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Birth Preparedness and Complication Readiness among Antenatal Attendees in a Tertiary Hospital in Northern Nigeria

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ABSTRACT

Background and Objective: Every expectant mother is at risk of complications during pregnancy, delivery, or after delivery. Delays in receiving care with accompanying maternal morbidity and mortality can be significantly reduced with adequate birth preparedness and complication readiness (BPCR). This study aims to determine the factors affecting BPCR among antenatal attendees in Gusau, Zamfara State, a security-challenged setting.

Methods: A cross-sectional study was conducted among pregnant women attending the antenatal clinic at Federal Medical Center, Gusau, Nigeria. Data were collected using a pretested questionnaire and analyzed using the Statistical Package for Social Sciences (SPSS) Version 26. Descriptive data using means, percentages, and frequency were presented in tables. Statistical testing using Chi-square for bivariate analysis and binary logistic regression for multivariate analysis was carried out with a significance level of $p < 0.05$.

Results: One hundred and forty-seven women were recruited; 111 (75.5%) had good knowledge of the danger signs of pregnancy, labor, and the postpartum period. One hundred and fourteen (77.6%) were birth-prepared and complications-ready. One hundred and ten (75%) identified insecurity as the most important hindrance to BPCR. The respondents with higher educational levels were thrice more likely to be birth-prepared and complications-ready (OR: 2.95, 95% CI: [1.65–5.27]). The women were twice more likely to be birth-prepared and complications-ready with an increase of ₦20,000 ($46.3) in monthly income (OR: 2.53, 95% CI: 1.97–5.29).

Conclusion and Global Health Implications: Education and wealth status are the key determinants of BPCR. Low educational status, financial constraints, and security challenges were identified as barriers that must be addressed to improve maternal and infant well-being.

Keywords: Parturition, Obstetric Labor Complications, Antenatal Care, Nigeria.

INTRODUCTION

Childbirth is an exceedingly joyful experience, yet for many women and their families, maternal morbidity and mortality are the undesirable outcomes.[1] Globally, maternal mortality remains a public health challenge, with more than 500,000 women dying yearly due to pregnancy and childbirth-related complications.[2] The maternal mortality ratio (MMR) in Nigeria is the fourth highest worldwide at 917, only behind South Sudan, Chad, and Sierra Leone at 1,150, 1,140, and 1,120 respectively.[2] Nigeria accounts for only 2% of the world's population but up to 10% of its maternal mortality ratio.[3]

Birth preparedness and complication readiness (BPCR) is a strategy to promote the timely utilization of skilled maternal and neonatal care, based on the theory that preparing for childbirth and being ready for complications reduces delays in obtaining care.[4]

Studies done in Nigeria to assess the level of BPCR among women and its determinants have shown widely different results. For example, some studies showed that less than half of the participants were birth-prepared and complications-ready[5–8] while others have shown that a very high proportion of their study participants were birth-prepared and complications-ready with some studies quoting as high as 94.4% of the participants.[9–12] This difference could have resulted from the difference in the population studied and no such study has been conducted in Zamfara State.

Maternal mortality remains a grave concern in Zamfara State, Nigeria, where a high burden (MMR of 1049)[13] persists which is higher than the national average (917),[2] and 44% of deliveries in the state occur with no one present.[14] Amidst this dire situation, a critical gap in research exists on BPCR for pregnant women in the state.

Moreover, the recent security challenges in Zamfara State have caused significant population displacement, compromising healthcare access and infrastructure.[15] In such a fragile context, the implementation of BPCR becomes especially challenging, and existing research on this topic in security challenges and humanitarian settings is limited.[16]

Furthermore, it has been argued that research should explore strategies for effectively tailoring BPCR interventions to specific populations,[17] such as in Zamfara State with a low level of education, especially among women,[18] in order to adapt interventions to fit the specific local cultural norms and context.

Therefore, our study aims to bridge these gaps by conducting a comprehensive assessment of BPCR practices in Zamfara State, Northern Nigeria. Thus, this study was conducted among antenatal attendees in the Federal Medical Center, Gusau, Zamfara State to:

1. Assess the knowledge of antenatal attendees on BPCR;
2. Assess the level of awareness and preparedness among antenatal attendees regarding potential complications during pregnancy, childbirth, and post-delivery; and
3. Analyze sociodemographic, economic, and healthcare-related factors that influence BPCR.

METHODS

Evaluation, Inclusion Criteria, and Data Collection

A cross-sectional study was carried out among pregnant women attending the antenatal clinic of the Federal Medical Center, Gusau, Zamfara State, and the manuscript was reported according to the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines. The inclusion criteria were women whose pregnancy was at least 12 weeks and who had attended antenatal clinics at least three times. The sample size was calculated using a prevalence of 33% by Akpan *et al.*[19] and was found to be 144, including a 10% attrition rate. The women were recruited as they presented to the antenatal clinic for their third visit using the systematic sampling technique.

