

ISSN Online 2704-4890 || ISSN Print 2720-7609

#### **Original Research Article**

Open

Access

HSI Journal (2021) Volume 2 (Issue 2): https://doi.org/10.46829/hsijournal.2021.12.2.2.244-252

# **Correlates of birth preparedness practices and** complication readiness among women in eight communities in Delta State, Nigeria

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Received July 2021; Revised August 2021; Accepted September 2021

#### Abstract

Background: Birth preparedness helps women avert possible complications associated with delivery, hence promoting safe motherhood.

Objective: In this paper, we assessed the magnitude of birth preparedness and complication readiness and its determinants among women within the reproductive ages selected from four rural communities in Delta State, Southern Nigeria.

Methods: The study was a cross-sectional household survey. The study included a sample size of 400 women within the reproductive ages. Analyses were undertaken at two levels at univariate and multivariate. At univariate, simple percentages and frequencies were used to describe the feature of respondents. Multivariable logistic regression was used to determine the predictors of birth preparedness and complication readiness among the women. The results were presented as odds ratios at a 95% confidence interval. A p < 0.05 was used to determine statistical significance.

Results: The results revealed that 48.7% of the respondents were prepared for birth and 42.9% were prepared for complications. About 36.7% saved money for delivery expenses, 28.1% knew the signs for the onset of labour, 35.2% bought all the materials they needed and made them available for delivery, 24.7% reported they knew the exact date for their delivery and 26.6% saved funds for emergency complications. In addition, 52.1% of respondents had overall knowledge of obstetric complications. The logistic regression revealed that employment status, number of living children and set of communities were the significant predictors of birth preparedness plan and complication readiness among the study participants.

Conclusion: The study concluded that the level of birth preparedness and complication readiness was low among women in Delta State, Nigeria. In addition, knowledge of danger signs was low. It is recommended that intervention programs that educate rural women on danger signs of complications and also on the benefits of birth preparedness should be implemented in a rural part of Nigeria.

Keywords: Birth preparedness, complication readiness, pregnant women, Delta State, Nigeria

## **INTRODUCTION**

ll pregnancies are at risk of pregnancy-related complications. Evidence has shown that all pregnancies may experience some form of complications, and about 15% of all pregnancies require emergency obstetric care to safeguard the lives of mothers and newborn babies [1]. Recent reports showed that annually 295,000 women die from pregnancy-related complications [2]. According to the World Health Organization (WHO), approximately 90 - 95% of maternal deaths occur among

\* Corresponding author Email: osazedaniel9@gmail.com resource-poor countries [2-4]. In 2016, it was reported that the proportion of maternal mortality ratio between resource-constrained settings and the developed world was 239 and 12 per 100,000 live births respectively [5]. Nigeria accounts for a disproportionate share of the global maternal mortality burden. Annually between 56,000 and 58,000 Nigerian women die from pregnancy-related complications [6-8]. Nigeria's maternal mortality rate (MMR) is one of the highest in the world. A recent estimate puts Nigeria's MMR between 545 and 608 per 100,000 live births [9]. Low quality of obstetric care services and limited coverage has been identified as leading causes of high maternal mortality in Nigeria [4]. Available evidence indicates that the major medical causes of maternal death in Nigeria are

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share Send us an email: info@hsijournal.org obstetric haemorrhage, puerperal sepsis; hypertensive disorders obstructed labour and unsafe abortion [10-11]. Over 65% of complications during pregnancy result from haemorrhage, eclampsia, pre-eclampsia, hypertensive disorder and prolonged labour [12]. Access to evidencebased maternal care including preconception, antenatal care (ANC), skilled delivery and postpartum care, has been recommended as a key intervention strategy that can significantly reduce maternal and perinatal mortalities [5, 2,13]. Birth preparedness practices is a safe motherhood strategy that has the objective of promoting timely utilization of maternal and neonatal care services during childbearing and emergencies complications, thereby reducing delays in seeking care, reaching care and receiving care [14].

