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Perception of obstetric danger signs among women living on the coastline of the Atlantic Ocean in rural Lagos, Nigeria

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Implementation of safe motherhood programs in sub-Saharan African nations requires recognition of signs of potential emergency obstetric cases to facilitate immediate care seeking and urgent medical intervention. This questionnaire-based survey aimed to describe the perception of obstetric danger signs among women of reproductive age, living on the Atlantic coastline of rural Lagos. This cross-sectional, descriptive study took place in two non-congruent communities of Lagos State, Nigeria, between October 2012 and March 2013. Epi Info 7 was used to calculate sample size for the projected population in each community. Statistical analysis was carried out using STATA 13 software. A total of 829 females (20% single, 80% married) participated in the study. Among these, about 76 and 79% disagreed that bleeding and high blood pressure were obstetric danger signs, respectively. Multivariate analysis showed a positive and significant association between awareness of bleeding as obstetric danger sign as the dependent variable and both knowledge of antenatal care (t=6.53, p=0.000) and knowing a woman who died in pregnancy (t=3.34, p=0.001) as independent variables. Rural women on Atlantic Ocean coastline of Lagos had low perception of obstetric danger signs indicating promotion of acceptable maternal health in this environment.

Key words: Perception, danger signs, obstetrics, reproductive age, Atlantic ocean coastline, rural.

INTRODUCTION

Globally, about 287,000 maternal deaths occurred in 2010, a drop of 47% from the figure given in 1990. Sub-Saharan Africa (sSA) (58%) and Southern Asia (30%) provided 88% of deaths among the Countdown countries in 2010 and within these regions, India (20%) and Nigeria (14.5%) alone accounted for more than one-third of all maternal deaths (Adams and Franz-Vasdeki, 2013). Since the end of the last century however, great progresses have been recorded on the status of maternal health and safe motherhood as more years have been added to their life-expectancy, and fertility rates have substantially reduced not only in the developed

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nations, but also in the developing countries (UN, 2003; Grown et al., 2005). These strides have led to substantial decline in burdens associated with childbirth and child rearing (Grown et al., 2005). Despite these advances, the level of maternal mortality in sSA could be regarded as a global crisis; in almost all countries and in all income groups. Women in child-bearing age are five times more likely at risk of these diseases (WHO, 2015a). The Millennium Development (MDG) Goal 5a, "Improve maternal health" stipulated that by 2015, maternal mortality should be reduced by a ratio of three-quarters (WHO, 2015). Progress on MDG-5 for maternal health has been slower than for MDG-4, with deaths declining from around 400,000 to around 275,000 (Lozano et al., 2011; UNFPA, 2012). The major causes of maternal deaths are hemorrhage (22.9%), hypertensive disorders (18.5%), abortion (14.6%), sepsis (8.6%), and other direct and indirect causes (35.5%) (Lozano et al., 2012).

Over the past few decades, great strides have been made in improvement of women's health status; more than a decade has been added to life expectancy, and fertility rates in both developed and developing countries have declined substantially, helping to reduce burdens associated with childbirth and child rearing (Grown et al., 2005). Despite this progress, more than half a million women, 99% of whom live in the developing world continue to die every year in pregnancy and childbirth due to entirely preventable reasons (WHO, 2015b). Maternal mortality of 630 deaths per 100,000 live births in Nigeria is unacceptably high (Hofmeyr et al., 2003). According to the World Health Organization (WHO), maternal deaths are higher in women living in rural areas and among poorer communities; young adolescents face a higher risk of complications and death as a result of pregnancy than older women; and between 1990 and 2013, global maternal mortality declined by only 2.6% instead of a decline of 5.5% required to achieve MDG-5 (WHO, 2015b). Part of the leading complications responsible for nearly 75% of all maternal deaths include; severe bleeding and high blood pressure (pre-eclampsia and eclampsia) (Say et al., 2014). Common modes of presentation of eclampsia in Nigeria are elevated blood pressure, convulsion, previous history of hypertension, epigastric pain and pedal oedema (Jimoh et al., 2007). Another Nigerian study reported a prevalence of 0.9% for eclampsia which occurred mostly (93.3%) among unregistered patients and mostly (78.5%) among women below the age of 30 (Orji et al., 2007). Incidentally, elevated blood pressure or hypertension which is the most common medical problem encountered in pregnancy is one of the criteria for the diagnosis of eclampsia which also includes convulsion and proteinuria (Nelson-Piercy, 2007). Hypertension is also a leading cause of perinatal and maternal morbidity and mortality, and pregnant women with this condition are more likely to develop placental abruption, Disseminated Intravascular Coagulopathy (DIC), cerebral haemorrhage, hepatic failure and acute renal failure (Report, 2000). A large proportion of maternal deaths, especially in Northern Nigeria, are associated with obstetric complications including haemorrhage and eclampsia (UNICEF, 2008). In Ethiopia, the level of knowledge of Obstetric Danger Signs (ODSs) during pregnancy, childbirth and postpartum period was low and in Uganda, the prevalence of recently delivered women who had knowledge of key danger signs, or those who were birth prepared was also very low (Bogale and Markos, 2015). While findings indicate a poor perception of common and serious ODSs in Pakistan, an Indian study reported that 90.5, 80.0 and 78.4% of pregnant women were able to recognize bleeding/leaking per vagina, decreased/absent fetal movements and seizures/fits during pregnancy as ODSs, respectively (Hasan and Nisar, 2002; Sangal et al., 2013).

