion of women who were assisted by skilled health worker was highest among women with at least secondary education (75.7%) and least among those with primary education (64.3%) ($p=0.015$). About 71.1% and 54.9% of women who earned at least 20,000 naira and at most 5,000 naira as average monthly income were assisted by skilled health worker respectively.

Postnatal care within three days of birth

The data as shown in Table 2 revealed that 29.1% of the women who had live birth in the last five years prior the survey sought post-natal care within the first 3 days after delivery. The age of mother at the birth of their most recent under-five child, education, religion, and income were found to be significantly associated with timing of post-natal check immediately after delivery ($p<0.05$). The percentage of women who sought post-natal care

Table 2: Percentage Distribution of Women According to Number of ANC Visit, Attendance During Antenatal Care, Place of Delivery, Assistant During Childbirth, and Timing of Commencement of PNC after Childbirth by Background Characteristics

Background Characteristics	Number of ANC Visit		ANC Provider		Delivery Place		Delivery Assistant		Com. of PNC		**Total Women**
	4+	χ^2-value (p-value)	**Skilled**	χ^2-value (p-value)	**Health Facility**	χ^2-value (p-value)	**Skilled**	χ^2-value (p-value)	**≤3 days after Del.**	χ^2-value (p-value)	
Total	76.7(592)		65.7(507)		62.4(482)		67.5(521)		29.1(225)		772
Mother's age at birth		**3.635**		**3.248**		**0.868**		**1.537**		**8.614*** **	
<20	79.3(69)	(0.485)	73.6(64)	(0.197)	62.1(54)	(0.648)	72.4(63)	(0.820)	33.3(29)	(0. 46)	87
20-34	75.5(420)		64.0(356)		63.3(352)		66.9(372)		29.7(165)		556
35+	79.8(103)		67.4(87)		58.9(76)		66.7(86)		24.0(31)		129
Education		**7.627**		**3.202**		**5.921**		**12.366*** **		**17.017** **	
None	70.3(137)	(0.106)	62.1(121)	(0.202)	60.0(117)	(0.052)	68.7(134)	(0.015)	35.9(70)	(0.002)	195
Primary	78.9(345)		65.4(286)		60.6(265)		64.3(281)		26.8(117)		437
Secondary+	78.6(110)		71.4(100)		71.4(100)		75.7(106)		27.1(38)		140
Family Type		**7.204**		**8.950*** **		**7.028*** **		**4.217**		**0.722**	
Single	75.0(3)	(0.125)	75.4(3)	(0.011)	75.0(3)	(0.030)	75.0(3)	(0.377)	25.0(1)	(0.949)	4
Monogamy	78.0(359)		69.8(321)		66.1(304)		70.2(323)		28.5(131)		460
Polygamy	74.7(230)		59.4(183)		56.8(175)		63.3(195)		30.2(93)		308
Religion		**2.739**		**7.454*** **		**3.865**		**6.704**		**9.985*** **	
Christianity	80.0(455)	(0.602)	67.7(385)	(0.024)	62.7(357)	(0.145)	68.4(389)	(0.152)	31.2(178)	(0.047)	569
Islam	78.8(156)		61.1(121)		62.6(124)		66.2(198)		23.2(46)		198
Traditional	75.0(3)		20.0(1)		20.0(1)		20.0(1)		20.0(1)		5
Ethnicity		**2.929**		**0.365**		**0.358**		**11.755** **		**4.526**	
Yoruba	78.0(481)	(0.231)	65.2(402)	(0.544)	61.9(382)	(0.550)	66.0(407)	(0.003)	28.7(177)	(0.104)	617
Others	71.6(111)		67.7(105)		64.5(100)		73.5(114)		31.0(48)		155
Work status		**3.599**		**0.155**		**0.271**		**0.814**		**0.902**	
Working	76.8(590)	(0.165)	75.0(576)	(0.694)	62.5(480)	(0.603)	67.6(519)	(0.666)	29.2(224)	(0.637)	768
Not working	50.0(2)		50.0(2)		25.0(1)		50.0(2)		25.0(1)		4
Occupation		**4.351**		**1.335**		**1.708**		**8.902**		**7.328**	
Not working	50.0(2)	(0.629)	50.0(2)	(0.721)	25.0(1)	(0.635)	50.0(2)	(0.179)	25.0(1)	(0.292)	4
Artisan	71.5(103)		62.5(90)		59.0(85)		60.4(87)		25.0(36)		144
Civil Servant	81.2(13)		75.0(12)		68.8(11)		75.0(12)		25.0(4)		16
Farming	79.7(177)		67.1(149)		61.7(137)		71.6(159)		33.8(75)		222
Trading	78.5(303)		66.1(255)		64.2(248)		67.6(261)		28.2(109)		386
Income		**5.471**		**4.039**		**3.708**		**13.794*** **		**12.539*** **	
<5000	77.0(122)	(0.706)	69.7(85)	(0.401)	59.0(72)	(0.447)	54.9(67)	(0.047)	30.3(37)	(0.037)	122
5000-9999	74.5(388)		67.5(262)		63.4(246)		71.1(276)		26.5(103)		388
10000-14999	79.3(164)		60.4(99)		59.1(97)		65.2(107)		35.4(58)		164
15000-19999	80.0(60)		61.7(37)		71.7(43)		73.3(44)		30.0(18)		60
20000+	81.6(38)		63.2(24)		63.2(24)		71.1(27)		23.7(9)		38

