Maternal and Perinatal Outcomes of Birth Preparedness and Complication Readiness in Recently Delivered Women of a Southwestern Nigerian Town

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Abstract

Context: Birth preparedness and complication readiness (BPCR) have been shown to increase knowledge of danger signs and enhance access to skilled obstetric care. Previous studies have focused on intermediate outcomes of BPCR such as utilization of skilled care for pregnancy and delivery. Aims: This study aims to determine the maternal and perinatal outcomes associated with birth preparedness and complication readiness. Setting and Design: A cross-sectional study involving 827 recently delivered women, attending selected health facilities in Ikenne, southwestern Nigeria. Materials and Methods: BPCR was determined from a set of eight indicators that were developed by the John Hopkin’s Bloomberg School of Public Health. Statistical Analysis: The data were analyzed using SPSS version 21. Bivariate analysis was done using Chi-square test, and binary logistic regression model was used to assess factors related to BPCR practice among respondents. The level of statistical significance was set to $P < 0.05$. Results: BPCR was observed in 470/827 (56.8%) of the participants. Only a minority had knowledge of financial – 125/827 (15.1%) and transportation assistance – 56/827 (6.8%). Knowledge of ≥ 5 danger signs of pregnancy was also low, 286/827 (34.6%). Institutional delivery was in only 331/827 (40%), and it depended on being birth prepared and complication ready (adjusted odds ratio [AOR] = 0.534, 95% confidence interval [CI] = 0.319–0.893). Significantly more perinatal deaths occurred to women who were not birth prepared (AOR = 2.951, 95% CI = 1.436–6.062), although no difference existed for perinatal (AOR = 1.202, 95% CI = 0.653–2.214) and maternal (AOR = 0.744, 95% CI = 0.452–1.226) morbidities. Conclusion: The knowledge and practice of key indicators of BPCR that reflect utilization of community resources in Ikenne Local Government Area is very poor. BPCR was an important determinant of perinatal survival.

Keywords: Antenatal care, birth preparedness, community resources, pregnancy outcome, skilled care

Résumé

Contexte: Il a été démontré que la préparation à L’accouchement et la préparation aux complications (PAPC) permettent d’accroître la connaissance des signes de danger et d’améliorer l’accès à des soins obstétriques spécialisés. Des études antérieures ont mis l’accent sur les résultats intermédiaires du PAPC, comme l’utilisation de soins spécialisés pour la grossesse et l’accouchement. Objectifs: Cette étude vise à déterminer les résultats maternels et périnatals associés à la préparation à la naissance et à la préparation aux complications. Paramètres et Design: Une coupe transversale de l’étude impliquant 827 récemment livré des femmes, fréquentent les établissements de santé sélectionnés dans Ikenne, sud-ouest du Nigéria. Matériel et Méthodes: la PAPC a été déterminée à partir d’un ensemble de huit indicateurs élaborés par la John Hopkins Bloomberg School of Public Health. Analyse statistique: Les données ont été analysées à l’aide de la version 21 du SPSS. Une analyse bivariée a été effectuée à l’aide du test du Chi carré, et un modèle de régression logistique binaire a été utilisé pour évaluer les facteurs liés à la pratique du PAPC chez les répondants. Le niveau de signification statistique a été fixé à $P < 0.05$. Résultats: le PAPC a été observé chez 470/827 (56,8%) des participants. Seule

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Birth preparedness has been defined as a strategy to promote preventive health services, empowering her to recognize the early signs of complications in pregnancy and what to seek help for. It also fosters family and community involvement in the provision of emergency obstetric care (EOC) as the barrier leading to first delays (decision to seek care) is removed.

The southwestern part of Nigeria flourishes with a lot of traditional birth attendants (TBAs) and several religious unskilled individuals, contributing to the high rate of deliveries that are either attended by unskilled individuals or occur at home. According to the National Demographic Health Survey report, of 2008; 62% of births in Nigeria occurred at home or were attended by unskilled individuals, only 35% of births occurred in a health facility. A more recent survey in Ogun state, southwestern Nigeria, revealed that almost two-thirds (63.6%) of deliveries are attended by TBAs. The WHO excludes the TBAs (trained or untrained) from the list of skilled health care providers.

