Trends and Factors Associated With Maternal Mortality in Ebonyi State University Teaching Hospital (EBSUTH), Abakaliki

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Abstract
Background: Maternal health indices are poor in Nigeria. Regular audit of maternal deaths is vital to maternal health care planning and delivery in Nigeria and other developing countries.
Objectives: The aim of the study was to audit maternal deaths in EBSUTH and determine the trend and factors associated with such mortality.
Method: A retrospective review and analysis of all maternal deaths between January 2004 and December 2007 at Ebonyi State University Teaching Hospital was carried out.
Result: There were thirty-five deaths out of the 3471 live births during the study period giving a maternal mortality ratio (MMR) of 1,008 per 100,000 live births. This represents a 41.2% decline from the preceding immediate triennia ratio. The commonest cause of maternal death during the period were obstructed labour/ ruptured uterus which accounted for 40% of the deaths as against sepsis which was responsible for 33% of deaths in the preceding triennia. The un-booked parturients and rural dwellers accounted for 74.3% and 82.9% of the deaths respectively.
Conclusion: Preventable maternal deaths remain a feature of obstetric practice in Nigeria. Concerted effort must be focused on the precipitating factors of such deaths if the Millennium Development Goal on maternal health is to be attained.
Key Words: Maternal Death, Morbidity, Pregnancy Complications

Introduction
Death of a woman while pregnant or from causes related to that pregnancy or childbirth is a tragedy in any population [1]. The African population places invaluable premium on childbirth, but unfortunately, pregnancy and delivery remain hazardous in most of tropical Africa and developing countries. A woman's life time risk of dying from pregnancy in Sub-Saharan Africa is estimated to be 1 in 13, in contrast to 1 in 4055 in some of the industrialized countries [2].

The tragedy of maternal mortality remains a sore point in Obstetric practice in developing countries. It shows the greatest discrepancy between developed and developing countries with regards to WHO health indices[1,2]. While 25% of females of reproductive age live in developed countries, they contribute only 1% to maternal mortality, whereas 99% 0f maternal deaths occur in reproductive age women in developing countries who comprise 75% of reproductive age females globally [1]. Despite the launch of the safe motherhood initiatives in 1987 in Kenya, data emanating from countries in Sub-Saharan Africa is embarrassingly high[3,4,5,6,7]. Every year, it is Estimated that over 585,000 women die and that 99% of these deaths occur in the developing countries particularly in the Sub-Saharan Africa [1].

In spite of all efforts to contain maternal mortality like the Safe Motherhood Initiative and the Millennium Development Goals, current evidence shows that maternal mortality is rising in sub-Saharan Africa and other regions of the World [3, 4, 5, 6, 7]. In fact, maternal mortality in developing countries has been described as a multitude of quiet tragedies and a disgrace to the modern world [8,9].

Nigeria, though constituting less than 1% of the world's total population, contributes disproportionately about 10% of maternal deaths to the world maternal mortality figures [10,

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Table 1: Annual Trend of Maternal Mortality at EBSUTH, Abakaliki

Years	Number of deliveries	Maternal deaths	MMR
2004	1156	7	606
2005	930	9	968
2006	773	10	1294
2007	612	9	1471
TOTAL	3471	35	1008

MMR: Maternal mortality ratio per 100,000 live births.

[11]. In real terms, about 60,000 Nigerian women die every year as a result of complications of pregnancy and child birth [12]. WHO/UNICEF has estimated that seven Nigerian women of reproductive age die from pregnancy related causes every hour [13]. Most of the maternal mortality ratios cited in Nigeria are hospital based and range from 460 to 2200 with an average of 1,000 per 100,000 live births [13]. Maternal mortality in Nigeria as in most parts of developing countries has been described as undoubtedly a neglected tragedy [14]. It is said to be an under recognized issue worldwide [15].

Documented reports from Ebonyi State have cited maternal mortality ratio ranging from 772 to over 2,600 per 100,000 live births[7,16,] and a figure 1,884 per 100,000 live births from this institution (EBSUTH)[17] following a four-year review (2000-2003). Regular audit of maternal death in important is evaluating policies and management protocols aimed at checking preventable maternal deaths. This study, therefore aims to audit and analyze the maternal mortality situation in EBSUTH, Abakaliki to determine the current maternal mortality ratio, the major causes and characteristics of maternal death and evaluate the trend in maternal death at the centre after the first quadrennial review (2000-2003).

