

## Clinical Audit of Quality of Intrapartum Care in a State University Teaching Hospital, Enugu, Southeast, Nigeria

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### Abstract

**Objectives:** To assess the quality of intrapartum care in Enugu State University Teaching Hospital, Enugu.

**Methods:** This retrospective clinical audit on intrapartum care quality indicators in the birth, newborn, intensive care unit and theatre registers was undertaken from January 1, 2010 to December 31, 2014. Data was analyzed using excel 2007 software and has been presented using percentages.

**Results:** A total of 5211 women delivered 5385 babies (including 174 twins). Majority of the women were of ages between 20-35 years (3995/5211, 76.7%), parity 2-4 (3001/5211, 56.7%) and booked (3731/5211, 71.6%). Preterm delivery (<37 weeks) occurred in (781/5211, 15.0%). Vaginal and caesarean deliveries occurred in (3495/5211, 67.1%) and (1533/5211, 29.4%) respectively. The commonest indication for caesarean delivery was previous caesarean delivery. Instrumental vaginal delivery was performed in (8/5211, 0.2%). Third or fourth perineal tear occurred in (8/3495, 0.2%). There was postpartum hemorrhage (>1000 mls) in (45/5211, 0.9%) women. Eclampsia (40/5211, 0.8%) and obstetric intensive care unit admissions (30/5211, 0.6%) were documented. Fifteen maternal deaths (15/5211, 0.3%) occurred giving a maternal mortality ratio of 292/100000 live births. The commonest cause of maternal death was postpartum-eclampsia. Apgar score <7 at 5 minute occurred in (531/5385, 9.9%) while 319 babies (319/5385, 9.0%) were admitted to newborn intensive care unit. The stillbirth rate was (256/5385, 4.8%). The neonatal death and perinatal mortality rates for 2012 to 2014 were (25/3314, 0.8%) and (194/3314, 5.9%) respectively.

**Conclusion:** Regular audits of intrapartum care quality indicators are essential for early detections of areas of poor-quality that demand immediate improvements to avoid further fetomaternal harms.

**Keywords:** Audit; Quality; Intrapartum care; Enugu

### Introduction

Majority of the high fetomaternal morbidities and mortalities in sub-Saharan Africa occur around the intrapartum period. These morbidities and mortalities, although unpredictable, are treatable when diagnoses are made early and appropriate treatments are given as in developed countries of the world. The major causes of these high morbidity and mortality are severe pre-eclampsia and eclampsia, uterine rupture, obstetric haemorrhage, prolonged/obstructed labour and unsafe abortion [1,2].

Quality antenatal care that is backed-up with quality intrapartum care can prevent most of these calamities. Institute of Medicine defined quality healthcare as care that is safe, effective, efficient, timely, equitable and patient-centered [3,4]. Quality antenatal care should have the above attributes. Quality antenatal care should foster friendly relationship between the couple (mother and father) and the health care provider that will encourage skilled attendance at birth and make the mother, and other family members prepared and ready for obstetric emergencies. It can identify pre-existing health conditions by checking weight and nutrition status, anemia, hypertension, syphilis, hepatitis and Human Immunodeficiency Virus (HIV) infections [5]. It can also detect early complications that may arise during pregnancy like pre-eclampsia and gestational diabetes. It should provide breast feeding and family planning counseling and prevent diseases like tetanus and malaria.

Quality intrapartum care also should provide active management of labor with partograph, and comprehensive emergency obstetric care services like parenteral antibiotics, uterotonic drugs, anticonvulsants, manual removal of retained placenta, operative deliveries and blood transfusion. Prompt referrals to adult and newborn intensive care units are also important components of a quality intrapartum care. Unfortunately, these services are not available in most rural communities of developing countries and even when they are available, the qualities of the services are very poor. The result is the unacceptable high maternal morbidity and mortality in developing countries like Nigeria

Globally, 3,400,000 maternal deaths, 2.7 million stillbirths and 3.1 million neonatal deaths occur each year with almost all of them occurring in the developing countries. In sub-Saharan Africa, a woman's lifetime risk of dying in childbirth can be as high as 1 in 16 while that of the developed countries is 1 in 2800. Majority of the deaths occur around the delivery period [6-8].

It is known that Nigeria constitutes 1.7% of the world population but contributes 10% of the global burden of maternal deaths. The maternal mortality ratio in Nigeria ranges from 2151 in Sokoto, 963 in Ibadan to 625 per 100 000 live births in Enugu [9-12].