However, most studies were health facility based, conducted mainly among those who were already pregnant or recently delivered and did not take into consideration non-pregnant and nulliparous women. Moreover, almost all the studies were conducted in the hinterland, far away from densely-populated Atlantic Ocean coastline. Furthermore, all women in these studies were lumped together as one category and not differentiated into various reproductive age groups. In addition, some of these studies focused mainly on medical modification of the damage already done, instead of addressing the root causes of the problem. Finally, very few studies in Africa consider a wide range of ODSs, but focused on either one or two. Data on perception of danger signs associated with pregnancy among coastal populations is very scanty leading to little knowledge of the exact figure of maternal morbidity and mortality in this geographical location. This study therefore aimed to explore the risk factors for perception of obstetric complications, assess the level of perception of women in various reproductive age groups and determine the respective roles of educational level and parity on the perception of identified ODSs. The test hypotheses were that the age, marital status, educational level, previous miscarriage and knowing a woman who died in pregnancy were significant risk factors in the perception of ODSs among the study group.

MATERIALS AND METHODS

This descriptive study compared perception of seven selected ODSs; vaginal bleeding, convulsion, high blood pressure, severe malaria, cessation of fetal movement, swollen legs, pale hands and feet among women in different childbearing age groups, taking into consideration their marital status, educational level and parity. Literature search revealed no similar study having been conducted in this geographical location in the country and extremely few in other parts similar location in sSA. The study population was defined as the homogenous group of people living together for at least 10 years at Elegushi Community in Ibeju-Lekki Local Government Area (LGA) and Ijede Community at Ikorodu LGA of Lagos State, Nigeria (Afolabi et al., 2015). In general there was a

high literacy rate of 88.4% in Lagos State and 91.6% among those aged 15 to 49 years (NPC, 2006). Although the 2006 population census of Ibeju-Lekki and of Ikorodu LGAs were recorded as 99,540 and 689,045, respectively by 2013 when this study took place, there was an increase in the population due to natural annual increase and rural-urban drift (Lagos State Government, 2005). The approximate population of Elegushi community and that of Ijede were 30,350 and 88,000, respectively, of which approximately 25% were women of child-bearing age, based on the census. Therefore, the sampling fraction (sample size 845; and population size 25%) to be selected for the study was calculated to be approximately 1 out of every 35 women in reproductive age. Each of these two communities is further subdivided into wards and further still, into different families living in either rented or owned houses. The populations were mostly traders with some who were government workers and farmers. Respondents were divided into three age groups and categorized into three corresponding stages of reproductive age. As shown in Figure 1 , respondents below the age of 25 were classified as early reproductive age (ERA), those between 25 and 34 years as mid reproductive age (MRA), and those 35 years and above as late reproductive age (LRA).

Ikorodu, located at approximately 30 km from metropolitan Lagos, is a semi-urban town sited close to the Atlantic Ocean. It is separated from Ibeju-Lekki LGA by a large body of inland water, the Lagos Lagoon. Ikorodu shares its northern boundary with Ogun State and its eastern and western borders with Epe and Kosofe LGAs, respectively. It is a traditional settlement of the Aworis, a sub-group of the Yorubas. A modern 10-lane expressway has been newly built to link metropolitan Lagos to Ikorodu, thus enlarging its population. There are thermal stations, mini ports, and institutions of higher learning at Ikorodu. Ibeju-Lekki sits next to the Atlantic Ocean. It is more of a resort center with sea-side hotels and tourist center. The climate is generally coastal, though the rainy and dry seasons follow their regular pattern. Luscious and verdant vegetation surround these communities that have minimal air pollution. Houses are made of bricks, roads are mostly tarred and the communities have private and public schools and hospital systems. Most houses are connected to the electricity grid, though electricity is not regular. Housing and sewage systems however need to be improved. The State government conducts regular in-door residual spraying and occasionally gives free Long-Lasting Insecticidal Nets (LLINs) and free malaria treatment to indigenes.

The target population was women in different stages of childbearing age residing in these communities. Measured independent variables in the study were marital status, highest level of education, religion, and ethnic group. Perception was assessed by asking if the respondents regard each of the medical conditions described above as a danger sign in pregnancy. Epi Info 7 was used to calculate the sample size for the projected WCBA population of each site of study, using 30% as an expected frequency of correct perception of obstetric danger signs in each of the communities, a confidence limit of 5%, and confidence level set at 95%. The calculated sample size was 641 (319 for Ibeju-Lekki and 322 for Ikorodu). For contingencies, especially the considerations of attrition, non-response and increase in representativeness, the sample size was increased by 30%, bringing it to 833 and rounding the figures to 845. Systematic random sampling was used to select streets at regular intervals from the list of streets in each community. From the selected streets, the starting point of the survey was the first house in a particular direction and by simple random sampling every fourth house was selected for the study. If a selected house did not have any WCBA, then the next house was visited to replace it for a respondent. All the WCBA (15 to 49 years) who agreed to participate were interviewed. Only women aged between 15 and 49 years, resident within the communities of study and not just visiting, of sound mind and not mentally compromised were included in the study. Those excluded were women hospitalized for any reason, those moribund, visitors and tourists, Caucasians and commercial sex workers.

Marital status was defined as “single” if the participant had never had a conjugal relationship or “married” if there had been or still was a conjugal relationship. Educational level meant the stage of education where each respondent was or stopped at the time of the study. Parity meant the number of times the respondent has delivered a child. The information was collected using pretested semi-structured questionnaires which were electronically prepared on a Mobile Data Capturing Device (MDCD). The electronic questionnaire was divided into six parts consisting of administrative information; demographic information; knowledge of Human Immunodeficiency Virus (HIV)/tuberculosis/malaria; contraceptive use; self-assessment of individual health; and in the last part of the electronic questionnaire, the reports of testing for hemoglobin concentration, malaria parasitemia, and HIV. It took roughly 45 min to complete a questionnaire in a face-to-face interview at household level. Six field workers were trained in administering the electronic questionnaire. Once data collection was finalized, questionnaires were electronically sent to a central location where they were automatically recorded in an Excel spreadsheet. The collected data were analyzed using STATA 13. Age distribution was assumed to be approximately normal, following a Gaussian curve. Two outliers in age were detected which prompted revisiting the respondents and correcting the ages which were due to transpositions. Frequency tables were used for categorical variables. Cross-tabulations and chi-square tests were used for appropriate variables such as age group and ANC, marital status and awareness of ODS. Confidence level (1-α) was set at 95% and power (1-β) at 80%. Appropriate test statistics were applied and the p-value (<0.05) was considered statistically significant. Ethical considerations included taking verbal, informed consent from all the participants. The confidentiality of the data was ensured and clearance was obtained from Lagos State Government ethics committee. The survey was anonymous in order to preserve the privacy of study subjects.

