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Evaluation of the Effectiveness of Postnatal Care Supportive Education Program among Pregnant Women Attending Health Facilities in Ebonyi State Nigeria

Ihuoma A, Obi[1*], Christiana I. Elusoji[2], Amos Nworie[3], Simon O Azi[3], Augusta N Emeh[1], Peace N Ani[4], Sussan N Ovuoba-Emeka[5], Mary F. Munge[2,] Ugwueze M. Unoma[5], Grace U Agu[4], Ejovi Akpojaro[2], Juliana O Onyeabor[5]

[1]Department of Nursing, College of Health Sciences, Ebonyi State University, Abakaliki, Ebonyi State Nigeria
[2]Department of Nursing Sciences, Benson Idahosa's University, Benin City. Edo State, Nigeria.
[3]Department of Medical Laboratory Science, College of Health Sciences, Ebonyi State University, Abakaliki, Ebonyi State Nigeria
[4]School of Nursing, Enugu State University of Science and Technology, Teaching Hospital Parklane Enugu Nigeria.
[5]Basic School of Nursing, Alex Ekwueme University Teaching Hospital, Abakaliki, Ebonyi State, Nigeria

***Corresponding author:** Ihuoma A Obi*
Email; ladyihuomaobi@gmail.com *Phone: +234835980988*
Department of Nursing, College of Health Sciences, Ebonyi State University, Abakaliki, Ebonyi State Nigeria

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Abstract
Postnatal care is a crucial aspect of maternal and child health, reducing maternal and newborn deaths. However, it is often neglected in the healthcare system. This study aimed to investigate the impact of postnatal care-supportive education on knowledge, willingness, and utilization of PNC services among pregnant mothers in rural areas of Ebonyi State, Nigeria. The research involved six objectives, two hypotheses, and a quasi-experimental design. The study used multistage and simple random techniques to select local government areas and health facilities, while purposive sampling was employed to select 225 pregnant mothers. A pretested questionnaire was used for data collection, with a content validity index of 0.92 and a reliability coefficient of 0.84. Data analysis was conducted using SPSS version 25. The results showed that 94.7% of respondents were Christians, 10.7% attended tertiary institutions, and 16.4% were civil servants. Pre-intervention, pregnant mothers had low knowledge of available PNC services and associated risks, but their knowledge improved significantly post-intervention. Factors such as education, age, and occupation were significantly associated with mothers' knowledge. The study also found low utilization of PNC services at baseline, with only 18.0% using services adequately in previous deliveries and 27.1% not using at all. Mothers demonstrated good willingness to utilize PNC services in subsequent deliveries. The study recommends that skilled healthcare workers provide adequate and well-prepared health education to mothers during antenatal and postnatal clinics to create awareness and make them understand the benefits of PNC services, ultimately improving utilization and reducing maternal and newborn deaths.
Keywords: Postnatal, Pregnancy, Mother, Healthcare, Childbirth

Introduction

The term “natal” is derived from a Latin word “natus” meaning parturition or ‘born’. Postnatal care refers to the series of health and health-related services given to women and their newborns following delivery (2). Postnatal care (PNC) is one of the important health care services that aim at prevention of impairment and disabilities of mothers and their newborns and it helps in the reduction of maternal and infant mortalities (3). To reduce the high rate of maternal and infant morbidity and mortality in sub Saharan Africa, one of the main objectives of the government and

health systems of the countries should be to increase and sustain key maternal health services including postnatal care especially in rural areas and among the hard-to-reach populations (4).

The World Health Organization (WHO) in Ndugga *et al.* (2020), defines postnatal period as the period that starts one hour after delivery of baby and placenta till six weeks (42 days) afterwards while Garba *et al.* (2020) define it as that period that begins immediately after the birth of a child till forty-two (42) days after. It is during this period that the mother's birth organs (uterus, cervix and ovaries) and hormonal level gradually go back to their pre-pregnancy state (5). The period of postnatal care can be divided into two namely – the immediate/early postnatal period, ranging from the time the baby and placenta are delivered to the first seven days of postpartum; and the later period which extends to about six weeks following delivery. Postnatal care provides opportunity for health workers to save the lives of mothers and babies by means of close monitoring to detect complications and tackle them early (5). During postnatal period, enough data can be collected (data concerning mother's and newborn's health status) which will be of immense help or used by health policy makers to formulate policies towards the realization of appropriate interventions and to achieve global postnatal best practices.