Attendance at Antenatal Clinic (ANC) in most Nigerian hospitals have no doubt increased, most women however do not return to these skilled centers for delivery or postnatal care.

Evidences abound from studies across Asia and Africa that promoting BPCR in pregnant women, increases knowledge of danger signs of pregnancy and enhances behavior towards seeking skilled care, during pregnancy, labor, after delivery and whenever there are complications.

There are several studies assessing the levels of birth preparedness globally, most of them reporting prospectively what the pregnant women plans to do as regards BPCR, but very few have done so on delivered mothers to actually access their BPCR practices. Most of the few available similar studies have dwelled on the intermediate outcomes of BPCR such as number of ANC bookings, number of deliveries in skilled facilities, the proportion of return for postnatal care etc., rather than end outcomes like maternal near miss (MNM) and perinatal morbidity and mortality. This study was therefore aimed to indirectly access the supply part of the obstetric needs equation by determining the proportion of birth prepared and complication ready-women (and the babies) who still had an adverse obstetric or perinatal outcome; thus auditing the quality of care at these skilled facilities.

Materials and Methods

Study location

The study was conducted in the Ikenne Local Government Area (LGA) of Ogun state, Nigeria. This LGA is semi-urban comprising of five towns namely; Ikenne-Remo (the LGA headquarter), Ilishan-Remo, Iperu-Remo, Ogere-Remo and Irolu-Remo. The facilities that provide skilled EOC within the LGA include Babcock University Teaching Hospital at Ilishan, State General Hospital at Ikenne, State Hospital at Iperu, Community Hospital at Ilisan and ten Primary Health Care (PHC) Centres in Wards situated in the five towns. There are also eight registered private hospitals and clinics where deliveries occur.

Inclusion criteria

Women aged 15–49 years and are within 2 years of their last delivery who are currently attending ANC, family planning, postnatal, infant welfare, gynecology, or the general outpatient clinics.
Exclusion criteria
Women whose last delivery was >2 years preceding this study, or who were critically ill, or are below 15 or above 49 years or failed to give consent for the study were excluded.

Study design
Descriptive cross-sectional study.

Sample size determination
The minimum sample size was determined using the Leslie Kish formula for estimating single proportion. The prevalence of 58.2% obtained for BPCR from a similar study done in Tanzania, was applied to the formula, to calculate the sample size.

A minimum sample size of 410 was obtained and multiplied by a design effect of 2 obtained from a previous similar study assessing BPCR among recently delivered women, to remove cluster effect from the multistage sampling technique. Thus, a final sample size of \( n = 820 \) was calculated for the study.

Data collection and sampling techniques
Data were obtained from women attending the ANC, postnatal clinic, infant welfare clinic, family planning, gynecology clinics, and the general outpatient department.

Sampling technique
A multi-stage sampling technique was employed. First, the health facilities in Ikenne were divided into two broad categories: providers of comprehensive EOC (6 in number) and the providers of basic EOC services (BEOC, 16 in numbers; 10 PHCs and 6 registered private clinics/maternity centers). A sampling frame of 1 in every 3 health facility was used to determine the representative health facilities that were included. Thus 2 Comprehensive providers and 6 BEOC providers (4 PHC and 2 private clinics) were selected giving a total of 8 health facilities within the Ikenne LGA. Simple random sampling was then done at the individual clinics of each selected facility, using the same sampling frame. Thus, in every 3 women who met the selection criteria was recruited at the clinics for interview.

Exit interviews were conducted for the participants with the aid of a modified, interviewer administered, semistructured questionnaire adapted from the safe motherhood questionnaire developed by the maternal and neonatal health program of JHPIEGO an affiliate of the Johns Hopkins University Baltimore, Maryland, USA. This was adapted according to context and the objectives of this study.

The questionnaire was translated into the Yoruba language and translated back into the English language to retain the original meaning of the questions. Five research assistants, who are fresh graduates of the school of public and allied health of the Babcock University, served as data collectors after training by the principal investigator.

Study outcomes
BPCR was calculated from a set of eight indicators that were developed by the John Hopkins Bloomberg School of Public Health, which applied to recently delivered mothers; these indicators were expressed as percentage of women having each specific characteristic.