Birth preparedness is an act of planning on the detailed steps of actions to be undertaken if complications result during child-bearing or the post-partum period [15]. The key elements of birth preparedness packages include knowledge of danger signs of complications in pregnancy, labour and the post-partum period, having knowledge of the date of delivery, making emergency transport arrangements, having a blood donor available, being decisive on the place of delivery, plan for the birth attendant and having savings to cover transport and other exigencies [14,15]. Birth preparedness has been advanced as a strategy to reduce phase 1 and 2 delays which account for several maternal morbidities and deaths [16]. In the literature, a host of factors were reported as determinants of birth preparedness practices and complication readiness. Some of the noted factors were; knowledge of danger signs of pregnancy, educational attainment, employment status, early ANC visits, adequacy of ANC visits, maternal age, partners' age, marital status, place of residence, poverty and birth order [14-15,17-20]. In November 2007 the Delta State government implemented the policy of free maternal and under-five healthcare services [3,21].

Available evidence has shown that both utilization and maternal health outcomes have improved consequently upon the initiation of the policy [13]. Despite recorded progress, reports showed that several women still delivered at home and some women were rushed to health facilities but only after either the baby or mother or both have suffered complications. This gives credence to poor birth preparation and complication readiness among rural women in Delta State, Southern Nigeria. Though a handful of Nigerian studies [22,23,24] explored the prevalence and predictors of birth preparedness and complication readiness, no previous studies were conducted among rural women in Delta State, Southern Nigeria. In the light of the foregoing, this study assessed the magnitude of birth preparedness plan and complication readiness and its determinants among 400 women in eight randomly selected villages in Delta State, Southern Nigeria. This is the first study conducted in a rural part of Delta State that examined determinants of birth preparedness and complication readiness among women of the reproductive ages.

# **MATERIALS AND METHODS**

## Study setting

This study utilized a community-based cross-sectional study design that employed a quantitative data collection method to assess the magnitude of birth preparedness and complication readiness among women within the reproductive age in Ughelli North Local Government Area (LGA) in Delta State, Southern Nigeria. Delta State is one of the federating Nigerian States and comprises twenty-five LGAs. Ughelli North is one of the twenty-five LGAs in Delta State. It lies between 9° 45 'N and 8° 43'E with a landmass of 818 square km. The population census of 2006 put the population figure at 321,028, with a population density of 460.1 people per square km. While females constitute 49.9% of the population, people within the age bracket 15-64 years constitute 57.6%. Administratively, it comprises 11 wards and seven communities which are further composed of about 105 villages. The primary source of maternity care in the LGA is Primary Healthcare Centers though there are several private hospitals in the LGA that render various degrees of maternal healthcare services.

#### Sample size determination

The outcome variable of interest in this study was severe underweight measured by weight-for-age z-score (WAZ). Generally, weight-for-age, height-for-age and weight-forheight are the 3 main indicators used for assessing the nutritional status of children in stable situations [16]. Among the 3 indicators, weight-for-age is considered to provide a good overall index of understanding the nutritional outcome of children under 5 year. and also serve as a composite index of height-for-age and weight-forheight [6,17,18]. Thus, weight-for-age serves as an overall indicator of a population's health. This study, therefore, used only weight-for-age to assess severe underweight among children under 5 year. A child is identified as severely underweight if his or her WAZ is below -3 standard deviations (SD) from the median of the reference population based on the 2006 WHO child growth standards [17].

## Sampling procedures

A multi-stage sampling technique was used to select communities and the respondents in the LGA. Four communities (Agbarha, Ogor, Agbaho & Orogun) were randomly selected from the seven communities in Ughelli North. To ensure fair representation and adequate coverage, a cluster sampling technique was used to select two villages from each of the four selected communities, making altogether eight villages. The selected villages were Agbaide, Agbarha-otor, Ogor, Otogor, Erherhe, Ekrehavwe, Aragba and Eboh. Within the villages, households were listed and the number of women within the reproductive age in each household was counted. Households with at least one woman within the reproductive age were enrolled in the survey. The eligibility criteria were the age 15-49 years, ever married, and having had a live birth within one year before the survey. In

households where more than one woman met the criteria, a simple random sampling technique was used to select one of them. A non-proportional sampling method was used in apportioning the 400 observations across the eight villages. Due to the lack of reliable and accurate data to enable proportional sampling, we assumed there were equal numbers of qualified women in all eight villages. Hence, we surveyed 50 women in each of the villages to make up the sample size of 400. The villages were surveyed consecutively and treated as clusters given the similarity in socioeconomic conditions across the villages.