The postnatal care services are numerous and they include both the ones meant for the mother and the ones for the newborn (4). These services are usually commenced immediately after delivery of the newborn and ideally should be rendered by skilled healthcare workers such as nurses, midwives, doctors and medical laboratory scientists. Despite the usefulness of postnatal services, it is worthy of note that in some areas within the developing countries and thickly populated countries of the world, PNC is the most neglected aspect of maternal health services as more attention is always given to antenatal and labour services and many women attend ANC more than

PNC, not minding the fact that maternal and infant morbidity and mortality rates in such countries are still on the high side (6). Maternal health services during antenatal, labour and postnatal together are very important as far as reduction of maternal and newborn morbidity and mortality are concerned. One is as important as others hence all the periods should be considered crucial to the reduction of complications and deaths of mothers and children in developing countries (6).

Sahbanathul (2016) states that postnatal care has been proved to be very cost effective as far as reduction of neonatal mortality is concerned and this he said is more cost effective than antenatal and intrapartum care (7). Postnatal care services are very important because they act as continuum of care from the antenatal care services and they ensure easy monitoring and early detection and intervention which offer tremendous help to the reduction of maternal mortality rate (8). Unfortunately many women do not receive this care especially those living in rural areas. Olajubu (2021) found that 75.8% of mothers in a study in Osun State of Nigeria did not receive PNC services and 62.4% did not know the importance (9). The low utilization of PNC in developing countries like Nigeria is a reason for non-achievement of millennium development goal (MDG) 4 and 5 (10).

Services rendered during postnatal period

WHO (2013) in Belachew *et al.,* (2016) recommends that PNC services should be given to mothers and their newborns in health facilities following uncomplicated vaginal deliveries and this should continue for at least 24hounrs before discharge. It is also very necessary to contact the women who delivered at home to offer them early postnatal care services (11).

Numerous services are offered to women and their babies both immediately after delivery and during postnatal clinic visits and some of the services are hereby enumerated:

Care services at the immediate postpartum period

Some of the services rendered to the mothers and babies during the immediate postpartum period include but are not limited to- vital signs monitoring and general care during recovery from birth processes to discover any complications, inspection of mother's perineal pad to rule out primary postpartum heamorrhage, encouragement on initiation of early breast feeding/proper nipple attachment to baby's mouth to enable the baby suck enough milk, and at the same time relieve the mother of milk engorgement (12). Other cares include observation of baby's cord for bleeding and observation of his vital signs such as respiration, heartbeat and change in colour (as an instance, change from pink which is the normal colour to a bluish colour in a newborn denotes asphyxia neonatorum). This means that the baby is not breathing well and so lacks oxygen (13).

Care during later period of postnatal

The cares during this period are numerous. They include maternal nutritional services such as encouraging postnatal mothers on adequate diets, offering them nutritional supplementation inform of irons, folic acid and vitamin tablets. They are also given health counselling on crucial areas like personal hygiene and care of the perineaum, family planning services, baby's subsequent bath/warmth maintenance, exclusive breastfeeding and weaning process (14).

Other cares pertaining to the baby and mother during this period include Growth monitoring and immunizations for the baby, continuing mother's own immunization (tetanus toxoid), treatment of minor ailments and referral of complicated cases (15).

Previously, mothers were given appointment for postnatal care at the sixth week after delivery. During this visit the mother's birth canal would be examined to ensure that cervix and uterus have

gone back to their pre-pregnancy state. General physical examination would be carried out and the breast examined to confirm adequate lactation. The baby would be given immunizations such as DPT, OPV, and hepatitis (16).

Current practices of postnatal care services

According to Maternal and Child Survival Programme (MCSP) (2015), the World Health Organization (WHO) in the year 2013 designed a package of care termed 'best practices of postnatal care' for mothers and newborns (17). This is because it is during postnatal period that most of the maternal and neonatal deaths occur especially during the first few weeks following delivery. WHO therefore recommended best practices of postnatal care to help curb the problems and complications that postpartum mothers and their newborns encounter during the postnatal period thus:

"Postnatal care services should be provided to all mothers and babies within the first 24 hours regardless of where the delivery takes place. The care within the first 24 hours should include full clinical examination with more attention to mothers that delivered in their homes. It becomes necessary that some postnatal care services should be rendered to mothers by healthcare workers through the use of mobile phones. Such services include health advice and giving appointments for next visit" (18).

The recommendation by WHO continues thus: "newly delivered mothers should be allowed to stay within the facility at least 24 hours following delivery as this replaces the former practice of discharge within 12-24 hours of delivery (19). Discharge after the stipulated 24 hours is accepted only if a mother is not bleeding, mother and baby have no signs of infections and baby is suckling well. All mothers and babies need at least four (4) postnatal checkups in the first 6 weeks after

delivery. This has come to replace the previous practice of only one or two postnatal checkups within the period of six (6) weeks after birth" (20).