The BPCR indicators are as follows:
1. Percentage of women who knew at least 5 key danger signs during Pregnancy, Labor and during postpartum period, including at least 1 danger sign in each stage. Spontaneous knowledge of key dangers signs as found in the BPCR manual of JHPIEGO was used in this study.
2. Percentage of women who attended 1st antenatal visit with a skilled person during 1st trimester.
3. Percentage of women who gave birth with a skilled provider.
4. Percentage of women who identified a mode of transport to the place of delivery.
5. Percentage of women who saved money for child birth.
6. Percentage of women who knew about financial assistance, health insurance or discounts from the local government or their employer.
7. Percentage of women who knew about the transport assistance, by their community, the local government or their employer.
8. Percentage of women who had at least 4 antenatal visits, with a skilled care giver.

The mothers who fulfilled 3 of 5 selected BPCR practice indicators were considered as “Birth prepared and complication ready” (BPCR), the selected indicators were; “identified a mode of transportation to the place of delivery,” delivery attended by skilled provider, saved money for child birth, had at least 4 ANC visits with a skilled provider and ‘made arrangement for blood before delivery’. Similar sets of BPCR indicators have been reported in literature.

Definition of Operational terms
The key danger signs that were expected to be spontaneously known and supplied by the respondents include that designed by the JHPIEGO, MNH programme in the BPCR manual and they include:

1. The key danger signs during pregnancy: Severe vaginal bleeding, swollen hands or face, blurred vision, totaling 3.
2. The key danger signs during labor and childbirth: Severe vaginal bleeding, prolonged labor (>12 h), Convulsions, Retained placenta, totaling 4.
3. The key danger signs during the postpartum period: Severe vaginal bleeding, foul-smelling vaginal discharge, high fever, totaling 3.
4. The key danger signs in the new born: Convulsions/spasms/rigidity, difficult/fast breathing, very small baby, lethargy/unconsciousness, totaling 4.

MNNM was defined as an acute obstetric complication that immediately threatened a woman’s survival but did not result in her death; either by chance or because of hospital care she received during pregnancy, labor or within 6 weeks after termination of pregnancy or delivery.
A participant was considered as having had institutional delivery if she delivered at a health facility and was attended by a skilled birth attendant (Physicians, Nurses, Midwives, or community health officers). 

Perinatal mortality was considered as stillbirths or neonatal deaths that occurred within the first 7 days of life. A stillbirth was considered as the death of foetus occurring in the interval from 28 weeks gestational age to delivery.

Statistical analysis

The data was edited on a daily basis before leaving the field and entered using excel spread sheet before converting into SPSS version 21 (Inc., Chicago, IL, USA) for computer analysis. Bivariate analysis was done using Chi-square test for categorical variables and binary logistic regression model was used to assess the factors related to BPCR practice in the respondents. The level of statistical significance was set to $P < 0.05$.

Ethical consideration

Ethical approval for this study was obtained from the Babcock University Health Research and Ethics Committee and permissions from the Ikenne LGA, through the PHC department and the administrative heads of all facilities that were involved in the study, before commencing data collection.

### Table 1: Prevalence of birth preparedness and complication readiness, knowledge and practice of key indicators of birth preparedness and complication readiness

| Variable                                      | Frequency (%) |
|-----------------------------------------------|---------------|
| Birth prepared                                | 470 (56.8)    |
| Not birth prepared                            | 357 (43.2)    |
| Total                                         | 827 (100)     |

| Key indicators of birth preparedness          | Frequency (n=827), n (%) |
|-----------------------------------------------|--------------------------|
| Knowledge of ≥ 5 danger signs in pregnancy, labor, and postpartum | 286 (34.6) |
| Knowledge of ≥ 7 danger signs in pregnancy, labor, postpartum, and in the newborn | 185 (22.4) |
| First ANC visit with skilled provider         | 195 (23.6) |
| Delivery at a facility with skilled provider (institutional delivery) | 331 (40.0) |
| Knowledge of delivery charges at nearest facility with skilled personnel | 199 (24.1) |
| Identified a mode of transport to place of delivery | 422 (51) |
| Saved money for delivery                      | 553 (66.9) |
| Knowledge of financial assistance             | 125 (15.1) |
| Knowledge of transport assistance             | 56 (6.8) |
| At least 4 ANC visits with a skilled provider | 520 (62.9) |
| Identified a potential blood donor/ made arrangement for blood | 253 (30.6) |