#### **Data collection procedure**

The questionnaire was adapted from United Nations International Children's Emergency Fund's multiple cluster indicator questionnaires and Johns Hopkins Program for International Education in Gynaecology and Obstetrics tools for monitoring birth preparedness and complication readiness. The questionnaire was pretested by administering it to 8 women in Gana, a neighbouring shared similar socioeconomic community that characteristics with the research communities. The questionnaire consisted of six sections. Section one respondents' socio-demographic contained the characteristics; section 2 on husband's data, section 3 contained questions on the respondents' reproductive history; section 4 was on antenatal, intrapartum and postnatal care experience for current pregnancy and births in the preceding three years, while section 5 contained questions on knowledge of obstetric complications and finally section 6 focused on birth preparedness practices and complication readiness. The questionnaire was entered into Computer-Assisted Personal Interviewing (CAPI) using a Census and Survey Processing System (CSPro) software (CSentry). The CSPro is a public domain software package developed by the US Census Bureau and the Inner-City Fund International and widely used for entering, editing, tabulating, and disseminating census and survey data. The software runs on the Microsoft Windows and Android families of operating systems. Thus, instead of the paper and pen interviewing, the CAPI facilitated accuracy and speed in the data collection process. The questionnaire was administered through face-to-face interviews by trained field assistants. The questionnaire was fielded in English or Pidgin English as appropriate, since all women in communities that participated in the study either understand English or Pidgin English.

#### **Dependent variables**

The outcome indicator in this study is Birth Preparedness plan and complication readiness (BPPCR). Ten questions were tested how prepared a woman was for delivery and complications (Table 3). Each of these attitudes was scored 1. The score for each was aggregated and expressed in percentage. A respondent was categorized as one prepared for both delivery and complication if she scored  $\geq 20\%$ , on the other hand, if her score < 20% she was categorized as not prepared. This categorization was adapted from Wilunda et al. [26]. Birth preparedness is a categorical variable assuming 1 for women that were prepared for delivery and 0 for those not prepared.

## **Explanatory variables**

To estimate the effects of socioeconomic factors on birth preparedness practices and complication readiness, eight predictors were utilized based on past studies on birth preparedness practices and complication readiness. The variables utilized were maternal age: 16 - 19, 20 - 24, 25 -29, 30 - 34, 35 - 39, 40 - 49; maternal education: no formal, primary, secondary, and tertiary; marital status: married, single, widow, and divorced; birth order: 0 - 2, 3 - 4, and  $\geq$  5; employment status: working, not working; previous complications: yes, no; and knowledge of pregnancyrelated complications: yes, no. The knowledge of respondents on key danger signs was examined. They were grouped under three phases of pregnancy, labour and postpartum. The key danger signs during pregnancy were vaginal bleeding, blurred vision, fits and convulsion, swollen limbs, severe headache, fever, lack of fetal movement, and difficulty in breathing. The key danger signs during labour were severe vaginal bleeding, protracted labour, convulsion and fits and retained placenta. The key danger signs during postpartum included, severe vaginal bleeding, foul smell, fever within seven days of delivery and engorged breast. The question posed to respondents to elicit information on their knowledge of danger signs during the three phases was, "what are some of the health challenges a woman may encounter during pregnancy, labour and in the post-partum period that you know may endanger her life?" Following past studies, respondents who could mention at least three of the danger signs were considered knowledgeable, hence coded 1, while those who could not accurately answer the question were classified 'not knowledgeable', and coded 0

## Statistical analysis

The data were extracted from the CAPI device, cleaned, and analyzed with STATA Statistical Software (Version 14, StataCorp LLC, College Station, TX). To describe the characteristics of the respondents, a univariate analysis using percentages and frequency was conducted. Chi square tests were conducted to examine factors that were significantly associated with birth preparedness practices and complication readiness at a 5% level of significance. Multivariate binary logistic regression was used to examine the determinants of birth preparedness practices and complications readiness. The binary logistic regression was conducted to determine the predictors of BPPCR during the most recent births by the respondents. The odds ratios and probability values were analyzed. Statistical significance was set at p < 0.05.