Best practices of postnatal care for newborns

The World Health Organization recommends home visits by skilled healthcare workers to ensure adequate postnatal care for newborns. At health facilities, newborns should be observed for signs of infections or diseases and referred to the appropriate center for expert treatment if necessary. Signs of ill health include weak breastfeeding, tachycardia, tachypnea, pyrexia, convulsion, jaundice, and difficulty breathing (21). Health workers should encourage mothers on exclusive breastfeeding (EBF) to provide benefits such as antibodies, adequate protein, vitamins, and minerals, and delay fertility. EBF also acts as a natural form of family planning, ensuring the baby matures before the mother can become pregnant again. Recommended best practices for newborns include using chlorhexidine digluconate 7.1% aqueous solution or gel for umbilical cord daily cleaning, which reduces neonatal mortality, especially in areas with high neonatal mortality rates. Chlorhexidine can prevent cord infection and sepsis and replace harmful traditional substances. Reinforcement of key newborn care messages among families and care providers is necessary to ensure adequate newborn care. Key elements of newborn care, such as delayed bathing, skin-to-skin contact, and maintaining adequate warmth, should be practiced and emphasized (22).

Mothers' knowledge of postnatal care

Lack of knowledge about health services, particularly postnatal care (PNC), is a significant factor contributing to poor utilization. Women and their families often lack understanding of the benefits and risks associated with PNC, leading to a lack of interest in using these services. Studies have

shown that rural women often have poor educational backgrounds, which affects their knowledge of PNC services. However, when educated about the benefits, location, and risks associated with non-utilization, mothers are more likely to seek these services. Therefore, skilled healthcare providers should provide health education to mothers about PNC services during the antenatal period (18).

Utilization of postnatal care services

Postnatal care services (PNC) utilization is low in developing countries like Nigeria, with low utilization rates in most Sub-Saharan African countries (23). Factors contributing to low utilization include poor maternal education, lack of job opportunities, early marriage, and lack of knowledge among rural and hard-to-reach mothers (24). Urban residence, younger mothers, good educational backgrounds, and good antenatal care (ANC) and facility delivery are factors that encourage PNC utilization. Maternal education and knowledge are key factors determining PNC utilization, as educated mothers attend antenatal clinics regularly (25). PNC services provide immunizations, growth monitoring, and knowledge about mother-baby-bonding for newborn development. However, the alarming rate of non-utilization in Nigeria highlights the need for improved maternal and neonatal survival strategies. Addressing the alarming rate of non-utilization can help direct policies at the national and state levels, promoting maternal and child survival strategies (26).

Risks associated with non-utilization of PNC services

Postnatal care for puerperal women is linked to high maternal and infant morbidity and mortality rates. In Nigeria, 80% of maternal deaths are due to severe bleeding, puerperal sepsis, hypertensive disorders, obstructed labor, and unsafe abortion. Adequate postnatal care can prevent or control these conditions, such as PPH, puerperal sepsis, and post abortion sepsis, which can potentially lead to maternal and infant deaths.

Specific risks on the mother's side

Postnatal complications can include postpartum haemorrhage, puerperal psychosis, pulmonary embolism, and puerperal sepsis. Women who deliver via caesarean section or episiotomy may experience wound breakdown and sepsis. Other complications include breast engorgement,

anemia, deep venous thrombosis, uterine prolapse, chronic waist pain, impaired mobility, and reproductive system damage (27). Mothers who fail to attend postnatal clinics may face risks, including convulsions, especially if they had pregnancy-induced hypertension. Early monitoring is crucial for raised blood pressure and persistent proteinuria (18).

Risks to the baby

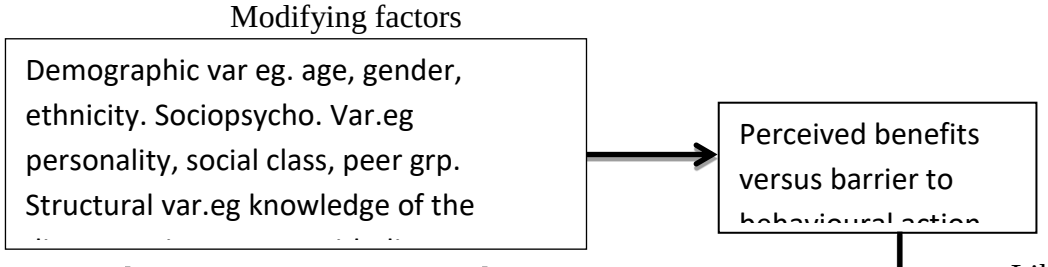
There could be sticky cord (infection), hypothermia, eye infection, poor feeding as a result of poor attachment, jaundice, fever which could lead to convulsion, incomplete immunization, female circumcision which is still practiced in some remote areas and this can become infected when performed by quacks (3).

