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Evaluation of Health Facilities Capacity for the Management of Severe Preeclampsia and Eclampsia in Bayelsa State, Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Background: The lack of properly-stocked facilities with basic and essential equipment and supplies as well as clinical guidelines required to successfully manage Pre-eclampsia/eclampsia (PE/E) has been reported in developing, low-income countries. It is necessary to ensure properly stocked health facilities for effective health care delivery. This study set out to assess the capacity of the health facilities in Bayelsa, Nigeria for the management of cases of eclampsia.
Methods: A descriptive design was used in the conduct of this research in which 155 workers were recruited. A multi-stage sampling technique was employed to select health facilities for the study. The study instruments included a self-administered structured questionnaire, an interview guide, and an inventory checklist. Data entry, cleaning and analysis were done using the Statistical Package for Social Sciences (SPSS) version 22. Descriptive and inferential statistics were generated using the data.
Results: It was found in this study that though $MgSO_4$ was present in one (8.33%) primary and two (66.6%) secondary health facilities visited, no guide on how to administer and monitor the patients was available. The majority of the workforce in the primary health facility were the CHEW/CHO (48%), followed by midwives (16.9%) and then nurses (12.3%).Doctors constituted 7.7% while

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pharmacists and pharmacist technicians constituted 6.2% and 9.2% respectively.
Conclusion: In conclusion, this study revealed that facilities assessed lacked most of the basic and essential equipment, supplies and drugs, required for the successful management of PE/E. For effective management of cases of eclampsia, it is very essential that there should be a continuous supply of necessary tools, drugs and functioning equipment needed for the management of PE/E in all health care facilities.

Keywords: Evaluation; eclampsia; management; health facilities.

1. INTRODUCTION

As much as 99% of maternal deaths occur in developing countries, with about 66% of these occurring in sub-Saharan Africa [1]. Women in these two regions are less likely than women in other regions to be seen by a health care provider at least four times during their pregnancy, and they were also less likely to be attended by skilled health personnel during childbirth [2]. Pre-eclampsia/eclampsia (PE/E), one of the leading causes of maternal mortality in low and middle-income countries claims the lives of an estimated 63,000 women worldwide each year [1,3-6]. Pre-eclampsia and eclampsia (PE/E) which are pregnancy-related hypertensive disorders, are consistently cited as leading causes of maternal morbidity and mortality in Nigeria [7-8]. A nationwide cross-sectional survey found out that preeclampsia and eclampsia are the leading causes of maternal mortality in Nigeria [9-10]. In addition to maternal morbidity and mortality, PE/E can also increase the likelihood of preterm birth or stillbirth [7]. The morbidities due to PE/E are preventable through timely detection and management of complications during and after pregnancy [10].

Pre-eclampsia is associated with high risks of maternal complications such as abruptio placenta, premature delivery, disseminated coagulopathy, pulmonary oedema, acute renal failure, eclampsia, liver failure, haemorrhage, and maternal death. It is also associated with higher risks of adverse perinatal outcomes such as low birth weight, intrauterine foetal growth restriction, hypoxia-neurologic injury and foetal death. Pre-eclampsia also impacts the social and economic life of a pregnant woman. In addition, infants who are born after a pregnancy complicated by preeclampsia are at increased risk of metabolic syndrome, stroke and cardiovascular disease later in life [11]. Most of these complications occur in low- and middle-income countries, where women frequently lack access to quality perinatal care and may delay seeking health care [11]. As at 2017, in the sub-Saharan Africa Region, only 59% of the births were attended to by skilled health personal [12]. In Nigeria, approximately 34% of pregnant women do not receive antenatal care, putting them at higher risk of maternal mortality [13].

Consequent on the above, countries in Africa and many developing countries fell far short of the standards set by WHO's initiative on safe motherhood. Therefore, another target, the millennium development goal (MDG) was set for the reduction of maternal mortality with 2015 as the target year to reduce it by three quarters of what it was in the year 2000. However, this was still not attainable by most countries in 2015, which led to the development of the Sustainable Development Goal 3 (SDG3) with one of its targets being the reduction of maternal mortality ratio to less than 70 per 100,000 live births by 2030 [2,14]. Maternal complications and poor perinatal outcome are highly associated with non-utilisation of antenatal and delivery care services and poor socioeconomic conditions of the patient, with poorer outcomes in unbooked than booked patients [15-16].