# RESULTS

In Table 1 a summary of statistics for the respondents is presented. Out of a total of 400 questionnaires administered, 384 were valid. The mean ( $\pm$  SD) age of the respondent was 4.5  $\pm$  5.7 years. A higher proportion of the

respondents (24.2%, n = 93,) were within the age group 30 – 34, followed by the age group 35 - 39 (20.3%, n = 78), then teenagers (16 – 19 years) (9.1%, n = 35), and women within the age group 20 - 24 (n = 55, 14.3%). The majority of the respondents (n = 211, 54.9%) had the primary

Variables	Number	%	
Maternal age			
Mean + SD	345 + 86		
16-19	35	9.1	
20-24	55	14.3	
25 29	64	167	
30.34	03	24.2	
25 20	79	24.2	
40-47	59	15.4	
Maternal education	01	22.7	
No Education	91	23.7	
Primary	211	54.9	
Secondary	/3	19.0	
Higher	09	2.3	
Employment status			
Not employed	127	33.1	
Employed	257	66.9	
Marital status			
Married	167	43.5	
Living together	150	39.1	
Widowod	16	4.2	
Divorce	51	13.3	
Previous complications:	~ 4	1 4 1	
No	54	14.1	
Yes	330	85.9	
Number of children ever	given birth to		
0-2	102	26.6	
3-4	78	20.3	
$\geq$ 5	204	53.1	
Overall knowledge of cor	nplications		
No	184	47.9	
Yes	200	52.1	
Birth Preparedness			
No	187	51.3	
Yes	197	48.7	
Communities			
Agbaide	46	11.9	
Agbarba, otor	40	12.8	
Agoaria- 0101	49	12.6	
Otogor	52	12.5	
Erherhe	18	12.5	
Ellene	40	12.5	
Anapai	40	12.5	
Aragbai	4/	12.2	
Eboh	46	11.9	

educational qualification and only a few of them (n = 9, 2.3%) had a higher educational qualification. The majority of the respondents were employed (n=257, 66.9%) and 127 (33.1%) were not employed. A higher proportion of the women were married and living with their spouses (n = 167, 43.5%), while 150 (39.1%) were in consensual union, 16 (4.17%) were widowed, and 51 (13.3%) were divorced. The majority of the respondents (n = 204, 53.1%) had  $\geq$  5 children, followed by those with 0 - 2 children (n = 102,

Table 2: Knowledge of obstetric complications among study

Characteristics	Number	%
Danger signs during pregnancy		
Vaginal bleeding	112	29.2
Blurred Vision	38	9.9
Fits and convulsion	18	4.7
Swollen limbs	34	8.9
Severe Headache	98	25.5
Fever	43	11.2
Lack of foetal movement	35	9.1
Difficulty in breathing	17	4.4
Danger signs during labour		
Severe vaginal Bleeding	121	31.5
Protracted labour	92	23.9
Convulsion and fits	73	19.0
Retained placenta	42	10.9
Danger signs in the post-partun	1 period	
Severe vaginal bleeding	142	36.9
Foul smell	67	17.4
Fever in 7 days of delivery	65	16.9
Encoursed Imposts	98	25.5
Engorged breasts		

 Table
 3:
 Birth
 Preparedness
 practices
 among
 study

 participants

Characteristics	Number	%
Birth Preparedness Practices		
Saved money for delivery expenses	141	36.7
Know signs of the onset of labour	108	28.1
Identified place of delivery	22	5.7
Enrol in medical Insurance	08	2.1
Bought all necessary materials	135	35.2
Know the expected date of delivery	95	24.7
Complication readiness practices		
Emergency transport arrangement	45	11.7
Saved fund for emergency	102	26.6
Have medical insurance	08	2.1
Arrangement with decision maker	19	4.9
Ready for complications	165	42.9

\* %, percentage



26.6%), and those with 3 - 4 children (n= 78, 20.3%). The majority of the respondents (n = 300, 85.9%) once experienced pregnancy-related complications. While 200 (52.1%) knew pregnancy-related complications, 184 (47.9%) did not. Also, 197 (51.3%) respondents were prepared for birth and ready for complications while 187 (48.7%) were not prepared using the various measures of birth preparedness and complication readiness. In Table 2,

we present the various responses by participants on their knowledge of danger signs in pregnancy, during birth and in the post-partum period. The three most frequently mentioned danger signs in pregnancy by respondents were vaginal bleeding (29.2%), severe headache (25.5%) and fever (11.2%). In pregnancy, the three most frequently mentioned danger signs were severe vaginal bleeding (31.5%), protracted labour (23.9%) and convulsion and fits