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Three of five selected JHPIEGO were used as indicators for BPCR; 470/827 of the participants met this criterion, giving a prevalence of 56.8%. Table 1 also reveals that while most of the participants; identified a mode of transportation to the place of delivery 422/827 (51%), saved money for the day of delivery 553/827 (66.9%) and had at least 4 ANC visits with a skilled provider 520/827 (62.9%); only a minority fulfilled the other 5 key indicators of birth preparedness as follows; 125/827 (15.1%) had knowledge of financial assistance and 56/827 (6.8%) had knowledge of transportation assistance. Institutional delivery was in only 331/827 (40%), while skilled provider care at the first ANC visit was for just 195/827 (23.6%) of the participants. Knowledge of ≥5 danger signs related to pregnancy was also low, 286/827 (34.6%), extension of knowledge of danger signs to the newborn i. e ≥7 in pregnancy, labor, puerperium, and in the newborn revealed a further lower value of 185/827 (22.4%).

The participants who were birth prepared were comparable to those who were not with respect to all the socio-demographic factors; age (adjusted odds ratio [AOR] =1.539, 95% confidence interval [CI] =0.662–3.578), parity (AOR = 0.801, 95% CI = 0.372–1.717), educational status (AOR = 0.238, 95% CI = 0.045–1.260), marital status (AOR = 0.969, 95% CI = 0.238–3.952), employment status (AOR = 1.285, 95% CI = 0.045–1.260), spousal employment status (AOR = 2.600, 95% CI = 0.296–22.865) and monthly income (AOR = 1.883, 95% CI = 0.741–4.785), Table 2.

Table 3 shows that participants with significantly lower odds of BPCR included those who failed to save money for delivery ($P < 0.001$, AOR = 0.005, 95% CI = 0.001–0.018), had < 4 ANC visits with a skilled provider (AOR = 0.004 (0.001-0.017), failed to make arrangement for blood before delivery (AOR = 0.012, 95% CI = 0.003–0.047) or who did not identify a mode of transportation to the place of delivery (AOR = 0.001, 95% CI = 0.000–0.006). Lack of knowledge of transport assistance from the community or LGA was however associated with higher odds of being birth prepared (AOR = 12.977, 95% CI = 2.029–83.006). Knowledge of financial assistance (AOR = 1.386, 95% CI = 0.569–3.379), cost of delivery at nearest facility with skilled provider (AOR = 0.941, 95% CI = 0.428–2.070), five

Written informed consent with signature or thumb print was obtained from the study participants before the start of the interview. Respondents that were assessed preliminarily and found not to have been birth prepared and complication ready were counseled regardless of the outcome of that pregnancy.

### Results

Eight hundred and fifty questionnaires were printed but 827 were suitable for analysis, giving a retrieval rate of 97.3%. Nine women opted out midway into the interview, while the remaining 14 questionnaire had no responses to important sections of the biodata.

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Table 2: Determinants of birth preparedness and complication readiness: sociodemographic factors