Data was collected using a proforma, which was adapted from a literature search including the JHPIEGO (Johns Hopkins Program for International Education in Gynecology and Obstetrics) BPCR matrix.[4] This was adapted to align with our study objective and context. The tool was pretested in the state specialist hospital, Ahmad Sani Yariman Bakura Specialist Hospital, Gusau, Zamfara State. The proforma elicited information on social demographic characteristics, knowledge of danger signs of pregnancy and delivery, and the practice of BPCR. The proforma was administered to the participants who met the inclusion criteria as they presented to the antenatal clinic. Their knowledge of danger signs of pregnancy was assessed using a four-point Likert scale as follows; strongly disagree, disagree, agree, strongly agree, and scores of 0, 1, 2, 3 were apportioned, respectively. A total of 26 questions were asked, and a maximum score of 78 was obtainable. Participants with a score of 39 or more (≥ 50%) were adjudged to have good knowledge of danger signs of pregnancy and delivery, while those who had less than 39 (< 50%) were adjudged to have poor knowledge.

The level of BPCR was assessed by asking 11 questions with options of a "NO" or "YES", and 0 or 1 was apportioned, respectively. A maximum score of 11 was obtainable, and participants with a score of 6 or more (> 50%) were adjudged to be well-prepared for birth and complications ready, while those with a score of 5 or less (< 50%) were regarded as being poorly prepared.

Statistical Analysis

The data was imputed into an SPSS software version 26 (IBM Corp. Released 2019. IBM SPSS Statistics for Windows, Version 26.0. Armonk, NY: IBM Corp). Frequency distribution was used to describe the background characteristics of the respondents. Pearson's chi-square test for categorical/binary variables and logistics regression analysis were used to examine the association between dependent and independent variables

Independent (explanatory) variables included age, occupation, average monthly income, number of children, and years of marriage, while the dependent variables (responses as

described above) were the level of BPCR. Ordinal variables were converted to categorical variables during analysis. Odd ratios with 95% CI and logistic regression were also carried out to identify confounders. A p-value less than 0.05 was considered statistically significant at a 95% confidence interval. Odds ratio (OR) < 1 infers that persons in that category have a lower likelihood of knowledge of the BPCR plan, while OR > 1 was designated as an increased probability of knowledge of the BPCR plan.

Ethical Consideration

Ethical approval for the study was obtained from the Ethical Review Committee of Federal Medical Center, Gusau, Nigeria. Permission was obtained from the head of the Department of Obstetrics and Gynecology and the health workers were sensitized about the purpose, tools, and protocols of the study. Written consent was obtained from study participants before the start of the interview. They were assured that refusal to participate or their responses would not affect their care at the facility. All the interviews were conducted in complete privacy, data collection tools were strictly anonymous, and the data were entered into a computer with a password known only to the principal investigator. Our respondents were not compensated for volunteering to participate in the study.

RESULTS

One hundred and forty-seven women were recruited for the study. The mean age of the participants was 27.4 ± 5.2 years.

Knowledge of BPCR

Vaginal bleeding was the most common danger sign of pregnancy identified by 127 participants (86.4%), followed by prolonged rupture of membranes and convulsions with 116 (78.9%) participants each. Excessive vaginal bleeding and delayed placenta delivery were the most common danger signs during and after delivery, identified by 119 (81%) participants. Almost one-third did not identify high fever as a danger sign of pregnancy [Table 1].

Level of Awareness of BPCR

One hundred and thirty-one (89.1%) of the respondents had identified a means of transportation to the health facility of their choice and had money saved for emergencies, while 114 (77.6%) had identified a blood donor should there be a reason for blood transfusion during pregnancy, labor, or after delivery. One hundred and eleven (75.5%) of the participants demonstrated good knowledge of dangerous signs in pregnancy and during delivery, and 114 (77.6%) of the respondents were well-prepared for birth and were complications-ready [Table 2].

Table 1: Participants' knowledge of danger signs during pregnancy and delivery.

Knowledge Variables	Strongly Agree/ Agree (%)	Strongly Disagree/ Disagree (%)
During Pregnancy		
Vaginal bleeding	127 (86.4)	20 (13.6)
Anemia (paleness of lips/nail bed)	114 (77.6)	33 (22.4)
Loss/reduced fetal movements	115 (78.2)	32 (21.8)
Water breakage before labor pain	108 (73.5)	39 (26.5)
Prolonged drainage of liquor	116 (78.9)	31 (21.1)
Body swelling	101 (68.7)	46 (31.3)
Severe headache	112 (76.2)	35 (23.8)
Dizziness/blurred vision	112 (76.2)	35 (23.8)
Loss of consciousness	117 (79.6)	30 (20.4)
High fever	107 (72.8)	40 (27.2)
Convulsions	116 (78.9)	31 (21.1)
During or After Delivery		
Prolonged labor	113 (76.9)	34 (23.4)
Heavy vaginal bleeding	119 (81.0)	28 (19.0)
Delayed placenta delivery	119 (81.0)	28 (19.0)
Malpresentation	114 (77.6)	33 (22.4)
Cord presentation	114 (77.6)	33 (22.4)

Table 2: Respondents' awareness and level of BPCR.