RESULTS

Initially, 859 open-ended, semi-structured questionnaires were prepared for the communities of study but 6 of these were technically incomplete and had to be excluded from further analysis. Five respondents travelled out of their residences during the study and their participation had to be terminated. Another 3 women rejected to respond further based on both religious or cultural beliefs and 2 refused to participate at all, giving a response rate of 98.1%. Table 1 shows that the 829 respondents included 249 (30.0%) women in ERA, 410 (49.5%) in MRA and 170 (20.5%) in LRA. Demographic characteristics of the respondents were skewed more towards 662 (79.9%) married women; 679 (81.9%) secondary education (679, 81.9%); 675 (81.4%) Yoruba ethnic group and 347 (41.85) parity of 1 to 2. Only 52 (6.3%) of the respondents had no formal education and 3 (0.4%) had other forms of education such as attending Koranic schools. There were 478 (57.7%) Christians, 346 (41.7%) Muslims and 5 (0.6%) Traditionalists. Figure 1 shows the distribution of parity among the respondents. In all, 384 (51.4%) women in MRA, 335 (44.8%) of those with parity 1 to 2 and 614 (82.1%) of those who had secondary education ever used Antenatal care (ANC). A

Table 1. Socio-demographic characteristics of respondents.

Variable	Item	Frequency	Percent
Age group (years)	<25	249	30.0
	25-34	410	49.5
	≥35	170	20.5
Marital status	Single	167	20.1
	Married	662	79.9
Educational level	No formal education	52	6.3
	Secondary	679	81.9
	Undergraduate	6	0.7
	Higher degree	50	6.0
	Diploma	39	4.7
	Others	3	0.4
Religion	Christianity	478	57.7
	Islam	346	41.7
	Traditional	5	0.6
Ethnicity	Yoruba	675	81.4
	Ibo	72	8.7
	Hausa	2	0.2
	Others	80	9.7
Parity	0	182	22.0
	1-2	347	41.8
	3-4	232	28.0
	5-6	59	7.1
	7-8	9	1.1

similar proportion among these groups was observed for those who considered that ANC as important in pregnancy (Table 2). As shown in Table 3, women in MRA were over three times more likely to visit ANC (X^2=23.43; P=0.000002, OR=3.34; 95% CI=2.01, 5.57) compared to those in ERA. Women in LRA were over four times more likely to visit ANC when matched with those in ERA. There was no statistically significant difference (X^2=0.23; P=0.63, OR=1.21; 95% CI =0.56, 2.64) in the proportion of women in LRA who visited ANC compared to those in MRA (Figure 2).

Figures 3 and 4 presents a graphical illustration of perception of ODSs by women in different age groups clearly showing that a large proportion of the women have low perception of these ODSs. As illustrated in Table 4, higher proportions of women in MRA had better perception of ODS than those in ERA or LRA. However, that proportion was statistically significant only for vaginal bleeding (X^2=4.31; P=0.037, OR=1.40; 95% CI=1.02, 1.92), severe malaria (X^2=3.67; P=0.05, OR=1.38; 95% CI=0.99, 1.91), pale hands and feet (X^2=4.43; P=0.03, OR=1.71; 95% CI =1.03, 2.85) when MRA group was compared with ERA group; and only for convulsion (X^2=4.75, p=0.03, OR=1.81, 95% CI =1.06, 3.10) when MRA group was compared with LRA group. Also, single women were more than twice likely to disregard vaginal bleeding (X^2=17.0; P=0.000043, OR=2.09; 95% CI=1.46, 2.98) and about twice as likely to also disregard convulsion (X^2=5.05; P=0.02, OR=1.80; 95% CI=1.10, 3.00) as ODSs. In general, there was no significant difference in the risks of an ODS among the respondents. Nevertheless, among those who disagreed that bleeding is an ODS, risk of vaginal bleeding during pregnancy was slightly higher among women in ERA compared with MRA (RR=1.17, 95% CI=1.0, 1.9) and among those who were singles compared to those who were married (RR=1.37, 96% CI=1.2, 1.7).

As shown in Tables 5 and 6, there were significant associations (positive and negative, respectively) between knowing a woman who died in pregnancy and perception of bleeding as an ODS (t=3.72, P=0.000, 95% CI=0.07, 0.22) on one hand and perception of pale hands