Characteristic	Yes % (95% CI)	<u>No</u> % (95% CI)	p value
Aaternal age			#
16 - 19	51.4 (11 - 123)	48.6 (0.1 - 2.1)	< 0.001 #
20 - 24	61.8 (12.3 - 3.5)	38.2 (0.2 - 1.9)	
25 - 29	53.1 (2.1 - 3.6)	46.9 (0.3 - 3.6)	
30 - 34	47.3 (6.7 - 68.9)	52.7 (0.1 - 2.6)	
35 - 39	44.9 (34 - 56.7)	55.1 (0.1 - 5.8)	
40 - 47	54.2 (0.1 - 2.4)	45.8 (0.1 - 2.5)	
Maternal education			
No Education	45.0 (0.4 - 7.9)	55.0 (0.5 - 3.7)	< 0.001 #
Primary	48.3 (0.1 - 3.7)	51.7 (0.2 - 5.9)	
Secondary	67.1 (0.6 - 8.9)	32.9 (0.5 - 7.9)	
Post-secondary	55.6 (0.7 - 5.7)	44.4 (1.1 - 3.6)	
Employment status			< 0.001 #
Not employed	89.0 (0.9 - 3.5)	11 (0.2 - 5.7)	
Employed	61.9 (0.1 - 5.7)	38.1 (1.2 - 3.6)	
Marital status			
Married	50 3 (0 3 - 6 8)	497(05-68)	
Living together	50.0 (0.8 - 6.6)	50.0(1.2 - 6.9)	< 0.001 #
Widow	43.8 (0.3 - 5.7)	56.3 (2.3 - 5.7)	( 01001
Divorce	60.8 (0.3 - 5.7)	39.2 (1.5 -5.5)	
Previous complications			
No	38.9 (0.8 - 5.7)	61.1 (1.2 - 4.6)	< 0.001 #
Yes	53.3 (1.3 - 6.8)	46.7 (1.1 - 3.7)	
Number of children ever s	given birth to		
0 - 2	89.2 (0.9 - 5.7)	10.8 (0.8 - 5.7)	< 0.001 #
3 - 4	52.6 (0.1 - 3.6)	47.4 (2.6 - 5.8)	
> 5	31.9(0.8-5.7)	681(07-55)	
_ 0	51.7 (0.0 5.7)	00.1 (0.7 5.5)	
Overall knowledge of con	nplications		
Yes	68.5 (3.6 - 8.9)	31.5 (1.23-5.89)	< 0.001 #
No	35.5 (1.3 - 5.7)	64.5 (1.23-6.56)	
Communities			
Agbaide	63.0 (1.3 - 7.9)	36.9 (0.78-5.67)	< 0.001 #
Agbarha- otor	63.3 (0.6 - 6.8)	36.7 (0.23-6.56)	
Ogor	58.3 (1.3 - 5.8)	41.7 (2.34-4.56)	
Otogor	48.1 (1.3 - 4.6)	51.9 (0.87-5.67)	
Erherhe	56.3 (1.1 - 2.3)	43.8 (1.11-2.35)	
Ekrerhavwe	50.0 (2.6 - 6.9)	50.0 (0.98-3.67)	
Aragbai	42.6 (1.5 - 6.6)	57.4 (0.78-6.56)	
Eboh	45.7 (1 - 2.4)	54.3 (2.45-5.78)	



Variables	AoR	95% CI	p vaue
Maternal age			
16 - 19(ref)	1	-	-
20 - 24	1.7	0.5 - 6.1	0.40
25 - 29	0.9	0.3 - 3.2	0.96
30 - 34	1.7	0.5 - 6.1	0.38
35 - 39	1.7	0.5 - 6.5	0.42
40 - 47	2.3	0.6 - 8.8	0.23
Maternal education			
No Education	1	-	-
Primary	1.4	0.8 - 2.5	0.29
Secondary	1.7	0.8 - 4.0	0.20
Post- secondary	0.6	0.1 - 4.8	0.64
Employment status:			
Unemployed(ref)	1	-	-
Employed	3.7	1.7 - 8.3	0.001*
Marital status:			
Married(ref)	1	-	-
living together	1.1	0.7 - 1.9	0.62
Divorce	0.7	0.2 - 2.8 0.1 - 2.2	0.04
Divorce	0.5	0.1 2.2	0.57
Number of children e	ver given b	irth to	
0-2 (ref)	1	-	-
3-4	0.3	0.1 - 0.6	< 0.001*
≥5	0.2	0.1- 0.4	< 0.001*
Previous complication	1S		
No (ref) Yes	1	- 0.3 - 2.5	- 0.79
	•		•,
Knowledge of pregna	ncy related	complication	
Yes	0.6	03-11	- 0.79
105	0.0	0.5 1.1	0.79
Communities:			
Agbaide (ref)	1	-	-
Agbarha- otor	1	0.3 -3.8	0.99
Ogor	0.5	0.1 - 3.1	0.49
Otogor	0.8	0.1 - 4.7	0.79
Ernerne	0.4	0.1 - 2.8	0.39
Araghai	0.4	0.1 - 0.9	0.04***
Eboh	0.2	0.1 - 1.9	0.05