Materials and Methods

Ebonyi State created in 1996 from the rural areas of the former Enugu and Abia States has 13 local Government areas, one urban, one semi urban and the rest rural. By the 2007 Nigerian National census, it has a population of 4.3 million people and occupies a land mass of 5932 $km^{2.}$ It shares boundaries in the west with Enugu State, Cross-River State in the east, Abia State in the southwest and Benue State in the North. About 75% of the population dwells in the rural area with farming as their major occupation.

Ebonyi State University Teaching Hospital, located in Abakaliki, the capital city of Ebonyi State, is one of the two referral tertiary training centres in the State, the other being the Federal Medical centre, Abakaliki. It undertakes undergraduate and postgraduate training in the different medical specialties including; Obstetrics and Gynaecology. It has 10 specialist Obstetricians/Gynaecologist and more than 20 resident doctors at various levels of the postgraduate training and numerous House officers. The department carries out audit of all cases managed daily during its daily morning review meetings. All maternal deaths are analysed within 24 hours, summarised and archived in the departmental office.

The free maternal health policy of the State government introduced in 2001 is obtainable at the centre. To enjoy full benefits from antenatal care, delivery and postnatal care services, the parturient must be booked for prenatal care at

Table 2: Socio Biological Variables of Women Who Suffered Maternal Death

	Number of Maternal Deaths	Percentages (%)
Age(Years)		
d19	-	-
20-25	10	28.6
26-30	14	40
31-35	8	22.9
36-40	3	8.6
Parity		
Primigravida	8	22.9
Para 1	8	22.9
,, 2-4	9	25.7
,, e 5	10	28.6
Residence		
Urban	6	17.1
Rural	29	82.9
Occupation		
Farmers	15	42.9
Traders	6	17.1
Civil servant	5	14.2
House wife	4	11.4
Hair dresser	2	5.7
Student	3	8.6

the centre. Unbooked women are not fully covered by the scheme. They (unbooked mothers) are meant to pay for some services. Druga not available at the hospital and cost of other items like blood for transfusion are respectively bought and borne by the patients.

This was a retrospective study of all the maternal deaths that occurred at Ebonyi State University Teaching Hospital over a four year period starting from January 1, 2004 to December 31, 2007. The registers of all the departments of the hospital that attend to mothers viz: Accident and Emergency department, the labour ward, theatre, antenatal, postnatal, and gynaecological ward and the intensive care unit were meticulously searched for all the patients that were attended to during the period under review. The particulars of all those that died were extracted. Their case files were got from the Hospitals record department and all the relevant information were extracted. The information extracted from these records included number of maternal deaths, booking status, age, parity, social class, time of death and causes of death. The results were analyzed using percentages and presented in simple frequency tables.

The research and ethics committee of the Teaching Hospital granted ethical approval for this review.

Results

During the period of study between January 1st 2004 and December 31st 2007, there were a total of 3,471 deliveries and 35 maternal deaths. This gives a maternal mortality ratio of 1,008 per 100,000 live births. When the maternal mortality ratio was analysed yearly, there was a steady rise from 606 per 100,000 deliveries in 2004 to 1,471 per 100,000 deliveries in 2007.

Table 1 shows the annual maternal mortality ratio (MMR). The maternal mortality ratio had been on the increase from 606 in 2004 to the highest level of 1471 per 100,000 live births in 2007. Table 2 analyses the socio demographic

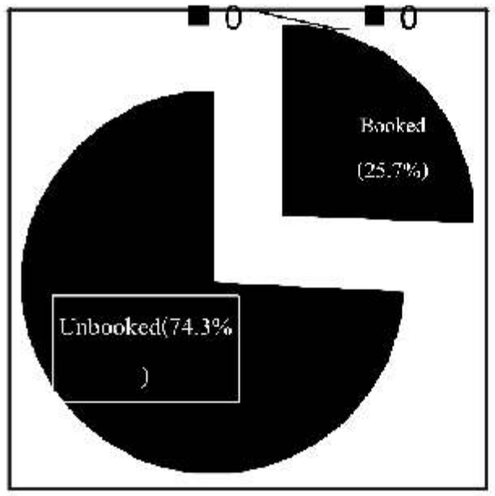

Figure 1: Maternal Mortality According to Booking Status in EBSUTH

characteristics of mothers who died at the hospital. The highest contribution to maternal deaths came from age bracket 26-30 years with maternal death of 14(40%). The age bracket 36-40 years had the least maternal death of three (8.6%). Grandmultiparous women had the highest maternal mortality of 10(28.6%) compared to women from other parities. It was also noted that farmers had the highest maternal mortality of 15(42%) in the period under review compared to women that died from other occupational groups. From the survey, civil servants, students and hair dressers are less likely to die from child birth. In that same vein, rural dwellers contributed significantly to maternal death 29(82.9%) compared to Urban dwellers six (17.1%) in the period under review. Figure 1 shows the effect of booking status on maternal mortality. Unbooked women accounted for 74.3% to maternal mortality compared to 25.7% by booked women. The unbooked patients were 2.9 times more likely to die than the booked with maternal mortality ratio of 259 per 100,000 deliveries in the booked patients and 749 per 100,000 deliveries in the unbooked patients.