Conceptual Framework/Theoretical Literature to Support the Study

Several theories could be used to support and guide this study. Prominent among them is the Health Belief Model.

Health belief model (HBM)

The Health Belief Model (HBM) is a health education and promotion model developed by Beckar in 1984. It helps understand why some people accept behavioral changes towards disease prevention or treatment acceptance, while others cannot. HBM has been used to study non-compliance with medical treatments and has been revised over time (1).



HBM suggests that successful behavior change requires interest, reason, threat, and benefit. It gathers health perceptions and factors influencing change, including susceptibility, severity, benefits, motivations, and cost. It helps understand health behaviors and their determinants.

The perceptions of health belief model

This model consists of perceptions, including perceived susceptibility, severity, benefit, and barrier. Perceived susceptibility refers to the belief that anyone can be susceptible to a disease or problem. Severity refers to the belief that the problem can become severe. Benefit is the belief that accepting positive behavior can benefit oneself. Barriers are the perceived obstacles to implementing new behavior. Cues to action, such as radio jingles or posters, help create awareness about the issue. These cues drive acceptance to positive behavior (28).

Application of health belief model to the study

Pregnant mothers need to be informed about Prenatal Nutritional Services (PNS) and the risks associated with non-utilization. The Health Belief Model is applied to the study, revealing that a pregnant mother's perceived susceptibility to PNS services can be severe, potentially causing her or her baby to contract infections. However, she also perceives benefits such as avoiding intrauterine infections and reducing hospital admissions and bills. Barriers like transportation costs can be overcome, but the benefits outweigh them. Further education and teaching aids can increase a pregnant mother's knowledge about PNC services and encourage her to utilize them.

This study highlights the importance of providing pregnant mothers with the right information to make informed decisions about PNC services (1).

The study aimed to explore the impact of postnatal care-supportive education on knowledge, willingness, and utilization of postnatal care services. The literature review revealed a lack of research on this topic, particularly in Nigeria, Ethiopia, Bangladesh, India, and Kenya. Most studies reported poor knowledge and utilization of postnatal care services, with factors such as lack of awareness, low maternal education, and distance from health facilities being key. The study aimed to fill this gap by examining the effect of postnatal care-supportive education on knowledge and utilization of these services (29).

METHODOLOGY

Research Design

This quasi-experimental study assessed postnatal care service knowledge and utilization before and after supportive education intervention in a community-based cross-sectional study. The design, one group before and after, established cause-effect relationships without randomization, as successful in a similar study (30).

Setting

The study focused on six randomly selected rural health facilities in Ebonyi State, Nigeria, covering three senatorial zones and thirteen local government areas. The state, which is known

for its quality rice and yam production and popular solid mineral, is considered one of the less privileged and less developed in the country. The facilities included Ngbo Health Centre Okposhi Ngbo and St Vincent Hospital Ndubia Izzi, Rural Improvement Mission Hospital Ikwo and Umuezeokoha PHC Ezza North, and Ukpa PHC Afikpo and Okaria PHC Onicha.

Ngbo Health Centre (Ngbo maternity): The Ngbo health facility, established in 1957 in Ohaukwu LGA of Ebonyi State, is a government-owned facility with six beds and records about 70 maternity cases monthly, situated in the Ndiagu Onwe Amagu area of Ngbo Court.

St. Vincent Hospital Ndubia: The Catholic Diocese of Abakaliki owns a faith-based health facility in rural Izzi, with 15 skilled and unskilled staff, addressing general and maternity cases, with a monthly maternity case count of ten.

Rural improvement mission (RIM) hospital: RIM Hospital, located in Ndiagu Echara, Ikwo LGA, is a randomly selected health facility in Ebonyi State. Established in 1954, it has 60 beds and 42 staff. It has various departments including maternal and child health services, out-patients, in-patients, theatre, laboratory, and pharmacy. The hospital records 350 monthly patients, with 100 being maternity cases. It is owned by the Presbyterian Church of Nigeria.

Umuezeokoha health facility: This study examines a government-owned public health facility in Ezza North LGA, Ebonyi State, established in 2004. The 25-bed facility, with skilled and unskilled staff, records 60 maternity cases monthly.

Ukpa Health Centre: This is located in Afikpo North Local Government area in Ebonyi South Senatorial zone. It is a government owned health facility and it records about fifty (50) maternity cases per month. It has four skilled health care workers and a few non clinical staff.

Okaria Health Centre: A government-owned primary health care center in Onicha LGA, Ebonyi State, treats mainly maternity cases, with 60 cases recorded within a month. The study chose rural areas due to high maternal and child morbidity and mortality rates, as most services are concentrated in urban areas. Research on MCH issues is limited in rural areas.