Williams et al. [17] in Bangladesh conducted a retrospective study and discovered that management of PE/E posed a challenge in low- and middle-income countries due to lack of basic supplies, health worker shortages, limited competencies of frontline providers and system challenges. They noticed that patients did not receive timely treatment due to delays in making the decision to seek care, delays during transportation to receive care and delays in receiving the required treatment at the care site where it is available. Sotunsa et al. [18] in their study in Ogun state, Nigeria, found out that although community health workers had good knowledge of preeclampsia and could diagnose and refer a patient adequately, they had certain deficiencies in their "standing order". One of such was the restriction from administering any form of treatment to PE/E patients before referral which inadvertently increased the time interval between presentation of the patient to a health facility and reception of adequate care [18].

Quality emergency obstetric service has been stated as consisting of both the provision of an equipped health facility and adequately trained staff [8]. In studiesundertaken in Sokoto and Bauchi, in Nigeria, it was discovered that the facilities studied lacked the basic and essential equipment and supplies including electricity, water, $MgSO_4$, and clinical guidelinesprovided by the Federal Ministry of Health [19]; required to successfully manage PE/E [8]. Magnesium sulphate ($MgSO_4$) has been identified as having a superior efficacy in the treatment of severe preeclampsia and eclampsia when compared with anti-convulsants [20-21]. Its use has thus been adopted by the Federal Ministry of Health in Nigeria as part of its guidelines for the management of PE/E [19] Similar to other studies, it was noticed that intervention need not end in the facility but should involve the community, which also had peculiar factors responsible for poor health seeking behavior and thus preventing early management of PE/E [8]. Considering that these challenges are peculiar to developing countries and not uncommon in Nigeria, it could also be a problem among health facilities in Bayelsa state. Therefore, the need arose to conduct an assessment of the capacity of health facilities to effectively manage cases of eclampsia across the three levels of care in the state.

This study aimed at identifying the gaps in health care services across the three levels of care in Bayelsa state, which would be the basis for initiating strategies and policies targeted at the prevention and adequate management of preeclampsia-eclampsia and its sequelae. This study alsosought to discover the peculiar challenges of the tertiary health facility in caring for patients with PE/E. Knowing the issues involved in managing patients adequately with severe preeclampsia/eclampsia can help sensitize the government, serve as an advocacy tool to government and philanthropists to promote obstetric care of women in Bayelsa state.This study was thus conducted and guided with the objective of describing the capacity of the health facilities in Bayelsa state, Nigeria, for the management of cases of preeclampsia / eclampsia.

2. MATERIALS AND METHODS

A descriptive design was used in the conduct of this research assessing the preparedness of health facilities in offering quality care to patients with severe preeclampsia and eclampsiain Bayelsa state. The unit of analysis were health facilities where severe pre-eclampsia and eclampsia were managed in the three senatorial districts of the State. Sample size for the quantitative aspect of the study was calculated using the sample size formula for descriptive studies [22]. The sample size was adjusted to compensate for non-response, using a non-response rate of 10%. Altogether, a total of 155 workers were recruited for the quantitative part of the study. For the qualitative aspect, using purposive sampling, 29 health facility managers were selected for the in-depth interviews, 2(two) from each facility.

A multi-stage sampling technique was employed to select health facilities for the study.Health facilities were selected from the three senatorial districts that comprise Bayelsa state. In stage 1, Ogbia local government area (LGA) was selected from the 3(three) LGAs in Bayelsa East senatorial district, Kolokuma/Opokuma LGA from Bayelsa Central senatorial district and Sagbama LGA from Bayelsa West senatorial district by simple random sampling (balloting). From each of the selected local government areas, one general hospital was selected for the study by simple random sampling (stage 2). From all the primary health centres referring patients to the selected General hospitals, 4 primary health centres were selected by simple random sampling (Stage 3). Finally, by simple random sampling (Balloting), the Federal Medical Centrewas chosen for the study from the two (2) tertiary healthcare facilities that are in the State. Healthcare providers in the employ of these selected facilities were recruited for the quantitative part of the study.