*****Significant at 1.0%; ***Significant at 5.0%; Com. of PNC: Commencement of Post Natal Care; ANC: Antenatal Care***

Table 3: Distribution of Women by Body Mass Index, and Mean Body Mass Index by Background Characteristics

Background Characteristic	**Body Mass Index**				Total Women	χ^2-value (p-value)	Mean BMI	p-value
	<18.5	**18.5-24.99**	**25-29.99**	**30+**				
Total	8.9(63)	63.7(450)	19.7(139)	7.6(54)	706		23.3±4.6	
Age						**32.937***		<0.001
15-24	7.0(12)	77.2(132)	11.7(20)	4.1(7)	171	(<0.001)	22.3±4.7	
25-34	10.8(36)	63.5(212)	19.5(65)	6.3(21)	334		23.1±4.1	
35+	7.5(15)	52.7(106)	26.9(54)	12.9(26)	201		24.7±5.9	
Children Ever Born						**32.493***		<0.001
≤2	9.6(23)	71.7(172)	14.2(34)	4.6(11)	240	(<0.001)	22.7±4.6	
3-4	8.9(22)	67.6(167)	17.0(42)	6.5(16)	247		22.9±3.9	
5+	8.2(18)	50.7(111)	28.8(63)	12.3(27)	219		24.7±6.0	
Education						**10.307**		0.615
None	8.9(16)	70.6(127)	16.7(30)	3.9(7)	180	(0.112)	23.1±5.9	
Primary	9.5(38)	59.8(238)	20.9(83)	9.8(39)	398		23.5±4.8	
Secondary+	7.0(9)	66.4(85)	20.3(26)	6.2(8)	128		23.4±4.0	
Birth Interval						**13.051**		0.571
7-23	10.7(8)	64.0(48)	20.0(15)	5.3(4)	75	(0.160)	22.8±6.2	
24-35	7.0(13)	70.3(130)	15.7(29)	7.0(13)	185		23.3±4.2	
36-59	9.6(20)	59.8(125)	21.5(45)	9.1(19)	209		23.3±4.1	
60+	11.4(14)	51.2(63)	26.0(32)	11.4(14)	123		23.7±4.6	
Occupation						**31.084***		<0.001
Artisan	8.7(11)	70.6(89)	15.9(20)	4.8(6)	126	(<0.001)	22.5±3.4	
Civil Servant	7.1(1)	85.7(12)	7.1(1)	0.0(0)	14		22.5±2.7	
Farming	9.9(21)	71.7(152)	15.1(32)	3.3(7)	212		22.5±3.6	
Trading	8.5(30)	55.6(197)	24.3(86)	11.6(41)	354		24.2±5.0	
Ethnicity						**6.440**		0.087
Yoruba	9.2(52)	61.6(348)	20.7(117)	8.5(48)	565	(0.092)	23.5±5.1	
Non-Yoruba	7.8(11)	72.3(102)	15.6(22)	4.3(6)	141		22.8±4.0	
Religion						**12.795*****		0.065
Christianity	8.6(45)	62.8(327)	20.9(109)	7.7(40)	521	(0.046)	23.5±4.6	
Islam	9.9(18)	66.9(121)	16.6(30)	6.6(12)	181		22.8±3.8	
Traditional	0.0(0)	50.0(2)	0.0(0)	50.0(1)	4		26.9±5.3	
Family Type						**2.407**		0.055
Not Married	0.0(0)	75.0(3)	25.0(1)	0.0(0)	4	(0.879)	21.5±4.8	
Monogamy	9.3(39)	64.0(268)	18.4(77)	8.4(35)	419		23.4±4.8	
Polygamy	8.5(24)	63.3(179)	21.6(61)	6.7(19)	283		23.6±5.1	
Income						**22.114*****		<0.001
<5000	13.1(14)	64.5(69)	15.9(17)	6.5(7)	107	(0.036)	22.6±4.0	
5000-9999	9.1(32)	67.4(238)	18.4(65)	5.1(18)	353		22.9±4.9	
10000-14999	5.8(9)	63.0(97)	20.8(32)	10.4(16)	154		24.0±4.2	
15000-19999	10.7(6)	48.2(27)	28.6(16)	12.5(7)	56		24.6±7.2	
20,000+	5.6(2)	52.8(19)	25.0(9)	16.7(6)	36		25.1±5.2	