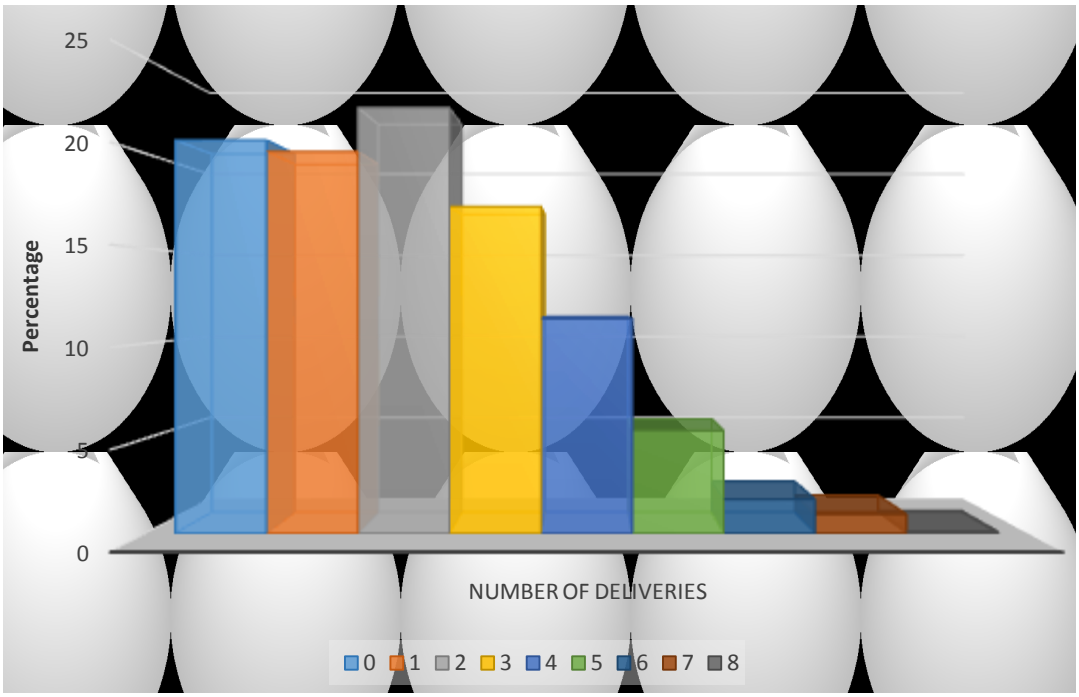

Figure 1. Frequency distribution of number of deliveries among rural women in Lagos, Nigeria.

Table 2. Utilization and perceived importance of antenatal care by respondents relative to age group (years), parity and educational status.

Variable	Item	Ever used ANC		ANC is important in pregnancy		
		Yes	No	Yes	No	Don't know
		Freq. (%)	Freq. (%)	Freq. (%)	Freq. (%)	Freq. (%)
Age group	<25	203 (27.1)	46 (56.8)	205 (28.1)	8 (44.4)	36 (50.0)
	25-34	384 (51.4)	26 (32.1)	384 (52.7)	6 (33.3)	20 (27.8)
	≥35	161 (21.5)	9 (11.1)	150 (20.6)	4 (22.2	16 (22.2)
Parity	0	126 (16.8)	56 (69.1	136 (18.4)	8 (44.4)	38 (52.8)
	1-2	335 (44.8)	12 (14.8)	327 (44.3)	6 (33.3)	14 (19.4)
	3-4	226 (30.2)	6 (7.4)	214 (29.0)	4 (22.2)	14 (19.4)
	5-6	53 (7.1)	6 (7.4)	55 (7.4)	0 (0.0)	4 (5.6)
	7-8	8 (1.1)	1 (1.2)	7 (0.9)	0 (0.0)	2 (2.8)
Educational level	No formal	47 (6.3)	5 (6.3)	49 (6.6)	1 (5.6)	2 (2.8)
	Secondary	614 (82.1)	65 (80.2)	600 (81.2)	15 (83.3)	64 (88.9)
	Undergraduate	4 (0.5)	2 (2.5)	5 (0.7)	0 (0.0)	1 (1.4)
	Higher degree	42 (5.6)	8 (9.9)	44 (6.0)	2 (11.1)	4 (5.6)
	Diploma	38 (5.1)	1 (1.2)	38 (5.1)	0 (0.0)	1 (1.4)
	Others	3 (0.4)	0 (0.0)	3 (0.4)	0 (0.0)	0 (0.0)
Total	-	748 (90.2)	81 (9.8)	739 (89.4)	18 (2.2)	72 (8.7)

and feet as an ODS (t=-2.30, P-value=0.02, 95% CI = -0.11, -0.01) on the other hand. This singular factor of knowing another woman who died in pregnancy was responsible for 33% of the variation in perception of bleeding (r=0.14, r^2=0.33, P=0.0001) and 22% of the variation perception of pale hands and feet (r = -0.06, r^2 =

Table 3. Relationship between age and utilization of antenatal care.

Age group (years)	Statistics	Age group (years)		
		<25	25-34	≥35
<25	X^2 (P-value)	-	23.43 (0.000002)	15.39 (0.00009)
	OR (95% CI)	-	3.34 (2.01, 5.57)	4.05 (1.93, 8.53)
25-34	X^2 (P-value)	23.43 (000002)	-	0.23 (0.63)
	OR (95% CI)	0.30 (0.18, 0.50)	-	1.21 (0.56, 2.64)
≥35	X^2 (P-value)	15.39 (0.00009)	0.23 (0.63)	-
	OR (95% CI)	0.25 (0.12, 0.52)	0.83 (0.38, 1.80)	-