Population of Study

The target population of this study included all the pregnant mothers receiving antenatal care at the six selected health facilities in the three senatorial zones during the study period. A total of 450

pregnant mothers were estimated based on the average monthly records of antenatal cases at the selected health facilities. The population was as follows:

Table 1. Population of the study

Health facility	**Population**
Ngbo Health Centre (HC)	70
St Vincent Hosp. Ndubia	110
RIM, Ikwo	100
Umuezeok-oha HC	60
Ukpa PHC	50
Okaria PHC	60
Total	**450**

Source: Record units/ registers of the health facilities involved.

Sample Size

Sample size determination using power analysis

Formula:

$$PA = \frac{\frac{Z^2 \times P\,(1-P)}{e^2}}{1 + \frac{Z^2 \times P\,(1-P)}{e^2 N}}$$

Where:

N = Population = 450

e = error margin = 0.05

P = Standard deviation = 0.5

Z = E. Score = 1.96 (Constant) See appendix K.

The sample size was calculated using power analysis formula which gave a total score of 207 but based on the decision of the researcher, a sample size of 225 (which was the sample on ground during the study period) was used for this study and this corresponded with 50% of each facility monthly turn-out. The sample was made up of the pregnant mothers who met the inclusion criteria.

Inclusion Criteria

Those included in this study were:

- Pregnant mothers at their 3rd trimester
- Those that have had previous childbirth at least one child before the present pregnancy.

Sampling Technique

Multistage sampling technique was used in two stages including simple random sampling to select the six (6) LGAs out of thirteen (two LGAs from each of the three senatorial zones of Ebonyi State). This was followed by another simple random sampling to select six (6) health facilities, one (1) from each of the 6 LGAs.

The study used purposive sampling and restriction methods to select participants, controlling confounding variables. However, contamination control was challenging, resulting in one of the limitations encountered.

Instrument for Data Collection

This study used a researcher-developed questionnaire with two sections, A and B, representing demographic variables and addressing research objectives. The instrument was designed based on literature reviews and was guided by study objectives. Most items were close-ended, allowing participants to select options that best described their disposition. Post-intervention, respondents'

willingness to utilize postnatal care services was assessed using 3-point modified Likert questions, with scores of 3, 2, and 1, respectively, and a mean score of 2.0 (31).

Validity of the Instrument

A draft instrument was presented to researchers, measurement experts, and the researcher's supervisor for face and content validity assessment. Corrections were made to ensure appropriateness, clarity, and ambiguity of question items. A content validity index of 0.92 was obtained, indicating instrument validity. Supervisor approved instrument for data collection.

Reliability of the Instrument

The study conducted a pre-test of a postnatal care instrument using a test re-test method at a primary healthcare center in Ezaofu, Izzi Local Government Area of Ebonyi State. 20 pregnant women were included in the study, and their data was collected twice. The test-retest method and Pearson's moment product correlation statistics were used to calculate the correlation coefficient, resulting in a score of 0.84. Twelve research assistants were trained on the study's purpose, inclusion criteria, postnatal care-supportive education, and questionnaire collection to avoid bias.

Ethical Considerations

The researcher obtained ethical clearance from Ebonyi State University's Research Ethics Committee and obtained permission from healthcare facilities (**EBSU/DRIC/UREC/Vol./06/011**). Participants were informed of the study's purpose, confidentiality, anonymity, and optional participation. Participants were assured of anonymity and no punishment for declining participation. Accepted respondents signed a consent form.

Procedure for Data Collection

Initial data collection (Baseline): The researcher provided ethical clearance certificates to health facilities and introduced the researcher to participants. They established rapport and guided them through questionnaire completion. Pre-intervention data was collected during pregnancy, and 225 questionnaires were administered face-to-face, with a 100% return rate.

Implementation of postnatal care-supportive education intervention:

The study focused on providing postnatal care services to mothers and babies. The researcher and her trained assistants conducted supportive education sessions in various facilities, teaching participants about the services, their importance, and the dangers associated with non-utilization. Posters were used to enhance learning, such as showcasing children with deformed legs due to poliomyelitis and female genital mutilation. The teaching was conducted in simple language and native dialect, with back-to-back translation where necessary. Each session lasted about one hour and thirty minutes. Participants were encouraged to come to the health facility for delivery and

were given free snacks, handkerchiefs, and airtime as incentives. The study lasted two weeks, with repeated teachings and regular phone calls to remind participants to return for delivery and completion of the second part of the questionnaire.

Post-intervention data collection:

The study involved 216 participants who completed a postnatal questionnaire at various health facilities. They were congratulated for safe delivery and encouraged to complete the form. The questionnaire was then completed during immunization clinics, with some clinics running twice a week. The research assistants assisted in the process, and the data was collected at home.