confidence interval; \*\* Significant at 5% significance level

(19.0%). After delivery, the three most frequently mentioned reasons were severe vaginal bleeding (36.9%), engorged breasts (25.5%) and foul smell (17.4%). In Table 3, we present the birth preparedness practices among the study participants. Regarding individual birth preparedness practices, about 36.7% (n = 141) reported they saved money for delivery expenses. Approximately, 35% (n = 135) bought materials on grounds that will enable them to

have quick delivery. An estimate of 28.1% (n = 108) reported they knew the signs for the onset of labour. Approximately, 25% (n = 95) knew the expected date of delivery. About 5.7% (n = 22) identified a place of delivery and only 2.1% (n = 8) applied for medical insurance coverage. Furthermore, 42.9% (n = 165) were prepared for complications. Analysis of individual complication practices showed that approximately 27% (n = 102) saved money for emergency complications. Only 11.7% (n = 45) made emergency transport arrangements. A negligible proportion (4.9%, n = 19) arranged with a decision-maker in case of an emergency. In Table 4, we cross-tabulate birth preparedness practices and complication readiness with the various socioeconomic factors. Analysis of age group revealed that a higher proportion (61.8%) of women within the age group 20 - 24 prepared for delivery, next was the respondents within the age group 40 - 47 (54.2%), and the least were respondents within the age group 35 - 39 (44.9%). A higher proportion (67.1%) of respondents that had secondary education prepared for delivery, when compared to those with no formal education (45.0%), primary education (48.3%), and higher education (55.6%).

#### Multivariate analysis

In this section of the study, the result of the multivariable logistic regression analysis carried out with the data gathered from the field survey is presented and analyzed. Table 5 presents the logistic regression model which shows the predictors of birth preparedness and complication readiness among the study participants. Women who were employed reported an almost three-fold increase in the odds [Adjusted odds ratio (AOR): 3.7; 95% confidence interval (CI), 1.7 - 8.3; p = 0.001) for preparing for delivery and ready for complications when compared to the unemployed. In reference to respondents drawn from Agbaide, those drawn from Ekrehavwe (AOR: 0.1; 95% CI, 0.1 - 0.9; p = 0.04) and those from Aragbai (AOR: 0.2; 95% CI, 0.1 - 0.9; p = 0.05) were respectively 86% and 85% significantly less likely to prepare for delivery and ready for complications. In reference to mothers who had 0 - 2 children, those who had 3 - 4 (AOR: 0.2; 95% CI, 0.1 -0.6; p < 0.001), and  $\geq 5$  children (AOR: 0.2; 95% CI, 0.1 -0.4, p < 0.001) were less likely to prepare for child delivery and be ready for complications.

# DISCUSSION

The data revealed that 48.7% of the respondents were prepared for delivery while 42.9% were ready for possible complications. The rate of birth preparedness reported here is high when compared with what was reported in studies conducted in other areas. In Eastern Ethiopia, Tilahun et al. [14] reported that out of 423 respondents, 42.8% of the pregnant women had good birth preparedness. In Northern Ethiopia, Hiluf et al. reported that about 22% of the respondents were prepared for birth and its complications [18]. In Nepal, Kaphle et al. reported that 22.7% of the respondents had adequate knowledge of birth preparedness and complication readiness [20]. In Kenya Omari et al.



reported that a large proportion of the women 70.5% was prepared for birth while 90.6% reported readiness for complications [19]. Although the level of birth preparedness and complication readiness reported in this study is higher than what was reported by some other studies, it is still a far cry from the optimal rate expected, and below the prevalent rate reported by selected Nigerian studies. For instance, Onoh et al. [23] reported that most of the women knew about birth preparedness (87.7%) and complication readiness (79.5%) in Abakiliki, Southeast Nigeria, while Sabageh et al. [24] reported that the general level of birth preparedness by respondents was (82.1%) in Osogbo Southwest Nigeria.