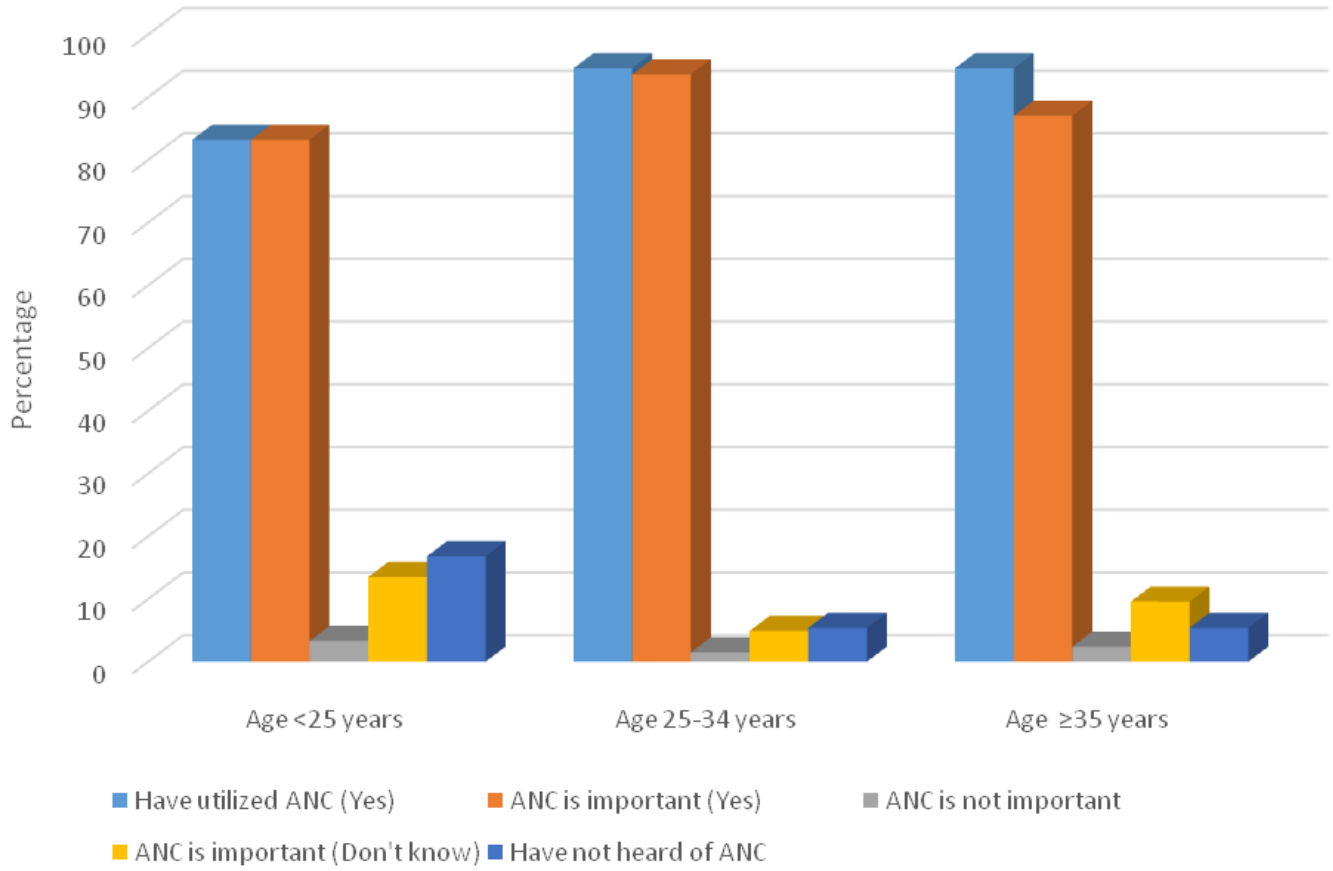

Figure 2. Attitude of coastal women in various reproductive stages on antennal care.

0.22, P-value=0.005) as ODSs. There was also a negative but significant association between age group and pale hands and feet (t = -3.41, P-value=0.001, 95% CI=-0.10, -0.03), accounting for a significant 22% of the variation in perception of pallor as an ODS (r=-0.07, r^2=0.022, P-value =0.005). Substantial but negative association was also observed between educational level and severe malaria (t=-2.46, P-value=0.14, 95% CI = -0.06, -0.01) which explains an insignificant 14% of the variation in the said perception (r= -0.04, r^2=0.014, P=0.09). Marital status was significantly but negatively associated with cessation of fetal movement (t=-2.86, P-value =0.004, 95% CI=-0.09, -0.02) which explained a significant 15% of the variation in perception of cessation of fetal movement as an ODS (r=-0.06, r^2=0.015, P-value = 0.05).