Method of Data Analysis

The study analyzed pre and post intervention data using descriptive and inferential statistics. Demographic data was compared with respondents' knowledge to determine if a relationship existed. Descriptive statistics were used to analyze the extent of utilization of PNC services and willingness to use them in subsequent childbirths. Inferential statistics were used to test null hypotheses, and Chi square was used to compare differences. The two hypotheses were rejected due to statistical differences observed.

RESULTS

This chapter presents data analysis results from 225 questionnaires, with 100% completed and returned for analysis pre-intervention and 96% available post-intervention.

Table 2. Demographic data of the respondents on the effect of supportive education on knowledge, willingness and utilization of PNC services among pregnant mothers in rural Ebonyi State

Demographic Data	**No of Respondents (N=225)**	**Percentage**
Age (years)		
≤20	26	11.6
21-25	102	45.3
26-30	49	21.8

Demographic Data	No of Respondents (N=225)	Percentage
31-35	21	9.3
36-40	20	8.9
>40	7	3.1
Highest level of education		
No school attended	34	15.1
Primary education only	78	34.7
Secondary education	89	39.6
Tertiary education	24	10.7
Occupation		
Civil servant	37	16.4
Trading	78	34.7
Farming	90	40.0
Not engaged in any work	20	8.9
Religion		
Christianity	213	94.7
Islam	5	2.2
Traditional	4	1.8
Others	3	1.3
Tribe		
Igbo	197	87.6
Yoruba	10	4.4
Hausa	6	2.7
Others	12	5.3
Number of children		
1-2	99	44.0
3-4	83	36.9
5 and above	43	19.1
Gestational age of current pregnancy (weeks)		
28-31	40	17.8
32-35	67	29.8
>35	118	52.4

Table 2 reveals demographic data for respondents, with 45.3% aged 21-25, 21.8% aged 26-30, and 3.1% aged 40 and above. The highest educational level was 15.1%, followed by primary education at 34.7%, secondary education at 39.6%, and tertiary education at 10.7%. Occupations

included civil servants, traders, and farmers. The majority were Christians, with 87.6% being Igbos. The number of children was 44.0%, and 52.4% were over 35 weeks pregnant.

Table 3 (a): Relationship between demographic data of the respondents and attendance to PN clinic

Demographic Data	**Attendance to PN clinic**		**$\chi 2$**	**P-value**
	No attendance (n=61)	**Attendance (n=164)**		
Age (years)				
≤30	51(28.8%)	126(71.2%)	1.217	0.270
>30	10(20.8%)	38 (79.2%)		

Demographic Data	Attendance to PN clinic		$\chi 2$	P-value
	No attendance (n=61)	Attendance (n=164)		
Highest level of education				
Below Secondary	36(32.1%)	76(67.9%)	2.857	0.091
Secondary & above	25(22.1%)	88(77.9%)		
Occupation				
Not employed	9 (45.0%)	11 (55.0%)	24.049*	<0.001
Government employed	0 (0.0%)	37(100.0%)		
Self employed	52(31.0%)	116(69.0%)		
Religion				
Others	3 (25.0%)	9 (75.0%)	0.029*	1.000
Christianity	58(27.2%)	155(72.8%)		
Tribe				
Others	8 (28.6%)	20 (71.4%)	0.035	0.853
Igbo	53(26.9%)	144(73.1%)		
Number of children				
1-2	28(28.3%)	71(71.7%)	13.764	0.001
3-4	13(15.7%)	70(84.3%)		
5 and above	20(46.5%)	23(53.5%)		
Gestational age of current pregnancy (weeks)				
≤35	12(30.0%)	28 (70.0%)	0.205	0.650
>35	49(26.5%)	136(73.5%)		

* Fisher's exact test used

The study found that occupation and number of children significantly (P<0.005) influenced clinic attendance, with government-employed individuals attending more than self-employed and unemployed individuals. Those with 3-4 children attended more. Age, education, religion, tribe, and pregnancy age had no significant (P>0.005) impact (Table 3a).

Table 3 (b): Binary logistic regression of the relationship between demographic data of the respondents and attendance to PN clinic

Demographic Data	Coefficient	S.E. of Coefficient	P-value	Odd Ratio	95% C.I. for Odd Ratio
Number of children					
1-2 (*ref*.)					
3-4	0.746	0.394	0.048	2.109	1.074-4.569
5 and above	-0.786	0.389	0.043	0.456	0.213-0.977

The demographic variables that were significantly related to PN clinic attendance in Table (3b) were subjected to binary logistic regression to ascertain their magnitude of relationship using the first option as the reference value. The number of children of the respondents was significantly related to PN clinic attendance ($P<0.05$). This is an indication that the respondents with 3-4 children were 2 times more likely to attend PN clinic than those with 1-2 children (OR=2.11, 95% C.I. for OR=1.074-4.569). However, the respondents with 5 or more children were 2.2 times less likely to attend than those with 1-2 children (OR=0.46, 95% C.I. for OR=0.213-0.977).