| Factor                        | Birth preparedness |   |   |   |   |
|-------------------------------|--------------------|---|---|---|---|
|                               | No (n=357), n (%)  | Yes (n=470), n (%) |   |   |   |
| Parity                        |                    |                |   |   |   |
| 1 (n=498)                     | 214 (43)           | 284 (57)       | 0.943 | 1.009 (0.893-1.139) | 0.801 (0.372-1.717) |
| ≥2 (n=329)                    | 143 (43.5)        | 186 (56.5)     | 1.000 | 1.000 | 1.000 |
| Age (years)                   |                    |                |   |   |   |
| <35 (n=647)                   | 279 (43.1)        | 368 (56.9)     | 1.000 | 1.004 (0.869-1.160) | 1.539 (0.662-3.578) |
| ≥35 (n=180)                   | 78 (43.3)         | 102 (56.7)     | 1.000 | 1.000 | 1.000 |
| Pregnancy status              |                    |                |   |   |   |
| Not pregnant (n=599)          | 252 (42.1)        | 347 (57.9)     | 0.308 | 1.074 (0.935-233)    | 1.390 (0.634-3.048) |
| Pregnant (n=228)              | 105 (46.1)        | 123 (53.9)     | 1.000 | 1.000 | 1.000 |
| Marital status                |                    |                |   |   |   |
| Single (n=48)                 | 34 (70.8)         | 14 (29.2)      | <0.001 | 0.498 (0.319-0.777) | 0.969 (0.238-3.952) |
| Married (n=779)               | 323 (41.5)        | 456 (58.5)     | 1.000 | 1.000 | 1.000 |
| Educational status            |                    |                |   |   |   |
| No formal (n=36)              | 19 (52.8)         | 17 (47.2)      | 0.302 | 0.825 (0.581-1.171) | 0.238 (0.045-1.260) |
| Formal (n=791)                | 338 (42.7)        | 453 (57.3)     | 1.000 | 1.000 | 1.000 |
| Employment status             |                    |                |   |   |   |
| Unemployed (n=163)            | 82 (50.3)         | 81 (49.7)      | 0.043 | 0.848 (0.718-1.003) | 1.285 (0.384-4.304) |
| Employed (n=664)              | 275 (41.4)        | 389 (58.6)     | 1.000 | 1.000 | 1.000 |
| Spouse employment status      |                    |                |   |   |   |
| Unemployed (n=34)             | 19 (55.9)         | 15 (44.1)      | 0.157 | 0.769 (0.524-1.128) | 2.600 (0.296-22.865) |
| Employed (n=793)              | 338 (42.6)        | 455 (57.4)     | 1.000 | 1.000 | 1.000 |
| Monthly income                |                    |                |   |   |   |
| ≤N20,000 (n=502)              | 216 (43.0)        | 286 (57.0)     | 0.850 | 1.021 (0.868-1.202) | 1.883 (0.741-4.785) |
| >N20,000 (n=147)              | 65 (44.2)         | 82 (55.8)      | 1.000 | 1.000 | 1.000 |

1 Responses did not add up to 827. CI=Confidence interval, OR=Odds ratio, COR=Crude OR, AOR=Adjusted OR

danger signs (AOR = 0.434, 95% CI = 0.171–1.102) or seven danger signs (AOR = 1.791, 95% CI = 0.637–5.031), were not significant determinants of BPCR, Table 3.

Comparing, intermediate and end outcomes, Table 4 shows that BPCR was an important determinant of perinatal outcome as significantly more perinatal deaths were reported by women who had no BPCR (P < 0.001, AOR = 2.951, 95% CI = 1.436–6.062). The observed risk of perinatal morbidity (AOR = 1.202, 95% CI = 0.653–2.214) and reported MNM (AOR = 1.209, 95% CI = 0.652–2.227) had however not significantly different between women who did BPCR and those who were not. The Table 4, also reveals that BPCR was an important determinant of institutional delivery, as women who had no BPCR had significantly lower odds of institutional delivery (AOR = 0.534, 95% CI = 0.319–0.893).