Significant at 0.1%; ***Significant at 5.0%

within 3 days after delivery reduces with increasing maternal age. It reduces from 33.3% among women aged less than 20 years to 24.0% among those above 34 years (p=0.046). Also women with at least secondary education (24.0%) had lower proportion of their members seeking post natal care within 3 days of delivery compared to those with no formal education (35.9%) (p=0.002). Also variation exists in timing of post-natal care by religious denomination with higher percentage of Christians (31.2%) than Muslims (23.2%) reported that they sought post-natal care within 3 days after delivery (p=0.047).

In figure 1, the data show that 43.7% and 83.3% reported that they went for post-natal care within 7 and 28 days after delivery respectively.

Maternal nutritional status

The data as shown in Table 3 revealed that the mean Body Mass Index (BMI) was 23.3±4.6kg/m^2, 63.7% of the women had normal weight while

Table 4: Logistic Regression Model of Maternal Health Services Utilization According to Background Characteristics

Background Characteristics	ANC Provider **Skilled**	Delivery Place **Health Facility**	Delivery Assistant **Skilled**	Com. of PNC **≤3 days after Del.**
Mother's age at birth				
<20				
20-34				
35+				
Education				
None			1	1
Primary			1.01(0.66-1.54)	0.67(0.46-0.97)***
Secondary+			1.71(1.18-2.97)***	0.65(0.39-1.05)
Family Type				
Single	2.02(0.20-19.72)	2.28(0.23-22.17)		
Monogamy	1.58(1.16-2.13)**	1.48(1.10-1.99)***		
Polygamy	1	1		
Religion				
Christianity	1			1
Islam	0.74(0.53-0.89)***			0.67(0.45-0.99)***
Traditional	0.13(0.01-1.16)			1.12(0.18-6.85)
Ethnicity				
Yoruba			1	
Others			1.52(0.95-2.42)	
Income				
<5000			1	1
5000-9999			1.89(1.24-2.89)**	0.81(0.51-1.28)
10000-14999			1.44(0.88-2.34)	1.36(0.81-2.27)
15000-19999			1.97(1.19-3.91)***	1.05(0.52-2.08)
20000+			1.94(0.87-4.29)	0.77(0.33-1.81)

***Significant at 1.0%; ***Significant at 5.0%; Com. of PNC: Commencement of Post Natal Care; ANC: Antenatal Care*

8.9% were underweight. The factors found to be significantly associated with maternal nutritional status as measured by BMI in this study were; age, number of previous births, occupation, religion and income ($p<0.05$). The percentage of overweight and obese women increases with increasing age. For instance, 4.1% of women in age group 15-24 have normal nutritional status while 67.6% and 50.7% of those had given birth to 3-4 and at least 5 children have normal nutritional status respectively. Women who are civil servants (85.7%) and farmers (71.7%) have higher proportion of their members as having normal BMI than traders (55.6%). The proportion of women who were either overweight or obese increases with increasing average monthly income while 13.1% of women who earned <5000 naira a month were undernourished compared to 5.6% observed among those who earned at least 20000 naira a month ($p<0.001$). Highest percentage of women who had normal nutritional status was recorded among those who left 24-35 months birth interval (59.8%).

years were obese as against 12.9% among women 35 years and above. Also, younger women are likely to be underweight than the older women. The percentage of women who had normal nutritional status (BMI=18.5-24.99) increases with increasing number of children ever born. About 72.0% of women of parity 2 or below.