The study instruments included a self-administered structured questionnaire and an inventory checklist for supplies, drugs and equipment. The structured questionnaire was pretested in one primary, secondary and tertiary healthcare centres. The review of the responses from health workers during the pre-test of the questionnaire led to adjustments in some sections of the questionnaire to ensure clarity and to elicit appropriate responses from study respondents.

Six research assistants were recruited and trained for the study. The training exposed the research assistants to the objectives and methods of the study. They were trained on the administration of the study questionnaire, the use of the interviewer guide, recording of the

interview and how to apply the inventory checklist to ensure that the data collection was systematic and consistent. They were also trained on how to obtain an informed consent from respondents and observe the ethics of medical research. The training was conducted by Experts from the Public health department of the Federal Medical Centre, Yenagoa. The training was followed by a field trial by the trainees supervised by the Public health experts and the principal Investigator before data collection commenced for the actual study.

Respondents were given the questionnaires by the principal investigator and the research assistants to fill after the objectives of the study were explained and informed consent was obtained. They were encouraged to fill the questionnaire as soon as possible and return to the research assistants. Respondents were assured of confidentiality of the information provided, which encouraged them to respond sincerely to the questions in the study instrument. The questionnaires were checked for completeness of response and respondents were also encouraged to give answers to any question they might have omitted and if they did not, their right to decline answering questions from the questionnaire was respected. The inventory checklist was administered in the different facilities after informing the officer in charge and fixing an appointment he or she was comfortable with. The checklist was administered in the antenatal clinic or wards (where applicable), labour wards (where applicable) and the pharmacy/drug store to sight and quantify commodities, materials and equipment needed in the management of severe PE/E.

All data collection was done using laid down ethical principles. Data entry, cleaning and analysis was done using the Statistical Package for Social Sciences (SPSS) 22.0 version. Categorical variables were summarized as frequencies and percentages while continuous variables were presented by the most appropriate measures of central tendency and dispersion.

3. RESULTS

One hundred and sixty questionnaires were given to the health care workers and one hundred and fifty-five questionnaires were returned with responses giving a response rate of 96.8%. However non-response rate to different items (item non-response rate) on the study questionnaire ranged between 0.6 – 15.5%.

3.1 Sociodemographic Characteristic of Respondents

Of the 155 respondents in this study, majority were female (66.5%). The mean age of the respondents was 34.9±7.6 years. 41.9% were aged between 31-40 years and most of the respondents were married (56.1%). Nurses constituted the highest proportion (40.0%) of respondents, followed by doctors (37.4%) and the remaining were the CHEW/CHO (22.6%). Majority worked at the tertiary level of healthcare (44.5%), followed by the primary level of healthcare (36.8%). The mean post-qualification working years was 8.98±7.58 years, with 33.5% of them having 6-10 years working experience. These details are shown in Table 1.

3.2 Current Practice in the Management of PE/E in Public Health Facilities

Though $MgSO_4$ was present in one (8.33%) primary and two (66.6%) secondary health facilities visited, no guide on how to administer and monitor the patients was available. This is shown in Table 2.

3.3 Equipment and Drugs

At the time of the survey, the following equipment and drugs: Sphygmomanometer, Stethoscope, uristix, $MgSO_4$, calcium gluconate, intravenous cannula and urethral catheter were available in 10(62.5%), 15(93.8%), 8(50%), 1(6.3%), 1(6.3%), 13(81.3%) and 8(50%) respectively in the labour ward of health facilities visited. Ten ml and/or twentyml syringes were present in only 15 (93.8) of health facilities. $MgSO_4$ and calcium gluconate were present in only one primary centre Table 3.