Table 3c. Services utilized by the respondents during postnatal clinic attendance

Services Received During PN Clinic Attendance	**No of Respondents (N=164)**	**Percentage**
Giving baby immunization	145	88.4
Checking of vital signs	131	79.9
Inspection of birth canal	101	61.6
Listened to health talk e.g. about breastfeeding, perineal care..	68	41.5
Baby's cord care	53	32.3
Checking of blood level in lab (if prescribed)	37	22.6
Reported any postpartum related problem to health care provider	35	21.3
Tetanus toxoid immunization for the mother (continuation)	26	15.9
Inspection of episiotomy site/tear (if given) to rule out infection	13	7.9

** Multiple responses allowed

The study found that 88.4% of 164 pre-intervention postnatal clinic attendees received baby immunization, 79.9% had vital signs checked, and 61.6% received birth canal inspection. Other services included health talks, baby's cord care, and lab checks, reporting postpartum issues, tetanus toxoid immunization, and episiotomy site inspection (Table 3c).

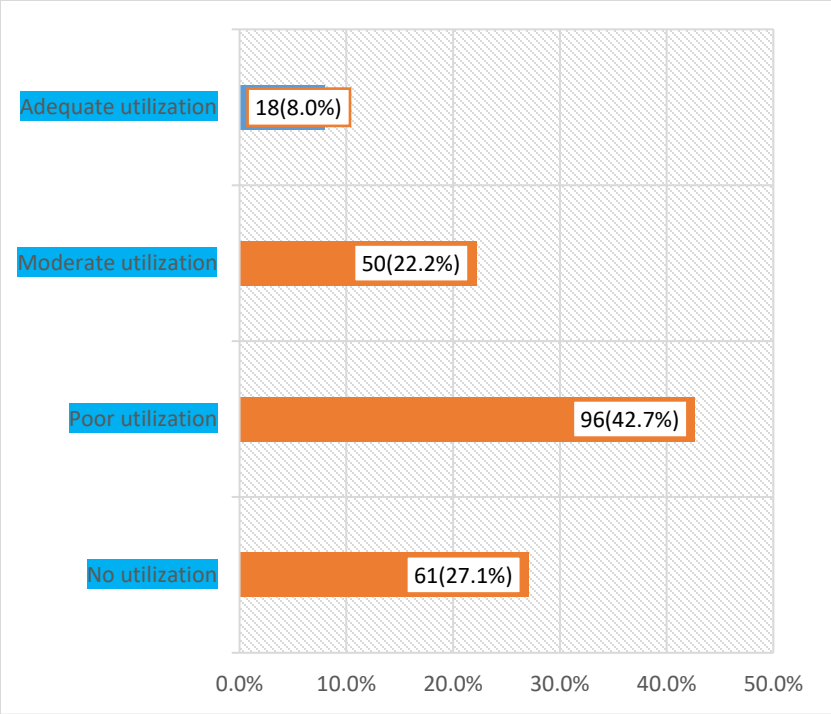


Figure 1. A bar chart showing percentage level of utilization of PNC services by the respondents

Responses from Figure 1 showed the percentage responses on the level of utilization of PNC services. Out of the 225 respondents in the pre-intervention for this study, 61(27.1%) of them did not utilize PNC services at all, 96(42.7%) of them had poor utilization of PNC services, while 50(22.2%) of them moderately utilized PNC services, and only 18(8.0%) of them adequately utilized PNC services.

Table 4. Willingness to utilize PNC services among the pregnant mothers attending rural health facilities in Ebonyi State, Nigeria

SN	Items	Yes	Not Sure	No	N	Mean	SD	Decision
a.	Willing to attend postnatal clinic after subsequent delivery.	156	41	19	216	2.63	0.64	Accepted
b.	To attend within $1^{st}/2^{nd}$ day after delivery.	145	33	38	216	2.50	0.78	Accepted
c.	Attend 4 times during postnatal period. (i.e. within first 24 and 48 hours, at 2weeks, and at 6weeks postpartum)	72	27	117	216	1.79	0.91	Rejected
d.	Utilize postnatal care services such as participating in health talks on exclusive breastfeeding, family planning, maternal immunization (T.T. continuation).	189	12	15	216	2.81	0.54	Accepted
e.	Accept inspection of birth canal to rule out infection and confirm that organs have gone back to their non-pregnant state.	173	17	26	216	2.68	0.68	Accepted
f.	Report any illness during postnatal period.	191	14	11	216	2.83	0.49	Accepted
g.	Accept to check my blood or any laboratory investigation if prescribed.	154	49	13	216	2.65	0.59	Accepted
h.	Bring baby for immunization.	181	11	24	216	2.73	0.65	Accepted
i.	Keep to appointment schedule strictly.	86	22	108	216	1.90	0.94	Rejected
	Mean of means					**2.50**	**0.39**	