Table 3 shows that the leading cause of maternal mortality in the centre was ruptured uterus from Obstructed labour 14(40%), the second was obstetric haemorrhage which occurred in four (11.4%) women that died. Abortion accounted for 8.6% of maternal deaths followed by severe pre-eclampsia/eclampsia 5.7% of the deaths. Anaemia, HIV/AIDS and anaesthetic deaths caused 5.7% of maternal deaths each, while lassa fever, cerebrospinal meningitis and chronic liver disease contributed 2.8% each. Table 4 shows duration of stay of women in the hospital before death. Majority of the mothers that died 22(62.9%) spent 24 hours or less in the hospital.

Discussion

Maternal mortality is an increasing but preventable tragedy in Nigeria. It continues to plague obstetric practice especially in developing countries. Maternal mortalities are usually reviewed periodically in Obstetric departments to improve on interventions and management to prevent further deaths. Maternal mortality ratio varies from place to place and from hospital to hospital and even within the same hospital it can vary at different times. The maternal mortality ratio within this four-year period was 1008 per 100,000 live births. This was down from the 1,884 per 100,000 live births reported by Umeora and co workers[17] from the same centre in 2005. It is possible that the first published maternal mortality figures triggered positive policies aimed at correcting identified institutional, departmental and management deficiencies.

Table 3: Leading Causes of Maternal Deaths at EBSUTH, Abakaliki, from 2004-2007.

Causes of Death	Number of Maternal Deaths	Percentage of Deaths (%)
Obstructed labour/ Ruptured Uterus	14	40
Haemorrhage	4	11.4
Abortion	3	8.6
Sepsis	3	8.6
Pre-eclampsia/ Eclampsia	2	5.7
Anaemia	2	5.7
HIV/AIDS	2	5.7
Anaesthesia	2	5.7
Lassa Fever	1	2.8
Cerebrospinal Meningitis	1	2.8
Chronic liver Disease	1	2.8
TOTAL	35	100

This was coupled with strengthening of the residency training programme and daily review of patients' management in the unit a form of daily audit (Morning Reviews).

The maternal mortality ratio of 1008 per 100,000 live births in this study is higher than ratios obtained from some other developing countries- India 798; Tanzania 308; Uganda 344; Zimbabwe 122; Egypt 190; Ethiopia 566 [9, 18,19,] and other centres in Nigeria: 567 in Ilorin[20], Ilorin 825[21], Enugu 772[22] and 344 in Benin City[23]. The ratio was however lower than what was obtained in some centres within Nigeria: University of Nigeria Teaching Hospital Enugu 1,406 [4]; University of Portharcourt Teaching Hospital 2,736[6]; Sokoto 2,15[24], but slightly higher than the national average of 1000 per 100,000 live birth[25]. These differences might be due to the different socio demographics of the parturients as well as the availability, access and uptake of emergency Obstetric services by the different populations studied. Other reasons adjudged to be responsible for this unacceptably high maternal mortality ratio were that the study population was mainly rural with prevalent, poverty, ignorance, illiteracy, poor blood transfusion services and substandard care received in maternity homes and traditional birth attendants[26]. Free maternal care instituted by Ebonyi State Government paradoxically attracted the worst and often near hopeless cases.

Majority of mothers that died in our centre were young, 24(68.6%) between ages 20-30 years. Maternal mortality strikes at prime and most productive part of life. This contrasted with the findings of Aboyeji and colleagues who reported that maternal deaths was common in women 40 years and above in their series[21]. Most women in this population with scant education probably are given out in marriage and commence their reproductive career early. These findings agree with earlier reports from Ray and Goswamii that maternal mortality is a tragedy of the prime[15,27]. Majority of maternal deaths was in grandmultiparas 10(28.6%). Primigravidas were also significantly affected, This conforms with knowledge of these groups as high risk group[10, 15,28,29].