3.4 Human Resources

The majority of the workforce in the primary health facility were the CHEW/CHO (48%), followed by midwives (16.9%) and then nurses (12.3%). General practice doctors constituted 7.7% while pharmacists and pharmacist technicians constituted 6.2% and 9.2% respectively. In the secondary health facility,nurses constituted the majority of the health workforce (33.3%), followed by midwives (28.2%). General practice doctors made up to 11.5%, and at this level the pharmacist

Table 1. Sociodemographic characteristic of respondents

Variable	Frequency N = 155 (%)
Gender	
Male	52(33.5)
Female	103(66.5)
Age Group	
21 – 30 years	55(35.5)
31 – 40 years	65(41.9)
41 – 50 years	30(19.4)
51 – 60 years	5(3.2)
Mean Age of Respondent – 34.9 ± 7.64 years	
Marital Status	
Single/Divorced/Widow(er)	68(43.9)
Married	87(56.1)
Occupation	
Nurse	62(40.0)
Doctor	58(37.4)
CHEW/CHO	35(22.6)
Level of Care	
Primary	57(36.8)
Secondary	29(18.7)
Tertiary	69(44.5)
Post Qualification working years	
Less than 1 year	10(6.5)
1 – 5 years	49(31.6)
6 – 10 years	52(33.5)
Greater than 10 years	44(28.4)
Mean Post Qualification working years – 8.98± 7.58 years	

CHEW- Community health extension worker, CHO- Community health officers

Table 2. Distribution of managerial materials at the facility level supporting the care of Severe PE and eclampsia

Variable	Total N =16 (%)	Primary N=12 (%)	Secondary N = 3 (%)	Tertiary N = 1 (%)
Was $MgSO_4$ in stock on visiting day	4 (25.0)	1 (8.33)	2 (66.6)	1 (100.0)
Did Guide explain $MgSO_4$ Use	1 (6.3)	0 (0.0)	0 (0.0)	1 (100.0)

Table 3. Availability of equipment and consumables for the care of Severe Preeclampsia and eclampsia at the facility level

Equipment/Consumables	Total N =16 (%)	Primary N=12 (%)	Secondary N = 3 (%)	Tertiary N = 1 (%)
Sphygmomanometer	15 (93.8)	11 (91.8)	3 (100.0)	1 (100.0)
Stethoscope	16 (100.0)	12 (100.0)	3 (100.0)	1 (100.0)
Uristix	12 (75.0)	8 (66.7)	3 (100.0)	1 (100.0)
Sphygmanometer in labour ward	10 (62.5)	7 (58.3)	2 (66.7)	1 (100.0)
Stethoscope in labour ward	15 (93.8)	11 (91.8)	3 (100.0)	1 (100.0)
Uristix in labour ward	8 (50.0)	7 (58.3)	1 (33.3)	0 (0.0)
Is $MgSO_4$ in Labour ward	1 (6.3)	1 (8.3)	0 (0.0)	0 (0.0)
Is calcium gluconate present	1 (6.3)	1 (8.3)	0 (0.0)	0 (0.0)
Intravenous Canula	13 (81.3)	10 (83.3)	3 (100.0)	0 (0.0)
10ml or 20 ml Syringe	15 (93.8)	11 (91.8)	3 (100.0)	1 (100.0)
Urethral catheter	8 (50.0)	6 (50.0)	2 (66.7)	0 (0.0)

Table 4. Health workforce distribution across selected health care facilities in Bayelsa State

Health Worker	Level of Healthcare Facility		
	Primary N = 65 (%)	Secondary N = 78 (%)	Tertiary N = 248 (%)
Obstetrician	0 (0.0)	1 (1.3)	20 (8.1)
General Practitioner	5 (7.7)	9 (11.5)	50 (20.2)
Midwives	11 (16.9)	22 (28.2)	82 (33.1)
Nurses	8 (12.3)	26 (33.3)	82 (33.1)
CHO/CHEW*	31 (47.7)	6 (7.7)	0 (0.0)
Pharmacist	4 (6.2)	5 (6.4)	11 (4.4)
Pharmacy Technician	6 (9.2)	9 (11.5)	3 (1.2)

**CHEW- Community health extension worker, CHO- Community health officers*

technician constituted 11.5%. The CHEW/CHO made up to 7.7%, Obstetricians 1.3% and the remaining (6.4%) were pharmacists. In the tertiary facility, the highest were the midwives and nurses (33.1% each). The general practice doctors at this level made up to 20.2%, the Obstetrician 8.1%, Pharmacist 4.4% and the Pharmacist technician constituted the remaining (1.2%) in the tertiary facility Table 4.