Level of Knowledge/Awareness	Frequency	Percent
Good (≥50%)	111	75.5
Poor (<50%)	36	24.5
Total	147	100
Level of BPCR	**Frequency**	**Percent**
Prepared (≥50%)	114	77.6
Not prepared (<50%)	33	22.4
Total	147	100

BPCR: Birth preparedness and complication readiness.

Insecurity and financial constraints were the most identified hindrances to accessing healthcare. These were identified by 110 (75%) and 109 (74.1%) participants, respectively.

Factors Influencing BPCR

BPCR was significantly associated with the level of education of the woman ($p<0.05$) and the average monthly income of the woman ($p<0.05$). However, the age, occupation, number of children, and years of marriage showed no statistically significant association [Table 3].

Table 3: Relationship between participants' sociodemographic characteristics and BPCR.

Variables	Well prepared, *n* (%)	Not prepared, *n* (%)	Total, *n* (%)	OR	95% CI	p-value
Age (years)						
<20	7 (58.3)	5 (41.7)	12 (100.0)	0.998	0.922–1.084	0.078
20–24	24 (68.6)	11 (31.4)	35 (100.0)			
25–29	38 (88.4)	5 (11.6)	43 (100.0)			
30–34	31 (77.5)	9 (22.5)	40 (100.0)			
>35	14 (82.4)	3 (17.6)	17 (100.0)			
Occupation						
Civil servants	54 (84.4)	10 (15.6)	64 (100.0)	1.439	0.994–2.084	0.057
Self-employed	9 (69.2)	4 (30.8)	13 (100.0)			
Student	20 (76.9)	6 (23.1)	26 (100.0)			
Unemployed	31 (70.4)	13 (29.6)	44 (100.0)			
Education						
No formal education	4 (66.7)	2 (33.3)	6 (100.0)	2.954	1.654–5.270	<0.001
Primary	9 (47.4)	10 (52.6)	19 (100.0)			
Secondary	27 (64.3)	15 (35.7)	42 (100.0)			
Tertiary	74 (92.5)	6 (7.5)	80 (100.0)			
Average Monthly Income						
<N20,000	50 (68.5)	23 (31.5)	73 (100.0)	2.524	1.97–5.29	0.005
N20,000–N40,000	15 (71.4)	6 (28.6)	21 (100.0)			
N40,001–N60,000	17(100.0)	0 (0.0)	17 (100.0)			
N60,001–N80,000	25 (89.3)	3 (10.7)	28 (100.0)			
>80,000	7 (87.5)	1 (12.5)	8 (100.0)			
Number of Children						
None	31 (68.9)	14 (31.1)	45 (100.0)	1.361	0.733–2.525	0.119
1–2	48 (78.7)	13 (21.3)	61 (100.0)			
3–4	23 (88.5)	3 (11.5)	26 (100.0)			
≥5	12 (80.0)	3 (20.0)	15 (100.0)			
Years of Marriage						
<5 years	47 (69.1)	21(30.9)	68 (100.0)	1.276	0.648–2.513	0.061
5–9 years	37 (82.2)	8 (17.8)	45 (100.0)			
>10 years	30 (88.2)	4 (11.8)	34 (100.0)			

BPCR: Birth preparedness and complication readiness, OR: Odd ratio, CI: Confidence interval, N: Naira, the Nigerian currency.

A logistic regression was performed to ascertain the effects of the woman's education level and her average monthly income on the likelihood of being birth-prepared and complications-ready. Holding all other predictors constant, it was found that the odds of being birth-prepared and complications-ready were three times higher (OR: 2.95, 95% CI: [1.65-5.27]) for higher educational levels. In addition, women who have higher average monthly income were 2.5 times (OR: 2.52 95% CI [1.197–5.29]) more likely to be birth-prepared and complications-ready.