Among all the birth preparedness practices, saving money for delivery expenses recorded the highest response (37%). Only 5.7% reported they identified a place of delivery. Previous studies also gave a similar report of only a few respondents being able to identify a place of delivery [18, 26]. However, several other studies reported that a higher proportion of participants identified a place of delivery. For instance, Kaphle et al. [20] reported that 94.4% of respondents identified a place of delivery. Being able to identify a place of delivery is a key component of birth preparedness and helps in reducing delays in reaching health facilities at the onset of labour. Again, the data reported that only 11.7% of respondents arranged for emergency transport. This finding conflicts with a facilitybased study that reported that several of the respondents identified a place of delivery and planned for emergency transport [19]. Overall knowledge of danger signs of complications for this study is 52.1%. This rate of knowledge of danger signs is low when we consider the high rate of maternal mortality in Nigeria. The poor knowledge of danger signs may be an indication that several of the respondents did not attend ANC and those who attended may not have attended lectures on health talks [19].

Several pregnant women only attend ANC to track the progress of their pregnancy and they care less about lectures on healthcare and danger signs of pregnancy. The most commonly mentioned danger signs of complications by the respondents were vaginal bleeding. This conforms with a study conducted in Uganda [27], Kenya [19] and Tanzania [28]. In Nigeria, it is estimated that vaginal bleeding or haemorrhage accounts for 46% of maternal deaths [10]. The widespread knowledge of vaginal bleeding as a dangerous sign of complications is because of the perceived threat associated with it. The results of multivariate logistic regression analyses showed that after adjusting for confounding factors, being employed, reporting a birth order of at least 3, is situated on middle wealth quintile and living in Aragbai and Ekrehavwe were the independent significant predictors of birth preparedness practices. Employed respondents were 272% more likely to prepare for delivery. This is strongly linked to control of resources needed to prepare for delivery and complication. In the same way that poverty or lack of income may negatively

affect maternal care utilization, it may also affect birth preparedness practices. To get more women in the study area to prepare for delivery, policies should be used to address unemployment among poor rural women. Women who had given birth to 3-4 and  $\geq$  5 children were respectively 0.23 times and 0.16 times less likely to prepare for delivery and ready for complication. This finding conforms with finding from a study conducted in southern Ethiopia which reported that first-time mothers were more prepared for delivery but not complications [27]. This may be because this set of women had experienced pregnancy several times hence, they can perceive pregnancy as a normal experience, and this may negatively affect the level of birth preparedness and complication readiness. Contrary expectations, knowledge of pregnancy-related to complications was not significantly associated with birth preparedness practices among the study group. This finding, therefore, contradicts findings from other studies [14, 19, 20]. This reinforces the need for enhancing the knowledge of pregnant women on the danger signs through multiple pathways including delivering key messages to pregnant women during ANC visitation by nurses and midwives, education of pregnant women using community health workers and women's development at the community level and using messages on radio, television and other mass media [14]. The data utilized for the study was self-reported; hence limited by memory lapse and social desirability bias. It may be difficult validating the claims made by respondents. A major limitation of the selfreported morbidity measurement is the problem of validity.

#### Conclusion

The study reports that the level of birth preparedness and complication readiness is low among women in Delta State, Nigeria. In addition, knowledge of danger signs is unimpressive. There is therefore a need to educate the women on the dangerous signs of pregnancy.

# **DECLARATIONS**

#### Ethical considerations

The study was conducted upon receiving approval from the University of Benin Ethics Review Committee with protocol number ADM/E22/A/VOL.VII/14689

#### **Consent to publish**

All authors agreed to the content of the final paper.

#### Funding

None

#### **Competing Interests**

No potential conflict of interest was reported by the authors.

#### Author contributions

DO and OPA conceived the study and reviewed the literature and undertook part of the analysis. HAE undertook part of the analysis and supervised the study. The final draft was approved by all the authors before uploading to the journal

#### Acknowledgements

Special thanks to Dr Rolle Remi Uhuru for being a source of inspiration and strength in the course of this work. Our special thanks also go to the participants in the study for agreeing to spend their time with us to participate in the study. We are very grateful to you all for your support in various ways that made the study successful

#### Availability of data

Data is available upon request to the corresponding author.

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