Table 4 : Duration of Stay in Hospital Before Maternal Death

Duration in the hospital	Number of Maternal Deaths	Percentage
d 6 hours	3	10
7-12 hours	7	23.3
13-18 hours	5	16-7
19-24 hours	7	23.3
25-48 hours	2	6.7
49 hours -7days	2	6.7
> 7days	4	13.3
TOTAL	**35**	**100**

Majority of these maternal deaths occurred among women who were unbooked 26(74.3%) because they did not benefit from any positive influence of quality prenatal care that would have been offered to them. The unbooked patient is 30 times more likely to die compared to the booked patients[20]. This is apparently because they come in moribund states after exhausting unorthodox methods for the relief of serious complications of labour[30]. Providing emergency Obstetric services for the unbooked patient in Abakaliki is challenging and most frustrating as majority of women present in hospital with life threatening complications and are unable to afford basic materials needed for emergency obstetric services which are not covered in the free maternal health policy like blood for transfusion. Maternal mortality in the unbooked cases in this study was three times higher than the booked cases. This portends these groups of women as high risk[10,17,24,31].

Most maternal deaths occurred in farmers (42.9%) who are poor and illiterate. Reaching this group of parturients should be the challenge for healthcare providers and the Government in developing countries. Majority of our patients that suffered maternal mortality 29(82.9%) were rural dwellers hence the programme of reducing maternal mortality should involve strategies for prompt intervention at the community level where a significant proportion of our clients reside. Effective training of midwives and quality of maternity services offered in our area of practice should be revisited with emphasis on early identification of high risk cases and effective referral network to secondary and tertiary centres[23]. Also community based Ambulances, heath posts and comprehensive health centres linked to well equipped tertiary centres for easy referrals should be established by local Governments and state Governments to reduce maternal mortality.

Obstructed labour/Ruptured uterus (40%) was the leading cause of maternal death in this study; this differs from what has been reported globally implicating haemorrhage as the leading cause of maternal deaths[9,17,32], as well as earlier report from the centre which implicated sepsis as the commonest cause of maternal deaths responsible for 33% of cases[17]. However, it is in tandem with maternal mortality documentation from a rural Mission hospital in the same Ebonyi State[7]. Sepsis had lost its leading position as the major cause of maternal deaths in our centre due to availability of potent antibiotics courtesy of free maternal care [17]. Obstructed labour/ ruptured uterus is common in our environment apparently due to injudicious use of Oxytocin by traditional birth attendants and maternity homes and rampant application of fundal pressures to force parturients to deliver[26]. The second cause of maternal death in this study was haemorrhage (11.4%). The effect of haemorrhage is worsened by the lack of efficient blood banking facilities and the cultural aversion to voluntary blood donation and transfusion prevalent in this population[17,33].

The leading cause of maternal death in our centre differs from the works of Aboyeji and colleagues who reported severe pre-eclampsia/eclampsia, haemorrhage and complications of abortion as the leading cause of maternal death in Ilorin[21]. Onah and colleagues in

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their work on maternal mortality in Enugu reported the leading cause of maternal death to be haemorrhage, sepsis and prolonged labour/ruptured uterus[22]. Ekele and Audu asserted that the leading cause of maternal death in Sokoto was ruptured uterus, eclampsia and haemorrhage[24]. Abortion (8.6%) was the third commonest cause of maternal death in this study. It was not a significant contributor to maternal death as in other studies[20, 34]. This could be attributed to lack of confidentiality, attitude of health workers who are often judgmental making abortion seekers resort to other facilities rather than the formal tertiary institutions[18].

This was a hospital based study and therefore may not truly reflect the maternal mortality situation in the whole State especially the hinterlands with scant medical facilities and personnel. It is possible that some maternal deaths go unrecorded and unannounced in the most rural settings. A community based study employing the sisterhood method of inquiry may be more apt in unearthing the true maternal mortality trend in Ebonyi State. Another limitation is that, being a tertiary centre, only complicated cases were referred to it and hence the picture presented above. Analysing maternal death figures from all institutions in the State may show a different trend and obstructed labour/ruptured uterus may lose its prime role as a cause of maternal death. A study involving all the formal medical units is recommended.

Over a four-year period MMR at the Ebonyi State University Teaching Hospital, Abakaliki has declined from 1,884 to 1,008 per 100,000 livebirths. This is attributable to the free maternal health policy of the State government as well as the internal regular self-auditing of the Obstetrics and Gyneacology unit of the institution. Though commendable, the 1,008 per 100,000 is still high and effort must be intensified and focused mainly on the rural dwellers, and the unbooked parturients who contribute disproportionately to these high figures. Expectant mothers must be encouraged to access prenatal care in their pregnancies while resident doctors must be trained and regularly re trained in emergency obstetric care including laparotomy for ruptured uterus. Concerted effort must also be made to improve on the blood banking services. Eradication of poverty and illiteracy and improvement of infrastructure especially in rural areas are advocated. Ultimate long term solution remains education of the girl-child, women of reproductive health and the larger population[10].

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