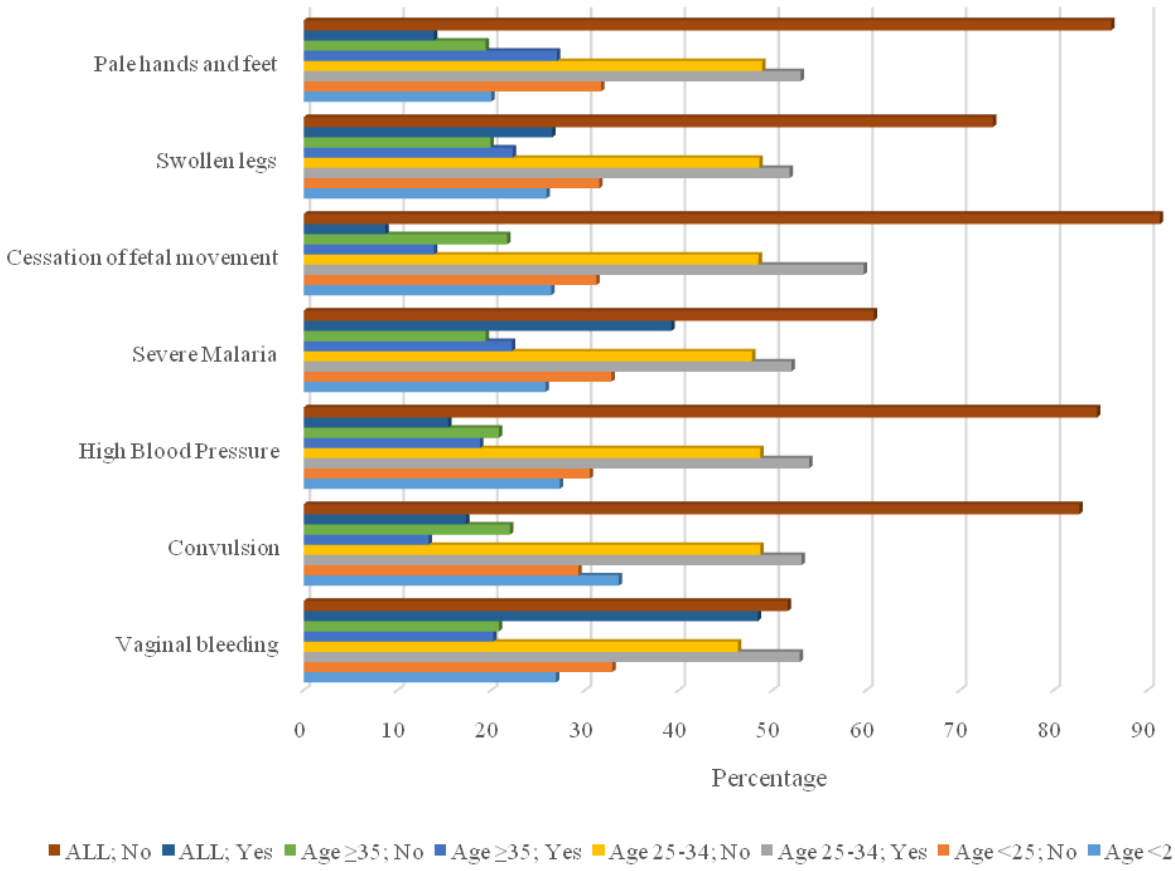

Figure 3. Perception of obstetric danger signs according to age group of women in rural coastal lagos, Nigeria.

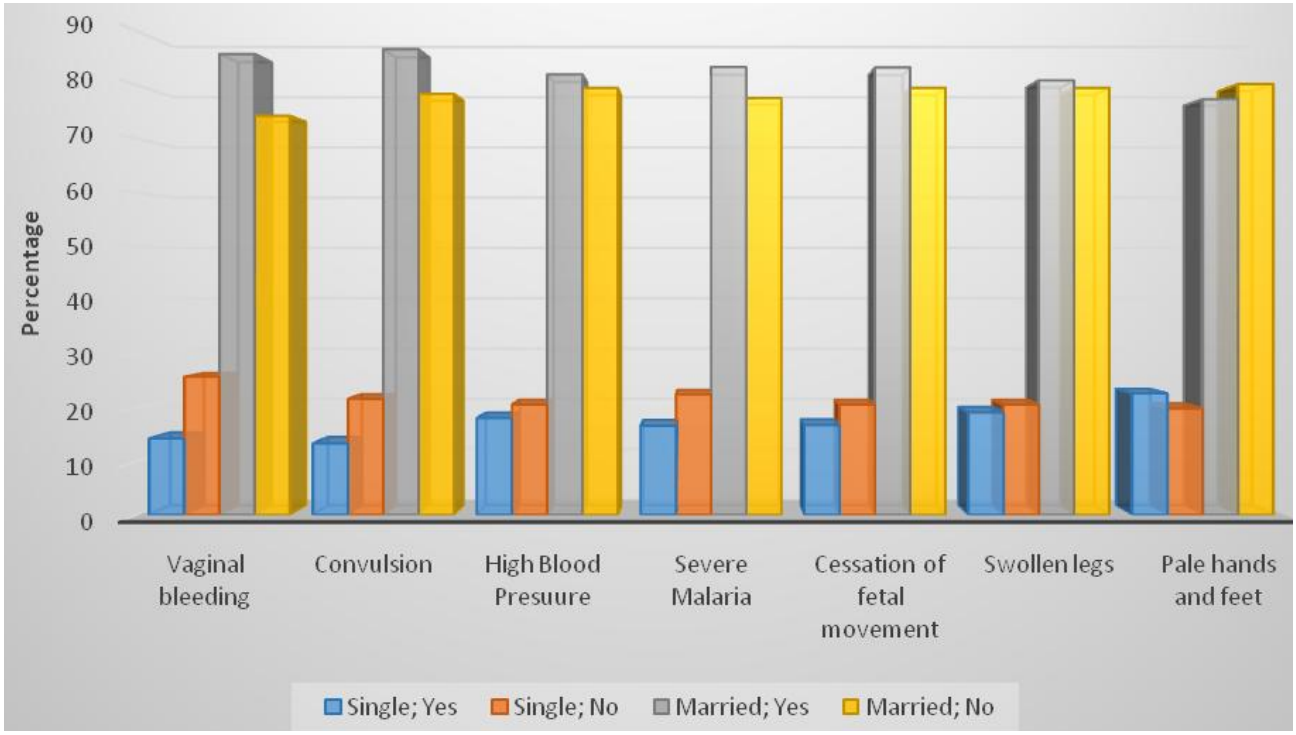

Figure 4. Perception of obstetric danger sign by marital status of women in coastal rural Lagos, Nigeria.

Table 4. Relative risks of the danger signs in pregnancy by age group (years) and marital status of women living in rural areas of Lagos.