**Discussion**

The prevalence of BPCR observed in this study is comparable to what was obtained in Tanzania (58.2%) and India (57%) from studies on recently delivered women, using similar 3/5 BPCR practice indicators as criteria. Lower prevalence were obtained in rural (13.2%) and urban (31.6%) Lagos when “4 out of 7 BPCR indicators” were applied as criteria. In Oredo, southern Nigeria, “any 3” of the key JHPIEGO indicators were applied and a higher prevalence of 87% was obtained. The knowledge and practice of key JHPIEGO indicators of BPCR is skewed towards those factors that are dependent on “self” or “family” provision and out-of-pocket health service payments; over half of the participants identified a mode of transport to the place of delivery, saved money for delivery and had ≥4 ANC visits with skilled provider. Similar observations were made in other parts of Nigeria. It is supported by reports of studies in other low income countries like Nepal, Bangladesh and Tanzania. Poor knowledge and utilization of community resources, including components of health insurance schemes appear to manifest in the very low knowledge of financial and transportation assistance for delivery and emergency events available from the local government, coupled with the low proportion (40%) of deliveries attended by skilled health providers. This finding supports earlier reports from analysis of the 2013 DHS which showed that only 39% of deliveries in Nigeria were attended by skilled providers. A recent study involving the Ikenne LGA reports that <50% of women utilized skilled obstetric care services; individual attributes in the women and the quality of professionalism displayed by the skilled health-care givers correlated well with the low patronage of the primary health centers that were surveyed. The observed low awareness and patronage of community resources is in contrast to reports from some other LMICs where these services have high uptake rates and whose maternal mortality ratios are on a rapid decline.
The lack of association between socio-demographic factors and BPCR, contrasts reports from similar studies in Kano and Ile-Ife,[22,26] A significantly higher BPCR rate was observed among participants who saved up money for the day of delivery. This indicator was also an important determinant of BPCR in reports from some earlier studies.[14,26-28] This is a disturbing finding as it suggests over reliance on personal or family income for health services, especially in a place like Ogun state, Nigeria where community resources are available and free.[15] Arrangement for blood before delivery either by identifying a potential donor or contacting a blood bank was associated with being BPCR, this corroborates reports from earlier studies.[14,26,29] Less than a quarter of the participants had adequate knowledge of the delivery charges at the nearest facility with skilled care provider. This knowledge, however, did not have statistically significant relationship with BPCR after adjusting for confounders. This factor has not been well explored in studies as a potential key indicator of BPCR. Seeking knowledge on cost of delivery services implies some level of awareness; it may also serve as avenue to acquire more information that may improve maternal and newborn health. Another factor that has been used to assess BPCR is the prelabor purchase of birth supplies.[21]

Another recognized key indicator of BPCR that had no significant effect on BPCR in this study was knowledge of financial assistance from the community or LGA. Knowledge of 5 key danger signs associated with pregnancy was generally poor supporting earlier findings in reports from Ile-Ife and Calabar.[26,30] The finding also corroborates poor knowledge observed in Tanzania, Rwanda and Ethiopia. The lack of association with BPCR in our study however contrasts their report of Knowledge of danger signs being higher among BPCR participants.[14,27,28] Similarly, knowledge of ≥7 danger signs was also very poor and not a determinant of BPCR among the participants. The danger signs were extended to ‘knowledge of danger signs in the newborn’ in this study because we aimed to determine the effect of BPCR on perinatal outcomes. The earlier findings of poor contact with community resources (evidenced by low rates of knowledge of available
### Table 4: Effect of birth preparedness and complication readiness on maternal and perinatal outcomes

| Birth Preparedness | Perinatal mortality* | P | COR (95% CI) | AOR (95% CI) |
|---------------------|----------------------|---|--------------|--------------|
|                     | Alive (n=728), n (%) |   |             |              |
| No (n=357)          | 282 (79.0)           | <0.001 | 4.114 (2.653-6.379) | 2.951 (1.436-6.062) |
| Yes (n=470)         | 446 (94.9)           |     |              |              |
|                     | Death (n=99), n (%)  |   |             |              |
| No (n=357)          | 75 (21.0)            |     |              |              |
| Yes (n=470)         | 24 (5.1)             |     |              |              |

| Birth Preparedness | Perinatal morbidity*, ‡ | P | COR (95% CI) | AOR (95% CI) |
|---------------------|-------------------------|---|--------------|--------------|
|                     | No (n=626), n (%)       | |              |              |
| No (n=284)          | 240 (84.5)              | 0.382 | 1.186 (0.825-1.704) | 1.202 (0.653-2.214) |
| Yes (n=444)         | 386 (86.9)              |     |              |              |
|                     | Yes (n=102), n (%)      | |              |              |
| No (n=284)          | 44 (15.5)               |     |              |              |
| Yes (n=444)         | 58 (13.1)               |     |              |              |