DISCUSSION

This study reveals that three-quarters of the participants had good knowledge of the danger signs of pregnancy and delivery. Similar findings are reported by Aduloju *et al.* in the Southwestern part of Nigeria, where 70% of the participants knew the danger signs of pregnancy.[20] The good knowledge may be attributable to the quality of ANC health education given to these women. However, the finding contrasts a study in Edo State, South-Southern part of Nigeria, where only half of the respondents (49.6%) knew at least one danger sign of pregnancy.[11] Lower numbers are noted in Western Bengal and Mpwapwa, Tanzania.[21,22] This could have been a result of the difference in the study setting; this study was carried out in a tertiary hospital setting in an urban area as against the primary health centers in rural areas in the study in Edo State, Western Bengal, and Mpwapwa. Having a high proportion of antenatal attendees knowing about the danger signs of pregnancy is not surprising as this is one of the information provided at every antenatal care (ANC) visit.

In this series, most participants are well prepared for birth and are complications-ready, similar to other studies.[6,10,23] The majority of the participants in this study had identified the means of transportation to be used in the event of an emergency. This is understandable as delays due to challenges with transportation are a recognized barrier to life-saving

obstetric services. Availability of means of transportation can expedite access to services. The finding is similar to studies done in Abia and Edo States.[20,23] This could have been a result of the similarity in the average distance of accessing health facilities in Zamfara and Edo States.[24] It is, however, contrary to the findings by Ibadin *et al*.[5] Low figures are also noted in some other studies.[22,25,26]

The determinants of BPCR in previous studies included booking status, level of education, occupation, and parity.[5,6,10–12] In our study, we found women's education levels and average monthly income to be significantly associated with their BPCR. This is expected because these factors create enabling opportunities for pregnant women to receive education throughout their pregnancy,[7] This finding is imperative, especially in the study setting given the low level of education among the general population and the high level of poverty.[18] It indicates the need to reinforce BPCR messages crafted in simple languages as well as the use of indigenous languages, particularly for women of low education and financial status.

Most participants believed insecurity to be the most important hindrance to couples' BPCR level. This is not surprising as the study was conducted in Zamfara State, Northwestern Nigeria, where there has been a recent surge in insecurity.[14] Security challenges can pose a significant hindrance to accessing services and thus exacerbate the high burden of maternal and neonatal mortality in the state. This was noted in a study conducted in Pokot, Kenya, a region hit with insecurity.[27]

Limitations

This single-facility study cannot be generalized; however, it provides useful insights to guide intervention. In addition, the findings from the study were self-reported, and the claims made by the participants could not be independently verified.

CONCLUSION AND GLOBAL HEALTH IMPLICATION

In conclusion, our study underscores the significance of socio-economic factors in BPCR. It reveals that individuals with higher education levels and greater financial resources had higher levels of preparedness. However, despite an overall high level of preparedness, we identified security challenges and financial constraints as key barriers that can jeopardize maternal and infant health by impeding adequate childbirth preparation. These findings emphasize the importance of addressing these barriers to ensure safe pregnancies and maternal well-being.

The level of birth preparedness is closely linked to education and wealth status. It is therefore recommended that health providers should prioritize reinforcing information about birth preparedness, particularly among individuals with lower education levels and limited financial resources, including using simple and indigenous language when communicating at ANC sessions. This ensures that pregnant women can understand and adopt the approaches effectively.

To enhance maternal healthcare, program interventions should focus on achieving universal health coverage. A way to achieve this is by implementing a health insurance scheme for pregnant women, thereby reducing the burden of out-of-pocket expenses.

Addressing sociocultural challenges is crucial. Empowering women and promoting girl child education are essential steps to enhance agency and opportunities for improving their livelihoods.

Recognizing that insecurity poses a significant obstacle to accessing healthcare, particularly in areas with security challenges, collaboration efforts involving varying stakeholders including security agencies and the community are essential to ensure safe access to critical maternal services, especially during emergencies, if we are going to make progress in reducing the disparities in health outcomes for mothers and children.

Key Messages

- Education and economic status are significant indicators of birth preparedness and complication readiness (BPCR).
- Insecurity and financial constraints are prominent barriers to achieving optimal BPCR.
- The introduction of a health insurance scheme for pregnant women is proposed as a viable solution to alleviate the burden of out-of-pocket expenses, thereby strengthening BPCR.
- Empowering women and promoting girl child education are crucial steps to enhance agency and opportunities, ultimately improving their livelihoods and maternal healthcare outcomes.
- Addressing education, economic, security, and sociocultural factors have the potential to improve maternal and newborn health outcomes.

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COMPLIANCE WITH ETHICAL STANDARDS

Conflicts of Interest

The authors report no conflicts of interest.

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Ethics Approval

Ethical approval for the study was obtained from the Ethical Review Committee of Federal Medical Center, Gusau, Nigeria. Approval number is FMC/2022/985/008/NHREC/TR/19/03/2022, dated February 2022.

Declaration of Patient Consent

The authors certify that they have obtained all appropriate patient consent.

Use of Artificial Intelligence (AI)-Assisted Technology for Manuscript Preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

Disclaimer

None.

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