Many instruments have been developed to evaluate quality of care in different environments including obstetric services. These include evaluation of provider's knowledge and attitudes in specific cases, evaluation of care based on medical charts (clinical audits) and direct observation of service providers during an episode of care [4,13,14]. Clinical audits of medical records are often used to evaluate the quality of obstetric care. The validity and reliability of this method are, however, uncertain as medical records and registers are often incomplete or missing [15,16].

Measuring the quality of obstetric services enables us to identify areas that need immediate improvements through trainings and policy

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changes. Quality improvement demands we measure only what we can improve upon [17]. The parameters we measure should be simple, understandable and the relevant results must be timely available to front-line staff, health planners and administrators for them to quickly effect changes that will prevent further harm [18-21]. This is regularly done in some countries now as maternity dashboards [8-12]. Maternity dashboard enabled an otherwise unrecognized adverse trend in a perinatal outcome to be detected and the problem was addressed by a training intervention [22].

Assessment of quality of intrapartum care has not been carried in ESUTH, Enugu. The aim of the author is to fill this gap in knowledge and use the results as baseline quality indicator benchmarks to initiate and drive continuous quality improvement measures in the department that will enable us to detect on time areas of poor quality so as to prevent further harm.

## Materials and Method

### Setting

Enugu State University Teaching Hospital (ESUTH) Enugu is a state owned health institution that evolved from Nursing Home in 1930 for the colonial masters to a teaching hospital status in June 2006 [23]. It is located in the center of Enugu metropolis and most of the population are Christians and of the Igbo tribe. ESUTH provides antenatal care and comprehensive emergency obstetric services [24]. In 2009, the department of Obstetrics and Gynecology was accredited to train resident doctors for West African College of surgeon's fellowship examinations. The department has two professors, a reader, 7 consultants, 3 senior registrars, 17 registers, house officers, and 45 staff nurse midwives. The obstetric unit has 42 beds with an average of 1250 deliveries annually. Pregnant women in labor, irrespective of their booking status, are admitted to the labor ward without restrictions. Some of the women had accessed traditional birth attendant care before presentation as emergencies. The department holds a monthly mortality audit during which adverse feto-maternal outcomes are critically evaluated by the doctors and senior nurses in the department. Unfortunately, measureable and achievable quality indicator targets that will drive and initiate policy changes and continuous quality improvement were not set at the mortality audit conferences.

### Method

A modified WHO adapted Zimbabwean maternity dashboard parameters and Sibanda, et al. intrapartum care quality indicators were used to audit the quality of intrapartum care in ESUTH (Appendix A) [25,26] The demographic profiles and intrapartum quality indicators available in the routinely collected data from the birth, newborn, intensive care unit and theatre registers from January 1, 2010 to December 31, 2014 were extracted manually. The intrapartum quality indicators used in this study include the number of: women delivered, births >28 weeks, multiple births, and percentages of preterm delivery, caesarean section, instrumental delivery, episiotomy, third or fourth degree perineal tear, postpartum hemorrhage >1000 mls, preeclampsia and eclampsia, obstetric intensive care unit admission, women who died, neonates with 5 mins Apgar score <7, and neonates admitted to newborn intensive care unit. The rates of stillbirths (fresh and macerated), neonatal death, and perinatal mortality were assessed. Quality indicators like induction of labor, percentage of term neonates (>37 weeks) with an Apgar score <7 at 5 minutes, and percentage of term neonates (>37 weeks) admitted to the special care baby unit that were not routinely documented in the relevant registers were

excluded from the study. Two medical doctors, who were trained by the author, extracted manually the above parameters from the available large volumes of registers. The parameters were entered in excel 2007 software, analyzed and presented using percentages.

### Ethical clearance

It was obtained from the ESUTH ethical committee on January 8, 2015 when the study was about to commence. The author funded the research and has no competing interests to declare.