Multivariate results

Table 4 presents the logistic regression model of maternal health care services utilization by background characteristics. Family type and religion were found to be the determinants of the use of skilled ANC provider in the study area. The likelihood of seeking ANC care from skilled health worker was 1.5(C.I=1.16-2.13, $p<0.01$) higher among women in monogamous family than those in polygamy. Also, belonging to Islamic religious group inhibits (OR=0.74; C.I=0.53-0.89, $p<0.05$) the use of skilled ANC provider than Christians. In addition women in monogamous family were 1.481(C.I=1.10-1.99) times more likely to deliver

Table 5: Generalized Linear Model of Maternal Nutritional Status by Background Characteristics

Background characteristics	u**β**(95% C.I) Model1	Wald χ^2-Square	adj.**β**(95% C.I) Model2	Wald χ^2-Square
Age				
15-24	-1.479(-2.370, -0.587)**	10.561	-0.499(-1.648,0.650)	0.725
25-34	-1.158(-1.924, -0.393)**	8.791	-0.508(-1.354, 0.337)	1.389
35+	0[a]		0[a]	.
Children ever born				
≤2	-1.492(-2.291, -0.692)*	13.368	-0.926(-1.966, 0.113)	3.051
3-4	-1.415(-2.209, -0.620)*	12.184	-1.143(-2.005, -0.282)**	6.761
5+	0[a]	.	0[a]	.
Religion				
Christianity	-3.402(-7.726, 0.922)	2.378	-3.904(-8.076, 0.267)	3.365
Islam	-4.045(-8.400, 0.309)	3.315	-4.828(-9.029, -0.628)***	5.076
Traditional	0[a]	.	0[a]	.
Occupation				
Artisan	-1.644(-2.525, -0.763)*	13.370	-1.367(-2.249, -0.485)**	9.220
Civil Servant	-1.666(-3.981,0.648)	1.992	-1.898(-4.186, 0.391)	2.642
Farming	-1.676(-2.415, -0.937)*	19.777	-1.709(-2.449,-0.969)*	20.495
Trading	0[a]	.	0[a]	.
Income				
<5000	-2.375(-4.022, -0.728)**	7.984	-2.114(-3.727,-0.500)***	6.591
5000-9999	-2.091(-3.587, -0.595)**	7.502	-1.472(-2.946,0.002)	3.832
10000-14999	-.941(-2.523, 0.642)	1.357	-0.442(-1.992,1.108)	0.312
15000-19999	-1.173(-2.999, 0.654)	1.584	-0.807(-2.586,0.971)	0.791
20,000+	0[a]	.	0[a]	.

**Significant at 0.1%; **Significant at 1.0%; ***Significant at 5.0%; u: unadjusted; adj.: adjusted; a: Set to zero because this parameter is redundant*

their babies at health facility than their counterparts in polygamous family. Education and income were found to be determinants of skilled attendant at delivery. While women who have at least secondary education have higher likelihood (OR=1.71; C.I=1.18-2.97, p<0.05) of utilizing skilled attendant during the delivery of their most recent under-five babies than those with no formal education. Those who earn 5,000 - 9,999 and at least 20,000 naira on average as their monthly income were 1.89(C.I=1.24-2.89; p<0.01) and 1.94(1.19-3.91; p<0.05) times respectively were more likely to be assisted by skilled attendant during child delivery than those who earned at most 5000 naira a month. Education and religion were found to be determinants of utilization of PNC within 3 days after birth. The likelihood of utilization of PNC within 3 days after birth was lower among women with primary education (OR=0.67; C.I=0.46-0.97; p<0.05) and those who belong to Islam religious group (OR=0.67; C.I=0.45-0.99, p<0.05) than their counterparts with no education and Christians respectively.