Discussion

This study was carried out to determine the effect of postnatal care-supportive education on the willingness **to** attend postnatal clinics and utilization of postnatal care (PNC) services among pregnant mothers attending rural health facilities in Ebonyi State. The study was carried out using sample sizes of 225 and 216 for pre-and post-intervention stages respectively. Postnatal care system is described as a branch of maternal and child health care that plays a major role in the survival of mother and newborn which can lead to reduction in maternal and newborn mortalities. Postnatal care is a crucial aspect of maternal and child health care, ensuring the survival of mothers and newborns and potentially reducing mortality rates. Research on its status, utilization, and factors hindering or encouraging it can help improve health policies in sub-Saharan countries like Nigeria.

The study reveals that only 10.7% of respondents attempted tertiary education, indicating a low level of education among women in rural Nigeria and other SSA countries. This low educational background is a major reason for poor or non-utilization of maternal healthcare services. Out of the 225 respondents in the pre-intervention phase, 94.7% were Christians, likely due to their location in Ebonyi State, Iboland, where Christianity is the predominant religion. This is in contrast to a similar study in Niger State, Nigeria, which revealed 73.6% of respondents as Muslims. The study also discusses respondents' knowledge using binary logistic regression statistics.

The study found that mothers attending antenatal care (ANC) in rural health facilities in Ebonyi State showed a good willingness to utilize postnatal care (PNC) services during their deliveries. They were willing to attend health talks, undergo laboratory investigations, and inspect the birth

canal at the 6th week to ensure genital organs return to their non-pregnant state. However, they showed poor willingness to attend postnatal clinics four times during the six-week period and to keep appointments according to schedule. The study suggests that supportive education on PNC services, including types, benefits, and dangers associated with non-utilization, can improve their utilization. Nurse midwives should arrange proper health education during clinic visits to help mothers identify postpartum health problems early and provide appropriate treatment on time. The study differs from a previous study, which found poor willingness to utilize PNC services among women of child bearing age in Kwara State, Nigeria. Differences in study areas and design may have influenced the results. The study also found that mothers still have issues with the number of days to visit PN clinics for checkups and appointments. The World Health Organization's recommendation of four visits per six weeks is not implemented, and government, non-governmental, and health professional efforts are needed to address this issue.

Conclusion

The aim was to ascertain the effects of PNC-supportive education on the willingness and utilization of PNC services among pregnant mothers in rural Ebonyi State for improvement on PNC services utilization and reduction of maternal and infant morbidities and mortalities.
Mothers demonstrated very poor utilization. Only 8.0% had adequate utilization of PNC services.

Majority of them had either what was described as poor utilization or no utilization at all.
Willingness to utilize PNC services subsequently: at post intervention phase, the respondents' willingness to utilize PNC services in subsequent childbirth was rather assessed. The mothers demonstrated a good level of willingness to utilize PNC services subsequently. Out of 9 items used in assessing the mothers' willingness, 7 were accepted and only two rejected. The relatively high level of willingness to utilize PNC services by the mothers could probably be as a result of the supportive education they received during the study period. To this effect continuing such teaching during any maternal and child health clinic sessions will help to improve utilization and subsequently reduce maternal morbidity and mortality

It can therefore be concluded that only a very few mothers utilized PNC services adequately; while a good number of them did not attend PN clinic at all; those who attended came only once which does not imply utilization.

Postnatal care-supportive education during ANC most probably influenced positively the mothers' willingness to utilize PNC services in future.

Recommendation

Health professionals should organize workshops and seminars to raise awareness about maternal and child health services, particularly postnatal care, among rural mothers. The health education unit and the State Ministry of Health Ebonyi State should support rural healthcare workers in

disseminating health information, reducing maternal and infant deaths. The government should create job opportunities and train rural women for financial empowerment. Free maternal health care services can also help reduce morbidities and mortalities.

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Competing interests

The authors declare that they do not have any conflicts of interest.

Ethics approval and consent to participate

Ethical clearance for this study was obtained from the Research and Ethics Committee of Ebonyi State University informed consent was obtained and confidentiality ensured (**EBSU/DRIC/UREC/Vol./06/011**).

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