### Results

Table 1 showed a total of 5211 women delivered in the facility within

Age in years	Number	Percentage
<20	172	3.3
20-35	3995	76.7
>35	539	10.3
Not stated	505	9.7
Total	5211	100
<b>Parity</b>		
1	1729	33.2
2-4	3001	57.6
5 & above	221	4.2
Not stated	260	5
Total	5211	100
<b>Booking status</b>		
Antenatal care in ESUTH	3731	71.6
Antenatal care in other facilities	1201	23
Not stated	279	5.4
Total	5211	100
<b>Gestational age at delivery</b>		
<34	201	3.9
34-37	580	11.1
38-42	3387	65
>42	193	3.7
Not stated	850	16.3
Total	5211	100
<b>Modes of delivery</b>		
Vaginal delivery	3495	67.1
Elective caesarean delivery	1135	21.8
Emergency caesarean delivery	398	7.6
Destructive operation	7	0.13
Vacuum extraction	0	0
Forceps delivery	1	0.02
Laparotomy for uterine rupture	89	1.7
Not stated	86	1.7
Total	5211	100
<b>Estimated blood loss</b>		
<250 mls	2972	57
250--500 mls	645	12.4
500--1000 mls	145	2.8
> 1000 mls	45	0.9
Not stated	1404	26.9
Total	5211	100
<b>Perineum</b>		
Intact	2972	85.9
Episiotomy	477	13.8
3rd or 4th perineal tear	8	0.2
Not stated	3	0

**Table 1:** Distributions of Socio-demographic profiles, Gestational age, Mode of delivery, estimated blood loss and State of the perineum of the mothers.

the study period. About 3995(76.7%) of them were of ages between 20-35 years and para 2-4 3001 (56.7%). Majority of them 3731 (71.6%) attended antenatal care in ESUTH. Preterm delivery (<37 weeks) occurred in 3731 (15.0%) while term delivery (38-42 weeks) occurred in 3387 (65.0%) as shown in Figure 1. The major modes of deliveries were vaginal delivery 3495 (67.1%) and caesarean delivery 1534 (29.4%). Assisted vaginal delivery was rarely practiced. Exploratory laparotomy for ruptured uterus was performed in 89 (1.7%). Obstetric hemorrhage >1000 mls was occurred in 45/5211 of the women. The perineum was intact in 2972 (85.9%), episiotomy was performed in 477 (13.8%) while third or fourth perineal tear occurred in 8/3460 of the vaginal deliveries. The commonest indication for caesarean delivery was previous caesarean delivery.

Table 2 showed the summary of the primary outcomes of the study and compared them with the Zimbabwean study. A total of 5385 babies (including 174 multiple births) were delivered within the study period. Caesarean delivery accounted for 29.4% of the deliveries. Episiotomy and third/fourth perineal tear occurred in 13.8% and 0.2% respectively. Other intrapartum quality indicators were as shown in Table 2.

Table 3 showed the stillbirth rate was 256(4.8%); 129 were fresh stillbirths while 127 were macerated stillbirths. Majority 4295 (79.8%) of the babies had Apgar scores at 5 minutes >7 while 531 (9.9%) had score

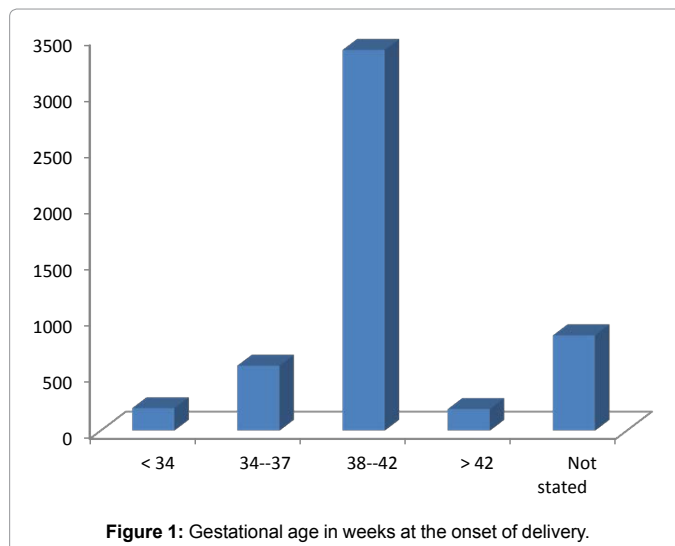


Figure 1: Gestational age in weeks at the onset of delivery.