The results of the generalized linear model are as presented in Table 5. The mean difference (j-i) where i is the mean BMI of the reference category and j for other categories of a variable including the Wald χ^2 are shown in Table 5. The negative sign is an indication of lower BMI compared to that of the reference category. In model 1, the BMI was significantly lower among women aged 15-24 (β=-1.479; C.I=-2.370--0.587, p<0.01) and 25-34 (β=-1.158; C.I=-1.924--0.393, p<0.01) years than those aged 35 years and above. This pattern was observed when other variables were included in the equation as control (model 2). The identified determinants of maternal nutritional status in the study area are children ever born, religion, occupation and income. The mean BMI was found to be significantly lower among women who had given birth to at most 2 children (β= 1.143; C.I=-2.005--0.282, p<0.01)

Table 6: Pregnancy Related Deaths, Life Time Risk of Maternal Death and Maternal Mortality Ratio Estimates

Age group	Number of respondents	Number of sisters exposed	Maternal deaths	Adjustment factor	Sister unit of risk exposure	LTR
15-19	50	129	3	0.107	14	0.217
20-24	174	432	4	0.206	89	0.045
25-29	195	569	5	0.343	195	0.026
30-34	194	538	7	0.503	271	0.026
35-39	122	364	3	0.664	242	0.012
40-44	86	249	4	0.802	200	0.020
45-49	43	107	3	0.900	96	0.031
Total	**864**	**2388**	**29**		**1106**	**0.0262**
Total Fertility Rate =5.92; Maternal Mortality Ratio =448 per 100,000 live births						

LTR: Life Time Risk

than those with at least 5 children (model 2). The difference in mean BMI was mostly pronounced between women who earned less than 5,000 a month (β=-2.114; C.I=-3.727--0.500, p<0.05) than those who earned at least 20,000 naira a month.

Maternal mortality ratio

Table 6 summarises the data on pregnancy-related deaths in the study communities. Overall, 864 women reported on their 2388 sisters who were aged 15 years and above or ever married. Of these, 86 were reported to have died of which 29 were pregnancy related. The life time risk of maternal death was highest among women aged below 25 years. The last column of Table 5 shows that 1 in 5 women aged 15-19 years would die from pregnancy related causes while the risk is 1 in 22 among those aged 20-24 years. This confirms the high risk associated with teenage pregnancy. The life time risk of maternal death was 0.0262 (1 in 38) which translates into a maternal mortality ratio of 448 pregnancy related deaths per 100,000 live births.

Discussion

Nigeria like many other developing countries is quite far from reducing the level of mortality to such level achieved by the developed nations. The type of care and assistance that women receive during pregnancy and at the time of delivery are key underlying factors influencing Maternal and Child Health[20-22]. We therefore assessed these important determinants of Maternal Health in a rural community in Nigeria. The mean age of the studied women was 29.9±7.8 years and one fourth had no education. These findings reflect the true mean age and level of education composition of women of reproductive age in rural communities in Nigeria. The findings corroborate the outcomes of similar studies previously conducted in Nigeria[23-24].

Nutritional status is the result of complex interactions between food consumption and the overall status of health and care practices. The Maternal nutritional status is an indication of their feeding pattern and access to balance diet. In this study, we found that the mean BMI, a measure of maternal nutritional status was 23.3±4.6kg/m^2, about 1 in 10 of the studied subjects was underweight and three-fifth had normal nutritional status. The findings are in agreement with Adebowale and his colleagues' study where slightly above ten percent of women of reproductive age were found to be underweight[25]. It has been established in the literature that rural dwellers sell their best farm products in order to meet other daily household needs[26], however, in Nigeria; they have access to fresh food substance and vegetables since they are the primary producers[26]. The BMI shows significant association with income and children ever born. This finding supports the outcome of studies conducted in other settings[25,27-28].

Many health problems common to pregnant women can be prevented, detected and treated if skilled health workers are consulted during antenatal visit[29]. WHO recommends a minimum of four antenatal visits, comprising interventions such as tetanus toxoid vaccination, screening and treatment for infections, and identification of warning signs during pregnancy[29]. Antenatal Care is essential to ensure optimal health outcomes for the mother and the baby[14]. This is necessary to

monitor the pregnancy and reduce maternal and child morbidity risks during pregnancy and delivery particularly when the ANC care is provided by skilled professionals[29]. This study revealed that approximately 4 in 5 women said that they attended at least 4 ANC visits during their last pregnancy and three-fourth received ANC from skilled health workers. Our finding on number of ANC visits is in agreement with previous studies conducted in Nigeria[17,30]. For instance, perceived quality of service was found as the most important factor which influenced the choice of facility for obstetric care[11]. Further, the current study revealed that family type and religion were predictors of ANC provider. Being in monogamous type of family and practicing Islam as religion promotes and inhibits seeking ANC from skilled providers than women in polygamous family and Christians respectively. While the reason for the pattern exhibited by family type may require further research, the speculation that some Muslim husbands often discourage their wives from accessing ANC, if such services would be provided by male health worker, who might be responsible for the observed pattern for religion. The pattern of relationship between family type and religion established in our study is similar to the findings from a study previously conducted in Nigeria[31].