4. DISCUSSION AND CONCLUSION

In this study that assessed the capacity of health facilities to manage cases of severe pre-eclampsia and eclampsia in Bayelsa State, it was found that the facilities assessed lacked most of the basic and essential equipment and drugs, all of which are required for the successful management of PE/E. This is similar to findings from a study by Ansari et al. [23] in Afghanistan. Consequently, these facilities are functionally incapable of detecting, preventing or treating PE/E effectively. In this study, only 6.3% of the facilities visited had $MgSO_4$ readily available in the labour ward which is worse than that reported by Adoyi et al. [24] who found out that a little more than one-third (34%) of health facilities had $MgSO_4$ available in the labour and maternity units. Also, Smith et al. [25] in their survey discovered that out of the nine countries that reported non-availability of $MgSO_4$, six of them were African countries.Continuous availability of $MgSO_4$ especially in the labour ward is critical to arrest convulsions in eclampsia and to prevent progression from severe pre-eclampsia to eclampsia; the latter of which is associated with more fatal outcomes for mothers and newborns [26-27]. The ready availability of adequate equipment, supplies and drugs is an important factor for the effectiveness of the management of obstetric complications. Also, it is illogical to manage preeclampsia without the necessary drugs and equipment. Ensuring availability of essential equipment and supplies including $MgSO_4$ will certainly contribute to reducing maternal mortality in Bayelsa State.

It was noticed in this study that inventories of basic essential equipment and supplies, for the management of PE/E were not routinely used or were unavailable. Other studies had found a similar lack of infrastructure in both primary and secondary facilities in Nigeria [28]. Salomon et al. [29] also noticed PHCs scored significantly lower than secondary health centres in almost all aspects of inventory and infrastructure. Despite their limited capacity to manage obstetric emergencies, PHCs should play a vital role in advising women on danger signs of obstetric complications, detecting these complications (including pre-eclampsia and eclampsia) early. Along with prompt detection should be referral of these women to general or specialist hospitals in a timely manner after initial stabilizing care, such as administration of a loading dose of $MgSO_4$ [29]. This study also found out that only 62.5% and 93.8% of the health facilities had functional blood pressure measuring machines and stethoscopes respectively in the labour wards. Other authors have also reported similar results regarding availability of these equipment [23].

Current practice in the management of severe PE/E in Bayelsastate is not uniform and depends largely on the centre involved. The inventory checklist used in the study further shed light on the abysmal state of preparedness of the health facilities in the management of severe PE/E. The primary and secondary health facilities were not prepared to manage severe PE/E as there was no stock management records and no local or national guidelines present in majority of the health facilities visited. Pregnant women with PE/E were usually referred immediately from the primary and occasionally secondary health facilities to the tertiary health facility. The primary and secondary health facilities (if incapable of managing the patient with severe PE/E) are

supposed to quickly resuscitate and administer the loading dose of $MgSO_4$ before referral. This simple step has been shown to reduce mortality due to this obstetric emergency since most of the mortalities associated with severe PE/E are those seen greater than 12 hours after the last fit [30]. Hence, the earlier a pregnant woman with severe PE/E receives $MgSO_4$ to prevent further fits and its complications, the better the outcome of the management of severe PE/E especially in a place like Bayelsa state where most communities are surrounded by water and means of transportation is difficult or completely unavailable. When these boats (the means of transportation in the riverine areas) are available they are sometimes unaffordable for these women and their families, which is more reason why the PHCs in these areas should be well equipped and adequately staffed to manage this obstetric emergency. In conclusion, this study revealed that facilities assessed lacked most of the basic and essential equipment, supplies and drugs, all of which are required for the successful management of PE/E. For effective management of these kinds of maternal emergencies, it has been recommended that there should be regular training of service providers on PE/E management and post-training supportive supervision [8]. It is also very essential that there should be a continuous availability of necessary tools, drugs and functioning equipment needed for the prompt diagnosis and management of PE/E in all health care facilities. This is needed to empower health care providers especially those in the primary and secondary health facilities to enable them handle obstetrical problems. This will help to expedite referral in rural pregnant women.

CONSENT

Respondents were given the questionnaires by the principal investigator and the research assistants to fill after the objectives of the study were explained and informed consent was obtained

ETHICAL APPROVAL

Approval for the study was obtained from the ethical committee of the Federal Medical Centre, Yenagoa and the Bayelsa State Ministry of Health.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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