Intrapartum Care Performance Indicators	Zimbabwean[20]		ESUTH Results
	Targets	2012	
Number of women delivered	-	10501	5211
Percentage of women who had antenatal care in ESUTH* and delivered in ESUTH*	-	-	71.60%
Number of births >28 weeks	-	-	5385
Multiple births N=174	-	1.30%	3.30%
Percentage of birth preterm delivery	-	4.10%	15.00%
Caesarean section rate	18.20%	18.10%	29.40%
Instrumental delivery rate	5.00%	1.60%	0.20%
Percentage of women who had episiotomy	-	-	13.80%
Percentage of 3 <sup>rd</sup> /4 <sup>th</sup> degree perineal tear	0.30%	0.00%	0.20%
Percentage of women who had **PPH>1000 mls	0.50%	0.00%	0.90%
Percentage of women with eclampsia N40	0.50%	0.50%	0.80%
Percentage of obstetric intensive care unit admission	-	-	0.60% (20% mortality rate)
Percentage of 5mins Apgar score <7 neonates	6.00%	6.20%	9.90%
Percentage of neonates admitted to NBICU in 2012 to 2014	17.50%	19.10%	9.20%
Total stillbirth rate	3.40%	3.30%	4.80%
Fresh stillbirth rate	0.70%	0.70%	2.40%
Macerated stillbirth rate	2.70%	2.70%	2.40%
Neonatal death rate (2012-2014 )	3.40%	3.60%	0.80%
Perinatal mortality rate(2012-2014	0.30%	0.30%	5.90%
Percentage of women who died	0.40%	0.50%	0.30% (***MMR=292/100000/ live births)
Percentage of avoidable maternal deaths	-	-	100%

Table 2: Results of intrapartum care quality indicators compared with WHO [25] targets results.

Sex	Number	Percentage
Male	2686	49.9
Female	2558	47.5
Not stated	141	2.6
Total (including 174 twin deliveries)	5385	100
Weight		
<2.5 kg	550	10.2
2.5 --3.5	3639	67.6
3.6--4.0	848	15.7
>4kg	215	4
Not stated	133	2.5
Total	5385	100
Apgar score at 5 minute		
0 (FSB)	129	2.4
0 (MSB)	127	2.4
1 to<7.0	531	9.9
>7.0	4510	83.8
Not stated	88	1.6
Total	5385	99.9
Calculations of Perinatal and Neonatal mortality rates		
		Number
Total delivery for 2012-2014		3483
Total stillbirths for 2012-2014	169	
Total live birth (3483-169)		3314
Total newborn intensive care unit admissions	319	
Total early neonatal deaths <7 days	25	
Causes of early neonatal deaths		
Neonatal sepsis	1	
Severe birth asphyxia		18
Prematurity		7
Very low birth weight		2
Disseminated intravascular coagulation	1	

Perinatal mortality rate (2012-2014)=Stillbirth+early neonatal deaths × 1000/Total live birth  
 = 169+25 × 1000/3314.  
 = 58.5/1000 live birth or 5.6% .  
 Neonatal death rate (2012-2014)=Neonatal death × 1000/Total live births  
 =25 × 1000/3314 live babies.  
 =7.54/1000 live birth or 0.8%.

Table 3: Distributions of sex, weight, Apgar scores, Perinatal and Neonatal mortality rates of the babies for 2012-2014.

Diagnosis	Number	Percentage	Outcome
Postpartum eclampsia	3	10	3 died
Eclampsia	8	26.7	1 died
Seizures	1	3.3	Died
Uterine rupture	7	23.3	All survived
Jaudince in pregnancy	1	3.3	Survived
Obstructed labour	1	3.3	Died
Postpartum haemorrhage from perineal tear	1	3.3	Survived
Sickle cell disease in pregnancy	2	6.6	Survived
Prolonged labour	1	3.3	Survived
Abruption placenta	2	6.6	Survived
Placenta praevia	2	6.6	Survived
Postpartum collapse	1	3.3	Survived
Total	30	100	6 died

**Table 4:** Obstetric intensive care unit admissions.

<7 at 5 minutes. The total newborn intensive care unit admission for 2012 to 2014 was 319 including 13 twins and 25 early (<7 days) neonatal deaths, giving a total live births of (3483 total births-169 total stillbirths) 3314 for 2012 to 2014. The neonatal death rate (25/3314 × 1000) was 7.5/1000 live births or 0.8%. The causes of the neonatal deaths were: neonatal sepsis 1 (20%), severe birth asphyxia 18 (72%), prematurity 7 (28%), very low birth weight 2(40%) and disseminated intravascular coagulopathy 1(20%). The perinatal mortality rate (stillbirth+early (<7days) neonatal deaths × 1000/ Total live birth=169+25 × 1000/3314) was 58.5/ 1000 live births or 5.9%.

Table 4 showed 30 critically ill obstetric patients 30/5211 were admitted to the intensive care unit and 6(20%) of them died. The commonest cause of death was postpartum eclampsia as shown in Table 4.