| Birth Preparedness | Maternal morbidity* | P | COR (95% CI) | AOR (95% CI) |
|---------------------|---------------------|---|--------------|--------------|
|                     | No (n=556), n (%)   | |              |              |
| No (n=357)          | 224 (62.7)          | 0.020 | 1.269 (1.045-1.541) | 0.744 (0.452-1.226) |
| Yes (n=470)         | 332 (70.6)          |     |              |              |
|                     | Yes (n=271), n (%)  | |              |              |
| No (n=357)          | 133 (37.2)          |     |              |              |
| Yes (n=470)         | 138 (29.4)          |     |              |              |

| Birth Preparedness | Care at delivery‡ | P | COR (95% CI) | AOR (95% CI) |
|---------------------|-------------------|---|--------------|--------------|
|                     | Unskilled (n=496), n (%) | |              |              |
| No (n=357)          | 260 (72.8)         | <0.001 | 0.546 (0.450-0.662) | 0.534 (0.319-0.893) |
| Yes (n=470)         | 236 (50.2)         |     |              |              |
|                     | Skilled/institutional (n=331), n (%) | | | |
| No (n=357)          | 97 (27.2)          |     |              |              |
| Yes (n=470)         | 234 (49.8)         |     |              |              |

* For perinatal mortality and perinatal morbidity, AOR was obtained by adjusting for age, parity, marital status, education level, occupation, spouse occupation, average monthly income, first ANC visit in first trimester with skilled provider, number of ANC visits, knowledge of ≥5 danger signs, saved money for delivery, knowledge of financial assistance, knowledge of transport assistance and institutional delivery. Could not add up to 827, due to removal of the perinatal deaths. ‡ For reported maternal morbidity, AOR was obtained by adjusting for age, parity, marital status, education level, occupation, spouse occupation, average monthly income, first ANC visit in first trimester with skilled provider, number of ANC visits, knowledge of ≥5 danger signs, saved money for delivery, knowledge of financial assistance, knowledge of transport assistance, knowledge of delivery charge at nearest facility with skilled provider and institutional delivery. § For institutional delivery, AOR was obtained by adjusting for age, parity, marital status, education level, occupation, spouse occupation, average monthly income, first ANC visit in first trimester with skilled provider, number of ANC visits, knowledge of ≥5 danger signs, saved money for delivery, knowledge of financial assistance, knowledge of transport assistance and knowledge of delivery charge at nearest facility with skilled provider. CI=Confidence interval, OR=Odds ratio, COR=Crude OR, AOR=Adjusted OR, ANC=Antenatal clinic.

Significantly more perinatal deaths were reported by women who were not BPCR compared to those who were, adequately prepared. The factors that may be responsible for the higher reported perinatal mortality among women who were not BPCR include: the lower rate of skilled care at delivery, the very poor knowledge of danger signs and very low access to community resources; financial and transportation support facilities. Utilization of birth preparedness interventions may thus produce improvements in maternal and newborn health outcomes. Implementation of the birth-preparedness matrix have been shown to reduce neonatal mortality by up to 30% and maternal mortality by 75% in a report from a cluster randomized control trial in Nepal. There was however no significant difference in reported perinatal morbidity or MNM between the two groups. This lack of association with BPCR may be due to variations in understanding of what the participants may consider as morbidity and what is worth reporting either in the surviving infant or mother, “perinatal death” is clear-cut to all participants.

The strength of this study is that the women have delivered and we are able to assess obvious outcomes like perinatal mortality and maternal morbidity. The main limitation in this study is the potential for recall bias, but this has been taken care of by restricting the inclusion criteria to within 2 years of delivery. Community based studies involving household and health facility verbal autopsies would be required to access the effect of BPCR on maternal death.

There is need to find out the reasons for low patronage of skilled care in pregnancy and during delivery; create better awareness for women and make prenatal, delivery, and postnatal care services more attractive, in addition to improved BPCR counseling to ensure better maternal and perinatal outcomes.

**Conclusion**

The BPCR rate in Ikenne LGA is slightly above average and largely due to high knowledge of and practice of key indicators that depend on individual efforts and payments for healthcare. The knowledge and practice of key indicators dependent on community resources is very poor. Birth preparedness and
complication readiness was an important determinant of institutional delivery and consequently perinatal survival.

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Conflicts of interest
There are no conflicts of interest.

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