Age group	Vaginal bleeding		Convulsion		High Blood Pressure		Severe malaria		Cessation of fetal movement		Swollen legs		Pale hands and feet	
	Yes Freq. (%)	No Freq. (%)	Yes Freq. (%)	No Freq. (%)	Yes Freq. (%)	No Freq. (%)	Yes Freq. (%)	No Freq. (%)	Yes Freq. (%)	No Freq. (%)	Yes Freq. (%)	No Freq. (%)	Yes Freq. (%)	No Freq. (%)
<25	108 (26.9)	141 (32.9)	48 (33.6)	201 (29.3)	35 (27.3)	214 (30.5)	84(25.8)	165(32.8)	19 (26.4)	230 (31.2)	57 (25.9)	192 (31.5)	23 (20.0)	226 (31.7)
25-34	212 (52.9)	198 (46.3)	76 (53.1)	334 (48.7)	69 (53.9)	341 (48.7)	169 (52.0)	241 (47.8)	43 (59.7)	367 (48.5)	114 (51.8)	296 (48.6)	61 (53.0)	349 (48.9)
X^2 (p-value)	4.31 (0.04)		0.06 (0.81)		0.90 (0.34)		3.67 (0.05)		1.48 (0.22)		1.94 (0.16)		4.43 (0.04)	
RR (95% CI)	1.17 (1.0, 1.9)		0.99 (0.9, 1.1)		1.03 (1.0, 1.1)		1.13 (1.0, 1.3)		1.03 (1.0, 1.1)		1.07 (1.0, 1.2)		1.07 (1.0, 1.1)	
≥35	81 (20.2)	89 (20.8)	19 (13.3)	151 (22.0)	24 (18.8)	146 (20.8)	72 (22.2)	98 (19.4)	10 (13.9)	160 (21.7)	49 (22.3)	121 (19.9)	31 (27.0)	139 (19.4)
X^2 (p-value)	0.75 (0.39)		4.94 (0.03)		0.00 (0.98)		3.21 (0.07)		0.48 (0.49)		1.88 (0.17)		7.29 (0.007)	
RR (95% CI)	1.08 (0.9, 1.3)		0.91 (0.8, 1.0)		1.00 (0.9, 1.1)		1.15 (1.0, 1.3)		0.98 (0.9, 1.0)		1.1 (1.0, 1.2)		1.1 (1.0, 1.2)	
X^2 (p-value)	0.79 (0.37)		4.75 (0.03)		0.66 (0.42)		0.06 (0.80)		3.07 (0.08)		0.06 (0.80)		1.01 (0.31)	
RR (95% CI)	0.92 (0.8, 1.1)		0.92 (0.9, 1.0)		0.97 (0.9, 1.0)		1.02 (0.9, 1.2)		0.95 (0.9, 1.0)		1.01 (0.9, 1.1)		1.0 (1.0, 1.1)	
Marital status														
Single	57 (14.2)	110 (25.7)	19 (13.3)	148 (21.6)	23 (18.0)	144 (20.5)	54 (16.6)	113 (22.4)	12 (16.7)	155 (20.5)	42 (19.1)	125 (20.5)	26 (22.6)	141 (19.8)
Married	344 85.8	318 (74.3)	124 (86.7)	538 (78.4)	105 (82.0)	557 (79.5)	271 (83.4)	391 (77.6)	60 (83.3)	602 (79.5)	178 (80.9)	484 (79.5)	89 (77.4)	573 (80.2)
X^2 (p-value)	17.0 (0.00004)		5.05 (0.02)		0.45 (0.50)		4.14 (0.04)		0.59 (0.44)		0.21(0.65)		0.50 (0.48)	
RR (95% CI)	1.37 (1.2, 1.7)		1.09 (1.0, 1.2)		1.02 (1.0, 1.1)		1.15 (1.0, 1.3)		1.02 (1.0, 1.1)		1.02 (0.9, 1.1)		0.98 (0.9, 1.0)	
Total	401 (48.4)	428 (51.6)	143 (17.3)	686 (82.7)	128 (15.4)	701 (84.6)	325 (39.2)	504 (60.8)	72 (8.7)	757 (91.3)	220 (26.5)	609 (73.5)	115 (13.9)	714 (86.1)

Freq: Frequency.

DISCUSSION

Keen perception of obstetric danger signs is the critical and indispensable initial stage in being compliant and accepting appropriate and timely referral to obstetric and newborn care. ODSs are global problems that have not been satisfactorily addressed, especially in developing countries. From the community perspective, both awareness of the danger signs of an obstetric complication and knowledge about their severity are important. Community members, especially women should therefore know when to take applicable lifesaving action for each of the complications. About 90% of the respondents had utilized ANC at least once, a figure higher than the 69% reported for sSA (Lincetto et al., 2006).

For 2.2% of respondents, ANC was not important during pregnancy and another 8.7% were not sure of the importance of ANC. Women who did not attend ANC were significantly less likely to be aware of both critical and non-critical pregnancy complications when compared with those who do not know any complications (Doctor et al., 2013). Furthermore, antenatal period clearly presents opportunities for reaching pregnant women with a number of interventions that may be vital to their health and well-being and that of their infants. It is a window of opportunity to inform women and families about danger signs and symptoms and about the risks of labour and delivery. It also provides the route for ensuring that pregnant women do in practice, deliver with

Table 5. Multiple regression analyses on associations between ODSs as dependent variables and other independent variables.

	Observed	R^2	F	P
Bleeding	829	0.033	4.59	0.0001
Convulsion	829	0.010	1.34	0.24
High Blood Pressure	829	0.006	0.79	0.58
Severe malaria	829	0.014	1.84	0.09
Cessation of fetal movement	829	0.015	2.03	0.05
Swollen feet	829	0.019	2.63	0.02
Pale hands and feet	829	0.022	3.140	0.005

Table 6. Correlation coefficient outcomes between ODSs as dependent variables and other independent variable.

Parameter	ODS	Coefficient (r)	Standard error	t	P-value	95% Confidence interval
Knows a woman who died in Pregnancy	Bleeding in pregnancy	0.14	0.04	3.72	0.00	0.07, 0.22
	Pale hands and feet	-0.06	0.03	-2.30	0.02	-0.11, -0.01
Age group (years)	Convulsion	0.05	0.02	2.29	0.023	0.01, 0.09
	Pale hands and feet	-0.07	0.02	-3.41	0.001	-0.10, -0.03
Educational level	Severe malaria	-0.04	0.01	-2.46	0.014	-0.06, -0.01
	Swollen feet	-0.03	0.01	-2.58	0.010	-0.06, -0.01
Marital status	Cessation of fetal movement	-0.06	0.02	-2.86	0.004	-0.09, -0.02

the assistance of a skilled health care provider (AbouZahr and Wardlaw, 2003). Factors that could be responsible for not seeing ANC as important might be related to previous experiences of respondents themselves, or of relatives and friends. These factors may include services provided at ANC, the environment where the health facility is located, difficulty in accessing the health facility, health staff unfriendly attitude, competing Traditional Birth Attendants and stock-outs of essential medicine. In addition, there have been reports that cost, in the form of transportation to and fro, as well as out-of-pocket spending may mitigate against appropriate utilization of ANC.