## Discussion

Clinical audit of intrapartum care quality indicators is a retrospective analysis of routinely documented medical records to detect of areas of poor-quality, and to institute quality improvement measures that will prevent further harm. What should constitute the components of the quality indicators and their targets or benchmarks for national or international performance monitoring are not well defined. Sibanda, et al. [26] advised individual units to monitor their performance over time and to look for adverse trends using local or national targets where available as was done in this discussion. The targets set at 20% below the 2012 values in Zimbabwean study appeared to be applicable to ESUTH, Enugu as the results are relatively comparable as shown in Table 2. Mpilo Central Hospital in Zimbabwe is public tertiary referral hospital in sub-Saharan Africa like ESUTH, Enugu in Nigeria.

### Maternal deaths and maternal mortality ratio

Fifteen (15/5211, 0.3%) maternal deaths occurred during the study period. This gives an institutional maternal mortality ratio (15 × 100000/5129) of 292/100000 live births. This figure 1 compared favorably to 0.4% Zimbabwean target, reported maternal mortality ratios of 1100/100000 live births in Sierra Leone, 980 in Chad, 730 in Congo Democratic Republic, 740 in Brundi, 625 in ESUTH, Enugu (2009) and the current national ratio of 576/100000 live births. The maternal mortality ratios in developed countries in 2013 were Sweden 4/100000 live births, Australia 6, Germany 7, United Kingdom 8, Canada 11 and United States 28 Maternal deaths are common in developing countries and they are still essential quality indicators in these settings unlike in developed countries where maternal death is a very rare event [12,25,27,28]. The improvement in maternal mortality ratio in this

study may be a reflection of the increase in the quality of manpower and infrastructural developments as this health institution transits to a teaching hospital status. The causes of maternal deaths in this study include eclampsia 5 (33.3%), haemorrhage 4 (26.7%) uterine rupture 3(20%), obstructed labour 1/15, seizures 1/25, and puerperal sepsis 1/25. Eclampsia and haemorrhage have remained the major causes of maternal deaths in ESUTH, Enugu as in some other institutions. These deaths are avoidable [12,29].

### Facility births

The high rate of booked facility births of 71.6% can be an index of the high quality of intrapartum care in ESUTH. It implies that most of the mothers are satisfied with both the antenatal and intrapartum services they received in the hospital. The reported Figure 1 in this study is comparable to the reported facility births of 78.1% in the same study population [27].

### Preterm delivery

Preterm delivery rate of 15.0% in this study is higher than 4.1% and 7.1% in Zimbabwe and Aba in Nigeria respectively. The fact that preterm deliveries are usually referred to hospitals with newborn intensive units like ESUTH may explain the high figure in this study [25,30].The department should critically audit the causes of these preterm deliveries and institute policy changes to reduce the incidence. Routine antenatal screening for urinary tract infection, encouraging adequate maternal rest in pregnancy and proper management of multiple pregnancies can reduce this high rate of preterm delivery.

### Caesarean delivery and instrumental vaginal delivery

In 1985, the World Health Organization (WHO) [31] stated: "There is no justification for any region to have CS rates higher than 10-15%", the reported caesarean delivery rate of 29.4% in this work is comparable to 32% in America, 27.4% in Enugu and 31.5% in Jos. It is higher than 18.1% in Zimbabwe [25]. This may be because only complicated deliveries are referred to ESUTH while normal deliveries occur in the peripheral health facilities like health centers, maternity homes and private hospitals [32-34]. Such referrals will increase the numerator and decrease the denominator and thus exaggerate the caesarean delivery rate as reported in this study. Policy changes of ensuring consultants reviewed cases before booking them for caesarean delivery, reduction in primary caesarean delivery, availability of vaginal birth after caesarean section and breech vaginal deliveries in selected cases may reduce this high caesarean delivery rate. Elective caesarean delivery accounted for 21.8% of the operative delivery in this study and this is comparable to 21.8% in Sokoto. Societal demands for improved fetal outcome and liberalization of the indications appear to be contributory to the increase in caesarean delivery [35]. Instrumental vaginal delivery of 0.2% means that many patients may have been denied of this service in ESUTH [36]. It may also be contributory to the high caesarean delivery rate in this work.