In a country where maternal health is given higher priority, all pregnant women should deliver in modern health facility either private or public and must be assisted by skilled health worker. Exceptionally, women do deliver at their homes, offices, farms or elsewhere if they are in labor unexpectedly. However, such women could be assisted by skilled health worker if they are within the reach in the community. Unfortunately, this is not the case in most rural communities in Nigeria where there is a rare access to primary health care. Our study shows that majority of the women who reported that they had live birth in the last 5 years delivered at modern health facility; about ¼th delivered in their homes and above half were assisted by skilled health worker. Similar patterns to these findings were found in a national survey conducted in Nigeria[7]. In the current study, education and income were found to be important determinants of being assisted by skilled health worker during delivery. There was an evidence of reduction in the risk of not being assisted by skilled health worker during childbirth among more educated women and those who earn larger monthly income. Health care services in Nigeria are not free even in the public health facilities; therefore the poor may consider alternative choices if they are financially incapacitated to pay for services in the health facility at the point of child delivery. The prevalence of having childbirth at a healthcare facility and delivered in the presence of qualified healthcare personnel in our study were lower than the figures obtained in a study conducted in Democratic Republic of Congo[31].

A large proportion of maternal and neonatal deaths occur during the first 36 hours after delivery[32]. Thus, prompt postnatal care is important, for both the mother and the infant, to treat complications arising from the delivery as well as to provide the mother with important information on caring for herself and her baby[32]. It is recommended that all women who deliver in a health facility receive a postnatal health check-up within the first 24 hours after delivery and also that women giving birth outside of a health facility should be referred to a health facility for a postnatal check-up within 12 hours of giving birth[23,33]. In this study, about 1 in 7 women and approximately 1 in 3 women sought post-natal care within the first 2 and 3 days after delivery respectively. The findings corroborate earlier results from similar survey in Nigeria[24]. The low reported proportion of women who sought post-natal care within 3 days after baby delivery might be a reflection of the poor health services access and delivery in Nigeria. Further, this study revealed that education and religion are the predictors of accessing post-natal care within three days after childbirth. Women who have primary education and Muslims have lower chances of commencing post-natal care within three days after childbirth than those with no education and Christian mothers respectively. The positive influence of having an element of formal education on utilization of health services has been widely discussed in literature[30,31]. Service acceptability may be responsible for higher utilization of PNC services within 3 days by Christian than the

Muslim women.

In developing countries like Nigeria, complications during pregnancy and childbirth are a leading cause of mortality and disability among women of childbearing age[34]. The maternal mortality ratio signifies the risk associated with each pregnancy, i.e. the obstetric risk[34]. It is also one of the key indicators of Millennium Development Goals[34]. Maternal mortality is one of the key indicators of measuring women's overall health conditions and reproductive health programs of a country. We estimated the maternal mortality from the proportions of sisters who died from pregnancy related causes. The life time risk of maternal death estimated in this study was 0.0262 (1 in 38) which translated to maternal mortality ratio of 448 deaths per 100,000 live births. The estimate is lower than 545 deaths per 100,000 live births found in Nigeria[23] but corresponds to the estimate of 440/100,000 live births in rural areas by a study in Nigeria[35].

Limitation

The cross-sectional nature of the data may influence some of the statistics found in this study since verbal reporting of historical event like number of ANC visits and timing of commencement of post-natal care are often susceptible to recall bias. However, limiting the reporting on maternal health care services to the most recent birth in the last five years prior the survey can reduce such limitation. Due to small number of events, trends and age-specific rates could not be estimated for maternal mortality ratio.

Conclusion

The utilization of maternal health care services and nutritional status of women in the study area can be said to be fair when compared to the generality of women in Nigeria. The identified determinants of utilization of maternal health services in this study should be taken into consideration when designing strategies to improving the use of modern health facilities in the study area. However, further research will be needed in the study area to develop context specific strategies that address access to maternal health care services. High maternal mortality ratio found in this study emphasizes the need for qualitative research to identify factors responsible for maternal deaths in the study area.

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