Similar to results from studies on women in Nigeria and in other parts of the world, respondents in this study demonstrated low perception of ODSs (Bogale and Markos, 2015; Kabakyenga et al., 2011; Hasan and Nisar, 2002; Nambala and Ngoma, 2013). For example, only 48.4% of respondents recognized vaginal bleeding as a danger sign in pregnancy, compared to 90.5% reported from India (Sangal et al., 2013). Multiple factors may contribute to this finding. First, this danger sign is relatively easy to recognize. Second, bleeding is common in women in reproductive age regardless of whether they are pregnant or not. Additionally, bleeding in pregnancy may be provoked and not directly linked to the pregnancy itself such as post-coital bleeding of cervical origin which may be due to infection or malignancy. Finally, bleeding with tissues, especially in early pregnancy, may be as a result of spontaneous (or illegally induced) abortion (Jager, 2015). Vaginal bleeding after mid-pregnancy is associated with maternal and fetal risks. Bleeding at this time often results from placenta previa, abruptio placenta and vasa previa (Sakornbut et al., 2015).

Similar to the report from Pakistan, about 90% of respondents perceived cessation of fetal movement as not a danger sign (Hasan and Nisar, 2002). Fetal movement, a marker of fetal well-being, is a relatively simple indirect means of fetal assessment that indicates a lack of significant acidosis. With fetal monitoring, movement in healthy fetuses increases sympathetic response and accelerates heart rate. Fetuses with severe acid-base disorders cannot oxygenate their muscles adequately and do not move (Warren, 2009). Nearly 50% of late-pregnancy intra-uterine fetal deaths have no associated risk factors, though fetal demise may however be heralded by decreased fetal movement followed by cessation of movement at least 12 h before death (Institute for Clinical Systems Improvement, 2008). In view of this, Harrington et al. (1998) contend that maternal

perception of decreased fetal movement is not associated with poor fetal outcome.

Convulsion, high blood pressure and swollen feet, taken together are common precursors of pre-eclampsia, of which over 80% of respondents were not aware of it as danger signs in pregnancy. About 50% of women aged 25 to 34 years demonstrated low perception of this trio as ODSs. Eclampsia was found more in age group 20 to 29 years which accounted for 60.5% of eclamptic patients at Ilorin in Nigeria (Jimoh et at., 2007) and occurring more in primigravidae and more during wet season than dry season (Orji et al., 2007). Since there is currently no known measure to effectively and consistently prevent pre-eclampsia, early detection is critical in reducing the morbidity and mortality due to this condition (Duley, 2003; Hofmeyr et al., 2003; Vainia et al., 2002).

High blood pressure in pregnancy is definitely detrimental to the mother separately, the fetus separately and both the mother and the fetus collectively. Hypertension could predate pregnancy, be associated with pregnancy or occur at post-partum period. Pregnant women should be made aware of the need to seek immediate advice from health care professionals if they experience symptoms such as severe headache, problems with vision (blurring or flashing before the eyes, severe pain just below the ribs, vomiting and sudden swelling of the face, hands or feet (National Institute for Health, 2015).

Strengths and weaknesses

The sample size was large enough; thereby improving external validity and statistical inferences. Weaknesses of the study include the absence of qualitative methods, such as focused group discussions, which would have better addressed some questions raised. Some of the respondents may be experiencing pregnancy for the first time and may not be too familiar with the appropriate responses to the questions raised. Occasional rains and a community disturbance disrupted field works briefly.

CONCLUSION

Accurate perception of ODS is a critical step in minimizing the high levels of reproductive morbidity and mortality in Nigeria. Since knowledge of ODSs is largely absent among pregnant women, attempts must be made to increase their knowledge and improve their perception through mass media announcement, Information, Education and Communication (IEC) as well as Behavioral Change Communication (BCC), activities and regular visits by Community Health Workers (CHWs) and other healthcare providers. Women education, from secondary level, is meaningfully related with level of knowledge about ODSs and also with health seeking incase these danger signs appear (Sandal et al., 2012).

RECOMMENDATIONS

The relevance of ANC as well as of Community Health Workers (CHWs) in empowering women with adequate knowledge on ODSs cannot be over-emphasized. While ANC is one of the windows of opportunity for women in child-bearing age in Nigeria and other developing economies to be empowered on ODSs, other windows of opportunity are the home through radio jingles and television programs; market places where flyers with pictorial diagrams and hand bills can be distributed; schools where female students at secondary level can be taught about their reproductive system; and at religious gatherings, saloons, village meetings and peer-group meetings. CHWs, meanwhile can provide education on ODSs since community perception on illness and health care can lead to pathways for better health seeking behavior (Rashid, 2001; Watkins and Plant, 2004).

Monitoring and evaluation programs should pool awareness of pregnancy danger signs with other indicators measuring related aspects of knowledge and behavior to evaluate the real impact of any awareness-raising program. Matching indicators may comprise if necessary, the proportion of the population who can identify the site of emergency obstetric services and the proportion of the population who anticipate using these services in the event of emergency.

Further studies should assess similar research topic in other rural coastal areas of Atlantic and Indian Oceans and possible the Mediterranean Sea. Future studies should consider using quantitative and qualitative techniques and hospital records for triangulation.

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Conflict of interest

Authors have none to declare.

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