### Stillbirth rates

In 2008, 2-4 million stillbirths occurred worldwide with 98% of them occurring in developing countries. In developed countries, the rate ranges between 2 and 8.7/1000 deliveries while the rate in Pakistan was between 22.4 and 127/1000 [37,38]. A total stillbirth rate of 4.8% in this work is similar to 4.5% in Port Harcourt, [39,40] Nigeria and to the national rate of 4.2%. [37] It is, however, higher than 3.4% target in Zimbabwe. Stillbirth rate is a reflection of the qualities of antenatal and intrapartum care services [25]. Fresh stillbirth rate is especially an



index of quality of intrapartum care. Fresh stillbirth rate of 2.4% in this report is higher than 0.7% in Zimbabwe but lower than 50.9% in Port Harcourt. There may be complacency during the management of labor in this facility [25,40]. Strict implementations of active management of labor and the use of partograph may prevent most of these fresh stillbirths. The 5 minutes Apgar score of <7 of 9.9% is relatively higher than 6.0% target in Zimbabwe. This may be a reflection suboptimal care in the labor management in this facility.

### Perinatal and neonatal death rates

Perinatal mortality is the death of a fetus in utero after the age of viability (still births) and deaths of neonates within the first seven days of life [41].

It is a better indicator of quality of maternal care than neonatal health. The perinatal mortality rates in developed countries can be as low as 10 per 1000 [42]. In Nigeria the rates ranges from 39 to 130 per 1000 [42,43]. With 25% of fetal deaths in occurring during the intrapartum period, the causes of perinatal mortality in the postnatal period are prematurity, respiratory distress syndrome, sepsis and congenital abnormalities [44-47]. The perinatal mortality rate of 58.5/1000 live births or 5.6% in this study is within the high Nigerian rate of 39 to 130 per 1000 live births. This result is about 19 times higher than the target of 0.3% in Zimbabwe. The neonatal mortality rate of 7.5/1000 live births or 0.8% is also higher than 3.4% in Zimbabwe. The commonest cause of the neonatal deaths in this study was severe birth asphyxia.

### The perineum

Episiotomy is an intentional surgical incision made on the perineum with the aim of enlarging the introitus during childbirth. The rates in the world range from as low as 9.7% in Sweden to 100% in Taiwan. In Nigeria, the rates range from 20.1% in Calabar [48,49], 35.6% in Zaria to 40.4% in Enugu for all vaginal deliveries. The episiotomy rate of 13.8% in this study is higher than the WHO recommended rate of 10.0% [50-52]. But lower than most studies in Nigeria. Episiotomy is significant cause of postpartum pain and should be performed when indicated and not as routines. The reported 0.2% third degree perineal tear compared favorably to 0.3% target in Zimbabwean study.

### Limitations of the study

This was a retrospective clinical audit and there were lots of missing information and even registers. The register for newborn intensive care unit admission for 2010 and 2011 were missing. Calculations of neonatal and perinatal mortality rates were based the available 2012-2014 data. There were no existing departmental quality indicator benchmarks for monitoring performances and the comparisons of the results were mostly on the Zimbabwean study and national demographic survey for 2013.

### Recommendations

This study has started a stock-taking or quality improvement study in the department and it should be done on monthly basis to track trends of adverse events that demand immediate improvement to prevent further harms. The results of this audit can serve as baseline benchmarks for comparing such future monthly intrapartum care quality audits as ESUT maternity dashboards. It requires trainings, computerization and updating quality indicator parameters in the relevant registers. The monthly departmental mortality audit should be changed to monthly adverse events audit to include mortalities and morbidities that occurred within the month. It should be inter-departmental audit with relevant departments like neonatal, anesthesia, nurses, blood bank, and

theatre and hospital management. Such a meeting will create enabling environment for immediate implementations of policy changes that will be devoid of inter-departmental resentments.

### Conclusion

This clinical audit has identified areas of high quality care in service utilizations of hospital delivery, booked facility births, term births and low episiotomy rate. The maternal mortality of ratio of 292/100000 live birth is lower than that of most sub-Saharan Africa countries.

Several areas of poor quality were also identified. High rates of preterm delivery, caesarean delivery, severe postpartum hemorrhage >1000 ml, and fresh stillbirth may be indices of poor quality. High intensive care unit mortality, stillbirth, and perinatal death rates are evidence that these areas are of poor quality and need urgent improvements to prevent further deaths.

The results of this study can be used as targets for comparing and monitoring adverse events in the department. The multi-departmental units involved in the care of the mothers and their babies should be part of the monthly departmental adverse events audit for ease implementations of policy changes that will be devoid of inter-departmental sentiments. Trainings and computerization of the medical records are essential for any regular clinical audits.

### Dedication

This study is dedicated to Professor Vincent Nnaemeka Egwuatu for being an ideal mentor in the department and for encouraging me to undertake researches that will project the image of this emerging great health institution.

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